Corporate Financial Policies With Overconfident Managers*

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Abstract

Many aspects of corporate financial policies in large US firms are puzzling from the perspective of traditional corporate-finance theory, including debt conservatism and pecking-order financing choices. We link these puzzles to managerial overconfidence. Managers who believe that their company is undervalued view external financing, especially equity financing, as overpriced. As a result, they display pecking-order behavior in their choice of financing and, if the aversion to external financing is strong enough, debt conservatism. We test these hypotheses empirically, comparing CEOs persistently who overexpose their personal portfolios to company-specific risk to CEOs who diversify. We find that, conditional on accessing public markets, CEOs who overinvest in their companies are significantly less likely to issue equity. They raise 32 cents more debt to cover an additional dollar of financing deficit than their peers. Moreover, the frequency with which they access any external finance (debt or equity) is significantly lower. The results replicate for CEOs whom the business press characterizes as confident and optimistic. We conclude that managerial overconfidence helps to explain variation in corporate financial policies among firms with similar operating risk.

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I Introduction

The determinants of firms' financing decisions and the resulting capital structure are an area of debate within the corporate finance literature. Existing theories, like the tradeoff (Miller (1977)) and pecking order (Myers (1984) and Myers and Majluf (1984)), relate the choice of financing instruments to market-, industry-, and firm-level determinants such as tax rates, bankruptcy costs, and firm-level asymmetric information. We propose extending the analysis to include managerial characteristics. Explicitly modeling variation across managers may explain empirical patterns that are difficult to reconcile with existing theories. For example, why do firms' financing policies slant more towards debt at one time, but favor equity at another, even when underlying firm fundamentals are not changing?

We consider managers with a preference for internal over external financing and for debt over equity. Such preferences induce managers to follow the pecking-order of financing (Myers (1984)) and may also lead to debt conservatism (Graham (2000)). Many studies debate the causes and importance of these empirical patterns.[1] We argue that managerial overconfidence provides an alternative foundation. Overconfident CEOs overestimate their ability to generate value and, thus, the future cash flows of their companies. As a result, they perceive their companies' risky securities to be undervalued by the market and are reluctant to seek external financing. In the extreme, this reluctance can lead to debt conservatism. When they do raise outside finance, they prefer debt over equity. Since equity prices are more sensitive to the market's expectation of future cash flows, overconfident CEOs perceive a larger cost to issuing equity than debt.

We identify revealed managerial beliefs using measures from Malmendier and Tate (2004) and (2005). Our main measure ("Longholder") targets CEOs whose personal portfolios are persistently over-exposed to company-specific risk. A subset of CEOs in our data hold (non-tradeable) executive stock options all the way to expiration despite the underdiversification caused by equity-based compensation and human capital investment in the firm. These CEOs consistently bet their personal wealth on the future appreciation of company stock. Yet, they do not earn abnormal returns over a simple strategy of

[1] For a detailed overview and discussion of the abundant literature see Frank and Goyal (forthcoming).

exercising and investing the proceeds in the S&P 500.[2] We consider several interpretations of this behavior – including signaling and (high) risk tolerance – and conclude that overconfidence best describes the evidence. We also verify the robustness of the results to alternative identification strategies: "Pre-" and "Post-Longholder" divide the Longholder fixed effect into years before and after the CEO holds an option to expiration and "Holder 67" identifies CEOs who do not exercise options which are highly in the money (67%) five years prior to expiration.[3] Finally, we identify CEOs beliefs based on outside perception, using CEOs the business press characterizes as "confident" or "optimistic."

We then test whether CEOs who reveal overly positive expectations about their company's future stock price also make significantly different financing decisions. Using SDC data on security issuance, we find that they are significantly less likely to issue equity, conditional on accessing public markets. We extend this result to include private financing sources using accounting data from Compustat and the methodology of Shyam-Sunder and Myers (1999) and Frank and Goyal (2003). We find that these CEOs use roughly 30 cents more debt than their peers to cover an additional dollar of external financing deficit (i.e. external financing required to meet current cash commitments). Finally, we use the "kink" variable from Graham (2000) to test whether reluctance to access external capital markets is sufficiently strong to induce heightened (unconditional) debt conservatism among overconfident CEOs. The kink measures the amount by which firms could increase debt outstanding before the marginal benefit of interest deductions begins to decline. We find that CEOs who reveal overly optimistic beliefs are significantly more likely to underutilize debt relative to the tax benefits, i.e. have higher kinks. Our results indicate that managerial overestimation of future cash flows is a significant determinant of corporate finance decisions. Moreover, overconfidence has a persistent long-term effect on firms' capital structures.

Our analysis rests on two important simplifications. First, we restrict the theoretical analysis to one period and one given investment project. In a dynamic model, the arrival of positive- and negative-NPV projects might induce larger differences between the in-

[2] To prevent underwater options from contaminating the results, we require that the options have reached a theoretically calibrated benchmark for exercise (40% in the money) as they enter their final year.

[3] The 67% threshold comes from the rational option exercise model of Hall and Liebman (2002) with constant relative reisk aversion of 3 and 67% of wealth in company stock.

vestment levels of rational and overconfident CEOs. A dynamic setting would also allow for alternative interpretations of the debt evidence; for example, that overconfident CEOs maintain excess debt capacity to finance (high) expected future investment levels without having to access equity markets.

Second, we restrict the empirical analysis to CEOs even though CFOs also exert significant influence on security issuance and capital-structure decisions. Unfortunately, data limitations prevent an extension of the analysis to CFOs: the portfolio data necessary to compute our overconfidence measures is available only for CEOs.[4] CEOs, however, typically make the ultimate financing decisions and set the general financing policy for the firm. For example, the CEO alone can withdraw his or her firm's stock offering at the last moment (Hechinger (1998)) or overrule the firm's CFO and treasurer (Whitford (1999)). Moreover, it is not unusual that a financing plan proposed by the CFO is disapproved by the CEO, especially when sales of assets are involved (Millman (2001)). The recent jury verdicts against CEOs whose companies were involved in financial scandals suggests that juries assume the same point of view.

Our results relate to several existing literatures. The empirical capital structure literature, particularly testing pecking order and tradeoff predictions, is extensive. Shyam-Sunder and Myers (1999), for example, argue that the tendency of firms to fill financing deficits with new debt rather than equity issues supports the pecking-order theory over a static trade-off model. Frank and Goyal (2003) use the same empirical methodology on an extended sample of firms to argue in favor of the trade-off model. Fama and French (2002) find evidence that contradicts both theories. These results leave room to explore other determinants of financing decisions. Our analysis of manager-specific effects neither contradicts nor confirms traditional theories. Rather, it points to the impact of individual managerial characteristics on capital structure, beyond market-, industry- and firm-level determinants, and allows for different financing patterns across similar firms or even within the same firm when the leadership changes.

Our results also build upon a prominent stylized fact from the social psychology liter-

[4] Using ExecuComp, one could attempt to use the data on the option remuneration of the top five executives of S&P 1500 companies to construct similar measures. However, the data is far less detailed, is often missing for CFOs, and is available for a shorter time frame.

ature, the "better than average" effect. When individuals assess their relative skill, they tend to overstate their acumen relative to the average.[5] Executives appear to be particularly prone to display overconfidence, both in terms of the better-than-average effect and in terms of "narrow confidence intervals".[6] One reason may be sorting of high-confidence individuals into top corporate positions. Another reason may be that executives face exactly the kind of environment that tends to trigger overconfidence: they have the greatest amount of power in their firm (potentially inducing the "illusion of control"); they are highly committed to good outcomes; and the reference points for success are rather abstract, making it hard to compare performance across individuals.[7] Indeed, March and Shapira (1987) and Langer (1975) find that CEOs believe they can control firm outcomes and tend to underestimate the likelihood of failure.

There is also a growing literature linking managerial beliefs to financing choices. Heaton (2002) models the financing choices of optimistic CEOs. Hackbarth (2004) and (2005) incorporates optimism and overconfidence in a model of corporate borrowing and shows that these biases may help to overcome conflicts between managers and shareholders, related to debt overhang, such as underinvestment and diversion of funds. Empirically, Graham and Harvey's (2001) CFO Outlook Survey, suggests a role for (biased) managerial beliefs. In the second quarter of 1999, prior to the end of the technology bubble, roughly 70% of the survey respondents state that their company stock is undervalued by the market, and 67% say that under- or overvaluation is an important factor in the decision to issue stock. Ben-David, Graham, and Harvey (2007) relate mis-calibration of CFOs, revealed in such surveys, to a wide range of corporate decisions, including corporate financing. Finally, Malmendier and Tate (2005) argue that the investment decisions of overconfident managers are more sensitive to cash-flow, particularly among firms with low debt capacity. However, the preference for internal over external financing and for debt over equity financing – which drives the impact of overconfidence on investment – is not

[5] See Larwood and Whittaker (1977); Svenson (1981); Alicke (1985). The effect extends to economic decision-making in experiments (Camerer and Lovallo (1999)). It also affects the attribution of causality: Because individuals expect their behavior to produce success, they are more likely to attribute good outcomes to their actions, but bad outcomes to (bad) luck (Miller and Ross (1975)).

[6] Larwood and Whittaker (1977); Kidd (1970); Moore (1977).

[7] Weinstein (1980); Alicke et al. (1995).

directly tested. This shortcoming leaves the results open to alternative interpretations, as well as to concerns about the endogeneity of investment regressions. This paper attempts to remedy the gap and links managerial overconfidence directly to financing choices.

The remainder of the paper is organized as follows. In Section II we develop the financing predictions of the overconfidence theory. Section III describes the data and the construction of the key dependent variables. Section IV describes our overconfidence measures. Section V tests the effects of overconfidence on financing policy. Section VI concludes.

II A Model of Overconfidence and Financing Decisions

We provide a simple framework that relates managerial beliefs to financing decisions and, in particular, to two unresolved issues in the capital structure literature: Do (some) managers use a pecking order of financing? And, are managers reluctant to access the external capital market, resulting in too low debt levels?

We consider the decision of a manager to implement an investment project with cost I and a stochastic return $\widetilde{R}$, given by R_G with probability $p \in (0;1)$ and R_B with probability $1-p$, where $R_G > R_B$. The market is fully informed about the distribution of future returns, and the risk-free interest rate is normalized to zero. The firm initially has cash C and non-cash assets A. To finance the investment project, the firm can use cash $c \in [0, C]$, issue debt with face value w, and offer new shares s. All parties are risk-neutral. Let s' be the number of existing shares and d the market value of debt. We note that the firm can obtain financing for the investment project if

$$I \leq A + C + E[\tilde{R}]. \tag{1}$$

We abstract from incentive misalignment between managers and shareholders and assume that the CEO maximizes the perceived value of the company to the old shareholders.

We allow for the CEO to overestimate the returns the project will generate under his management, $\hat{E}[\tilde{R}] \geqslant E[\tilde{R}]$. We focus on the specific case that the CEO perceives the return in the good state as $R_G + \Delta$ rather than R_G, with $\Delta \geq 0$, where $\Delta = 0$ captures the benchmark case of a rational CEO. We will return to a more general model of overconfidence and its implications at the end of the section.

We derive the CEO's choice of financing conditional on implementing the project. We ask later which projects the CEO chooses to implement. The CEO's maximization problem conditional on implementing the project is:

$$\max_{c,w,s} \quad \frac{s'}{s+s'}\hat{E}[(A+C+\tilde{R}-c-w)^+] \tag{2}$$

$$\text{s.t.} \quad \frac{s}{s+s'}E[(A+C+\tilde{R}-c-w)^+] = I-c-d \tag{3}$$

$$E[\min\{w, A+C+\tilde{R}-c\}] = d \tag{4}$$

$$0 \le c \le C,\ d \ge 0,\ c+d \le I \tag{5}$$

The right-hand side of (3), $I-c-d$, is the financing gap remaining after the use of cash and debt and equals the market price of the new shares if the investment project is implemented. The maximization problem can be reformulated as maximization of the CEO's perceived future value of the firm minus (i) the difference between the CEO's perceived value of debt and the market value of debt minus (ii) the difference between the CEO's perceived value of newly issued shares and the market value of newly issued shares.

Lemma 1. The optimization problem (2) - (5) is equivalent to

$$\max_{c,w,s} \quad \hat{E}[A+C+\tilde{R}-I] \tag{6}$$

$$-\left(\hat{E}[\min\{w, A+C-c+\tilde{R}\}] - E[\min\{w, A+C-c+\tilde{R}\}]\right) \tag{7}$$

$$-\frac{s}{s+s'}\left(\hat{E}[(A+C+\tilde{R}-c-w)^+] - E[(A+C+\tilde{R}-c-w)^+]\right) \tag{8}$$

$$\text{s.t.} \quad \frac{s}{s+s'} = \frac{I-E[\min\{c+w, A+C+\tilde{R}\}]}{E[(A+C+\tilde{R}-c-w)^+]} \tag{9}$$

$$0 \le c \le C,\ d \ge 0,\ c+d \le I$$

Proof of Lemma 1. Denoting $\tilde{y} \equiv A+C+\tilde{R}-c-w$, we rewrite the maximand in (2) as

$$\begin{aligned} & \hat{E}[(\tilde{y})^+] - \frac{s}{s+s'}\hat{E}[(\tilde{y})^+] \\ = \ & \hat{E}[\tilde{y}] - \hat{E}[\min\{0,\tilde{y}\}] - \frac{s}{s+s'}\hat{E}[(\tilde{y})^+] \\ = \ & \hat{E}[A+C+\tilde{R}-I] \\ & -\hat{E}[\min\{c+w, A+C+\tilde{R}\}] - \frac{s}{s+s'}\hat{E}[(\tilde{y})^+] + I. \end{aligned} \tag{10}$$

Adding up (3) and (4) and solving for I gives

$$I = \frac{s}{s+s'}E[(A+C+\tilde{R}-c-w)^+] + E[\min\{c+w, A+C+\tilde{R}\}],$$

We can thus rewrite (10) as (6) to (8) and solve for $\frac{s}{s+s'}$, to obtain (9). **Q.E.D.**

In the new formulation of the optimization problem, (6) is the CEO's perceived value of the firm to old shareholders after implementing the investment project, (7) subtracts the price differential between the CEO's perceived value of debt and the market value of

debt, and (8) subtracts the differential between the CEO's perceived value of newly issued shares and the market value of newly issued shares. Thus, conditional on implementing the investment project, the CEO's maximization problem is equivalent to minimizing the perceived deadweight cost of external financing.

We can now show that, for a rational CEO, capital structure irrelevance holds, while an overconfident CEO prefers debt financing:

Proposition 1. *Conditional on choosing to implement the investment project, a rational CEO* ($\Delta = 0$) *is indifferent between all available forms of financing. An overconfident CEO* ($\Delta > 0$) *prefers cash or debt financing.*

Proof of Proposition 1. **(Rational Case.)** For $\Delta = 0$, we have (7) = (8) = 0. Therefore a rational CEO is indifferent between all feasible combination of cash, debt and equity financing (c, w, s). This is a special case of Modigliani-Miller.

(Overconfidence Case.) For $\Delta > 0$, the CEO perceives debt not to be undervalued but equity to be undervalued by the new shareholder's portion $(\frac{s}{s+s'})$ of Δ:

$$\begin{aligned} (7) &= 0 \\ (8) &= -p\Delta\frac{s}{s+s'} \end{aligned}$$

Substituting (9) into (8), we can distinguish two cases.

Case 1: $A + C - c + R_B \geqslant w$ (riskless debt). In this case, $-p\Delta\frac{s}{s+s'} = -p\Delta\frac{I-c-w}{A+C-c+E[\tilde{R}]-w}$, and the resulting objective function is increasing in $(c + w)$, given the financing condition (1), and thus maximized at the highest value $(c + w)^*$ satisfying (5) within Case 1:

$$w^* = \min\{A + C - c^* + R_B, I\}.$$

Case 2: $A + C - c + R_B < w$ (risky debt). Now, $-p\Delta\frac{s}{s+s'} = -p\Delta\frac{I-(1-p)(A+C+R_B)-p(c+w)}{p(A+C+R_G)-p(c+w)}$. Given the financing condition (1), the objective function is again increasing in $(c + w)$, thus is maximized at

$$w^* = p^{-1}[(I - c^*) - (1 - p)(A + C - c^* + R_B)]$$

and no equity is used.

Thus, the objective function is decreasing in $(c + w)$ over both ranges (riskless debt and risky debt), and the overconfident CEO only uses cash and debt. **Q.E.D.**

In summary, the optimal capital structure for $\Delta > 0$ is given by $(c+w)^* = I$. Since the rational CEO is indifferent in the amount of debt issued, we conclude that the overconfident CEO issues at least as much debt as the his rational colleague.

Note that the choice of capital structure for $\Delta > 0$ is more complex if the CEO also overestimates the return in the bad state, for example if $\hat{R}_B = R_B + \Delta$. In this case, equity becomes attractive if the firm is close to bankruptcy and the market and the CEO disagree on the riskiness of debt, i.e. about the probability of bankruptcy. If the market perceives debt to by risky and the CEO perceives debt to be riskless, debt financing requires the CEO to give up the full difference between perceived and actual debt repayment in the bad state, $\min\{\Delta; w - (A + C - c + R_B)\}$, while equity financing preserves at least a portion of the (perceived) value for shareholders. The cost of debt financing becomes $(7) = -(1-p)x$ and the cost of equity financing becomes $(8) = -\frac{s}{s+s'}(\Delta - (1-p)x)$. In this new sub-case of risky debt that the CEO perceives to be riskless, he chooses debt financing if and only if $\Delta > (1-p)(R_G - R_B)$. Else he chooses equity akin to the phenomenon of "gambling for resurrection." Since our empirical analysis focuses on the largest U.S. firms, the latter distinction is unlikely to be relevant empirically.

We return to the case $\hat{R}_B = R_B + \Delta$ and ask, under which conditions the CEO will choose to implement the investment project in the first place. Given the capital structure irrelevance for rational CEOs and the preference for debt financing for overconfident CEOs, the optimization problem (2) - (5) simplifies to maximizing $E[A + C + \tilde{R} - I] + p\Delta$. Thus, the rational CEO will choose to implement any investment project with positive net present value, while an overconfident CEO chooses to implement any project for which $E[\tilde{R}] + p\Delta > I$. Thus an overconfident CEO will also implement some negative-NPV projects.

Overconfidence can be embedded into both a trade-off model and a pecking order model, which pin down the choice of capital structure for the rational CEO. In the trade-off model, the optimal level of debt issuance is determined by balancing the cost and benefit of debt, tax deductibility of interest payments and cost of bankruptcy. An overconfident CEO overestimates the future cash flows. He perceives it more likely that after making all necessary interest payments, his company is still profitable and all the tax benefits can be realized. Therefore he tends to overestimate the tax benefits of issuing debt. The overestimation of future cash flows also leads to underestimation of the probability

of bankruptcy. Therefore from the perspective of an overconfident CEO, the marginal benefit of debt is higher while the marginal cost is lower. Thus, in the framework of the trade-off theory, the overconfident CEO tends to issue more debt than his rational peers.

Under the pecking order theory, asymmetric information induces managers to cover financing deficits first with internal cash, then safe debt, then risky debt, and finally as a last resort, equity. An overconfident manager considers it more likely that his company will earn more cash in the future, and will have more capacity for safe debt as he maintains the (perceived) profitability of the company. He also perceives equity financing as too expensive. As a result, an overconfident CEO is less concerned about the cost of not having enough cash, or the inability to issue more safe debt in the future, and more concerned about the high cost of issuing equity, due to both asymmetric information and differences in beliefs. Consequently, an overconfident manager tends to use more cash and issue more debt to cover any given financing deficit.[8]

It is still an ongoing debate which theory better describes corporate financing decisions; our analysis does not contribute directly to this issue. Either of the two theories can be used to pin down the rational CEO's choice of capital structure and to generate the following hypotheses:

Hypothesis 1. Given the level of external financing deficit, overconfident CEOs tend to issue more debt than CEOs who are not overconfident.

Similar arguments apply to the decision between internal and external financing. In an extended model, that allows for disagreement about the probability of bankruptcy, an overconfident manager prefers internal finance to accessing capital markets, including accessing the debt market. Given the underestimation of bankruptcy, the CEO perceives debt financing as too costly. To cover financing needs, overconfident managers tend to use more cash than their rational peers; thus, they must issue less debt and equity. Despite preferring debt to equity conditional on accessing external finance, they might still raise less debt than their rational peers overall.

Hypothesis 2. Overconfident CEOs issue debt more conservatively than the CEOs

[8] Note this argument assumes that the strict form of the pecking order is not empirically valid. That is, asymmetric information alone does not already induce CEOs to cover all financing needs with debt.

who are not overconfident, that is, they tend to have higher kinks than their rational peers.

We test these hypotheses in Section V. The empirical analysis consists of two steps. The first step is the construction of empirical overconfidence measures. The second step is the analysis of the relationship between overconfidence and the use of debt in external financing (Hypothesis 1) and debt conservatism (Hypothesis 2).

III Data

We identify CEOs who hold company stock options beyond rational benchmarks for exercise using the 1980 to 1994 sample of 477 publicly-traded U.S. firms from Hall and Liebman (1998) and Yermack (1995). This data provides us the stock ownership and set of option packages – including exercise price, remaining duration, and number of underlying shares – for the CEO of each company year by year. The drawback of this sample, particularly in the context of financing regressions, is its focus on large companies. To be included in our sample, a firm must appear at least four times on one of the lists of largest US companies compiled by Forbes magazine in the period from 1984 to 1994. Frank and Goyal (2003) find systematic differences between the financing choices of small and large companies. Because our tests focus on the interaction of overconfidence with financing decisions and not on the average financing decision itself, our conclusions should be largely unaffected by the exclusion of small firms.

We also measure confidence using outsiders' perception of the CEO as captured by portrayal in the business press. We use hand-collected annual data on the press coverage of our sample CEOs in *The Wall Street Journal, The New York Times, Business Week, Financial Times,* and *The Economist.* We count the total number of articles each year referring to the CEO and the subsets of articles using the words "confident" or "confidence;" "optimistic" or "optimism;" and "reliable," "cautious," "practical," "frugal," "conservative," or "steady." We hand-check each article to ensure that the adjectives are used to describe the CEO and to identify articles that use the terms in negated form. We also collect detailed information on the context of each reference. For example, we record

whether the article is about the CEO, the firm, or the market or industry as a whole and, if the article is about the firm, the specific policies it references (earnings, products, mergers, culture, etc.).

To connect these measures of CEO beliefs to financing choices, we merge the data with information on public security issues from Thomson's SDC Platinum database. We include all U.S. new issues of common stock, convertible debt, convertible preferred stock, non-convertible debt, and non-convertible preferred stock. We also include U.S. Rule 144A issues of these securities. To capture the impact of loans and other forms of private debt on financing choices, we use COMPUSTAT cash flow statement data to construct alternative measures of debt and equity issuance. We measure net debt issuance as the difference between long-term debt issuance (item 111) and long-term debt reduction (item 114). We measure net equity issuance as the difference between sales of common stock (item 108) and stock repurchases (item 115). Long-term debt reduction and stock repurchases are set to zero if they are missing or combined with other data items. We exclude financial firms (SIC codes 6000 - 6999) and regulated utilities (SIC codes 4900 to 4999) from our analysis.

We also construct the net financing deficit to capture the amount of financing the CEO has to raise through either debt or equity issues in a given firm year:

$$\mathrm{FD}_t = \mathrm{DIV}_t + I_t + \Delta W_t - C_t,$$

DIV is cash dividends. I is net investment (capital expenditures + increase in investments + acquisitions + other uses of funds - sale of PPE - sale of investment).[9] ΔW is change in working capital (change in operating working capital + change in cash and cash equivalents + change in current debt).[10] C is cash flow after interest and taxes (income before extraordinary items + depreciation and amortization + extraordinary items and

[9] In terms of COMPUSTAT item numbers, net investment is item 128 + item 113 + item 129 + item 219 - item 107 - item 109 for firms reporting format codes 1 to 3 and item 128 + item 113 + item 129 - item 107 - item 109 - item 309 - item 310 for firms reporting format code 7. When these items are missing or combined with other items, we code them as 0.

[10] For format code 1, this is item 236 + item 274 + item 301. For codes 2 and 3, this is - item 236 + item 274 - item 301. For code 7, this is - item 302 - item 303 - item 304 - item 305 - item 307 + item 274 - item 312 - item 301. All items, excluding item 274, are replaced with 0 when missing or combined with other items.

discontinued operations + deferred taxes + equity in net loss (earnings) + other funds from operations + gain (loss) from sales of PPE and other investments).[11] These definitions follow Frank and Goyal (2003). We use the value of book assets (item 6) taken at the beginning of the fiscal year to normalize debt and equity issuance and the financing deficit.

We also use COMPUSTAT to construct several firm level control variables. We measure Q as the ratio of market value of assets to book value of assets. Market value of assets is defined as total assets (item 6) plus market equity minus book equity. Market equity is defined as common shares outstanding (item 25) times fiscal year closing price (item 199). Book equity is calculated as stockholders' equity (item 216) [or the first available of common equity (item 60) plus preferred stock par value (item 130) or total assets (item 6) minus total liabilities (item 181)] minus preferred stock liquidating value (item 10) [or the first available of redemption value (item 56) or par value (item 130)] plus balance sheet deferred taxes and investment tax credit (item 35) when available minus post retirement assets (item 336) when available. Book value of assets is total assets (item 6).[12] We measure profitability using operating income before depreciation (item 13) and asset tangibility using property, plants and equipment (item 8). We normalize both variables using the book value of assets at the beginning of the fiscal year. We measure book leverage as the quantity debt in current liabilities (data 34) plus long term debt (item 9) divided by the quantity debt in current liabilities (data 34) plus long term debt (item 9) plus common equity (item 60).

Finally, we merge our data with the "kink" variable, provided by John Graham. Following Graham (2000), we say that a firm issues debt conservatively if it can increase its interest payment without lowering the marginal tax rate. The construction of this variable and the associated control variables are described in detail in Graham (2000).[13] The kink variable captures the amount of additional debt firms could issue before the

[11] For codes 1 to 3, this is item 123 + item 124 + item 125 + item 126 + item 106 + item 213 + item 217 + item 218. For code 7, this is item 123 + item 124 + item 125 + item 126 + item 106 + item 213 + item 217 + item 314. All items are coded as 0 when missing or combined with other items.

[12] Definitions of Q and its components as in Fama and French (2002).

[13] See also the caption to Table 1 for more detail on these variables. Following Graham, all continuous control variables in the kink regressions are winsorized at the 1% level.

marginal benefit of interest deductions begins to decline. It is defined as the ratio of the hypothetical interest level at which the marginal tax rate starts to fall (numerator) to the actual amount of interest paid by the firm (denominator). When a firm is committed to future interest payments that are sufficient low, almost all of the interest payments are likely to be deducted from future profits and the company enjoys a tax benefit equal to the interest payment times the marginal corporate tax rate. As debt levels increase, the company is committing to pay more interest in the future, and it becomes increasingly possible that in some states of the world, the company cannot generate enough profits to fully realize the interest tax shield. Consequently, the marginal tax benefit is decreasing when an additional dollar of interest payment is committed. If the marginal cost of debt intersects the downward-sloping portion of the marginal benefit curve, then a kink greater than 1 indicates the firm has "left money on the table" and the potential gain from adding debt increases with the kink. In this sense, high-kink firms use debt more conservatively.

The left columns of Table 1 ("Full Sample") present the summary statistics of the data. Panel A summarizes the COMPUSTAT data and the distribution of our sample of firms across the 12 Fama and French Industry Groups[14] Panel B summarizes the variable kink and the control variables we use in the kink regressions. Panel C summarizes CEO characteristics and Table 2 summarizes SDC security issues.

IV Overconfidence Measures

We take two approaches to identify CEO overconfidence. First, we use the CEOs' own "revealed beliefs." Specifically, we use their exercise decisions on company stock options, exploiting the incentive for early option exercise created by underdiversification. CEO compensation contracts regularly contain large quantities of stock and option grants. To maximize the incentive effects of these holdings, the options cannot be traded. Moreover, firms prohibit CEOs from perfectly hedging the risk by short-selling company stock. Most importantly, CEOs' human capital is invested in their firms, so that a bad outcome in the firm not only negatively impacts their personal portfolios, but also reduces their outside options. All of these effects leave CEOs highly exposed to the idiosyncratic risk of

[14] For definitions see http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html.

their company. When deciding whether to exercise or continue to hold in-the-money stock options, risk averse CEOs must trade off option value against the costs of underdiversification. Though the optimal schedule for exercise depends on their individual wealth, degree of risk-aversion and diversification (Hall and Murphy (2002)), it is generally true that risk aversion and underdiversification predict early exercise of executive options. Overconfidence in their managerial abilities, on the other hand, can induce CEOs to believe their companies' stocks will perform better in the future than they should objectively expect. Overconfident CEOs may hold in-the-money stock options – even when those options have passed rational thresholds for exercise – as a means to personally benefit from expected future stock price appreciation. Malmendier and Tate (2004) translate this logic into three measures of overconfidence. Here, we use the same measures to maintain consistency and allow us to interpret our results within the context of previous findings.

Longholder. Longholder is a binary variable which takes the value 1 for all CEOs who ever hold an option until the year of expiration even though the option is at least 40 percent in the money entering its final year. The exercise threshold of 40 percent corresponds to constant relative risk aversion of 3 and 67 percent of wealth in company stock in the rational option exercise model of Hall and Murphy (2002). Though options held to expiration are typically well beyond the threshold entering their final year, applying the threshold removes cases, including underwater options, in which the decision to hold to expiration is easily rationalizable.

The Longholder measure is a managerial fixed effect. The remaining measures allow for variation within the CEO's tenure.

Pre-Longholder / Post-Longholder. These measures split the Longholder indicator into two separate variables: Post-Longholder is a dummy variable equal to 1 only after the CEO for the first time holds an option until expiration (provided it exceeds the 40 percent threshold). Pre-Longholder is equal to 1 for the rest of the CEO years where Longholder is equal to 1. Post-Longholder, then, allows us to isolate financing decisions after the CEO has revealed his confidence level.

Holder 67. Instead of requiring the CEO to hold options all the way to expiration, Holder 67 focuses on the choice to exercise an option with five years remaining duration.

Maintaining the previous assumptions on constant relative risk aversion and diversification, the new exercise threshold (in the Hall-Murphy framework) is 67 percent in the money. Holder 67 is a binary variable equal to 1 if a CEO fails to exercise options with 5 years remaining duration despite a 67 percent increase in stock price (or more) since the grant date. When we apply this measure, we restrict the comparison group to CEOs who were faced with this exercise decision, but chose to exercise rather than hold: A CEO enters the sample once he has an option with 5 years remaining duration that is at least 67 percent in the money. Once a CEO decides to postpone the exercise of such an option he receives a value of 1 under Holder 67 and retains that value for the remainder of his sample years.

Our second approach to measuring differences in beliefs is to use outsiders' perceptions of the CEO. The press data, described in Section III, provides the number of articles year-by-year that refer to each sample CEO using the terms (*a*) "confident" or "confidence," (*b*) "optimistic" or "optimism," (*c*) "confident," but in a negated form (*d*) "optimistic," but in a negated form and (*e*) "reliable," "cautious," "conservative," "practical," "frugal," or "steady." We construct a measure of CEO beliefs by comparing, for each sample year, the number of *past* articles that portray the CEO as confident and optimistic to the number of *past* articles that portray him as not confident, not optimistic, reliable, cautious, conservative, practical, frugal, or steady. That is, we define the following indicator of CEO confidence (where i denotes the CEO):

$$TOTALconfident_{it} = \begin{cases} 1 \text{ if } \sum_{s=1}^{t-1} a_{is} + b_{is} > \sum_{s=1}^{t-1} c_{is} + d_{is} + e_{is}; \\ 0 \text{ otherwise.} \end{cases}$$

Though we use only past media portrayal to construct the indicator, it is possible that (persistent) corporate financial policy affects the tenor of CEO press coverage. We check the context of the individual articles to assess this possibility. We find few articles about financial policy among the sample: among the 960 articles primarily about the firm, 53% focus on company earnings and 17% on mergers, while fewer than 5% focus on financial policy. It is also possible that differential coverage could bias our TOTALconfident measure. If, for example, there is a press bias towards positive news stories, CEOs who are often in the press would be more likely to have TOTALconfident equal to 1. To address

this possibility, we include total mentions in the selected publications, aggregated over the same period as the TOTALconfident measure, as a control whenever we utilize the measure

In the right-hand columns of Table 1, we show firm and CEO summary statistics for the subsample of Longholder firm years. The sample characteristics are similar using the other measures of overconfidence. Moreover, the overconfidence measures are all positively and significantly correlated with each other.

Before analyzing CEO financing decisions, we consider alternative interpretations of our measures. Malmendier and Tate (2004) discuss at length several reasons why CEOs may choose not to exercise options, even when they are highly in-the-money, and find that overconfidence is most consistent with the evidence. One benefit of presenting results based on outsiders' perceptions side-by-side with results based on CEOs' "revealed beliefs" is that many of the alternative interpretations of the revealed beliefs measures from Malmendier and Tate (2004) have little or no bearing on the TOTALconfident measure. For example, personal taxes, board pressure and procrastination, though potential explanations for late option exercise, have no effect on CEOs' portrayal in the business press. So, to address these stories, we rely on the robustness of our results across the two approaches to measuring overconfidence. However, we do specifically address alternative explanations that can accommodate both late option exercise and "confident" press portrayal.

Inside Information. CEOs may fail to exercise in the money options because they have private information that the firm's future earnings will be strong. Then, holding company stock options is a profitable investment opportunity until outsiders learn the information and incorporate it into prices. Moreover, CEOs with such information may justifiably exude "confidence" and "optimism" to outsiders, including the business press. In this case, our results would support the traditional information-based explanation of pecking order financing behavior. The key distinction between this story and our overconfidence hypothesis is whether the CEO's belief is correct. To distinguish the two possibilities, we check whether CEOs earn positive abnormal returns when they fail to exercise options that are beyond the calibrated thresholds for exercise. We find that they do not profit above a strategy of exercising and investing the proceeds in a diversified portfolio. Longholder

CEOs would earn greater profits on average by exercising 1, 2, 3, or 4 years earlier and investing in the S&P 500 for the remainder of the options' durations.[15] We find similar evidence for the Holder 67 measure. Thus, there is no evidence that the average CEO who excessively holds company stock options has positive inside information.

Signalling. The apparent absence of real inside information makes a rational signalling interpretation of our measures difficult. If late option exercise and bold statements to the press are signals to the market, those signals would need to be ineffective for us to still find that the firms who send them are the firms that are least likely to issue equity. Nevertheless, the Post-Longholder measure allows us to view financing decisions as a function of past decisions not to hold options to expiration. If private information drove managerial preferences for debt over equity and the failure to exercise options (and press coverage) were attempts to signal that information to the market, we would expect weaker impacts of the signals on financing choices as we separate them in time. Overall, the evidence does not support this hypothesis.

Risk Tolerance. CEOs with greater risk tolerance may be more willing to expose their personal wealth to company-specific risk, even though they have already invested their human capital in the company. To outsiders, like business reporters, "risk takers" may appear "confident" and "optimistic" and are unlikely to appear "cautious," "conservative," "practical," "reliable," or "steady." On corporate accounts, bankruptcy will serve as less of a deterrent to issuing debt for less risk averse (or even risk seeking) CEOs. Thus, they may lean more towards debt conditional on accessing external markets. On the other hand, less risk aversion does not predict a general aversion to external financing. Thus, our debt conservatism results in Section B will be difficult to reconcile with this story.

Though each of these stories is difficult to reconcile with some of the evidence, overconfidence in future performance is consistent with all of our findings. Thus, for the remainder of the paper, we will interpret Longholder, Holder 67, and TOTALconfident CEOs as overconfident.

[15] See Malmendier and Tate (2007) for detailed tables.

V Empirical Analysis

A Overconfidence and the Choice Between Debt and Equity

Because they believe issuing equity unduly dilutes the claims of existing shareholders, overconfident managers are reluctant to issue equity. Debt, on the other hand, allows current shareholders to remain the residual claimant on the firm's (overestimated) future cash flows. As a result, overconfident CEOs will (generally) prefer debt to equity. We begin by asking whether, conditional on accessing public securities markets, CEOs we classify as overconfident are less likely to issue equity (Hypothesis 1). We then extend the analysis to allow for private debt and to account explicitly for the amount of outside financing (debt or equity) the firm has to raise to cover financing deficits.

A.1 Public Issues

In Table 2, we present summary statistics of public securities issues, separately for CEOs we classify as overconfident and the remaining sample of CEOs. Under each of our overconfidence measures, we find that the frequency of equity issuance is lower for overconfident CEOs. When Longholder is 1, we find that 31% of firm years with public issues contain at least 1 equity issue. This percentage is virtually constant across Pre- and Post- Longholder years. When Longholder is 0, we find instead that 42% of issue years contain an equity issue. The difference between the frequency of Longholder and non-Longholder equity issues is statistically significant at the 5% level, where standard errors are adjusted for clustering at the firm level. The evidence is even stronger, both economically and statistically using the Holder 67 and TOTALconfident measures. Holder 67 CEOs issue equity 23% of the time, but CEOs for whom Holder 67 is 0 issue equity 39% of the time. Using TOTALconfident, the frequencies are 25% and 48% for CEOs we classify as overconfident and non-overconfident, respectively. For both measures, the differences are significant at the 1% level, again clustering at the firm level.

We find some evidence that overconfident CEOs also issue debt at a higher frequency than other CEOs. Under all measures, the percentage of public issue years with at least one debt issue is higher for overconfident CEOs than their non-overconfident peers. The

difference in frequencies, however, is only statistically significant using the TOTALconfident measure. The evidence on hybrid security issuance, e.g. convertible securities, is not consistent across the different measures of overconfidence and is never statistically significant. Note that even though we condition on conducting a public issue, the significantly lower frequency of equity issues among overconfident CEOs does not trivially imply a significantly higher frequency of debt and hybrid issues since a year in which both a debt (and/or hybrid) issue and an equity issue occur counts in both categories.

Next, we check the robustness of these cross-sectional patterns in the SDC data to the inclusion of various firm-level controls. We continue to focus on the sample of firm years with at least one public security issue. By conditioning on accessing public markets, we implicitly control for differences across overconfident and non-overconfident CEOs in the frequency with which they access public markets. If we look instead at the unconditional difference in the frequency of equity issuance, we confound the frequency effect with the choice of debt or equity. We estimate a logit model in which the dependent variable is a binary indicator of at least one equity issue during the fiscal year.[16] We begin by running a baseline logit including only the overconfidence measure as an explanatory variable. We then add portfolio controls (the percentage of company stock held by the CEO and the number of vested stock options held by the CEO scaled by shares outstanding[17]). These variables capture the incentive effects of performance based compensation, which may systematically differ across CEOs we classify as overconfident and non-overconfident. We then add standard controls from the empirical capital structure literature – the natural logarithm of sales, profitability, tangibility, Q, and book leverage – to capture the effects of known cross-sectional determinants of changes in leverage.[18] Leverage is a particularly important control as it captures any systematic differences in the ability to (further) access debt markets. Finally, we add year effects to control for the possibility that overconfident CEO-years are disproportionately clustered in cold markets for equity issuance. All of

[16] As in Table 2, we do not find consistently significant results when we use either debt or hybrid issuance as the dependent variable.

[17] The percentage of stock options held by he CEO is multiplied by 10 so that its mean is comparable to the mean of stock holdings.

[18] When we use book leverage as a control, we drop the small number of observations for which book leverage is greater than 1.

these control variables are measured at the beginning of the fiscal year and all standard errors are adjusted for firm-level clustering.

In Table 3, we present the results of the estimations using the Longholder measure. Among the controls, we find that smaller firms are more likely to issue equity. We also find that large vested option holdings increase the odds of issuing equity. The coefficient estimate, however, is implausibly large. We find that it is driven by roughly 5 outlier observations in the upper tail of the distribution. Eliminating those observations substantially decreases the coefficient on vested options, but with no impact on the Longholder coefficient. One surprising result is that Q does not seem to positively predict equity issues. We find, however, that including stock returns over the prior year does significantly predict a higher probability of issuing equity without materially affecting the Longholder estimate. Most importantly, the inclusion of these different sets of controls does not affect the measured impact of Longholder on the probability of issuing equity. We find that Longholder CEOs are roughly half as likely as other CEOs to issue equity across all specifications.

We find similar results using the Holder 67 and TOTALconfident measures. In all cases, but one, the measured impact on equity issuance is stronger economically and statistically than the Longholder results. The one exception is the estimation including all controls and year effects with TOTALconfident as the overconfidence measure (odds ratio = 72%; p-value = 0.18). There are also no significant differences between the Pre- and Post-Longholder portions of the Longholder effect. Finally, the results are robust to alternative sets of controls; for example, including changes in sales, Q, profitability, or tangibility either in addition to or in lieu of the levels has little impact on the results. Overall, CEOs we classify as overconfident are less likely to issue equity conditional on accessing public securities markets, even controlling for standard determinants of issuance decisions.

A.2 Debt versus Equity and the Financing Deficit

We also consider the debt versus equity choice within the financing deficit framework of Shyam-Sunder and Myers (1999) and Frank and Goyal (2003), using data from the com-

panies' cash flow statements. This data accounts for bank loans and other private sources of financing we have thus far ignored by focusing on public security issuance. We examine the net amount of financing raised in each sample firm year. Because overconfident CEOs overestimate the returns to investment projects, they may have greater financing needs than other CEOs. Thus, rather than asking whether overconfident CEOs raise more dollars of debt or fewer dollars of equity than their peers, we ask whether overconfident CEOs cover more of their financing deficit through debt than equity, where the financing deficit measures the amount of firm expenditures that must be covered using outside sources of finance. This approach is analogous to conditioning on accessing public securities markets in our analysis of issue frequency. Here, we use the following regression specification:

$$\text{Debt}_{it} = \beta_1 + \beta_2 FD_{it} + X'_{it}B_3 + \beta_4 \Delta_{it} + FD_{it} \cdot X'_{it}B_5 + \beta_6 FD_{it} \cdot \Delta_{it} + \epsilon_{it} \qquad (11)$$

FD denotes the financing deficit (as defined in Section III); X is the set of control variables used in the regression; Δ is the overconfidence measure. X includes both firm and CEO-level controls. At the CEO level, we control for stock ownership (as a percentage of total shares outstanding) and total number of vested options (normalized by total number of shares outstanding).[19] At the firm level, we use the controls from Frank and Goyal (2003): change in profitability, change in tangibility, change in the natural logarithm of sales, change in Q and book leverage. We also include firm fixed effects and their interactions with the financing deficit. These fixed effects allow us to conclusively separate effects we attribute to the CEO from omitted constant firm effects which happen to be correlated with our proxies for managerial overconfidence. That is, we can identify differences in the amount of required outside financing covered by debt between overconfident and non-overconfident CEOs within the same firm.[20] Finally, we include year effects to control for the effects of hot equity issuance markets.All standard errors account for clustering at the firm level.

Table 4 presents the results of estimating (11) using Longholder as the overconfidence

[19] Stock ownership and vested options are taken at the beginning of the fiscal year. Also, we multiply vested options by 10 in the regressions so that its mean is comparable to the mean of stock ownership.

[20] In the case of Holder 67 and TOTALconfident, we can also exploit variation between a particular CEO's overconfident and non-overconfident sample years.

proxy. Column 1 presents a baseline regression without fixed effects or controls for comparison to prior literature. The coefficient of roughly 0.73 on the financing deficit suggests that our sample is more similar to the Shyam-Sunder and Myers sample than to the Frank and Goyal (2003) sample.[21] But, again, there is no reason to believe that sample selection should bias the interaction of the financing deficit with our overconfidence measures. In Column 2, we add Longholder, its interaction with the financing deficit, firm fixed effects, and the interaction of firm fixed effects with the financing deficit.[22] Column 3 adds controls for CEO stock and option ownership and Column 4 adds year fixed effects. In Column 5, we add changes in sales, changes in Q, changes in profitability, and changes in tangibility and, in Column 6, the lag of book leverage.[23] Among the controls, we find a negative relationship between deviations from average book leverage and debt issues, consistent with leverage targeting. We also find that larger than average changes in Q lead to less debt issues and a larger portion of the financing deficit covered by equity, consistent, for example, with a market timing story. More debt is used to cover the deficit when stock holdings are higher than average, consistent with incentive effects in the presence of positive information (or overconfidence). Surprisingly, higher than average option holdings significantly reduce the tendency to cover deficits with debt. The economic magnitude of the effect, however, is low (roughly 3¢ at the mean) and there is little impact of including this control on the Longholder estimate. In all five specifications, we find that Longholder CEOs cover more of their financing deficits using debt than non-Longholder predecessors or successors within their firm. Economically, the effect ranges from 32¢ to 35¢ more in debt issues per $1 of financing deficit.

The results using TOTALconfident to proxy for Δ are qualitatively similar, though weaker economically and statistically. And, again, we find no significant difference be-

[21] The sample of Shyam-Sunder and Myers (1999) contains rather large firms, with mean assets of $953m for the period 1971-1989. (Our firms are even larger, with mean assets of $5477m for the period 1980-1994.) When Frank and Goyal (2003) analyze, separately, the quartile of largest firms, they find similar coefficients of 0.753 for the period 1971-1989 and of 0.675 for the period 1990-1998.

[22] Note that with the inclusion of firm fixed effects interacted with the financing deficit, we exclude the the level effect of the financing deficit on debt issues to avoid collinearity. We could exclude the fixed effect dummy for one firm and include the level effect of the financing deficit in the regression, but the coefficient would depend on our (arbitrary) choice of which firm to exclude.

[23] The results are nearly identical using lagged levels of the sales, tangibility, profitability, and Q controls (as in Section V.A.1) rather than changes.

tween the Pre- and Post- Longholder portions of the Longholder estimate. We find very little impact of Holder 67 on the amount of financing deficit covered with debt. The coefficient estimates are typically near zero and not statistically significant. We also re-estimate the regressions without firm fixed effects and their interactions with the financing deficit. Using the TOTALconfident measure, we find stronger results, both economically and statistically. Using Longholder, however, we no longer find a positive and significant interaction with the financing deficit. In fact, the interaction becomes negative, though insignificant. This finding suggests that Longholder CEOs are concentrated in firms which, during our sample period, use more equity than debt to meet financing needs.[24] This empirical result could arise endogenously from a dynamic overconfidence model if overconfident CEOs tend to eventually exhaust their firms' debt capacities, eliminating debt as a viable financing option. Thus, it is crucial to remove as much as possible of this selection effect, via the fixed effects analysis, to observe that overconfident CEOs nevertheless use less equity than the average CEO in their firm. This latter effect is consistent across the TOTALconfident and Longholder measures.

B Overconfidence and Internal versus External Financing

The overconfidence hypothesis not only predicts a managerial preference for debt over equity, but also a preference for internal versus external finance. Malmendier and Tate (2005) show that managers who are overconfident under the Longholder and Holder 67 measures have higher sensitivities of corporate investment to cash flow than other managers.[25] Moreover, this effect is most pronounced among firms classified as equity dependent using a priori measures like the lagged Kaplan-Zingales index, firm age, or credit rating. This evidence indirectly corroborates a preference for internal finance over external finance among overconfident CEOs.

Another possible manifestation of the preference for internal finance is debt conservatism. If overconfident CEOs have abundant cash relative to investment needs or per-

[24] Given our findings in Section V.A.1, it also suggests that private forms of debt or other changes in equity holdings beyond public issues are driving the cross-sectional differences here.

[25] The definitions of Holder 67 and Longholder are slightly different here and follow the definitions in Malmendier and Tate (2005). See the latter paper for a more detailed description of the differences.

ceived financing costs dominate overestimated investment returns, then we may observe unconditionally less aggressive debt policies among overconfident CEOs. Graham (2000) constructs the "kink" variable to measure how much firms could increase debt before the tax benefit begins to decline and shows that firms, on average, appear to leave money on the table by following excessively conservative debt policies. We ask whether reluctance to access external finance due to overconfidence explains a portion of the effect. Overconfident CEOs may choose debt over equity when they access external markets (i.e. conditional on having a positive financing deficit), yet not access those markets frequently enough to take full advantage of the available tax benefits of debt. We use the following regression specification:

$$\text{Kink}_{it} = \beta_1 + \beta_2 \Delta_{it} + X'_{it} B_3 + Y'_{it} B_4 + \epsilon_{it}, \tag{12}$$

where Δ is the overconfidence measure, X is a set of firm level controls and Y captures CEO portfolio characteristics. We include all of the firm controls from Graham's original tobit analysis, to ease comparison. All standard errors adjust for clustering at the firm level. The null hypothesis is that β_2 is equal to zero. We also test whether overconfident CEOs with high "kinks" simultaneously raise equity and whether they have sufficient cash on hand to cover investment needs. For $\beta_2 > 0$ to be consistent with overconfidence, the first test must be negative and the second positive.

In Table 5, we present tobit estimates of (12) using Longholder to proxy for Δ.[26] In Column 1, we present a baseline regression, without controls. In Column 2, we add CEO-level controls for company stock and option ownership. In Column 3, we add the full set of firm-level controls and industry dummies from Graham (2000).[27] We find some evidence that more vested option holdings are associated with lower kinks. Of Graham's 19 firm-level controls (including the 5 untabulated industry dummies), 16 have qualitatively similar effects in our data. The exceptions are negative owners' equity, the natural log of

[26] The kink variable is artifically bounded between 0 and 8.

[27] Graham also includes squares of all of the continuous controls in his regressions. Though we do not tabulate the results, including the squared terms in our specification has little impact on our findings. The estimated Longholder coefficient is 0.611 (p = 0.051) in this specification compared to the 0.605 coefficient in Column 3.

sales and advertising expense scaled by sales, all of which have opposite signs in the two data sets. Across specifications we find that Longholder CEOs have significantly higher kinks. Economically, the 0.605 to 1.256 range of coefficient estimates represents a 15% to 32% increase in kink from its mean and an increase of 0.24 to 0.46 standard deviations.

Conditional on tapping external financial markets, Longholder CEOs prefer debt (Section V.A). Yet, Longholder CEOs also exhibit greater debt conservatism. Taken together, the results suggest that debt conservatism among Longholder CEOs is driven by heightened reliance on internal sources of finance, rather than high equity financing. In Column 4, we test this implication directly. We include a dummy, "Low Cash Status," for low levels of cash, relative to the expected volume of investment. More precisely, Low Cash Status is equal to 1 if the firm's cash stock at the beginning of the year, divided by mean industry investment, is at or below the 40th percentile in our sample.[28] Mean industry investment is calculated separately for each year and each of the 12 Fama-French industries shown in Panel A of Table 1. We find no evidence of higher kinks among Longholder CEOs with insufficient cash reserves to meet investment needs. But, when cash is abundant, Longholder CEOs have significantly higher kinks (coefficient = 0.85, p = 0.025). Thus, the kink effects are not driven by cash-strapped CEOs who would need to raise equity to meet expected investment in the absence of debt issues, confirming aversion to external finance as the underlying mechanism. (We will show the low levels of equity issuance directly in Table 7.)

We also replicate our findings in a logit framework, using kink > 1 as the dependent variable (Table 6). The advantage of this approach is that we can use conditional logit to overcome the incidental parameters problem and obtain consistent estimates including firm fixed effects. This specification identifies the Longholder effect using only differences in kink across Longholder and non-Longholder CEOs within the same firm. Thus, it rules out alternative explanations which rely on (uncontrolled) cross-sectional differences between firms with and without Longholder CEOs. The results confirm the tobit analysis. Though we cannot reject a zero effect in the fixed effects analysis (Longholder p = 0.116, Column

[28] Our findings are robust to using variations in cutoff such as the 25th or the 30th percentile. The coefficient on overconfidence remains positive and significant. They are also robust to alternative proxies for "expected volume of investment" such as using prior-year (rather than concurrent) averages.

5), the economic magnitude of the effect, if anything, is larger. Overall, we consistently find that Longholders use debt more conservatively than other CEOs, particularly when cash reserves are abundant.

To confirm the interpretation that Longholder CEOs have high kinks due to aversion to external finance, we check whether Longholder CEOs who display conservative debt policy also do fewer equity issues. In Table 7, we tabulate the distribution of net equity issues among Longholder CEOs, separately for four different levels of "kink": (1) firms with kinks less than or equal to 1, (2) firms with kinks bigger than 1 but less than or equal to 3, (3) firms with kinks bigger than 3 but less than or equal to 7, and (4) firms with kinks bigger than 7. Comparing across groups, we find that higher levels of kink are associated with less equity issuance. The differences in mean equity issues between groups (1) and (2) and groups (1) and (3) have p-values of 0.016 and 0.052, respectively (clustering errors at the firm level). The remaining cross-group differences are not statistically significant. Thus, Longholder CEOs with high kinks are not more likely to issue equity, consistent with high kinks indicating greater reliance on internal finance. It is also possible that Longholder CEOs stockpile debt capacity in anticipation of large future investment or acquisition projects (thereby inducing high kinks). This explanation would be consistent with the evidence in Malmendier and Tate (2004) that overconfident CEOs do more mergers and prefer to finance them with cash and debt.

Finally, we analyze the relationship between the credit-worthiness of firms and their kinks. This analysis addresses two concerns. First, the high degree of debt conservatism among overconfident CEOs (i.e. the high kinks of their firms) may simply reflect bad credit ratings. Second, if the firms of overconfident CEOs have particularly high ratings, high kinks may reflect the ability to issue additional, nearly riskless debt. Overconfident CEOs should not be reluctant to issue riskless debt, since it is identical to internal finance, especially if they can use it to finance projects they perceive to have positive net present value. To test whether either extreme of credit-worthiness is driving our results, we use the S&P Long-Term Domestic Issuer Credit Rating to split the sample of firm years into thirds. The cutoffs in our sample are A+ and BBB: firms with A+ ratings or better are in the highest third and firms with BBB ratings or worse are in the lowest third. We drop

firms with missing credit ratings. Repeating our tobit analysis on each subsample, we find that the effect of our overconfidence measures on debt conservatism is almost entirely concentrated in the middle third of the distribution of credit ratings. Thus, our findings neither reflect limited access to debt markets nor a failure to capitalize on the ability to issue additional riskless debt.

We find similar results using Holder 67 as the proxy for Δ. We also find little consistent evidence of differences across the Pre- and Post-Longholder portions of the Longholder measure. The results using the TOTALconfident proxy, however, are quite different. TOTALconfident CEOs appear to have lower kinks than other CEOs, though the result is not robust to the fixed effects logit specification. This result is not surprising given our finding in Table 2 that only TOTALconfident CEOs are associated with a significantly higher probability of public debt issuance. One possible explanation for the difference in results is that the portfolio measures identify a more extreme perception of undervaluation.

C Leverage and the History of Managerial Beliefs

Our results thus far confirm the predicted impact of overconfidence on financing choices: CEOs we classify as overconfident prefer internal to external finance and prefer debt to equity conditional on accessing external finance. One interesting question is whether these financing choices have a persistent impact that can explain cross-sectional variation in corporate leverage. Since overconfident CEOs have a preference for debt over equity conditional on accessing external markets, more past (external) financing decisions with overconfident CEOs in place may explain higher current leverage ratios. This relationship, however, may be clouded by firm fixed effects on capital structure. For example, we saw in Section V.A.2 that the cross-sectional and within firm impacts of Longholder on the amount of financing deficit covered by debt go in opposite directions. Some firms systematically use more equity than other firms and Longholder CEOs are disproportionally sorted into these firms. Even though Longholders use more debt than other CEOs within their firms, we may not find higher leverage in their firms in the cross-section if the between effect dominates. As a result, we first examine the impact of overconfidence on the cross-section of leverage using the TOTALconfident measure (for which the between

and within firm effects go the same direction). We then return to the Longholder measure and try to address the sorting issue.

To conduct our test, we define external finance weighted TOTALconfident as the financing-deficit-weighted average of the TOTALconfident variable. We replace the financing deficit with 0 in years in which it is negative to constrain the weights to be positive and add to 1. Intuitively, the variable gives the fraction of total external finance the firm raised in years in which we classify the CEO as overconfident. This definition is analogous to the external finance weighted average market to book ratio of Baker and Wurgler (2002). We also compute the mean of TOTALconfident conditional on the financing deficit being positive (which measures the fraction of years in which the firm raised external finance and we classify the CEO as overconfident) and the unconditional mean of TOTALconfident (which measures the fraction of all firm years with a CEO we classify as overconfident). We then ask whether firms with higher values of these variables (i.e. more "overconfident sample years") have (1) within sample increases in leverage and (2) higher end-of-sample leverage. For this analysis, we define book leverage following Baker and Wurgler (2002) and Fama and French (2002).[29] The results, however, are unchanged using our prior definition of book leverage. Moreover, the results are robust to using market, rather than book, leverage. Given the purely cross sectional nature of the regression, we need only adjust standard errors to account for heteroskedasticity.

Table 8 presents the results using external finance weighted TOTALconfident to measure overconfident sample-years. (The results are similar using the alternative weighting schemes). In Column 1, we present a baseline regression of book leverage at the end of the sample on standard controls: within sample changes in profitability, tangibility, the logarithm of sales, and Q. We also control for book leverage at the beginning of the sample. This specification is equivalent to regressing the within sample change in leverage on the within sample changes in the control variables. We find that firms that begin the sample with high leverage tend to decrease leverage during the sample. An increase in the logarithm of sales during the sample also predicts a decrease in leverage. In Column 2, we

[29] Book leverage is the quantity assets (item 6) minus book equity divided by assets. Market leverage replaces the denominator with assets plus market equity minus book equity. Book and market equity are defined in Section III.

add external finance weighted TOTALconfident and TOTALmentions to the specification. The effect of weighted TOTALconfident is positive and significant, but general press coverage (TOTALmentions) has no impact. Moreover, the R^2 of the regression increases by 0.04. In Column 3, we add external finance weighted market to book to the regression. As in Baker and Wurgler (2002), this variable significantly predicts lower leverage. The R^2 of the regression also improves by another 0.02. Finally we add the contemporaneous value of the TOTALconfident variable and the TOTALmentions control in Column 4. These controls allow us to assess whether the explanatory power of the external finance weighted average comes from historical managerial beliefs or merely captures contemporaneous predictability of TOTALconfident for book leverage. The weighted average remains positive and significant even with these controls.

In columns 5 through 8, we focus on the level of, rather than changes in, leverage. In Column 5, we regress end-of-sample leverage on the Rajan and Zingales (1995) controls. We find that less profitable, larger firms with fewer tangible assets have higher leverage. In Column 6, we add external finance weighted TOTALconfident and TOTALmentions. Again, the coefficient on weighted TOTALconfident is positive and significant and the R^2 of the regression increases. In the remaining columns we successively add external finance weighted Q, and the contemporaneous values of TOTALconfident and TOTALmentions as controls. In all cases external finance weighted TOTALconfident is positive and significant. Thus, having CEOs outsiders perceive as "confident" and "optimistic" in place when the firm raises external finance appears to robustly predict increases in leverage and higher end-of-sample leverage.

Next, we repeat the analysis using Longholder in place of TOTALconfident.[30] Replicating Table 8, we find a negative effect of external finance weighted Longholder across specifications. The effect is between one third to half the magnitude of the TOTALconfident effect and is statistically insignificant in both regressions controlling for contemporaneous Longholder. The non-random sorting of Longholder CEOs across firms appears to dominate the preference of Longholders for debt over equity in the cross-section. The clustering

[30] We cannot use the Holder 67 measure in this analysis, since the sample selection criterion (i.e. the requirement that CEOs have an option that is at least 67% in the money with five years remaining duration) leads to gaps in the time series of firm-years. Our inability to classify the gap years makes interpreting within sample changes in leverage difficult.

of Longholder CEOs into firms which use more equity, however, could arise endogenously in a dynamic overconfidence model. Longholder CEOs may, over time, exhaust the firm's debt capacity without losing their desire to undertake (excessive) investment. Then, the impact of Longholder on leverage would be non-monotonic over time. To account for this possibility, we re-estimate the regressions of Table 8 comparing firms with no Longholder years to firms with fewer than 5 Longholder years, firms with 5 to 7 Longholder years, and firms with more than 7 Longholder years (in lieu of including the weighted average Longholder variable). The results are broadly consistent with the story. Firms with 5 to 7 Longholder years have marginally significant increases in book leverage relative to firms without Longholder CEOs (the coefficient estimates in columns (2) - (4) range from 0.095 to 0.099). They also have higher end of sample leverage, though the difference is not statistically significant. Firms with more than 7 Longholder years, on the other hand, have significant decreases in leverage relative to firms without Longholders and lower end-of-sample leverage ratios. Replicating this analysis with TOTALconfident we find that the difference between the measures comes precisely from firms with more than 7 overconfident sample years. Using TOTALconfident, the effect on leverage is positive for all three intervals.[31]

Overall the results are consistent with an impact of past managerial beliefs on current capital structure. But, given the short time series and sorting effects, the results are not as strong as the results for contemporaneous financing choices.

VI Conclusion

Traditional analyses in corporate finance relate corporate decision-making to market-, industry-, and firm-level determinants. This paper illustrates that corporate financial policies may be better understood if the analysis also accounts for managerial characteristics. Our analysis focuses on managerial overconfidence, i.e. overestimation of future cash flows. Overconfident CEOs perceive a larger cost to issuing equity than debt. Overconfi-

[31] The results do not depend on the (aribtrary) cutoff in year 7. Defining the middle interval as years 5 to 9 produces similar results. However, it is important to segregate firms with 10 or more Longholder years.

dent CEOs, therefore, prefer to finance with cash and, conditional on accessing external markets, with debt. Thus, they may display pecking-order behavior and, if the aversion to debt is strong enough, debt conservatism.

We test these predictions empirically, using two measures overconfidence. First, we use data on personal portfolio decisions of the CEO: Does the CEO hold options beyond calibrated thresholds for early exercise? Whenever the answer to this question is yes, we classify a CEO as overconfident. Second, we use outside perception of the CEO, measured using portrayal in the business press.

We find strong evidence that, conditional on accessing public securities markets, overconfident CEOs are less likely to issue equity than other CEOs. We also find that to cover an additional dollar of external financing deficit, overconfident CEOs issue roughly 30 cents more debt than their less overconfident peers. We also find a positive relationship between kink (a measure of debt conservatism) and managerial overconfidence. And, this debt conservatism is not driven by an increased propensity to issue equity among the overconfident CEOs. Finally, we find some evidence that the preference for debt over equity leads to longer term increases in leverage for firms with overconfident managers in place when external finance is raised.

These results have important implications for contracting practices and organizational design. Specifically, standard incentives such as stock- and option-based compensation are unlikely to mitigate the detrimental effects of managerial overconfidence. As a result, the board of directors may need to employ alternative disciplinary measures, such as cash dividend payment and debt overhang, which can suffice to constrain overconfident CEOs. In addition, the results confirm the need for independent and vigilant directors.

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Table 1. Summary Statistics

Panel A. Financing Deficit Variables

Net financing deficit is cash dividends plus net investment plus change in working capital minus cash flow after interest and taxes. Net investment is capital expenditures plus increase in investments plus acquisitions plus other uses of funds minus sale of property, plants, and equipment minus sale of investment. Change in working capital is change in operating working capital plus change in cash and cash equivalents plus change in current debt. Cash flow after interest and taxes is income before extraordinary items plus depreciation and amortization plus extraordinary items and discontinued operations plus deferred taxes plus equity in net loss (earnings) plus other funds from operations plus gain (loss) from sales of property, plants, and equipment and other investments. Net debt issues are long term debt issuance minus long term debt reduction. Net equity issues are sales of common stock minus stock repurchases. Profitability is operating income before depreciation, normalized by assets at the beginning of the year. Tangibility is property, plants, and equipment, normalized by assets at the beginning of the year. Q is the market value of assets over the book value of assets, where market value of assets is the book value of assets plust market equity minus book equity. Δ denotes one year changes.

	Full Sample						Longholder Sample					
	Number of Firms = 263						Number of Firms = 56					
Variable	Obs.	Mean	Median	SD	Min.	Max.	Obs.	Mean	Median	SD	Min.	Max.
Assets ($m)	2385	5476.92	2111.96	13389.44	39.64	198598.70	463	4820.30	2111.78	8763.07	48.79	79262.00
Net Financing Deficit ($m)	2385	42.67	0.75	538.56	-6800.30	8845.50	463	10.41	-1.05	287.07	-845.00	1698.00
Cash Dividends ($m)	2385	109.47	35.58	239.77	0.00	2487.00	463	126.59	40.69	252.09	0.00	1870.00
Net Investment ($m)	2385	502.28	172.70	1311.81	-2930.00	26523.00	463	498.57	207.37	1070.84	-577.00	9755.00
Change in Working Capital ($m)	2385	26.73	16.02	790.77	-21767.00	16224.00	463	35.54	17.95	347.04	-2920.50	2675.00
Cash Flow after Interest and Taxes ($m)	2385	595.80	228.56	1276.57	-1678.44	20278.00	463	650.29	254.62	1243.20	-1678.44	11273.00
Net Financing Deficit/$Assets_{t-1}$	2385	0.03	0.00	0.16	-0.63	2.56	463	0.02	0.00	0.14	-0.24	1.60
Net Debt Issues/$Assets_{t-1}$	2385	0.01	0.00	0.08	-0.62	0.92	463	0.01	0.00	0.06	-0.15	0.36
Net Equity Issues/$Assets_{t-1}$	2155	0.00	0.00	0.08	-0.77	1.85	413	0.01	0.00	0.09	-0.30	1.18
Profitability	2385	0.18	0.17	0.11	-0.24	0.99	463	0.21	0.19	0.12	-0.03	0.88
Δ Profitability	2385	0.00	0.00	0.06	-0.76	0.98	463	0.00	0.00	0.08	-0.51	0.98
Tangibility	2385	0.44	0.42	0.22	0.00	2.08	463	0.46	0.43	0.21	0.06	2.08
Δ Tangibility	2385	-0.05	-0.03	0.11	-1.47	0.54	463	-0.05	-0.03	0.12	-1.47	0.16
Q	2385	1.61	1.30	1.01	0.59	12.26	463	1.70	1.44	1.02	0.77	10.71
Δ Q	2385	0.01	0.01	0.50	-7.18	5.04	463	0.03	0.02	0.42	-1.81	4.32
ln(Sales)	2385	7.90	7.82	1.12	3.18	11.93	463	7.89	7.87	1.18	3.18	11.23
Δ ln(Sales)	2385	0.08	0.07	0.19	-2.04	1.67	463	0.09	0.08	0.17	-0.55	1.67

Distribution across Fama French 12 Industry Groups

	(2381 observations)			*(463 observations)*			
Consumer Nondurables	0.13	Telecommunication	0.06	Consumer ND	0.11	Telecommunication	0.02
Consumer Durables	0.05	Utilities	n/a	Consumer Durables	0.03	Utilities	n/a
Manufacturing	0.18	Shops	0.14	Manufacturing	0.16	Shops	0.14
Energy	0.04	Health	0.06	Energy	0.00	Health	0.09
Chemicals and Allied Products	0.08	Money	n/a	Chemicals	0.16	Money	n/a
Business Equipment	0.09	Other	0.18	Business Equipment	0.13	Other	0.17

The Fama-French Industry Groups are defined on French's website (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html).

Table 1 (cont.)

Panel B. Kink Variables

Kink is the amount of interest at the point where the marginal benefit function becomes downward sloping, as a proportion of actual interest expense. ECOST is the standard deviation of the first difference in taxable earnings divided by assets, the quoteient times the sum of advertising, research, and development expenses divided by sales. CYCLICAL is the standard deviation of operating earnings divided by mean assets first calculated for each firm, then averaged across firms within two-digit SIC codes. Return on assets is income before extraordinary items plus depreciation, divided by assets. Z-score is 3.3 times the difference of operating income before depreciation and depreciation plus sales plus 1.4 times retained earnings plus 1.2 times working capital (balance sheet), the quantity divided by assets. Quick ratio the sum of cash and short-term investments and total receivables divided by total current liabilities. Current ratio is total current assets divided by total current liabilities. Q-ratio is preferred stock plus market value of common equity plus net short-term liabilities, the quantity divided by assets. R&D to sales and Advertising to sales are set to 0 when the numerator is missing.

Computer Industry are all firms with SIC code 357, Semiconductor Industry all firms with SIC code 367, Chemicals and Allied Products comprises SIC codes 280-289, Aircraft and Guided Space Vehicles SIC codes 372 and 376, and Other Sensitive Industries SIC codes 340-400, excluding 357, 367, 372, and 376. Vested options (as a % of shares outstanding) are multiplied by 10 so that the means of vested options and stock ownership are the same order of magnitude. Longholder is a binary variable where 1 signifies that the CEO at some point during his tenure held an option package until the last year before expiration, provided that the package was at least 40% in the money entering its last year.

	Full Sample						Longholder Sample					
	Number of Firms = 189						Number of Firms = 44					
Variable	Obs.	Mean	Median	SD	Min.	Max.	Obs.	Mean	Median	SD	Min.	Max.
Kink	1726	3.93	3	2.74	0	8	377	4.59	4	2.75	0	8
I(No dividend)	1726	0.12	0	0.33	0	1	377	0.17	0	0.38	0	1
I(Negative owners' equity)	1726	0.01	0	0.12	0	1	377	0	0	0	0	0
I(NOL carryforward)	1726	0.15	0	0.36	0	1	377	0.14	0	0.35	0	1
ECOST	1726	1.74	0.65	3.21	0	18.92	377	2.36	0.79	3.92	0	18.92
CYCLICAL	1726	0.07	0.07	0.03	0.02	0.18	377	0.08	0.07	0.02	0.04	0.18
Return on assets	1726	0.11	0.11	0.06	-0.11	0.26	377	0.12	0.12	0.06	-0.11	0.26
Ln(sales)	1726	7.88	7.82	1.01	5.49	10.32	377	7.93	7.87	1.07	5.49	10.32
Z-score	1726	2.51	2.34	1.17	0.38	7.07	377	2.74	2.51	1.24	0.79	7.07
Quick ratio	1726	1.08	0.89	0.74	0.16	4.92	377	1.12	0.94	0.71	0.16	4.92
Current ratio	1726	1.88	1.63	0.96	0.57	6.02	377	1.97	1.71	0.94	0.58	6.02
PPE-to-assets	1726	0.42	0.40	0.18	0.06	0.81	377	0.41	0.39	0.16	0.06	0.81
Q-ratio	1726	1.12	0.88	0.78	0.15	4.58	377	1.22	0.99	0.83	0.15	4.58
R&D-to-sales	1726	0.02	0.01	0.03	0	0.16	377	0.03	0.02	0.04	0	0.16
Advertising-to-sales	1726	0.02	0	0.03	0	0.16	377	0.02	0.01	0.03	0	0.16
Computer Industry	1726	0.04	0	0.19	0	1	377	0.07	0	0.25	0	1
Semiconductor Industry	1726	0.02	0	0.14	0	1	377	0.03	0	0.16	0	1
Chemicals and Allied Products Industry	1726	0.14	0	0.35	0	1	377	0.21	0	0.41	0	1
Aircraft and Guided Space Vehicles Industry	1726	0.02	0	0.13	0	1	377	0.02	0	0.14	0	1
Other Sensitive Industries	1726	0.19	0	0.39	0	1	377	0.15	0	0.35	0	1

Panel C. CEO Variables

CEO Vested Options are the CEO's holdings of options that are exercisable within 6 months of the beginning of the year, as a percentage of common shares outstanding and multiplied by 10 (so that the mean is roughly comparable to CEO Stock Ownership).

	Full Sample						Longholder Sample					
	Number of CEOs = 498						Number of CEOs = 58					
Variable	Obs.	Mean	Median	SD	Min.	Max.	Obs.	Mean	Median	SD	Min.	Max.
Age	2384	57.77	58	7.16	32	84	2384	57.77	58	7.16	32	84
Tenure	2364	8.83	6	7.69	1	45	2364	8.83	6	7.69	1	45
CEO Stock Ownership	2385	0.03	0.00	0.08	0	0.95	2385	0.03	0.00	0.08	0	0.95
CEO Vested Options	2385	0.03	0.01	0.14	0	4.63	2385	0.03	0.01	0.14	0	4.63

Table 2. Public Security Issuance Decisions

Longholder is a binary variable, equal to 1 if the CEO, at some point during his tenure, held an option package until the last year before expiration, provided that the package was at least 40% in the money entering its last year. Post-Longholder is a dummy, equal to 1 for all CEO-years after the CEO for the first time holds options to expiration. Pre-Longholder is 1 minus Post-Longholder. Holder 67 is a dummy equal to 1 for all CEO years after the CEO for the first time fails to exercise a 67% in the money option with 5 years remaining duration. In the Holder 67 regressions, the sample is limited to CEO years after the CEO for the first time had a 67% in the money option with 5 years remaining duration. TOTALconfident is a dummy variable equal to 1 when the number of "confident" and "optimistic" mentions for a CEO in the LexisNexis and Wall Street Journal searches exceeds the number of "not confident", "not optimistic", and "reliable, cautious, practical, conservative, steady, frugal" mentions. TOTALmentions is the total number of articles mentioning the CEO in both sets of searches. Both dummies consider all articles over the sample period up to the previous year.
Data on public issues is from the SDC. There are 330 firms. Equity issues are issues of common stock or non-convertible preferred stock. Debt issues are issues of non-convertible debt. Hybrid issues are issues of convertible debt or convertible preferred stock. US. Rule 144A issues are included. Standard errors are adjusted for clustering at the firm level.

	Years with a Security Issue	% of Issue Years with an Equity Issue	% of Issue Years with a Debt Issue	% of Issue Years with a Hybrid Security Issue
Longholder = 0	621	42%	57%	16%
Longholder = 1	141	31%	63%	19%
Pre-Longholder = 1	91	31%	63%	23%
Post-Longholder = 1	50	32%	64%	12%
Difference t (Longholder = 0 - Longholder = 1)		2.03**	0.85	0.85
Holder 67 = 0	95	39%	65%	21%
Holder 67 = 1	182	23%	73%	16%
Difference t		3.12***	1.18	1.04
TOTALconfident = 0	452	48%	47%	18%
TOTALconfident = 1	214	25%	79%	14%
Difference t		5.37***	6.77***	1.43

Table 3. Equity Issuance Logits

The sample consists of all firm years in which the firm did at least one public security issue. The dependent variable is binary and equals 1 if the firm issued equity during the fiscal year, where equity issues are SDC issues of common equity or non-convertible preferred stock. CEO Vested Options are the CEO's holdings of options that are exercisable within 6 months of the beginning of the year, as a percentage of common shares outstanding and multiplied by 10 (so that the mean is roughly comparable to CEO Stock Ownership). Profitability is operating income before depreciation normalized by beginning of the year assets. Tangibility is property, plants, and equipment, normalized by beginning of the year assets. Q is the market value of assets over the book value of assets, where market value of assets is the book value of assets plust market equity minus book equity. Book leverage is the sum of debt in current liabilities and long term debt divided by the sum of the numerator and common equity. We exclude observations in which book leverage is negative or greater than 1.

Stock, Vested Options, ln(Sales), Q, Profitability, Tangibility, and Book Leverage are measured at the beginning of the fiscal year. Longholder is a binary variable where 1 signifies that the CEO at some point during his tenure held an option package until the last year before expiration, provided that the package was at least 40% in the money entering its last year. All standard errors are adjusted for clustering at the firm level.

	Logit (1)	Logit (2)	Logit (3)	Logit (4)	Logit (5)
Longholder	-0.469	-0.592	-0.534	-0.46	-0.457
	(1.94)*	(2.34)**	(2.10)**	(1.80)*	(1.66)*
CEO Stock Ownership		-0.266	-0.996	-1.279	-0.655
		(0.16)	(0.59)	(0.72)	(0.34)
CEO Vested Options		6.766	4.669	4.234	7.328
		(3.43)***	(2.21)**	(2.14)**	(3.05)***
ln(Sales)			-0.414	-0.437	-0.355
			(3.79)***	(3.70)***	(2.84)***
Q			-0.088	-0.074	0.139
			(0.68)	(0.56)	(1.00)
Profitability			-1.872	-1.493	-2.463
			(1.53)	(1.21)	(1.74)*
Tangibility			0.139	0.088	0.113
			(0.30)	(0.19)	(0.23)
Book Leverage				0.651	1.288
				(1.14)	(2.07)**
Year Fixed Effects					X
Observations	762	644	627	617	617
Number of Firms	330	174	171	171	171

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

Table 4. Longholder and Financing Deficits

The dependent variable is net debt issues normalized by beginning of the year assets, where net debt issues are long term debt issuance minus long term debt reduction. Net financing deficit is cash dividends plus net investment plus change in working capital minus cash flow after interest and taxes. Net investment is capital expenditures plus increase in investments plus acquisitions plus other uses of funds minus sale of PPE minus sale of investment. Change in working capital is change in operating working capital plus change in cash and cash equivalents plus change in current debt. Cash flow after interest and taxes is income before extraordinary items plus depreciation and amortization plus extraordinary items and discontinued operations plus deferred taxes plus equity in net loss (earnings) plus other funds from operations plus gain (loss) from sales of PPE and other investments. Profitability is operating income before depreciation normalized by beginning of the year assets. Tangibility is property, plants, and equipment, normalized by beginning of the year assets.

Q is the market value of assets over the book value of assets, where market value of assets is the book value of assets plust market equity minus book equity. Book leverage is debt in current liabilities plus long term debt divided by the quantity debt in current liabilities plus long term debt plus common equity and is measured at the beginning of the year. Δ denotes one year changes. CEO Vested Options are the CEO's holdings of options that are exercisable within 6 months of the beginning of the year, as a percentage of common shares outstanding and multiplied by 10 (so that the mean is roughly comparable to CEO Stock Ownership). Longholder is a binary variable where 1 signifies that the CEO at some point during his tenure held an option package until the last year before expiration, provided that the package was at least 40% in the money entering its last year. All standard errors are adjusted for clustering at the firm level.

	OLS	OLS	OLS	OLS	OLS	OLS
	(1)	(2)	(3)	(4)	(5)	(6)
Net Financing Deficit (FD)	0.729					
	(9.90)***					
Longholder		-0.006	-0.005	-0.008	-0.008	-0.005
		(1.43)	(1.37)	(1.95)*	(2.03)**	(1.43)
Longholder * FD		0.350	0.348	0.332	0.322	0.334
		(1.78)*	(1.77)*	(1.77)*	(1.69)*	(1.90)*
CEO Stock Ownership			0.015	0.015	0.014	0.010
			(0.87)	(0.90)	(0.85)	(0.76)
CEO Vested Options			-0.025	-0.021	0.000	0.011
			(1.49)	(1.15)	(0.00)	(0.52)
Stock * FD			0.373	0.431	0.370	0.348
			(2.30)**	(2.63)***	(2.14)**	(2.17)**
Vested Option * FD			-0.088	-0.098	-0.135	-0.156
			(3.21)***	(3.59)***	(3.06)***	(3.76)***
Δ ln(Sales)					-0.009	-0.012
					(0.80)	(1.11)
Δ ln(Sales) * FD					0.045	0.025
					(0.30)	(0.21)
Δ Q					-0.009	-0.008
					(2.60)***	(2.34)**
Δ Q * FD					-0.046	-0.046
					(3.32)***	(3.00)***
Δ Profitability					-0.022	-0.032
					(0.81)	(1.26)
Δ Profitability * FD					0.054	0.147
					(0.22)	(0.61)
Δ Tangibility					0.009	0.002
					(0.54)	(0.15)
Δ Tangibility * FD					-0.011	-0.067
					(0.09)	(0.55)
Book Leverage						-0.096
						(5.98)***
Book Leverage * FD						-0.129
						(0.54)
Firm Fixed Effects		X	X	X	X	X
Year Fixed Effects				X	X	X
Firm Fixed Effects * FD		X	X	X	X	X
Observations	2385	2385	2385	2385	2385	2346
Number of Firms	263	263	263	263	263	262
R-squared	0.75	0.93	0.93	0.94	0.94	0.94

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

Table 5. Overconfidence, Kink and Cash on Hand (Tobits)

The dependent variable is the "kink" variable of Graham (2000). Kink is the amount of interest at which the marginal benefit function starts to slope down, as a proportion of actual interest expense. Longholder is a binary variable, equal to 1 if the CEO, at some point during his tenure, held an option package until the last year before expiration, provided that the package was at least 40% in the money entering its last year. CEO Stock Ownership is the percentage of company stock owned by the CEO and his immediate family at the beginning of the year. CEO Vested Options are the CEO's holdings of options that are exercisable within 6 months of the beginning of the year, as a percentage of common shares outstanding and multiplied by 10 (so that the mean is roughly comparable to CEO Stock Ownership).

No Dividend, Negative Owners' Equity, and NOL Carryforward are dummy variables, where NOL means net operating loss. ECOST is the product of (1) the standard deviation of the first difference in taxable earnings divided by assets and (2) the sum of advertising, research, and development expenses divided bysales. CYCLICAL is the standard deviation of operating earnings divided by mean assets first calculated for each firm, then averaged for each two-digit SIC code. Return on Assets is income before extraordinary items plus depreciation, divided by assets. Z-Score is 3.3 times the difference of operating income before depreciation and depreciation plus sales plus 1.4 times retained earnings plus 1.2 times working capital (balance sheet), divided by assets. Quick Ratio is the sum of cash and short-term investments and total receivables divided by total current liabilities. Current Ratio is total current assets, divided by total current liabilities.

Q-Ratio is preferred stock plus market value of common equity plus net short-term liabilities, divided by assets. R&D-to-Sales and Advertising-to-Sales are set to 0 when the numerator is missing. Industry Fixed Effects are the kink-regression industry dummies of Graham (2000); see Table 1, Panel B. Low Cash Status is a dummy variable, equal to 1 if the firm's cash stock at the beginning of the year, divided by mean industry investment, is at or below the 40th percentile in our sample. Mean industry investment is calculated separately for each year and each of 12 Fama-French industry. (See Table 1, Panel A.) All standard errors are adjusted for clustering at the firm level. The tobit regressions account for two-sided censoring of the kink variable at 0 and 8.

	(1)	(2)	(3)	(4)
Longholder	1.122	1.256	0.605	0.852
	(1.75)*	(1.94)*	(1.72)*	(2.25)**
CEO Stock Ownership		3.369	-1.049	-0.956
		(1.01)	(0.47)	(0.43)
CEO Vested Options		-3.025	-3.170	-2.974
		(0.70)	(2.05)**	(1.91)*
No Dividend			-1.068	-1.020
			(3.12)***	(3.00)***
Negative Owners' Equity			0.374	0.339
			(0.85)	(0.73)
NOL Carryforward			-0.959	-0.952
			(3.55)***	(3.56)***
ECOST			-0.285	-0.287
			(3.71)***	(3.75)***
CYCLICAL			-8.297	-8.443
			(1.24)	(1.28)
Return on Assets			21.405	21.271
			(6.26)***	(6.33)***
ln(Sales)			-0.537	-0.600
			(3.33)***	(3.61)***
Z-Score			0.404	0.409
			(2.26)**	(2.38)**
Quick Ratio			0.421	0.344
			(1.05)	(0.87)
Current Ratio			0.597	0.627
			(1.75)*	(1.85)*
PPE-to-Assets			-0.729	-0.722
			(0.83)	(0.82)
Q-Ratio			1.123	1.113
			(4.70)***	(4.69)***
R&D-to-Sales			20.527	20.506
			(2.54)**	(2.54)**
Advertising-to-Sales			20.100	19.496
			(3.28)***	(3.12)***
Low Cash Status				-0.123
				(0.59)
Longholder * (Low Cash Status)				-0.654
				(1.24)
Industry Fixed Effects			X	X
Observations	1726	1726	1726	1725
Number of Firms	189	189	189	189

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

Table 6. Overconfidence, Kink and Cash on Hand (Logits)

The dependent variable is binary and equal to 1 when the "kink" variable of Graham (2000) is greater than 1. Kink is the amount of interest at the point where the marginal benefit function becomes downward sloping, as a proportion of actual interest expense. Longholder is a binary variable, equal to 1 if the CEO, at some point during his tenure, held an option package until the last year before expiration, provided that the package was at least 40% in the money entering its last year. CEO Stock Ownership is the percentage of company stock owned by the CEO and his immediate family at the beginning of the year. CEO Vested Options are the CEO's holdings of options that are exercisable within 6 months of the beginning of the year, as a percentage of common shares outstanding and multiplied by 10 (so that the mean is roughly comparable to CEO Stock Ownership). No Dividend, Negative Owners' Equity, and NOL Carryforward are dummy variables, where NOL means net operating loss.

ECOST is the product of (1) the standard deviation of the first difference in taxable earnings divided by assets and (2) the sum of advertising, research, and development expenses divided by sales. Return on Assets is income before extraordinary items plus depreciation, divided by assets. Z-Score is 3.3 times the difference of operating income before depreciation and depreciation plus sales plus 1.4 times retained earnings plus 1.2 times working capital (balance sheet), divided by assets. Quick Ratio is the sum of cash and short-term investments and total receivables divided by total current liabilities. Current Ratio is total current assets, divided by total current liabilities. Q-Ratio is preferred stock plus market value of common equity plus net short-term liabilities, divided by assets. R&D-to-Sales and Advertising-to-Sales are set to 0 when the numerator is missing.

CYCLICAL is the standard deviation of operating earnings divided by mean assets first calculated for each firm, then averaged across firms within two-digit SIC codes. Low Cash Status is a dummy variable and equal to 1 if the firm's cash stock at the beginning of the year, divided by mean industry investment, is at or below the 40th percentile in our sample. Mean industry investment is calculated separately for each year and each of the 12 Fama-French industries. (See Table 1, Panel A.) Industry Fixed Effects are the kink-regression industry dummies as in Graham (2000); see Table 1, Panel B. All standard errors are adjusted for clustering at the firm level.

	(1)	(2)	(3)	(4)	(5)
Longholder	0.606	0.721	0.552	0.836	1.116
	(1.59)	(1.79)*	(1.76)*	(2.04)**	(1.59)
CEO Stock Ownership		2.407	-0.443	-0.452	8.318
		(0.98)	(0.33)	(0.34)	(1.64)*
CEO Vested Option		-2.147	0.175	0.287	-4.591
		(1.79)*	(0.10)	(0.17)	(0.08)
No Dividend			-1.668	-1.585	-2.278
			(4.87)***	(4.76)***	(3.29)***
Negative Owners' Equity			-0.310	-0.145	1.043
			(0.54)	(0.27)	(1.61)
NOL Carryforward			-0.689	-0.700	-0.516
			(2.39)**	(2.43)**	(1.16)
ECOST			-0.141	-0.146	-0.201
			(1.63)	(1.67)*	(1.10)
Return on Assets			14.752	14.486	8.496
			(3.67)***	(3.61)***	(1.97)**
ln(sales)			-0.134	-0.175	-1.028
			(0.70)	(0.86)	(2.15)**
Z-score			1.176	1.218	2.605
			(3.40)***	(3.46)***	(2.96)***
Quick ratio			-0.205	-0.272	-0.402
			(0.36)	(0.47)	(0.60)
Current ratio			0.370	0.407	0.483
			(0.74)	(0.78)	(0.84)
PPE-to-Assets			0.338	0.412	-1.210
			(0.43)	(0.51)	(0.50)
Q-Ratio			0.661	0.683	-0.198
			(1.63)	(1.69)*	(0.31)
R&D-to-Sales			11.429	11.364	24.388
			(1.25)	(1.23)	(1.07)
Advertising-to-Sales			4.004	3.889	-6.617
			(0.60)	(0.57)	(0.56)
CYCLICAL			4.630	4.234	
			(0.51)	(0.47)	
Low Cash Status				-0.050	0.340
				(0.18)	(0.97)
Longholder * (Low Cash Status)				-0.659	-1.034
				(1.26)	(1.58)
Industry Fixed Effects			X	X	
Firm Fixed Effects					X
Observations	1726	1726	1726	1725	745
Number of Firms	189	189	189	189	75

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

Table 7. Distribution of Longholder CEOs' Net Equity Issues by Kink

The sample is all firm years in which Longholder equals 1. Longholder is a binary variable where 1 signifies that the CEO at some point during his tenure held an option package until the last year before expiration, provided that the package was at least 40% in the money entering its last year. Kink (Graham (2000)) is the amount of interest at the point where the marginal benefit function becomes downward sloping, as a proportion of actual interest expense. Net equity issues are sales of common stock minus stock repurchases and are normalized by beginning of the year assets.

	Kink ≤ 1	1 < Kink ≤ 3	3 < Kink ≤ 7	Kink ≥ 8
10th percentile	-0.00834	-0.02923	-0.02668	-0.05162
25th percentile	0.0000	-0.00003	-0.01055	-0.01286
50th percentile	0.00544	0.00180	0.0000	0.0000
75th percentile	0.04148	0.00629	0.00348	0.00794
90th percentile	0.09536	0.01733	0.02928	0.01685
Observations	37	110	111	96
Mean	0.02869	0.00600	0.00497	0.00352
Standard Deviation	0.06086	0.05291	0.08199	0.09174

Table 8. Leverage and Past Managerial Beliefs

For each firm, year 0 refers to the first year it appears in our sample and year T to the last. The dependent variable is book leverage in year T, where book leverage is the difference between assets and book equity divided by assets. Profitability is operating income before depreciation normalized by beginning of the year assets. Tangibility is property, plants, and equipment, normalized by beginning of the year assets. Q is the market value of assets over the book value of assets, where market value of assets is the book value of assets plust market equity minus book equity. Δ denotes changes, where the subscripts denotes the first and last year of the difference, respectively. TOTALconfident is a dummy variable equal to 1 when the number of "confident" and "optimistic" mentions for a CEO in the LexisNexis and Wall Street Journal searches exceeds the number of "not confident", "not optimistic", and "reliable, cautious, practical, conservative, steady, frugal" mentions. TOTALmentions is the total number of articles mentioning the CEO in both sets of searches. Both dummies consider all articles over the sample period up to the previous year. External finance weighted average Q is the average of Q between times 0 and T-1, weighted by the financing deficit.
Similarly, external finance weighted average TOTALconfident is the average of TOTALconfident between times 0 and T-1, weighted by the financing deficit and external finance weighted average TOTALmentions is the weighted average of TOTALmentions over the same time period. In all cases, negative financing deficits are set to 0 in constructing the weights.

	OLS (1)	OLS (2)	OLS (3)	OLS (4)	OLS (5)	OLS (6)	OLS (7)	OLS (8)
$\Delta_{t=0,T-1}$ Profitability	-0.003	0.008	-0.057	-0.054				
	(0.05)	(0.14)	(0.87)	(0.83)				
$\Delta_{t=0,T-1}$ Tangibility	-0.081	-0.091	-0.076	-0.080				
	(1.11)	(1.28)	(1.02)	(1.08)				
$\Delta_{t=0,T-1}$ ln(Sales)	-0.043	-0.047	-0.018	-0.017				
	(2.82)***	(3.17)***	(1.01)	(0.98)				
$\Delta_{t=0,T-1}$ Q	0.003	0.004	0.032	0.031				
	(0.24)	(0.34)	(1.88)*	(1.90)*				
Book Leverage$_{t=1}$	0.622	0.603	0.550	0.576				
	(6.62)***	(6.12)***	(5.82)***	(5.79)***				
Profitability$_{t=T-1}$					-0.676	-0.639	-0.586	-0.582
					(1.99)**	(1.92)*	(1.79)*	(1.77)*
Tangibility$_{t=T-1}$					-0.030	-0.027	-0.042	-0.038
					(0.46)	(0.42)	(0.66)	(0.60)
$Q_{t=T-1}$					-0.003	-0.006	0.029	0.028
					(0.10)	(0.22)	(1.13)	(1.12)
ln(Sales)$_{t=T-1}$					0.065	0.053	0.047	0.046
					(5.88)***	(4.06)***	(3.70)***	(3.75)***
TOTALconfident				0.055				-0.008
				(1.64)				(0.26)
TOTALmentions				0.000				0.000
				(1.48)				(1.68)*
External Finance Weighted Average Q			-0.058	-0.055			-0.063	-0.062
			(3.52)***	(3.42)***			(2.83)***	(2.77)***
External Finance Weighted Average TOTALconfident		0.152	0.150	0.101		0.092	0.107	0.11
		(2.91)***	(2.91)***	(1.71)*		(1.87)*	(2.19)**	(2.07)**
External Finance Weighted Average TOTALmentions		0.000	0.000	0.000		0.000	0.000	0.000
		(0.02)	(0.19)	(0.37)		(0.56)	(0.62)	(0.30)
Observations	268	268	268	268	268	268	268	268
R-squared	0.24	0.29	0.32	0.33	0.20	0.22	0.25	0.25

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