Overconfidence and Early-life Experiences: The Effect of Managerial Traits on Corporate Financial Policies

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ABSTRACT

We show that measurable managerial characteristics have significant explanatory power for corporate financing decisions. First, managers who believe that their firm is undervalued view external financing as overpriced, especially equity financing. Such overconfident managers use less external finance and, conditional on accessing external capital, issue less equity than their peers. Second, CEOs who grew up during the Great Depression are averse to debt and lean excessively on internal finance. Third, CEOs with military experience pursue more aggressive policies, including heightened leverage. Complementary measures of CEO traits based on press portrayals confirm the results.

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What are the primary determinants of firms' financing decisions? Traditional theories emphasize firm-, industry-, and market-level explanations, such as the trade-off between the tax deductibility of interest payments and bankruptcy costs, or asymmetric information between firms and the capital market (Miller (1977), Myers (1984), Myers and Majluf (1984)). These theories explain a significant portion of the observed variation in capital structure. Yet, recent research identifies firm-specific stickiness in capital structure that is not a clear prediction of the traditional theories (Lemmon, Roberts, and Zender (2008)). Moreover, while modern dynamic theories of optimal capital structure allow room for firms with similar fundamentals to operate away from a common target, the factors that predict these differences are less clear.

In this paper, we study the role of managerial traits in explaining the remaining variation. We consider both capital structure-relevant beliefs (overconfidence) and formative early-life experiences (Great Depression, military service). In contrast to prior literature on managerial fixed effects (Weisbach (1995), Chevalier and Ellison (1999), Bertrand and Schoar (2003), Frank and Goyal (2007)), we identify specific managerial characteristics, derive their implications for financial decisions, and measure their effects empirically. To avoid confounds with firm characteristics (e.g., due to the endogenous matching of CEOs to firms (Graham, Harvey, and Puri (2009))) we use a fixed effects estimation strategy where possible to compare CEOs with different traits operating the same firm.

First, we consider managers who overestimate their firms' future cash flows and hence believe that their firms are undervalued by the market. We show that such overconfident managers view external financing to be unduly costly and prefer to use cash or riskless debt. Conditional on having to raise risky external capital, they prefer debt to equity, since equity prices are more sensitive to differences in opinions about future cash flows. Unconditionally, however, their reluctance to access external financing may result in low levels of risky debt relative to available interest tax deductions (and even lower levels of equity).

Second, we consider variation in managers' personal histories that is likely to generate differences in their financial decision-making. Existing evidence suggests that individuals are most affected by seismic events early in life (see, for example, Elder (1998)). We identify two shocks that are likely to be formative experiences and that affect a significant portion of our sample CEOs early in life: growing up during the Great Depression and serving in the military. Experiencing the Great Depression induces less faith in external capital markets (Graham and Narasimhan (2004), Schoar (2007), Malmendier and Nagel (2011)). Depression CEOs therefore lean excessively on internal financing. Military service, and particularly combat exposure, during early adulthood have a lasting effect on veterans' life-choices and decision making (Elder (1986), Elder and Clipp (1989), Elder, Gimbel, and Ivie (1991)) and induce agressiveness or risk-taking. These traits may later manifest themselves in more aggressive capital structure choices.

We measure overconfidence using data on CEO option holdings. First, we use detailed data from large U.S. companies between 1980 and 1994 to identify CEOs who systematically maintain high personal exposure to company-specific risk. The CEOs in our data have a strong incentive to diversify their personal portfolios since they receive substantial equity-based compensation and the value of their human capital depends on firm performance. Yet, some CEOs hold nontradeable in-the-money executive stock options until expiration rather than exercise them after the vesting period. This delay in exercise, captured by the measure *Longholder* from Malmendier and Tate (2005, 2008), is not explained by insider knowledge, as it does not yield abnormal returns over a simple strategy of exercising and diversifying. A plausible interpretation is that these CEOs overestimate the means of their firms' future cash flows.[1] We address several alternative interpretations, including signaling and risk tolerance, and we separate years before and after a CEO first displays *Longholder* behavior (*Pre-* and *Post-Longholder*). As an alternative measure, we identify CEOs who do not exercise options that are highly in the money (67%) five years prior to expiration (*Holder 67*).[2] As a robustness check, we also construct analogous portfolio measures using CEO compensation and insider trading data from *Execucomp* and *Thomson Financial* from 1992 to 2007. Though data limitations preclude us from classifying CEOs with the same precision as in the earlier

sample, these measures confirm the generalizability of our key results to more recent data. Finally, as an alternative to our portfolio-based measures, we identify CEOs' beliefs based on their portrayal as "confident" or "optimistic" in the business press.

We measure Depression experience using birth years in the decade leading up to the Great Depression. We measure military experience based on hand-collected information from *Dun and Bradstreet* and *Who's Who in Finance and Industry*; we use information on service years to identify veterans of World War II, the Korean War, and the Vietnam War. As with overconfidence, we use press coverage to sharpen the interpretation of our measures. Here, we use press coverage as "cautious" or "conservative" (or in similar terms), which is positively correlated with membership in the Depression cohort but negatively correlated with military experience.

We relate our measures of overconfidence and formative past experiences to corporate financial policies. Using *SDC* data on security issuance, we find that overconfident CEOs are significantly less likely to issue equity conditional on accessing public markets. For example, *Longholder* CEOs issue equity in only 31% of the years in which they access public markets, compared to 42% among their peers. We find the same pattern using accounting data from *Compustat*, which includes private financing, and the financing deficit methodology of Shyam-Sunder and Myers (1999): *Longholder* CEOs raise roughly 35 cents more debt than rational predecessors or successors in the same firm to meet an additional dollar of external financing needs. The aversion of overconfident CEOs to equity is strong enough to have a cumulative effect on firm leverage, controlling for firm and year fixed effects: firms have significantly higher leverage ratios in years in which they employ overconfident CEOs.

We also test whether overconfident CEOs are generally more reluctant to access external capital markets, preferring instead to rely on internal sources of finance. While not a necessary implication, overconfidence offers a possible explanation for prior findings that, in general, firms do not issue enough debt. Using the kink methodology of Graham (2000), we find that overconfident CEOs are significantly more likely to underutilize debt relative to available tax benefits. At the same time, they do not abstain from issuing riskless debt, that is, debt with high S&P long-term credit ratings, for which there is no

disagreement about the appropriate interest rate. Moreover, the most debt-conservative overconfident CEOs are also equity-conservative: they are least likely to issue equity.

Turning to the role of formative past experiences, we find that Depression CEOs are also more prone to underutilize debt relative to its tax benefits than the average CEO. Further, they do not substitute equity for debt, confirming their preference to avoid public markets. CEOs with prior military service, instead, choose more aggressive capital structures, particularly those who served in World War II. Under their leadership, market leverage ratios are significantly higher than under their predecessors or successors in the same firm. The results on World War II veterans are particularly important since, due to the draft, they alleviate concerns about self-selection into service.

Our findings demonstrate the importance of managerial traits for financing decisions, both within and between firms. To the extent that managerial beliefs and the effect of past experiences are sticky, they can help to explain the strong firm fixed effects identified in the recent capital structure literature (Lemmon, Roberts, and Zender (2008)). Moreover, if unanticipated by the firm, the effect of CEO traits on financing decisions implies limitations in the ability of existing compensation contracts and governance mechanisms to perfectly align managerial preferences with those of diversified shareholders.

Our analysis uses identifiable traits of CEOs, but not of CFOs, for whom we do not have data on personal characteristics and portfolio choices.[3] As a result, our findings allow for two interpretations: (1) CEOs directly determine financing, or (2) CFOs determine financing, but their decisions are positively correlated with CEO traits (assortative matching). For the decisions considered in our analysis, it is likely that CEOs have the ultimate say. While CFOs first design financing decisions, the CEO alone can withdraw (or approve) a stock offering at the last moment or overrule the CFO and treasurer.[4]

Our findings relate to several strands of literature. Our analysis of overconfidence contributes to the literature linking biased managerial beliefs to corporate decisions, initiated by Roll (1986). In the context of financing, Heaton (2002) models a bias in the perceived probability of high cash flow, which affects both the first and the second moments of the perceived cash flow distribution. Similarly, Hackbarth (2008) models distortions to both the mean and the variance. Our approach differs by focusing on the

overestimation of mean future cash flows. Malmendier and Tate (2005) consider a similar model and show that investment by overconfident CEOs is more sensitive to cash flow, particularly in firms with low debt capacity.

Empirically, Graham and Harvey's (2001) CFO Outlook Survey suggests a direct role for biased managerial beliefs in financing choices. For example, in the second quarter of 1999, prior to the end of the technology bubble, roughly 70% of respondents state that their company stock is undervalued, and 67% say that misvaluation is an important factor in the decision to issue stock. Ben-David, Graham, and Harvey (2007) relate the miscalibration bias of CFOs revealed in such surveys to a wide range of corporate decisions, including corporate financing.

The psychology literature suggests that executives are particularly prone to exhibit overconfidence.[5] Possible reasons include sorting of high-confidence individuals into top positions (Goel and Thakor (2008)); self-attribution bias induced by past successes, such as those necessary to become CEO (Miller and Ross (1975), Billett and Qian (2008)); and illusion of control.[6]

Our results fill a critical gap in the overconfidence literature by directly linking CEO overconfidence to financing choices in large U.S. firms. Though preferences among different financing instruments are an implicit prediction in much of the literature,[7] to our knowledge this prediction remains untested using field data from corporations.

Our results on past experiences of CEOs (Great Depression, military service) build on research exploring the long-term effects of prior life experiences. Donaldson (1990) argues that corporate leaders who were young adults in the 1930s were "profoundly affected by the collapse of the capital markets during the Great Depression," leading them to be "deeply skeptical of the public capital markets as a reliable source of personal or corporate funding," and "to have an instinctive affinity for a strategy of self-sufficiency" (p. 125). Consistent with this view, Graham and Narasimhan (2004) find that Depression-era CEOs chose lower leverage in the 1940s than other CEOs. More broadly, Schoar (2007) shows that CEOs who start their career in a recession make more conservative capital structure choices, for example, choosing lower leverage and internal over external growth. Malmendier and Nagel (2011) find related

evidence that past economic shocks have a long-lasting effect on individual risk aversion and deter risky financial investment decisions such as stock market participation. A large medical and psychology literature examines the effect of military exposure on post-war behavior. Berkowitz and Lepage (1967) find that weapons are "aggression-eliciting stimuli," and Killgore et al. (2008) show that combat exposure increases risky behavior upon returning from deployment. Wansink, Payne, and van Ittersum (2008) provide evidence of higher risk-taking propensity among World War II veterans. Elder (1986), Elder and Clipp (1989), and Elder, Gimbel, and Ivie (1991) argue that the skills learned from combat make individuals more convinced that they can handle stressful and risky situations, resulting in less risk aversion and higher assertiveness.

We also provide a new angle on the older literature testing pecking-order and trade-off theories. 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 to argue in favor of the trade-off model. The analysis of managerial beliefs helps explain residual variation that is difficult to reconcile with either theory. For example, one important puzzle highlighted by Frank and Goyal (2003) is that "pecking-order behavior" best describes the capital structure choices of large firms. However, standard pecking-order theory relates such behavior to information asymmetries, from which large firms should suffer the least. Our analysis offers one explanation: biased beliefs of managers in large firms, whose past successes make them prone to overconfidence.

The remainder of the paper is organized as follows. In Section I, we derive empirical predictions linking managerial beliefs and past experiences to capital structure choices. Section II describes the data and the construction of our key variables. Section III describes our measures of overconfidence and early-life experiences. Section IV relates our measures to financing choices. Section V discusses alternative interpretations of our evidence and Section VI tests the robustness of our main results out-of-sample. Finally, Section VII concludes.

I. Testable Hypotheses

In this section we derive the capital structure implications of a specific set of empirically identifiable beliefs (overconfidence) and formative past experiences (Great Depression, military service); a formal model, which focuses on overconfidence, is presented in the Internet Appendix. To simplify the analysis, we allow for only two market imperfections: tax deductibility of interest payments and financial distress costs. In allowing for these two frictions, we do not take a stand on the relative merits of pecking-order versus trade-off theories, which are both complementary to the managerial effects studied here. The assumed frictions simply serve the purpose of fixing a unique optimal capital structure for a rational, value-maximizing CEO: the debt level that exactly trades off the marginal tax benefit of an additional dollar of debt against the marginal cost of financial distress (Miller (1977)). We then compare the decisions of CEOs with biased beliefs to this rational benchmark.

We define overconfidence as the overestimation of mean returns to investment. This overestimation implies that overconfident CEOs overinvest if they have sufficient internal funds or access to riskless debt financing. However, an overconfident CEO does not necessarily overinvest, and may even underinvest, if internal or riskless financing is insufficient for the desired investment. The reason is that overconfidence also implies a misperception of the cost of external financing: rational shareholders demand higher compensation for providing equity financing than the CEO deems appropriate. Likewise, rational creditors demand higher interest rates than the CEO believes are warranted as long as the CEO overestimates the cash flows in default states. Thus, overconfident CEOs tap risky external finance only if the overestimated investment returns are larger than the perceived financing costs.

When they do access external financing, overconfident CEOs generally perceive equity financing to be more mispriced than risky debt. In the case of equity financing, the difference in opinions between shareholders and the CEO about future cash flows matters for all states of the world. However, in the case of risky debt, the difference in opinions matters only for default states; the extent to which the CEO overestimates cash flows in the good states, above and beyond his debt obligations, is irrelevant to the

interest rate.[8] Thus, the equilibrium financing plan of an overconfident CEO will contain more risky debt than the trade-off equilibrium of a rational CEO with equal financing needs.

HYPOTHESIS 1. *Conditional on accessing external financing and for given financing needs, overconfident CEOs choose more debt financing, relative to equity, than rational CEOs.*

If, however, the (overestimated) cost of external finance exceeds (overestimated) investment returns, overconfident CEOs do not access external financing and invest only up to the limit of riskless debt finance, potentially underinvesting relative to a rational CEO. In a dynamic setting, an overconfident manager may accumulate spare riskless debt capacity in anticipation of future investments and maintain lower levels of outstanding debt than a rational CEO. Absent other frictions, a rational CEO does not retain cash inside the firm since external finance is fairly priced and cash holdings carry a tax disadvantage.[9] Thus, overconfidence can lead to debt levels that are too low relative to available tax benefits.

HYPOTHESIS 2. *Overconfident CEOs are more likely than other CEOs to issue debt conservatively relative to available tax benefits.*

In Table I, we summarize the empirical predictions of our analysis for four key capital structure outcomes: (1) the choice between public debt and equity issuance, (2) the choice to cover financing deficits using debt or equity, (3) outstanding debt relative to available interest tax deductions, and (4) market leverage. Note that the first two variables measure changes to the firm's capital structure from raising new capital while the latter two provide measures of the firm's aggregate indebtedness relative to different benchmarks.

Insert Table I here.

As summarized in Columns 1 and 2, the preference for debt over equity is a necessary implication of overconfidence under our baseline assumptions (Hypothesis 1). “Debt conservatism,” on the other hand,

is only a possible implication of overconfidence (Hypothesis 2; Column 3). Prior empirical work, however, finds that CEOs in large profitable firms appear to leave money on the table by choosing low debt levels (for example, Graham (2000)). Thus, overconfidence offers an explanation for an important empirical puzzle, and the range of parameters leading to debt conservatism may be empirically relevant.

Debt conservatism relative to available interest tax deductions can, but need not, imply low leverage, that is, low levels of debt relative to the sum of debt and equity. The reason is that overconfident CEOs are even more reluctant to issue equity than to raise debt. Figure 1 illustrates incremental financing choices for a rational CEO and an overconfident CEO that are consistent with this aggregate pattern.

Insert Figure 1 here.

In the example, the rational and overconfident CEOs have the same investment opportunities and financing needs, but the rational CEO uses less cash financing. In the context of our reduced-form model (in the Internet Appendix), this is consistent with both the rational CEO and the overconfident CEO implementing a fixed investment project of scale I but the overconfident CEO depleting more of his (higher) initial cash holdings. Alternatively, if the initial cash holdings (and cash financing) are equal, the overconfident CEO may still choose lower debt financing if she underinvests, that is, if the perceived costs of external finance exceed overestimated investment returns. Even in this case, the increment to leverage can be higher for the overconfident CEO since she is even more averse to equity issuance. Indeed, if Hypothesis 1 holds, then equity aversion will aggregate into higher market leverage over time for most of the parameter range (Column 4 of Table I).

We also consider predictable variation in CEOs' financing choices due to formative past experiences. Past experiences may affect behavior via two channels: changing beliefs or changing preferences. We do not formally model these effects and hence allow for both possibilities. Moreover, preferences or beliefs may be specific to the context of financing choices or may reflect more general attitudes about the self or world. To narrow the scope of our analysis and generate clear testable predictions, we require past experiences to satisfy three criteria: (1) they must be major events, (2) they must affect a significant

fraction of our sample CEOs, and (3) there must be clear existing evidence linking them to later-life preferences or beliefs.

We focus on two such experiences: the Great Depression and military service. Existing evidence suggests that Depression experience discourages individuals from participating in capital markets. We therefore expect to observe more debt conservatism (and equity conservatism) among Depression CEOs than among their peers. Unlike overconfident CEOs, who might also display debt conservatism, Depression CEOs do not overestimate the returns arising from hand-picked investment projects; they simply have a preference for self-sufficiency. Thus, while both Depression CEOs and overconfident CEOs may display debt conservatism, the mechanism is different. Depression CEOs underinvest to avoid risky capital, but do not overinvest in bad projects when cash rich.

HYPOTHESIS 3. *CEOs who experienced the Great Depression in early adulthood access risky capital markets more conservatively than other CEOs.*

Evidence from the psychology literature suggests that CEOs with a military background, especially those with battlefield experience, are likely to have a preference for more aggressive policies, or less risk aversion. Service in the U.S. armed forces during World War II in particular is likely to reinforce the connection between aggressiveness and success. Unlike overconfident CEOs, military CEOs do not necessarily overestimate returns from investment. They may invest and access external capital markets optimally, but choose to lever up their companies more aggressively than other CEOs.

HYPOTHESIS 4. *CEOs with a military background maintain higher leverage than other CEOs.*

The lower half of Table I summarizes the capital structure predictions for Depression CEOs and military CEOs that arise from Hypotheses 3 and 4.

II. Data

To measure CEO beliefs about future stock performance, we use several data sets with different sample periods. Our primary sample is the data on CEOs' personal investments from Hall and Liebman (1998) and Yermack (1995). The data detail the stock ownership and set of option packages – including exercise price, remaining duration, and number of underlying shares – for the CEOs of 477 publicly traded U.S. firms between 1980 and 1994, year by year. To be included in the sample, firms must appear at least four times on one of the *Forbes* magazine lists of largest U.S. companies between 1984 and 1994. The sample selection is important since Frank and Goyal (2003) find systematic differences between the financing choices of small and large companies. In Section VI, we extend our analysis to smaller firms and to more recent years using data from *Execucomp* and *Thomson Financial*.

We use data on CEO age to identify birth cohort; in particular, we identify CEOs born between 1920 and 1929 as Depression babies. We also supplement the portfolio data with hand-collected information on CEO military service from *Dun and Bradstreet (D&B)* and *Who's Who in Finance and Industry*. We classify CEOs as World War II veterans if the *Who's Who* or *D&B* entry specifically references World War II or if the term of service includes any years between 1941 and 1945. Similarly, we identify veterans of the Korean (1950 to 1953) and Vietnam (1965 to 1973) Wars.

As an alternative way to measure CEO characteristics, we use portrayals in the business press. We hand-collect annual data on the press coverage of 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 referring to the CEOs 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 determine whether they are negated. 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).

We merge these CEO-level data with *Thomson's SDC Platinum* data on U.S. new issues of common stock and convertible and nonconvertible debt and preferred stock, including U.S. Rule 144A issues. Alternatively, we use *Compustat* cash flow statement data to measure debt and equity issuance, including loans and other forms of private debt. Net debt issuance is the difference between long-term debt issuance (*dltis*) and long-term debt reduction (*dltr*). Net equity issuance is the difference between sales of common stock (*sstk*) and stock repurchases (*prstkc*). 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 and regulated utilities (SIC codes 6000 to 6999 and 4900 to 4999).

To measure financing needs, we construct the net financing deficit, that is, the amount the CEO has to raise through debt or equity issues in a given firm-year to cover expenditures:

$$FD_t = DIV_t + I_t + \Delta W_t - C_t,$$

where *DIV* is cash dividends; *I* is net investment (capital expenditures + increase in investments + acquisitions + other uses of funds - sale of property, plants and equipment (PPE) - sale of investment);[10] *ΔW* is the change in working capital (change in operating working capital + change in cash and cash equivalents + change in current debt);[11] and *C* is cash flow after interest and taxes (income before extraordinary items + depreciation and amortization + extraordinary items and discontinued operations + deferred taxes + equity in net loss (earnings) + other funds from operations + gain (loss) from sales of PPE and other investments).[12] All definitions follow Frank and Goyal (2003). We use the value of book assets (*at*) 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 book value of total assets (*at*) plus market equity minus book equity. Market equity is defined as common shares outstanding (*csho*) times fiscal year closing price (*prcc_f*). Book equity is calculated as stockholders' equity (*seq*) (or the first available of common equity (*ceq*) plus preferred stock par value (*pstk*) or total assets (*at*) minus

total liabilities (*lt*)) minus preferred stock liquidating value (*pstkl*) (or the first available of redemption value (*pstkrv*) or par value (*pstk*)) plus balance sheet deferred taxes and investment tax credit (*txditc*) when available minus post-retirement assets (*prba*) when available. Book value of assets is total assets (*at*).[13] We measure profitability as operating income before depreciation (*oibdp*) and asset tangibility as PPE (*ppent*). We normalize both variables using the book value of assets at the beginning of the fiscal year. Book leverage is the quantity debt in current liabilities (*dlc*) plus long-term debt (*dltt*) divided by the quantity debt in current liabilities (*dlc*) plus long-term debt (*dltt*) plus common equity (*ceq*). We measure market leverage by replacing common equity with market equity in the definition of book leverage.

Finally, we use the variable *kink*, provided by John Graham. The construction of this variable and the associated control variables are described in Graham (2000).[14] For each firm, *kink* is defined as the ratio of the hypothetical level of interest at which the expected marginal tax-shield benefits of debt start to fall (numerator) to the actual amount of interest paid (denominator). It captures the amount of additional debt the firm could issue before the marginal benefit of interest deductions begins to decline: when a firm is committed to low future interest payments, all of the interest payments are likely to be deducted from future profits, and the tax benefits are equal to the interest payment times the marginal corporate tax rate. As debt levels and future interest payments increase, it becomes increasingly likely that the company cannot generate enough profits to fully realize the interest tax shield. Consequently, the expected marginal tax benefit is decreasing when an additional dollar of interest payment is committed. Assuming that the marginal cost of debt intersects the downward-sloping portion of the marginal benefit curve, *kink* greater than one indicates that the firm has "left money on the table." The potential gain from adding debt increases with *kink*. In this sense, high-kink firms use debt more conservatively. Thus, *kink* provides a measure of the aggressiveness with which firms access debt markets that is comparable across firms and over time.

The left columns of Table II present summary statistics for our sample firms after excluding financial firms and utilities (263 firms).

Insert Table II here.

Panel A shows the *Compustat* data and the distribution across the 12 Fama and French industries.[15] Panel B summarizes the variable *kink* and the control variables used in the *kink* regressions. In the latter analysis, the sample is reduced to 189 firms due to missing values for the controls required in the *kink* analysis. Panel C summarizes CEO characteristics. CEOs' age, tenure, and ownership of stock and options generally serve as control variables; *Depression Baby* and *Military Experience* are our proxies for past formative experiences. In the baseline sample, the Depression indicator is equal to one for 40% of the firm-year observations. The subsample we use for our analysis of Depression effects requires the *kink* controls and consists of 343 CEOs, 132 of whom are Depression babies. In the baseline sample, CEOs are coded as having military experience in 22% of firm-years. Note that we limit the sample to CEOs for whom we were able to locate a *Who's Who* or *D&B* entry, resulting in a lower number of observations (1,617). The subsample consists of 285 CEOs, 64 of whom have served in the armed forces. This restriction should minimize measurement error, though selective reporting remains a possible source of bias.

III. Measuring Overconfidence and Formative Experiences

Our main approach to identify CEO overconfidence is to infer CEOs' beliefs about future stock performance from their decisions to hold nontradeable company stock options. This approach exploits CEOs' high exposure to the idiosyncratic risk of their companies: CEO compensation typically includes large grants of company stock and options. In addition, CEOs' human capital is invested in their firms, so that bad firm performance also reduces their outside options. In order to diversify, optimizing CEOs exercise their executive options early. The exact threshold for rational exercise depends on individual wealth, risk aversion, and diversification (Hall and Murphy (2002)). CEOs who overestimate future returns of their firms, however, may hold in-the-money options beyond the rational threshold in order to personally benefit from expected stock price appreciation. Malmendier and Tate (2008) translate this

logic into three measures of overconfidence using the Hall-Liebman-Yermack portfolio data. To begin, we construct the same measures, which allows us to interpret our results within the context of previous findings.

Longholder. The measure *Longholder* is an indicator for all CEOs who, at any point during the sample period, hold an option until the year of expiration even though the option is at least 40% in the money entering its final year. The exercise threshold of 40% corresponds to constant relative risk aversion of three and 67% of wealth in company stock in the rational option exercise model of Hall and Murphy (2002). Note that *Longholder* is a managerial fixed effect. The remaining measures allow for within-CEO variation.

Pre- and Post-Longholder. The measure *Post-Longholder* is an indicator equal to one only after the CEO for the first time holds an option until expiration, provided it exceeds the 40% threshold. This measure allows us to isolate financing decisions after the CEO has revealed his confidence level. The measure *Pre-Longholder* is equal to one for the other years in which *Longholder* is equal to one.

Holder 67. We consider option holdings with five years remaining duration. Maintaining our prior assumptions on risk aversion and diversification, the new exercise threshold in the Hall-Murphy framework is 67% in the money. The measure *Holder 67* is binary and is set equal to one once a CEO fails to exercise options with five years remaining duration despite a stock price increase of at least 67% since the grant date. We restrict the comparison group to CEOs who face this exercise decision but choose to exercise rather than hold. A CEO enters the sample once he has an option with five years remaining duration that is at least 67% in the money.

Our second approach to measure CEO overconfidence uses the perception of outsiders, as captured by CEO characterizations in the business press, instead of beliefs revealed by direct CEO choices. Our press data, described in Section II, provides the year-by-year number of articles that refer to each sample CEO. We construct an indicator of CEO confidence that compares the number of past articles using the terms

(a) "confident" or "confidence" or (b) "optimistic" or "optimism" to the number of past articles that portray the CEO as (c) not "confident," (d) not "optimistic," or (e) "reliable," "cautious," "conservative," "practical," "frugal," or "steady" (*i* denotes the CEO):

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

We only use past media portrayal to ensure that financing policies do not affect the indicator directly. We also hand-check the context of the individual articles and find that few focus on financial policies: among the 960 articles that are primarily about the firm, 53% focus on company earnings, 17% on mergers, and fewer than 5% on financial policy. We also address possible bias due to differential coverage. If, for example, there were a press bias towards positive news stories, CEOs who are often in the press would be more likely to have *TOTALconfident* equal to one. To address this possibility, we control for the total number of articles in the selected publications, aggregated over the same period as the *TOTALconfident* measure.

In the right half of Table II, we show firm and CEO summary statistics for the subsample of *Longholder* firm-years. The firm characteristics are quite similar to those of the overall sample. The differences in means between firm-years with and without *Longholder* CEOs are typically statistically insignificant, adjusting errors for firm-level clustering. The lone exception is profitability (0.18 versus 0.21), for which we control in our regressions. In the lower part of Panel A, we see that overconfident CEOs are distributed more or less proportionally across industries, though they are overrepresented in the *Chemicals and Allied Products* and the *Business Equipment* industries, and somewhat underrepresented in *Energy* and *Telecommunication*. Panel B reveals that overconfident CEOs have higher kinks and, using the Graham (2000) industry indicators, appear to be somewhat overrepresented in the *Computer Industry*. In Panel C, we see that overconfident CEOs have significantly longer tenures, with a mean of 11 years compared to nine years in the full sample. They hold significantly less company stock, but more options

than other CEOs. They are also more likely both to have served in the military and to be members of the Great Depression cohort. The sample characteristics are similar using the other measures of overconfidence. Moreover, the overconfidence measures are all positively and significantly correlated with each other: the pairwise correlations between *Longholder* and *Holder 67*, *Pre-Longholder*, *Post-Longholder*, and *TOTALconfident*, respectively, are 0.42, 0.76, 0.58, and 0.09. In our regression analyses, we focus on the *Longholder* measure. However, we report differences in our results across measures in the text.

In Table III, we report the pairwise correlations between several firm and CEO characteristics and our two measures of formative past experiences, *Depression Baby* and *Military Experience*.

Insert Table III here.

Depression Baby CEOs have significantly higher levels of Graham's *kink*, indicating that they access debt markets conservatively. They are also significantly less likely than other CEOs to issue equity, conditional on accessing public securities markets. Military CEOs, on the other hand, do not show any aversion to debt markets and are significantly more likely to issue equity, conditional on accessing public markets. They also appear to have higher leverage, though the correlation is not statistically significant. The directions of the effects are consistent with military experience as a proxy for (overly) aggressive beliefs and early-life experience during the Great Depression as a proxy for conservatism. It is also interesting, in light of our hypotheses, that military CEOs are significantly more likely to make acquisitions (and have worse operating performance).[16] However, there is no correlation between the Depression cohort and merger frequency and a positive relation with *ROA*.

As a final step, we check whether our findings on Depression and military CEOs are consistent with outsiders' perceptions of these CEOs. Mirroring our analysis of overconfidence, we use CEOs' portrayal in the business press and the press data described in Section II. Individuals who experienced the Great Depression early in life have a preference for self-sufficiency and conservative financing choices. These preferences are likely to manifest themselves more generally in a conservative leadership style. Consistent

with this story, we find a positive and significant correlation between coverage in the business press as "cautious," "practical," "reliable," "conservative," "frugal," or "steady" (variable *TOTALcautious*) and membership in the Depression cohort. Military exposure instead induces aggressiveness and risk tolerance. Indeed, we find that military service has a significant negative correlation with *TOTALcautious*. We also test these correlations in a regression framework, controlling for differential press coverage and CEO age. Despite the imprecision of the measures, the direction of the effects remains the same, though only the negative correlation between *TOTALcautious* and military service remains statistically significant.

Finally, we compare our two press measures: *TOTALcautious* and *TOTALconfident*. Because both measures require coverage of the CEO in the press, they have a significant positive pairwise correlation. However, regressing *TOTALcautious* on *TOTALconfident* controlling for total mentions in the press reveals the expected negative relation.

IV. Managerial Traits and Capital Structure Choices

A. Debt vs. Equity

Next, we test the capital structure predictions of differences in CEO traits. We begin with the choice between debt and equity. Here, only the overconfidence model makes a prediction (see Table I). Overconfident managers are reluctant to issue equity because they believe that it dilutes the claims of existing shareholders. They are also reluctant to issue risky debt because they believe that the interest rate creditors demand is too high given the distribution of future returns. On the other hand, they overestimate their financing needs because they overestimate returns to investment. Thus, overconfident CEOs may access public markets with higher or lower baseline frequencies. Conditional on accessing external financing, however, overconfident CEOs generally prefer debt to equity since debt allows current shareholders to remain the residual claimant on the firm's future cash flows. Thus, we test whether, conditional on accessing public securities markets, overconfident CEOs are less likely to issue equity.

Specification 1: Public Issues. Panel A of Table IV presents the frequencies of equity and debt issues, conditional on conducting a public issue.[17] Equity issues are issues of common or preferred stock, and debt issues are issues of nonconvertible debt. Years with both a debt and an equity issue count in both categories.

Insert Table IV here.

We find that equity issues are less frequent for overconfident CEOs under all measures. For *Longholder* CEOs, 31% of firm-years with public issues contain at least one equity issue. This percentage is virtually constant across *Pre-* and *Post-Longholder* years. When *Longholder* is zero, 42% of issue years contain an equity issue. The difference is statistically significant at the 5% level, where standard errors are adjusted for firm-level clustering. The results are stronger economically and statistically using the *Holder 67* and *TOTALconfident* measures: *Holder 67* CEOs issue equity 23% of the time, but CEOs in the comparison group issue equity 39% of the time, and *TOTALconfident* CEOs issue equity 25% of the time, but CEOs for whom *TOTALconfident* is zero issue equity 48% of the time. For both measures, the differences are significant at the 1% level, again adjusted for firm-level clustering. Overconfident CEOs also issue debt at a higher frequency than other CEOs under all measures. However, the difference is statistically significant only using the *TOTALconfident* measure. There are no significant differences for hybrid securities.

We test whether these cross-sectional patterns are robust to the inclusion of CEO- and firm-level controls. Panel B of Table IV presents a logit model, which uses an indicator for "at least one equity issue during the fiscal year" as the dependent variable. We first run a baseline logit with *Longholder* as the only explanatory variable (Column 1). We then add portfolio controls for the incentive effects of performance-based compensation: the percentage of company stock and the number of vested options held by the CEO (Column 2). Options are scaled by shares outstanding and multiplied by 10 so that the mean is comparable to the mean of stock holdings. In Column 3, we add the standard firm controls from the capital structure literature – the natural logarithm of sales, profitability, tangibility, and Q – to capture the effects of known cross-sectional determinants of changes in leverage (Rajan and Zingales (1995)). In

Column 4, we add book leverage to capture systematic differences in the ability to access debt markets, due, for example, to covenants on existing debt contracts.[18] We then add year effects to control for the possibility that overconfident CEO-years are disproportionately clustered in cold markets for equity issuance (Column 5). Finally, in Column 6 we include the full set of firm-level controls and industry dummies from Graham (2000) as an alternative way to capture traditional capital structure determinants. These controls (described in Panel B of Table II) include the binary indicators *No Dividend*, *Negative Owners' Equity*, and *Net-Operating-Loss Carryforwards* and five industry groupings, as well as continuous measures for firm size, expected cost of financial distress (*ECOST*), cyclicality of operating earnings, return on assets, z-score, current and quick ratios, R&D and advertising expenditures, and *Q*. All controls are measured at the beginning of the fiscal year. All standard errors are adjusted for firm-level clustering.

The results confirm the pattern in the raw data. Across all specifications, *Longholder* CEOs are 37% to 49% less likely than their peers to issue equity. The estimated effects are significant at the 5% or 10% levels. Among the CEO controls, vested option holdings increase the odds of issuing equity, though the large coefficient estimate is driven by five outlier observations in the upper tail of the distribution. Eliminating those observations substantially decreases the coefficient without affecting the *Longholder* coefficient. Among the standard firm controls, only sales are consistently significant. Smaller firms are more likely to issue equity. Surprisingly, *Q* does not seem to positively predict equity issues. As a robustness check, we control for stock returns over the prior year. We verify that past returns predict significantly higher equity issuance without materially affecting the *Longholder* estimate. In the specification with kink controls, firms that do not pay dividends and have more cyclical earnings appear to issue more equity, while firms with higher R&D expenditures issue less.

We also consider the robustness of the results to alternative sets of controls. For example, we re-estimate the regression using the available controls from Gomes and Phillips (2007).[19] Missing *I/B/E/S* data requires that we drop observations prior to 1984. However, even in the roughly 40% smaller sample, we find qualitatively similar, though statistically insignificant, results (*Longholder* coefficient = -0.395; *p*-

value = 0.188). Likewise, including changes in sales, *Q*, profitability, or tangibility either in addition to or in lieu of the levels has little effect on the results. We also find similar results using the *Holder 67* and *TOTALconfident* measures. The measured effect on equity issuance is statistically and economically stronger than the *Longholder* results in all cases but one. 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, as in Panel A, we do not find consistently significant results when we use either debt or hybrid issuance as the dependent variable.

Overall, CEOs that we classify as overconfident are less likely to issue equity conditional on accessing public securities markets, controlling for standard determinants of issuance decisions.

Specification 2: Financing Deficit. We repeat the test in the standard "financing deficit framework" of Shyam-Sunder and Myers (1999). The financing deficit measures the amount of expenditures requiring external finance. We test whether overconfident CEOs cover more of their financing deficits using debt than other CEOs. This approach is analogous to testing for fewer equity issues conditional on issuing any public security in Specification 1 above, but adds bank loans and other private sources of financing to the analysis and focuses on the amount of finance raised rather than the frequency with which it is raised. It also uses data from cash flow statements and hence allows us to use the full sample of firm-years rather than only years with a public security issuance. One immediate advantage of the larger sample is that we can include firm fixed effects, that is, identify the effect of overconfidence separately from time-invariant firm effects.

Note that overconfident CEOs may raise more funds than rational CEOs (since they overestimate the returns to investment) or less funds (since they perceive external financing to be overpriced). Thus, rather than asking whether overconfident CEOs raise more dollars of debt or fewer dollars of equity than their peers, the appropriate test is whether the mix of external finance depends on overconfidence: whatever the determinants of the baseline relation between debt financing and the financing deficit, do overconfident

CEOs demonstrate a heightened preference for debt? As a result, our findings are unaffected by controversy over trade-off versus pecking-order explanations of financing deficit regressions.

We estimate the following regression specification:

$$Debt_{it} = \beta_1 + \beta_2 FD_{it} + X'_{it}B_3 + \beta_4 \Delta_{it} + FD_{it} \cdot X'_{it}B_5 + \beta_6 FD_{it} \cdot \Delta_{it} + \varepsilon_{it}, \quad (1)$$

where *Debt* is long-term debt issues minus long-term debt reduction (*Net Debt Issues*), normalized by beginning-of-year assets, *FD* denotes the financing deficit, as defined in Section II, Δ is the overconfidence proxy, and *X* includes CEO- and firm-level controls. At the CEO level, we control for stock ownership and vested options. At the firm level, we use the controls from Frank and Goyal (2003): book leverage and changes in profitability, tangibility, the natural logarithm of sales, and *Q*. All controls are included as level effects and interacted with *FD*. We also include firm fixed effects and their interactions with *FD*. The fixed effects allow us to separate effects that we attribute to the CEO from time-invariant firm effects. In the case of *Holder 67* and *TOTALconfident*, we also exploit variation between a CEO's overconfident and non-overconfident years. Finally, we include year effects to control for the effects of hot equity issuance markets. All standard errors account for firm-level clustering.

Table V presents the results using *Longholder* as the overconfidence proxy.

Insert Table V here.

For comparison to prior literature, Column 1 presents a baseline regression without fixed effects or controls. The coefficient of 0.729 on the financing deficit is very close to the effect estimated in Shyam-Sunder and Myers (1999), reflecting that our sample of large firms is more similar to their sample than to the Frank and Goyal (2003) sample.[20] In Column 2, we add *Longholder*, its interaction with the financing deficit, firm fixed effects, and the interactions of firm fixed effects with the financing deficit. We drop the level effect of the financing deficit when including interactions of the financing deficit with firm fixed effects to avoid collinearity. Including fixed effects and their interactions with the financing deficit means that we estimate separate intercepts and slopes for each individual firm. Our test identifies the effect of

overconfidence on the proportion of the financing deficit covered with debt using only variation that is not confounded by firm-specific effects. In our data, there are 35 firms in which we observe a change from an overconfident to a rational CEO, accounting for 371 of the 2,385 sample years. While a small portion of the overall variation in the data (consistent with the high value of R^2 in these regressions), this variation is also the cleanest to interpret. In Column 3, we add controls for CEO stock and option ownership, and in Column 4 year fixed effects. Finally, in Column 5 we add controls for changes in sales, *Q*, profitability, and tangibility and in Column 6 we add the lag of book leverage.[21]

Among the controls, deviations from (within-firm) average book leverage are negatively related to debt issues, consistent with leverage targeting. Above-average changes in *Q* predict less financing deficit covered with debt, consistent, for example, with market timing. More debt is used when CEOs have above average stock holdings, consistent with either incentive effects in the presence of positive information or overconfidence. Surprisingly, CEOs use significantly less debt when their option holdings are above average, though the economic magnitude is small (one to two cents less debt per $1 of financing deficit for a one-standard deviation increase in option holdings). In all specifications, *Longholders* use more debt than non-*Longholder* successors or predecessors in the same firm. The effect is significant at the 10% level and economically large, ranging from 32 to 35 cents more debt per $1 of financing deficit. At the mean of the annual financing deficit ($43m), the estimates imply $15m more in debt issuance.

The results using the *TOTALconfident* proxy are qualitatively similar, though weaker economically and statistically. We find no significant difference between the *Pre-* and *Post-Longholder* portions of the *Longholder* estimate and very little effect of *Holder 67*, perhaps due to reduced sample size. Overall, we confirm the findings from Specification 1 using the financing deficit framework with firm fixed effects.

B. Internal vs. External Finance

Overconfidence predicts not only a preference for debt over equity, but also for internal over external finance. A possible consequence is debt conservatism: even though overconfident CEOs choose debt over

equity when they access external capital markets, their preference is to forgo external markets altogether. If perceived financing costs dominate overestimated investment returns or if cash is abundant, they may not access those markets frequently enough to take full advantage of the tax benefits of debt. In other words, even if overconfident CEOs choose more debt relative to equity than rational CEOs, the level of debt chosen may still be conservative relative to available tax benefits.

Early-life experience during the Great Depression also predicts an aversion to external capital. However, unlike overconfidence, it does not predict misassessment of investment returns. Thus, debt conservatism is a necessary, not just possible, consequence.

To test these hypotheses, we use the *kink* variable of Graham (2000) to measure debt conservatism. The *kink* captures how much a firm could increase debt before the expected tax benefit begins to decline. Graham shows that, on average, firms leave money on the table by following excessively conservative debt policies. We test whether managerial traits explain a portion of the effect. We use the following regression specification:

$$Kink_{it} = \beta_1 + \beta_2 \Delta_{it} + X'_{it} B_3 + \varepsilon_{it}, \quad (2)$$

where Δ is the managerial trait of interest and X are firm- and CEO-level controls. We include the firm controls from Graham's original analysis, to ease comparison. We estimate tobit regressions because *kink* is artificially bounded between zero and eight. All standard errors are clustered at the firm level. The null hypothesis is that β_2 is zero; overconfidence and Depression experience predict $\beta_2 > 0$. Though these hypotheses are one-tailed, we report the results of two-tailed tests, resulting in a higher threshold for rejecting the null of no effect. We also test whether CEOs with high kinks simultaneously raise equity as a substitute for debt, which would falsify the overconfidence and Depression baby hypotheses: CEOs should be both debt- and equity-conservative.

In Table VI, Panel A, we present tobit estimates of model (2).

Insert Table VI here.

Column 1 shows a baseline regression of *kink* on *Longholder* without controls. Column 2 adds CEO-level controls and Column 3 adds the full set of firm-level controls and industry dummies from Graham (2000).[22] The large number of *kink* controls reduces the sample to only 189 firms. Among the controls, we find some evidence that more vested option holdings are associated with lower *kinks*. Of Graham's 19 firm-level and industry controls, 16 have qualitatively similar effects in his and our estimations. The exceptions are negative owners' equity, the natural log of sales, and advertising expense over sales, which have opposite signs.[23]

We find that *Longholder* CEOs have higher kinks across all three specifications. The coefficient estimates are significant at the 10% level and range from 0.647 to 1.256, representing a 16% to 32% increase in *kink* from its mean and an increase of 0.24 to 0.46 standard deviations.

In Columns 4 and 5, we provide parallel estimates substituting *Depression Baby* for *Longholder*. Column 4 presents the baseline regression without controls. Column 5 adds CEO age, CEO tenure, and the Graham (2000) controls. The CEO age control is particularly important in separating the effect of the Depression cohort from the effect of higher age.[24] We find that Depression babies have significantly higher levels of the *kink* variable. Economically, the 0.5053 increase in *kink* in Column 5 represents a 13% increase from the sample mean. Hence, the Depression effect is similar in magnitude to the overconfidence effect.

Finally, Column 6 shows a specification that includes both the *Longholder* overconfidence measure (and portfolio controls) and *Depression Baby*. This specification is important given the evidence in Table II that *Longholder* CEOs are more often Depression babies. We find nearly identical point estimates on both *Depression Baby* and *Longholder*, though the *Longholder* coefficient becomes marginally insignificant. Thus, Depression experience appears to induce a preference for self-sufficiency that is distinct from the effect of overconfidence.[25]

In Panel B, we test whether debt-conservative *Longholder* and *Depression Baby* CEOs are also equity-conservative – that is, issue less equity as their firms' kinks increase – consistent with a general aversion to external finance. We tabulate the distribution of net equity issues among *Longholder* CEOs and among

Depression Baby CEOs separately for four different levels of kink: (i) *kink* ≤1, (ii) 1< *kink* ≤3, (iii) 3< *kink* ≤7, and (iv) *kink* >7. We find that higher levels of *kink* are associated with less equity issuance. Both the mean and the median of net equity issuance decline monotonically in *kink*. For *Longholder* CEOs, the differences in mean equity issues between groups (i) and (ii) and groups (i) and (iii) have *p*-values of 0.016 and 0.052, respectively, with errors clustered at the firm level. The remaining cross-group differences are not statistically significant. For Depression CEOs, those with the highest values of the *kink* variable are actually net repurchasers of company equity, on average.[26] Thus, both *Longholder* and Depression CEOs who display debt conservatism also issue equity more conservatively, implying that they rely more on internal finance.[27]

We perform a number of robustness checks on this evidence. One shortcoming of the tobit analysis is that we cannot include firm fixed effects without biasing the coefficient estimates due to the incidental parameters problem. To address (uncontrolled) cross-sectional differences between firms with and without *Longholder* (or *Depression Baby*) CEOs, we replicate our findings in a conditional logit framework that uses only within-firm variation for identification and an indicator for *kink* > 1 as the dependent variable. Though we lose much of the information in the *kink* variable, our results are qualitatively similar. In the specification mirroring Column 3, we find an odds ratio of 2.23, meaning that *Longholder* CEOs have more than double the odds of having *kinks* exceeding one, though the estimate is not statistically significant. The *Depression Baby* estimate is less robust to the fixed effects specification. A possible explanation is a greater ease in matching CEO to firm preferences based on observable cohort effects than (ex ante) unobservable cognitive biases.

Unlike Depression babies, overconfident CEOs overestimate investment returns. They do not have a general aversion to external capital, but avoid risky capital only if (1) cash is abundant or (2) perceived costs exceed (overestimated) returns to investment. We take two additional steps to ensure that the measured aversion to debt among *Longholder* CEOs conforms to the full overconfidence hypothesis. First, we explore the effect of cash holdings on our estimates of the *Longholder* effect. We add the indicator *Low Cash Status* and its interaction with *Longholder* to the regression specification in Panel A,

Column 3, where *Low Cash Status* is equal to one 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 Fama-French industry shown in Panel A of Table II. We find no evidence of higher *kinks* among *Longholder* CEOs with low internal funds. Only *Longholder* CEOs with abundant cash have significantly higher kinks than rational CEOs. The statistical significance of the effect increases (p-value = 0.025). While the difference in kinks between *Longholders* with and without low cash is insignificant (p-value = 0.214), the result confirms that high kinks are not driven by CEOs who cannot use internal funds.

Second, we analyze the relation between *kink* and creditworthiness. The overconfidence hypothesis implies that debt aversion should not be found among firms with access to riskless debt financing, for which there is no disagreement about the appropriate interest rate. We use the S&P Long-Term Domestic Issuer Credit Rating to split the sample into thirds: firm-years with A+ ratings or better are in the highest third, and firm-years with BBB ratings or worse are in the lowest third. We drop firms with missing credit ratings. Repeating the tobit analysis of Table VI, Panel A, on each subsample, we find that the effect is concentrated in the middle third: the coefficients and p-values for *Longholder* in the Column 3 specification are 0.489 (0.32), 0.823 (0.018), and 0.412 (0.178) for low, middle, and high credit ratings. The lack of an effect among the highest-rated firms confirms that *Longholder* CEOs are not reluctant to raise (nearly) riskless debt. Moreover, the weak effect among the lowest-rated firms suggests that high *kinks* among *Longholder* CEOs are not an artifact of systematically worse credit ratings.

Finally, we re-estimate our regressions using the alternative proxies for overconfidence. We find similar results using *Holder 67* and little difference across the *Pre-* and *Post-Longholder* portions of the *Longholder* measure. However, *TOTALconfident* CEOs have lower kinks than other CEOs, though the result is not robust to the fixed effects logit specification. Given our earlier finding in Table III that only *TOTALconfident* CEOs are associated with a significantly higher probability of public debt issuance, one possible interpretation for the difference in results is that, among overconfident CEOs, the press is most

likely to identify those who demonstrate their beliefs by overinvesting, thereby requiring higher external finance.

C. Leverage

Recent research argues that there are large unexplained time-invariant effects in leverage (Lemmon, Roberts, and Zender (2008)). One interesting question is whether managerial traits, such as overconfidence, can explain these differences across firms: do differences in financing (or changes in leverage) accumulate into differences in capital structures (levels of leverage)? In the context of overconfidence, this is an empirical question since the theoretical prediction could go either way, depending on the relation between overestimated investment returns, cash holdings, and perceived financing costs. In the context of military experience, however, we have a clear prediction of higher leverage.

Unfortunately, it is difficult to assess causality in cross-sectional leverage regressions and, specifically, to determine whether the effect is due to the manager or to the firm. For example, firms that leverage more aggressively may also be attractive places for overconfident CEOs to work. Alternatively, overconfident CEOs may be attracted by the spare debt capacity in low leverage firms. In other words, selection effects might obscure the true effect of individual CEOs. In order to obtain identification, we follow an approach similar to Bertrand and Schoar (2003) and compare leverage under different CEOs operating the same firm. We estimate the following regression:

$$Leverage_{it} = \beta_1 + X'_{it}B_2 + \beta_3\Delta_{it} + \varepsilon_{it}, \quad (3)$$

where *Leverage* is end-of-fiscal-year market leverage, X is a vector of firm and CEO control variables, and Δ is the managerial trait of interest.

We begin by estimating two baseline regressions for comparison with existing literature. In Column 1 of Table VII, we estimate a pooled regression, including our standard set of firm-level controls: profitability, tangibility, size, *Q*, and the financing deficit. Standard errors are clustered at the firm level.

Insert Table VII here.

The controls explain 34% of the variation in leverage and have the typical directional effects: size (+), profitability (-), tangibility (+), *Q* (-), and financing deficit (+).[29] In Column 2, we add firm fixed effects. Consistent with Lemmon, Roberts, and Zender (2008), we find that adding firm effects more than doubles the R^2 of the regression. Among the controls, only tangibility loses explanatory power when estimated using within-firm variation.

Next, we test whether differences in managerial confidence levels can explain remaining within-firm variation in leverage. Adding *Longholder* (Column 3), we find that overconfident CEOs maintain significantly higher leverage than their predecessors or successors. The percentage of explained within-firm variation increases from 11% to 12%. The effect is robust to the inclusion of several important controls: In Column 4, we add five lags of stock returns to capture the effect of changes in stock prices on leverage ratios (Welch (2004))[30] and on option exercise. As expected, stock returns have a significantly negative effect on leverage. The effect decays in the length of the lag, with the fifth lag being insignificant. Including stock returns also eliminates the predictive power of *Q* while improving the R^2 of the regression. In Column 5, we add our standard CEO controls for stock and option holdings. If CEOs have private information, then these controls capture variation in CEOs' concern over diluting their personal equity stakes through new issues. We also add year effects and both CEO tenure and its interaction with *Longholder* to the regression. We find a negative coefficient on the interaction of tenure with *Longholder*, which may reflect learning – *Longholder* CEOs learn to issue risky capital more appropriately as their tenures increase – but may also reflect a tendency of *Longholder* CEOs to exhaust their firms' debt capacities early in their tenures and subsequently finance desired (over-)investment using equity.

The effect of *Longholder* on leverage is large. In the Column 4 specification, for example, replacing a rational CEO with an overconfident one increases firm leverage by 20% of a standard deviation or, alternatively, by 15% from its mean level. The true CEO effect may be even larger since we are

conservative in separating out time-invariant firm effects: some of the effects we attribute to the firm may actually reflect the influence of past and current CEOs. In particular, our estimates of β_3 do not exploit any information from firms with only a single (overconfident) CEO during our sample period; however, such long-tenured CEOs may have the largest effects on their firms' capital structures.

Next, we test whether CEOs with a military background pursue more aggressive financial policies. In Column 6, we find that military CEOs choose higher leverage than their predecessors or successors. Economically, the effect is smaller than the effect of overconfidence, increasing leverage by 17% of a standard deviation or, alternatively, by 13% from its mean. Statistically, the baseline effect of military experience is significant at the 10% level after clustering at the firm level. In Column 7, we add our standard set of firm-level controls – profitability, tangibility, firm size, *Q*, and the financing deficit – and the relevant CEO-level controls – age and tenure. The coefficient of past military service is virtually unaffected. In Column 8, we refine our measure of military experience by separating World War II veterans, who are more likely to have had combat exposure, from other military CEOs.[31] We find that the effect of military service on leverage choices comes primarily from World War II veterans. Among this group, the chosen leverage is 25% higher than the sample mean, and the difference relative to other military experience is significant at the 5% level. This result also helps to address the self-selection explanation, under which aggressive or risk-tolerant individuals choose to serve in the military (and later take more aggressive managerial decisions), as involuntary service was common during World War II.

Finally, in Column 9, we include *Military Experience* and *World War II Veteran* with the *Longholder* overconfidence measure and the union of relevant controls. Despite the reduced sample size, both the *Longholder* and *World War II Veteran* variables remain positive and significant, suggesting that they capture different subsets of CEOs or traits.[32]

We perform a number of additional robustness checks, using alternative variable definitions, regression specifications, and methodology. First, we consider book rather than market leverage as the dependent variable. The results are qualitatively similar though statistically weaker. For example, the coefficient estimate on *Longholder* is 0.042 with a *t*-statistic of 1.51 in the Column 5 specification. One potential

reason for the discrepancy is that book equity – as a historical accounting measure – has only a noisy relation to the economic quantity of interest, the value of shareholders' cash flow claims. We also find similar results using an alternative methodology inspired by Baker and Wurgler (2002), whereby we measure the relation between the change in leverage and the number of overconfident sample CEO-years (or, alternatively, "external finance weighted" overconfidence). Finally, we find similar results using the *TOTALconfident* proxy, with a few notable differences. First, the relation with the overconfidence proxy is stronger in the cross-section than within firms. Second, the relation is stronger when we remove within-CEO variation. Finally, the effect is typically strongest using book, rather than market, leverage as the dependent variable.

Overall, our results support the hypothesis that managerial traits help to explain variation in capital structure that cannot be explained by time-invariant firm differences or variation in traditional capital structure determinants. Though we cannot identify the effect econometrically (due to joint determination), the evidence suggests that managerial factors account at least partially for the time-invariant, firm-specific component of leverage uncovered in recent empirical studies. The results are also consistent with predictions of the overconfidence hypothesis: overconfident CEOs view equity financing as a last resort, resulting in measurable differences in firm leverage ratios compared to their rational predecessors or successors.

V. Alternative Interpretations

We consider several alternative interpretations of our main measure of overconfidence, late option exercise. We exclude several explanations that have no link to capital structure decisions or have little or no bearing on the press measure. For example, personal taxes, board pressure, and procrastination are potential explanations for late option exercise, but have no plausible effect on CEOs' portrayal in the business press.

Dilution. CEOs with extensive holdings of company stock and options may want to avoid diluting those holdings with additional equity issues. Graham and Harvey (2001), for example, report that earnings-per-share dilution is a primary consideration in stock issuance decisions. This interpretation is unlikely to affect our press measure. It is also unlikely to affect our portfolio-based overconfidence measures, since they capture the timing of option exercise, not the level of holdings. Nevertheless, we address the concern by controlling directly for the level of CEO stock and option holdings in all of our estimations. These variables control for the CEOs' incentives to avoid stock dilution because of their own portfolio holdings. In addition, we control for leverage and credit rating since CEOs of firms near financial distress may rationally worry more about dilution due to debt overhang. However, perceived dilution is exactly the mechanism that causes overconfident CEOs to avoid issuing equity. Thus, it is important to distinguish overconfidence from real information.

Inside Information. A CEO may choose not to exercise in-the-money options because of positive private information about future earnings. In this case, holding company stock options is a profitable investment until outsiders learn the information. Moreover, CEOs with such information may justifiably exude "confidence" and "optimism" to the business press. In this case, our results would support the traditional information-based pecking-order theory. The key difference from overconfidence is whether CEOs' beliefs are correct.

We check whether CEOs earn positive abnormal returns from holding options. We find that *Longholder* CEOs would earn greater profits on average by exercising one, two, three, or four years earlier and investing in the S&P 500 for the remainder of the options' durations.[33] We find similar evidence for the *Holder 67* measure. This evidence suggests that the average *Longholder* or *Holder 67* CEO does not have positive inside information.

Signaling. The apparent absence of inside information casts doubt on rational signaling as an interpretation of our measures. If late option exercise and bold statements to the press are meant to signal strong future stock price performance, those signals seem ineffective: CEOs who send them are the least

likely to issue equity and their stock does not display positive abnormal performance. It is possible, though, that investors would expect even worse future performance in the absence of option-holding and strong statements in the press, leading to even less equity issuance. Our findings using the *Post-Longholder* measure cast doubt on this interpretation. If private information drives managerial financing preferences for debt over equity and delayed option exercise (and press coverage) signals that information to the market, we would expect a weaker effect of past "signals." Instead, we find little difference between the relation of past and contemporaneous late exercise to financing choices.

Risk Tolerance. CEOs may hold options longer due to a higher willingness to take risk. Risk-tolerant CEOs may also appear more "confident" and "optimistic" and less "cautious," "conservative," "practical," "reliable," or "steady" to business reporters. In addition, bankruptcy is less of a deterrent to debt issuance for risk-seeking CEOs. However, risk tolerance does not predict aversion to external financing. Thus, our debt conservatism results in Section IV.B are difficult to reconcile with this story.

In sum, each of the interpretations above is difficult to reconcile with some of the evidence, whereas overestimation of future performance is consistent with all of our findings. The main insight of the paper, however, is independent of this interpretation: systematic and measurable differences in CEO beliefs and traits predict systematic differences in financial policies.

VI. Robustness: Extension to 2007

As a final step, we extend our analysis beyond the 1980 to 1994 Hall-Liebman data. We gather insider trading data from *Thomson Financial* and personal portfolio data from *Compustat's Execucomp* database. The *Thomson* data contain detailed information on CEO option exercise. *Execucomp* includes annual snapshots of aggregate CEO stock and option holdings, which are needed as controls in the overconfidence analysis. The merged data cover S&P 1500 firms from 1992 to 2007 and include smaller firms than our main sample. Generally, the sample characteristics differ in the expected direction: asset

tangibility is smaller, *Q* is higher, and the fraction of nondividend payers is higher (See the Internet Appendix.).

One immediate observation is that the extended data are not suitable to analyze early-life shocks from the Great Depression or service in World War II. Due to age and retirement, the fraction of Depression CEOs declines precipitously after 1995. Overall, only 3% of firm-years have a Depression CEO. The fraction of World War II veterans declines similarly. After supplementing the data with hand-collected information on military service through 2003, we find that less than 1% of firm-years have a World War II veteran as CEO.[34]

We use the data to construct four alternative overconfidence measures that correspond as closely as possible to our core measures based on late option exercise (Section III). (1) We use the package-level data on CEO option holdings available in *Execucomp* beginning in 2006 to replicate exactly our *Longholder* measure (*Longholder_Exec*). (2) We use the year-by-year aggregate data on CEO vested option holdings available in *Execucomp* over the entire 1992 to 2007 sample period to construct a *Longholder*-type measure following the approach of Campbell et al. (2009) and Hirshleifer, Teoh, and Low (2010). The measure classifies as overconfident those CEOs who at least twice hold vested options with average moneyness of at least 67% at the end of a fiscal year (*Longholder_CJRS*). (3) We use option exercise data from *Thomson* to classify as overconfident those CEOs who exercise options within a year of expiration that are at least 40% in the money one year prior to expiration. We consider all CEOs for whom we observe at least one option exercise (but who do not meet the criteria for overconfidence) in the comparison group (*Longholder_Thomson*). (4) We replicate the overconfidence classification of *Longholder_Thomson*, but include all *Execucomp* CEOs who do not qualify as overconfident in the comparison group (*Longholder_Thomson_Fill*). We provide additional details on the measures and discussion of the key differences from the *Longholder* and *Holder 67* variables in the Internet Appendix.

To begin, we assess how well these variables replicate our main portfolio-based overconfidence measures (See the Internet Appendix.). The measure *Longholder_Exec*, which is identical in definition to the original *Longholder* measure, classifies roughly 20% of CEOs as overconfident, similar to

Longholder. For the other measures, we see wide variation, ranging from 32% to 54%. We also calculate the pairwise correlations between the different measures. In all cases, we find positive and significant correlations. The measure *Longholder_Thomson* (*_Fill*) should exactly match *Longholder_Exec* in CEO-years for which both are defined; however, we find a correlation of only 0.44 (0.48). The correlation of *Longholder_CJRS* with *Longholder_Exec* is even lower (0.22). The latter is less surprising since *Longholder_CJRS* differs from the other measures in relying on option moneyness to determine CEO beliefs, rather than remaining option duration at exercise.

The lower correlation and difference in definition raise the concern that *Longholder_CJRS* may mix information about CEO beliefs with information about firm performance: rather than capture a CEO's overestimation of future performance, it might (also) capture good past performance. Avoiding such a confound is crucially important in our context since overconfidence makes opposite predictions for financing choices to strong stock performance. To quantify this concern, we calculate the pairwise correlations of *Longholder_CJRS* with five lags of annual stock returns (excluding dividends). We find that *Longholder_CJRS* is indeed significantly positively correlated with each lag of returns. The correlations between *Longholder_Exec* and lags of returns, on the other hand, are smaller by an order of magnitude and insignificant for three of the five horizons.

Overall, our analysis suggests that (1) *Longholder_Exec* is the best candidate to replicate the Malmendier and Tate (2008) overconfident measures with more recent data, but its implementability suffers from the very short sample period, and (2) the other measures capture information about CEO beliefs, but are noisier and influenced by other systematic factors (performance).

The key (unambiguous) prediction of the overconfidence theory is that overconfident CEOs prefer risky debt to equity, conditional on accessing external capital (Hypothesis 1). Our analysis of public security issuance tests this prediction using (in part) cross-sectional variation across CEOs. Since such variation is required to employ the *Longholder_Exec* measure, we focus on this test to determine the robustness of our key results in later firm-years and among the broader cross-section of firms.

We report the results in Table VIII. In a univariate specification (Panel A, Column 1), *Longholder_Exec* CEOs are roughly 45% less likely to issue equity, significant at the 10% level. The result is stronger both economically and statistically using the various sets of controls from Section IV.A.

Insert Table VIII here.

We also re-estimate our regressions using the *Longholder_CJRS* and *Longholder_Thomson* (*_Fill*) measures. Using either *Thomson*-based measure, we confirm our basic results (though the estimates are typically smaller economically). Using the *Longholder_CJRS* measure, the results depend crucially on the set of controls. In the univariate setting, the estimate is positive and significant. However, once we add the controls for past stock performance, the estimate becomes negative and significant. Strong past stock performance predicts heightened equity issuance. Since *Longholder_CJRS* is positively correlated with past performance, it picks up this effect. The negative overconfidence effect emerges only with careful performance controls.

Our results suggest that the effect of overconfidence on financing choices is likely to generalize over time and across firms. The results demonstrate both the promise and potential pitfalls of using common data sources to measure late option exercise over the 1995 to 2005 time period.

VII. Conclusion

We provide evidence that managers' beliefs and early-life experiences significantly affect financial policies, above and beyond traditional market-, industry-, and firm-level determinants of capital structure. We begin by using personal portfolio choices of CEOs to measure their beliefs about the future performance of their own companies. We focus on CEOs who persistently exercise their executive stock options late relative to a rational diversification benchmark. We consider several interpretations of such behavior – including positive inside information – and show that it is most consistent with CEO overconfidence. We also verify our measure of revealed beliefs by confirming that such CEOs are

disproportionately characterized by the business press as "confident" or "optimistic," rather than "reliable," "cautious," "practical," "conservative," "frugal," or "steady."

This form of belief makes specific capital structure predictions: overconfident CEOs overestimate future cash flows and therefore perceive external financing – and particularly equity – to be unduly costly. Thus, they prefer internal financing over external capital markets and, conditional on raising risky capital, debt over equity. 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 about 33 cents more debt than their peers. Managerial overconfidence is also positively related to debt conservatism, measured using the *kink* variable of Graham (2000). This debt conservatism is not driven by an increased propensity to issue equity. Instead, overconfident CEOs who are debt-conservative are also equity conservative and rely excessively on internal funds. Finally, overconfident managers choose higher leverage ratios than predecessors or successors in their firms.

We also consider early-life experiences that are likely to shape beliefs and choices later in life. Guided by prior psychology and management literature, we focus on two major formative experiences that affect our sample CEOs: growing up during the Great Depression and serving in the military. We find that CEOs who experience the Great Depression early in life display a heightened reluctance to access external capital markets. World War II CEOs, on the other hand, choose more aggressive corporate policies, including higher leverage ratios. The effects are distinct from the effect of overconfidence on financial decisions. Though the specific shocks that guide belief formation may differ in other samples of CEOs, our methodology for identifying those shocks is easily generalized.

Our results have several implications. First, our findings help to explain the strong time-invariant component of firm capital structure identified in recent studies. Though our identification strategy requires us to establish the effect of managerial beliefs using within-firm variation, the significance of our measures suggests that variation in managerial beliefs may account for a significant portion of the (co-

determined) between-firm variation. Managerial beliefs may be particularly important in firms with long-serving managers, family ownership, or a preference for hiring managers with a particular "style."

Second, our results have distinct implications for contracting practices and organizational design. To the degree that boards do not anticipate or desire bias-driven policies, standard incentives, such as stock- and option-based compensation, are unlikely to offset fully the effects of managerial overconfidence on investment and financing decisions. Biased managers believe they are choosing value-maximizing policies, and boards may need to use different tools, such as cash dividend payment and debt overhang, to constrain overconfident CEOs. Similarly, financial incentives will be miscalibrated if they do not account for financial conservatism or financial aggressiveness arising from a CEO's past experiences.

Third, our findings on the financial decision-making of Depression and military CEOs provide evidence that major personal events can have a life-long effect on risk attitudes and choices. Macroeconomic shocks, such as the current financial crisis, are likely not only to have an immediate impact on corporate financial policies (e.g., through de-leveraging and a shift toward self-sufficiency), but also to affect future policies as today's young investors, who are being introduced to financial markets during a time of crisis, become the next generation of corporate leaders. The *Depression Baby* results thus not only document a pattern of historical interest, but also suggest how financial choices may play out over the coming decades.

Finally, exposure to a military environment may affect corporate decision-making more broadly than just financial policy. For example, military CEOs may implement a more command-based corporate culture. An interesting topic for future research is to test whether CEOs with military experience create a more hierarchical structure in their firms and, conversely, to test for an effect of private-sector experience on the decisions of government, military, or nonprofit leaders.

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[1] A different behavioral bias sometimes referred to as "overconfidence" is the underestimation of variance (e.g., in Ben-David, Graham, and Harvey (2007)). This bias does not have a clear implication for the timing of option exercise. It implies an underestimation rather than overestimation of option value, predicting expedited option exercise. But, assuming that CEOs exercise executive options for the purpose of selling the stock (consistent, for example, with the evidence in Ofek and Yermack (2000)), it also implies lower perceived benefits of diversification and hence delayed exercise. Delayed option exercise is unambiguously predicted only by the type of overconfidence analyzed in this paper, that is, the overestimation of mean future cash flows. Moreover, the capital structure implications of underestimation of the variance run in the opposite direction (Hackbarth (2008)), which allows us to empirically distinguish which bias dominates.

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

[3] The *Execucomp* data on the top five executives in S&P 1500 firms are not as detailed, often missing for CFOs, and available for a shorter time frame. These data overlap with our main sample period for only two years.

[4] See Hechinger, J., 1998, Heard in New England: SLI's chief blasts analyst as firm puts off a big stock offering, *Wall Street Journal*, Jun 3, p. NE2 and Whitford, D., 1999, Jesse shakes the money tree, *Fortune* 139, Iss. 12, 102-108. It is also not unusual for CEOs to reject the CFO's financing plan, especially when asset sales are involved (Millman, Gregory J., 2001, Managing up the CFO and the board, *Financial Executive* 17, 24-26.). Recent jury verdicts against CEOs of firms with financial scandals imply the same view.

[5] See Larwood and Whittaker (1977), Kidd (1970), and Moore (1977).

[6] Langer (1975), Weinstein (1980), Alicke et al. (1995), and March and Shapira (1987) argue, more generally, that individuals overestimate their ability to control outcomes and underestimate the likelihood of failure.

[7] See the survey by Baker, Ruback, and Wurgler (2007). Recent work also includes Hietala, Kaplan, and Robinson (2003), Landier and Thesmar (2009), and Lowe and Ziedonis (2006).

[8] For a restricted range of parameters, an overconfident CEO may perceive debt to be more costly than equity. This case requires the CEO to (mistakenly) believe the bad state will not result in default. In addition, the probability of default must be large and overconfidence sufficiently small. (See the Internet Appendix for more details.) Intuitively, under a debt contract, the overconfident CEO expects to pay too much in the bad state (the full interest rate), and since the bad state is very likely the overpayment looms large. Under an equity contract, in contrast, the perceived overpayment is spread over both the good and the bad states, allowing the CEO to retain more in the bad state. If the value of the (overestimated) residual claim in the good state under the debt contract and the perceived extra tax benefit from paying an unduly high interest rate are sufficiently low, the preference for debt over equity can be reversed. The range of parameters that satisfy these conditions is small and unlikely to be empirically relevant for our sample of large U.S. firms.

[9] Other frictions that cause capital rationing (asymmetric information, agency costs) may distort even rational CEOs towards retaining cash. In these settings, overconfidence pushes a CEO even further toward self-sufficiency.

[10] For firms reporting format codes 1 to 3, net investment is *capx* + *ivch* + *aqc* + *fuseo* - *sppe* - *siv*; for firms reporting format code 7, it is *capx* + *ivch* + *aqc* - *sppe* - *siv* - *ivstch* - *ivaco*. When items are missing or combined with other items, we code them as 0.

[11] For format code 1, this is *wcapc* + *chech* + *dlcch*; for codes 2 and 3, - *wcapc* + *chech* - *dlcch*; for code 7, - *recch* - *invch* - *apalch* - *txach* - *aoloch* + *chech* - *fiao* - *dlcch*. All items, excluding *chech*, are replaced with 0 when missing or combined with other items.

[12] For codes 1 to 3, this is *ibc* + *xidoc* + *dpc* + *txdc* + *esubc* + *sppiv* + *fopo* + *fsrco*. For code 7, this is items *ibc* + *xidoc* + *dpc* + *txdc* + *esubc* + *sppiv* + *fopo* + *exre*. Items are coded as 0 when missing or combined with other items.

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

[14] See Table II for more details. Following Graham (2000), all continuous controls in the *kink* regressions are winsorized at the 1% level.

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

[16] The merger effect is robust to controlling for standard merger determinants like *Q* and cash flow in a logit regression.

[17] An alternative to conditioning on issuance is to explicitly model both the decision to issue and the choice between debt and equity. We perform such an analysis using a Heckman probit selection model (with the net financing deficit and cash stock as identifying variables for the public issuance choice). Our conclusions are unaffected.

[18] When controlling for book leverage, we drop the few cases with book leverage greater than one.

[19] Since *IRRC* data are unavailable for our sample period, we use the natural log of board size as an alternative governance measure. We also do not have the marginal tax rate control.

[20] Shyam-Sunder and Myers (1999) analyze large firms, with mean assets of $953m for the period 1971 to 1989. (Our firms are even larger, with mean assets of $5,477m for the period 1980 to 1994.) When Frank and Goyal (2003) analyze, separately, the quartile of largest firms, they find similar coefficients of 0.753 for the period 1971 to 1989 and 0.675 for the period 1990 to 1998.

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

[22] Graham (2000) also includes squares of all continuous controls. Including the squares has little impact on the results: the estimated *Longholder* coefficient in Column 3 changes from 0.605 to 0.611 ($p = 0.051$).

[23] The control variables are statistically significant with the exception of *Negative Owners' Equity*, *CYCLICAL*, *Quick Ratio*, and *PPE-to-Assets*.

[24] The results are robust to adding a quadratic term in age.

[25] We also re-run the specification in Column 6 including *Military Experience* as an independent variable. Though the estimates are less powerful due to the smaller sample size, our conclusions are qualitatively unchanged. There is no significant relation between military service and *kink*.

[26] Here the cross-group difference between (i) and (iv) is significant (p =0.051); however, the differences between groups (i) and (ii) and groups (i) and (iii) are not (p =0.122 and p =0.194, respectively).

[27] It is possible that *Longholder* CEOs store debt capacity in anticipation of large investments or acquisitions (thereby inducing high kinks). This explanation is consistent with the evidence in Malmendier and Tate (2008) that overconfident CEOs do more acquisitions and prefer to finance them with cash and debt.

[28] The results are robust to using other cutoffs, such as the 25th or the 30th percentile, and alternative proxies for "expected volume of investment," such as prior-year averages.

[29] We include the financing deficit for consistency with our earlier specifications. It is indeed significant. However, the *Longholder* effect does not depend upon its inclusion.

[30] We do not include contemporaneous returns due to endogeneity concerns. However, the results are robust to this additional control.

[31] Alternatively, we code "combat exposure" as including World War II, the Korean War, and the Vietnam War. The results are the same: we find a positive and significant effect on leverage, controlling for *Military Experience*. However, the coefficient appears to be driven by World War II. If we include separate dummies for the 12 Korean War veterans and eight Vietnam War veterans in our sample, we find insignificant coefficients.

[32] For completeness, we also re-run the Column 9 specification including *Depression Baby*, even though we do not have a theoretical prediction. We find no significant relation with leverage.

[33] See Malmendier and Tate (2004) for detailed tables.

[34] We re-analyze the link between military experience and leverage in the later sample for veterans of the Korean or Vietnam Wars and for all veterans. The results confirm our earlier finding that the link between military experience and leverage is specific to World War II veterans. One interpretation is that success or failure of the military experience matters for later-life attitudes. Though these experiences vary at the individual level, World War II veterans are more likely to have had a victorious personal experience and may be more likely to interpret individual failures as nevertheless contributing to a major collective victory.

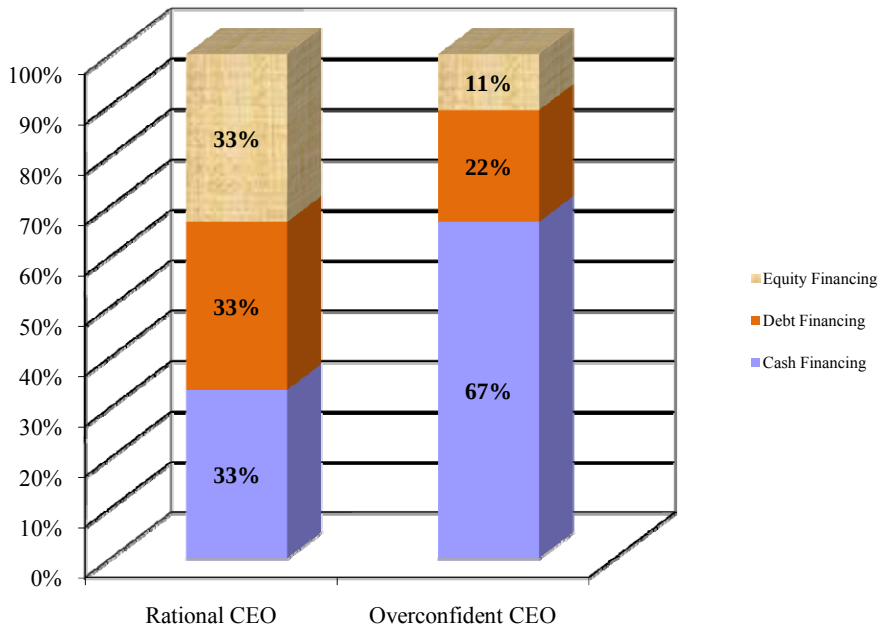

Figure 1. Model Predictions (Stylized Example). The hypothetical example illustrates how overconfident CEOs may deviate from a hypothetical rational benchmark in their average financing of investment projects holding constant investment opportunities and financing needs. The example assumes a (hypothetical) rational benchmark of 33% cash, 33% debt, and 33% equity financing. Overconfident CEOs choose a lower absolute amount of debt financing (22% < 33%), but more debt financing relative to total new capital (22%/[22%+11%] > 33%/[33%+33%] ↔ 2/3 > 1/2) due to even lower absolute amounts of equity financing (11% < 33%).

Table I
Empirical Predictions

The table summarizes the empirical capital structure predictions of managerial traits as described in Section I and formalized in the Internet Appendix. * indicates the prediction holds for a range of parameter values (See the model in the Internet Appendix.). ** indicates a cumulative effect.

	Preference for Public Debt vs. Equity Issues	Preference for Debt vs. Equity to Fill External Financing Needs ("Financing Deficit")	Debt Level Relative to Maximum Available Tax Benefit ("Kink")	Market Leverage
Overconfidence	Debt	Debt	Low*	High*,**
Depression Baby	No prediction	No prediction	Low	No prediction
Military Service	No prediction	No prediction	No prediction	High

Table II
Summary Statistics

In Panel A, 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. 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 PPE, normalized by assets at the beginning of the year. Q is market value of assets over book value of assets, where market value of assets is book value of assets plus market equity minus book equity. Δ denotes one-year changes. Longholder is a binary variable where one 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. The Fama-French Industry Groups are defined on French's website. In Panel B, 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 quotient times the sum of advertising and R&D 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 interest expense 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 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, the quantity divided by assets. R&D-to-sales and Advertising-to-sales are set to zero when the numerator is missing. Computer Industry is all firms with SIC code 357, Semiconductor Industry is 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. Longholder is a binary variable where one 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. In Panel C, CEO Vested Options are the CEO's holdings of options that are exercisable within six months of the beginning of the year (as a percent of shares outstanding), multiplied by 10 so that the means of vested options and CEO Stock Ownership are the same order of magnitude. Depression Baby is an indicator variable for CEOs born in the 1920s. Military Experience indicates CEOs with prior military service.

Panel A. Financing Deficit Variables

	Full Sample (Number of Firms = 263)						Longholder Sample (Number of Firms = 56)					
Variable	Obs.	Mean	Median	SD	Min.	Max.	Obs.	Mean	Median	SD	Min.	Max.
Assets ($m)	2,385	5,476.92	2,111.96	13,389.44	39.64	198,598.70	463	4,820.30	2,111.78	8,763.07	48.79	79,262.00
Net Financing Deficit ($m)	2,385	42.67	0.75	538.56	-6,800.30	8,845.50	463	10.41	-1.05	287.07	-845.00	1,698.00
Cash Dividends ($m)	2,385	109.47	35.58	239.77	0.00	2,487.00	463	126.59	40.69	252.09	0.00	1,870.00
Net Investment ($m)	2,385	502.28	172.70	1,311.81	-2,930.00	26,523.00	463	498.57	207.37	1,070.84	-577.00	9,755.00
Change in Working Capital ($m)	2,385	26.73	16.02	790.77	-21,767.00	16,224.00	463	35.54	17.95	347.04	-2,920.50	2,675.00
Cash Flow after Interest and Taxes ($m)	2,385	595.80	228.56	1,276.57	-1,678.44	20,278.00	463	650.29	254.62	1,243.20	-1,678.44	11,273.00
Net Financing Deficit/$Assets_{t-1}$	2,385	0.03	0.00	0.16	-0.63	2.56	463	0.02	0.00	0.14	-0.24	1.60
Net Debt Issues/$Assets_{t-1}$	2,385	0.01	0.00	0.08	-0.62	0.92	463	0.01	0.00	0.06	-0.15	0.36
Net Equity Issues/$Assets_{t-1}$	2,155	0.00	0.00	0.08	-0.77	1.85	413	0.01	0.00	0.09	-0.30	1.18
Profitability	2,385	0.18	0.17	0.11	-0.24	0.99	463	0.21	0.19	0.12	-0.03	0.88
Δ Profitability	2,385	0.00	0.00	0.06	-0.76	0.98	463	0.00	0.00	0.08	-0.51	0.98
Tangibility	2,385	0.44	0.42	0.22	0.00	2.08	463	0.46	0.43	0.21	0.06	2.08
Δ Tangibility	2,385	-0.05	-0.03	0.11	-1.47	0.54	463	-0.05	-0.03	0.12	-1.47	0.16
Q	2,385	1.61	1.30	1.01	0.59	12.26	463	1.70	1.44	1.02	0.77	10.71
Δ Q	2,385	0.01	0.01	0.50	-7.18	5.04	463	0.03	0.02	0.42	-1.81	4.32
ln(Sales)	2,385	7.90	7.82	1.12	3.18	11.93	463	7.89	7.87	1.18	3.18	11.23
Δ ln(Sales)	2,385	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

	(2,381 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

Table II (cont.)

Panel B. Kink Variables

	Full Sample Number of Firms = 189						Longholder Sample Number of Firms = 44					
Variable	Obs.	Mean	Median	SD	Min.	Max.	Obs.	Mean	Median	SD	Min.	Max.
Kink	1,726	3.93	3	2.74	0	8	377	4.59	4	2.75	0	8
I(No dividend)	1,726	0.12	0	0.33	0	1	377	0.17	0	0.38	0	1
I(Negative owners' equity)	1,726	0.01	0	0.12	0	1	377	0	0	0	0	0
I(NOL carryforward)	1,726	0.15	0	0.36	0	1	377	0.14	0	0.35	0	1
ECOST	1,726	1.74	0.65	3.21	0	18.92	377	2.36	0.79	3.92	0	18.92
CYCLICAL	1,726	0.07	0.07	0.03	0.02	0.18	377	0.08	0.07	0.02	0.04	0.18
Return on assets	1,726	0.13	0.14	0.05	-0.06	0.27	377	0.14	0.14	0.05	-0.06	0.27
ln(sales)	1,726	7.88	7.82	1.01	5.49	10.32	377	7.93	7.87	1.07	5.49	10.32
Z-score	1,726	2.51	2.34	1.17	0.38	7.07	377	2.74	2.51	1.24	0.79	7.07
Quick ratio	1,726	1.08	0.89	0.74	0.16	4.92	377	1.12	0.94	0.71	0.16	4.92
Current ratio	1,726	1.88	1.63	0.96	0.57	6.02	377	1.97	1.71	0.94	0.58	6.02
PPE-to-assets	1,726	0.42	0.40	0.18	0.06	0.81	377	0.41	0.39	0.16	0.06	0.81
Q-ratio	1,726	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	1,726	0.02	0.01	0.03	0	0.16	377	0.03	0.02	0.04	0	0.16
Advertising-to-sales	1,726	0.02	0	0.03	0	0.16	377	0.02	0.01	0.03	0	0.16
Computer Industry	1,726	0.04	0	0.19	0	1	377	0.07	0	0.25	0	1
Semiconductor Industry	1,726	0.02	0	0.14	0	1	377	0.03	0	0.16	0	1
Chemicals and Allied Products Industry	1,726	0.14	0	0.35	0	1	377	0.21	0	0.41	0	1
Aircraft and Guided Space Vehicles Industry	1,726	0.02	0	0.13	0	1	377	0.02	0	0.14	0	1
Other Sensitive Industries	1,726	0.19	0	0.39	0	1	377	0.15	0	0.35	0	1

Panel C. CEO Variables

	Full Sample Number of CEOs = 498						Longholder Sample Number of CEOs = 58					
Variable	Obs.	Mean	Median	SD	Min.	Max.	Obs.	Mean	Median	SD	Min.	Max.
Age	2,384	57.77	58	7.16	32	84	463	58.46	59	6.30	41	82
Tenure	2,364	8.83	6	7.69	1	45	442	10.78	9	6.78	1	36
CEO Stock Ownership	2,385	0.03	0.00	0.08	0	0.95	463	0.02	0.00	0.04	0	0.49
CEO Vested Options	2,385	0.03	0.01	0.14	0	4.63	463	0.07	0.02	0.29	0	4.63
Depression Baby	2,384	0.40	0	0.49	0	1	463	0.49	0	0.50	0	1
Military Experience	1617	0.22	0	0.41	0	1	352	0.28	0	0.45	0	1

Table III
Correlations of Depression Baby and Military Experience with Firm and CEO Characteristics

Depression Baby indicates CEOs born between 1920 and 1929. Military Experience is an indicator variable for CEOs who served in the military. TOTALcautious is the number of articles from *LexisNexis* and *Wall Street Journal* searches that describe the CEO as "reliable," "cautious," "practical," "conservative," "steady," or "frugal." Return on Assets is income before extraordinary items plus interest expense plus depreciation, divided by assets. Market Leverage is debt in current liabilities plus long-term debt, divided by the sum of the numerator and market equity. Merger Activity is an indicator for at least one merger in a given firm-year. Kink is the amount of interest at which the marginal benefit function starts to slope down, as a proportion of actual interest expense. Equity Issuance indicates at least one stock issue, conditional on accessing public securities markets. *p* -values and number of observations are in parentheses.

	Depression Baby	Military Experience	TOTAL-cautious	Age	Tenure	Return on Assets	CEO Stock Ownership	Leverage	Merger Activity	Kink	Equity Issuance
Depression Baby	1										
	(- ; 3,617)										
Military Experience	0.1472	1									
	(0.00; 2,320)	(- ; 3,617)									
TOTALcautious	0.036	-0.08	1								
	(0.03; 3,580)	(0.00; 2,378)	(- ; 3,803)								
Age	0.3766	0.1332	0.0194	1							
	(0.00; 3,617)	(0.00; 2,320)	(0.25; 3,580)	(- ; 3,617)							
Tenure	0.1009	-0.056	0.154	0.3668	1						
	(0.00; 3,500)	(0.01; 2,250)	(0.00; 3,471)	(0.00; 3,500)	(- ; 3,501)						
Return on Assets	0.0680	-0.0808	-0.0162	0.0012	0.0289	1					
	(0.00; 3,454)	(0.00; 2,267)	(0.33; 3,560)	(0.95; 3,454)	(0.09; 3,362)	(- ; 4,393)					
CEO Stock Ownership	-0.1061	-0.0941	0.1003	-0.0332	0.3084	0.0164	1				
	(0.00; 3,496)	(0.00; 2,258)	(0.00; 3,465)	(0.05; 3,496)	(0.00; 3,454)	(0.34; 3,360)	(- ; 3,497)				
Market Leverage	-0.0586	0.0227	-0.0272	-0.0337	-0.0911	-0.3792	-0.0579	1			
	(0.00; 3,504)	(0.28; 2,263)	(0.10; 3,558)	(0.05; 3,504)	(0.00; 3,425)	(0.00; 4,281)	(0.00; 3,425)	(- ; 4,528)			
Merger Acitivity	0.0085	0.0674	-0.0199	-0.0278	-0.0300	-0.0513	-0.0105	0.0045	1		
	(0.61; 3,617)	(0.00; 2,378)	(0.22; 3,803)	(0.09; 3,617)	(0.08; 3,501)	(0.00; 4,393)	(0.53: 3,497)	(0.76; 4,528)	(- ; 5,131)		
Kink	0.1129	-0.022	-0.0347	0.0305	0.0598	0.4318	0.0977	-0.6468	-0.0300	1	
	(0.00; 2,846)	(0.34; 1,868)	(0.06; 2,917)	(0.10: 2,846)	(0.00; 2,764)	(0.00; 2,912)	(0.00; 2,770)	(0.00; 2,900)	(0.10; 2,978)	(- ; 2,978)	
Equity Issuance	-0.0829	0.1105	-0.0098	-0.1534	-0.0314	-0.0477	0.0458	-0.0955	0.0392	-0.0953	1
	(0.02; 739)	(0.01; 524)	(0.79; 756)	(0.00; 739)	(0.40; 727)	(0.19; 748)	(0.22; 718)	(0.01; 752)	(0.28; 769)	(0.01; 654)	(- ; 769)

Table IV
Debt vs. Equity (I): Public Issues

Longholder is a binary variable equal to one 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 equal to 1 for all CEO-years after the CEO for the first time holds options to expiration. Pre-Longholder is Longholder minus Post-Longholder. Holder 67 is a binary variable equal to one for all CEO-years after the CEO for the first time fails to exercise a 67% in-the-money option with five years remaining duration. For Holder 67, the sample is limited to CEO-years after the CEO for the first time had a 67% in-the-money option with five years remaining duration. TOTALconfident is a binary variable equal to one 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," and "frugal" mentions. TOTALmentions is the total number of articles mentioning the CEO in those searches. Both TOTAL variables include all articles over the sample period up to the previous year. Data on public issues are from *SDC* . There are 330 firms. Equity issues are issues of common stock or nonconvertible preferred stock. Debt issues are issues of nonconvertible debt. Hybrid issues are issues of convertible debt or convertible preferred stock. U.S. Rule 144A issues are included. Standard errors are adjusted for clustering at the firm level. In Panel B, the sample consists of all firm years in which the firm did at least one public security issue. The dependent variable is a binary variable equal to one if the firm issued equity during the fiscal year. Coefficients are reported as log odds ratios. CEO Vested Options are the CEO's holdings of options that are exercisable within six months of the beginning of the year (as a percent of shares outstanding), multiplied by 10 so that the means of vested options and CEO Stock Ownership are the same order of magnitude. The standard firm controls are ln(Sales), Q (market value of assets over book value of assets, where market value of assets is book value of total assets plus market equity minus book equity), Profitability (operating income before depreciation normalized by beginning-of-year assets), Tangibility (PPE, normalized by beginning-of-year assets). 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 one. CEO Stock Ownership, ln(Sales), Q, Profitability, Tangibility, and Book Leverage are measured at the beginning of the fiscal year. Kink controls are defined as in Graham (2000) and listed in Table II. Industry fixed effects are the kink-regression industry dummies of Graham (2000). Standard errors are adjusted for clustering at the firm level. * indicates significance at 10%; ** significance at 5%; *** significance at 1%.

Panel A. Frequencies

		% of Issue Years with		
	Number of Years with Any Security Issues	Equity Issues	Debt Issues	Hybrid Issues
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*

Panel B. Logit Regressions

	(1)	(2)	(3)	(4)	(5)	(6)
Longholder	-0.469	-0.592	-0.534	-0.46	-0.457	-0.6695
	(1.94)*	(2.34)**	(2.10)**	(1.80)*	(1.66)*	(2.22)**
CEO Stock Ownership		-0.266	-0.996	-1.279	-0.655	-7.6403
		(0.16)	(0.59)	(0.72)	(0.34)	(2.35)**
CEO Vested Options		6.766	4.669	4.234	7.328	10.6238
		(3.43)***	(2.21)**	(2.14)**	(3.05)***	(2.81)***
Standard Firm Controls			X	X	X	
Book Leverage				X	X	
Kink Controls						X
Industry Fixed Effects						X
Year Fixed Effects					X	X
Observations	762	644	627	617	617	442
Number of Firms	330	174	171	171	171	135

Table V
Debt vs. Equity (II): Financing Deficit

OLS regressions with Net Debt Issues normalized by beginning-of-year assets as the dependent variable, where Net Debt Issues are long-term debt issues minus long-term debt reduction. Net Financing Deficit (FD) is cash dividends plus net investment plus change in working capital minus cash flow after interest and taxes, normalized by beginning-of-year assets. Net investment, change in working capital, and cash flow after interest and taxes are defined in Table II. Longholder is a binary variable equal to one 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 Vested Options are the CEO's holdings of options that are exercisable within six months of the beginning of the year (as a percent of shares outstanding), multiplied by 10 so that the means of vested options and CEO Stock Ownership are the same order of magnitude. The FD control variables are identical to those in Frank and Goyal (2003): changes in profitability (operating income before depreciation normalized by beginning-of-year assets), in tangibility (PPE, normalized by beginning-of-year assets), in the logarithm of sales, and in Q (market value of assets over book value of assets, where market value of assets is book value of total assets plus 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. CEO Stock Ownership and Book Leverage are measured at the beginning of the fiscal year. All standard errors are adjusted for clustering at the firm level. * indicates significance at 10%; ** significance at 5%; *** significance at 1%.

	(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 Stock * FD			0.373	0.431	0.370	0.348
			(2.30)**	(2.63)***	(2.14)**	(2.17)**
CEO Vested Options			-0.025	-0.021	0.000	0.011
			(1.49)	(1.15)	(0.00)	(0.52)
CEO Vested Options * FD			-0.088	-0.098	-0.135	-0.156
			(3.21)***	(3.59)***	(3.06)***	(3.76)***
Book Leverage						-0.096
						(5.98)***
Book Leverage * FD						-0.129
						(0.54)
FD Control Variables					X	X
FD Control Variables * FD					X	X
Year Fixed Effects				X	X	X
Firm Fixed Effects		X	X	X	X	X
Firm Fixed Effects * FD		X	X	X	X	X
Observations	2,385	2,385	2,385	2,385	2,385	2,346
Number of Firms	263	263	263	263	263	262
R^2	0.75	0.93	0.93	0.94	0.94	0.94

Table VI
Internal vs. External Financing

In Panel A, the dependent variable is the kink variable of Graham (2000), that is, the amount of hypothetical interest at which the marginal tax benefit function starts to slope down, as a proportion of actual interest expense. The tobit regressions account for two-sided censoring of the kink variable at zero and eight. Longholder is a binary variable equal to one 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. Depression Baby indicates CEOs born between 1920 and 1929. 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 six months of the beginning of the year (as a percent of shares outstanding), multiplied by 10 so that the means of vested options and CEO Stock Ownership are the same order of magnitude. Kink controls and industry fixed effects are defined as in Graham (2002) and listed in Panel B of Table II. Low Cash Status is an indicator, equal to one 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 industry groups. (See Table II, Panel A.) All standard errors are adjusted for clustering at the firm level. * indicates significance at 10%; ** significance at 5%; *** significance at 1%. In Panel B, net equity issues are sales of common stock minus stock repurchases and are normalized by beginning-of-year assets.

Panel A. Debt Conservatism: Kink Tobits

	(1)	(2)	(3)	(4)	(5)	(6)
Longholder	1.122	1.256	0.647			0.618
	(1.75)*	(1.94)*	(1.71)*			(1.61)
Depression Baby				0.898	0.505	0.484
				(2.27)**	(2.07)**	(1.90)*
CEO Stock Ownership		3.369	-1.145			0.296
		(1.01)	(-0.48)			(0.11)
CEO Vested Options		-3.025	-3.193			-2.752
		(-0.70)	(-2.02)**			(-1.84)*
Age					-0.026	-0.022
					(-1.38)	(-1.15)
Tenure					-0.016	-0.023
					(-0.88)	(-1.22)
Kink Controls			X		X	X
Industry Fixed Effects			X		X	X
Observations	1,726	1,726	1,726	1,717	1,717	1,705
Number of Firms	189	189	189	190	190	188

Panel B. Equity Conservatism: Distribution of Longholder Net Equity Issues by Kink

	Kink ≤ 1	1 < Kink ≤ 3	3 < Kink ≤ 7	Kink > 7
Sample: Longholder = 1				
10th percentile	-0.00834	-0.02923	-0.02668	-0.05162
25th percentile	0.00000	-0.00003	-0.01055	-0.01286
50th percentile	0.00544	0.00180	0.00000	0.00000
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
Sample: Depression Baby = 1				
10th percentile	-0.00846	-0.03568	-0.04293	-0.06254
25th percentile	0.00000	-0.00855	-0.01158	-0.02315
50th percentile	0.00104	0.00047	0.00001	0.00000
75th percentile	0.00800	0.00570	0.00575	0.00523
90th percentile	0.05131	0.04080	0.01893	0.01646
Observations	74	270	240	175
Mean	0.00950	0.00277	-0.00088	-0.01053
Standard Deviation	0.03470	0.05085	0.07096	0.06885

Table VII
Leverage

OLS regressions with end-of-fiscal-year market leverage as dependent variable, measured as debt in current liabilities plus long-term debt divided by the sum of the numerator and market equity. 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. Military Experience is an indicator variable for CEOs with prior military service; World War II Veteran indicates service during World War II. Profitability is operating income before depreciation normalized by beginning-of-year assets; Tangibility is PPE, normalized by beginning-of-year assets. Q is market value of assets over book value of assets, where market value of assets is book value of total assets plus market equity minus book equity. Net Financing Deficit is cash dividends plus net investment plus change in working capital minus cash flow after interest and taxes, normalized by beginning-of-year assets. Net investment, change in working capital, and cash flow after interest and taxes are defined in Table II. $Returns_x$ are the natural logarithm of one plus stock returns (excluding dividends) from year x-1 to x. CEO Vested Options are the CEO's holdings of options that are exercisable within six months of the beginning of the year (as a percent of shares outstanding), multiplied by 10 so that the means of vested options and CEO Stock Ownership are the same order of magnitude. Profitability, Tangibility, ln(Sales), Q, Net Financing Deficit, and CEO Stock Ownership are measured at the beginning of the fiscal year. All standard errors are adjusted for clustering at the firm level. * indicates significance at 10%; ** significance at 5%; *** significance at 1%.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Longholder			0.0361	0.0410	0.0517				0.0518
			(1.98)**	(2.44)**	(2.28)**				(1.95)*
Military Experience						0.0353	0.0326	-0.0015	0.002
						(1.69)*	(1.92)*	(-0.08)	(-0.09)
World War II Veteran								0.0695	0.0517
								(2.21)**	(1.71)*
Profitability	-0.7074	-0.4600	-0.4634	-0.2774	-0.3586		-0.3364	-0.3281	-0.274
	(-5.18)***	(-6.79)***	(-6.88)***	(-3.78)***	(-4.64)***		(-3.52)***	(-3.56)***	(-3.60)***
Tangibility	0.1155	0.0248	0.0238	0.0265	0.0286		-0.0062	-0.0035	0.0258
	(2.66)***	(0.58)	(0.56)	(0.63)	(0.70)		(-0.16)	(-0.09)	(-0.75)
ln(Sales)	0.0360	0.0476	0.0491	0.0338	0.0513		0.0418	0.0411	0.0457
	(4.03)***	(4.76)***	(4.92)***	(3.32)***	(4.11)***		(3.07)***	(3.09)***	(3.03)***
Q	-0.0424	-0.0126	-0.0119	0.0028	0.0089		-0.013	-0.0132	0.0172
	(-2.68)***	(-1.86)*	(-1.76)*	(0.40)	(1.31)		(-1.92)*	(-1.94)*	(2.88)***
Net Financing Deficit	0.2438	0.1228	0.1227	0.1189	0.1238		0.1427	0.1406	0.1047
	(4.14)***	(4.96)***	(4.95)***	(4.75)***	(5.20)***		(4.48)***	(4.49)***	(4.55)***
$Returns_{t-1}$				-0.0692	-0.0718				-0.098
				(-4.21)***	(-4.05)***				(-6.62)***
$Returns_{t-2}$				-0.056	-0.0526				-0.0835
				(-2.72)***	(-2.38)**				(-6.28)***
$Returns_{t-3}$				-0.0416	-0.0469				-0.0604
				(-3.54)***	(-3.88)***				(-6.56)***
$Returns_{t-4}$				-0.0307	-0.0396				-0.0546
				(-3.48)***	(-4.21)***				(-5.63)***
$Returns_{t-5}$				-0.0105	-0.0176				-0.0153
				(-1.30)	(-2.11)**				(-1.80)*
CEO Stock Ownership					0.1085				0.0431
					(1.60)				(-0.94)
CEO Vested Options					0.1119				-0.0001
					(2.48)**				(-0.00)
Age							0.0036	0.0025	0.0024
							(2.90)***	(2.08)**	(2.09)**
Tenure					-0.0007		-0.0054	-0.0051	-0.0044
					(-0.81)		(-4.60)***	(-4.75)***	(-4.19)***
(Tenure)*(Longholder)					-0.0021				
					(-1.45)				
Firm Effects		X	X	X	X	X	X	X	X
Year Effects					X	X	X	X	X
Observations	2,184	2,184	2,184	2,184	2,184	1,626	1,626	1,626	1,521
Number of Firms	241	241	241	241	241	210	210	210	194
Adjusted R^2 (Within)		0.11	0.12	0.16	0.22	0.08	0.19	0.19	0.29
Adjusted R^2	0.35	0.77	0.77	0.78	0.80	0.78	0.80	0.80	0.83

Table VIII
Alternative Longholder Measures and Public Issues

Logit regressions with coefficients reported as log odds ratios. The dependent variable is a binary variable equal to 1 if the firm issued equity during the fiscal year. The sample consists of all firm years in which the firm did at least one public security issue for S&P 1500 firms included in *Compustat's Execucomp* database between 1992 and 2007 excluding financial firms (SIC 6000-6999) and regulated utilities (SIC 4900-4999). CEO Stock Ownership is the number of shares owned by the CEO excluding options. CEO Vested Options is the CEO's holdings of unexercised exercisable stock options, multiplied by 10 (so that the mean is roughly comparable to CEO Stock Ownership). CEO Stock Ownership and CEO Vested Options are scaled by common shares outstanding and are measured at the beginning of the fiscal year. Longholder_Exec is is a binary variable where one 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. Longholder_Thomson is a binary indicator defined as Longholder_Exec, but using *Thomson Financial* data to identify option exercises that occur in the final year of the option's duration. Longholder_Thomson is zero for CEOs for whom we observe at least one option exercise in the *Thomson* database during the sample period. Longholder_Thomson_Fill is defined as Longholder_Thomson, but includes all CEOs who do not satisfy the Longholder criteria in the control group. Longholder_CJRS is a binary indicator set to one if the CEO at least twice during his tenure in the sample was holding options with average moneyness greater than 67% at the end of a fiscal year, starting in the first year the CEO displays the behavior. Return controls are the natural logarithms of one plus annual stock returns (excluding dividends) over the five prior fiscal years. Standard firm controls, book leverage, kink controls, and industry fixed effects are as defined in Table IV. All standard errors are adjusted for clustering at the firm level. * indicates significance at 10%; ** significance at 5%; *** significance at 1%.

	(1)	(2)	(3)	(4)	(5)	(6)
Panel A. Longholder_Exec						
Longholder_Exec	-0.5854	-1.1084	-0.9629	-0.9203	-0.9361	-1.2997
	(1.79)*	(2.54)**	(2.50)**	(2.34)**	(2.16)**	(2.33)**
CEO Stock Ownership		15.2343	10.2797	10.4621	7.3521	10.3829
		(3.08)***	(2.87)***	(2.89)***	(1.47)	(1.77)*
CEO Vested Options		5.21	1.68201	1.45963	1.6262	0.92258
		(2.55)**	(0.91)	(0.78)	(0.79)	(0.36)
Observations	361	297	293	282	269	226
Panel B. Longholder_CJRS						
Longholder_CJRS	0.3243	0.2057	-0.0021	0.0022	-0.3273	-0.4304
	(3.82)***	(2.00)**	(0.02)	(0.02)	(2.50)**	(2.78)***
CEO Stock Ownership		4.6172	2.2825	2.1641	1.6315	1.6771
		(4.77)***	(2.70)***	(2.62)***	(1.52)	(1.21)
CEO Vested Options		1.45164	-0.02549	0.10186	0.0658	0.5303
		(2.98)***	(0.06)	(0.24)	(0.15)	(0.82)
Observations	3,552	2,648	2,615	2,539	2,276	1,773
Panel C. Longholder_Thomson						
Longholder_Thomson	-0.5377	-0.5083	-0.3011	-0.3036	-0.2401	-0.2355
	(4.95)***	(4.00)***	(2.30)**	(2.26)**	(1.67)*	(1.35)
CEO Stock Ownership		4.9631	2.929	2.8806	2.2132	2.2235
		(3.64)***	(2.73)***	(2.57)**	(1.83)*	(1.52)
CEO Vested Options		2.00796	0.25694	0.38396	0.20277	0.74639
		(3.35)***	(0.51)	(0.73)	(0.38)	(0.83)
Observations	2,568	1,991	1,970	1,921	1,776	1,373
Panel D. Longholder_Thomson_Fill						
Longholder_Thomson_Fill	-0.6344	-0.5764	-0.3728	-0.3606	-0.3405	-0.3622
	(6.78)***	(5.27)***	(3.38)***	(3.17)***	(2.79)***	(2.49)**
CEO Stock Ownership		5.0850	2.7279	2.6052	1.9706	1.5942
		(5.70)***	(3.78)***	(3.59)***	(2.21)**	(1.35)
CEO Vested Options		1.6251	0.00965	0.12202	-0.06323	0.25244
		(3.32)***	(0.02)	(0.29)	(0.14)	(0.39)
Observations	3,960	2,822	2,788	2,705	2,393	1,840
Standard firm controls			X	X	X	
Book leverage				X	X	
Kink controls						X
Return controls					X	X
Industry fixed effects						X
Year fixed effects				X	X	X