

CEO Overconfidence:
An Alternative Explanation for Corporate Financing Decisions

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Abstract:

In the well-established trade-off capital structure model, a rational CEO chooses to issue debt and equity depending on the costs and benefits of each. In this model, the optimal amount of debt and equity financing occurs when the dead-weight costs of bankruptcy exactly offset the tax saving benefits of debt. However, this rational decision-making theory does not provide an adequate explanation for empirical findings that companies often deviate from the presumably optimal levels of debt and equity issuance. As an alternative explanation for these capital structures, we examine the additional impact that CEO overconfidence appears to have on financing decisions. In order to measure overconfidence of CEOs, we employ a measure based on the percentage of optimistic press coverage a CEO receives relative to the percentage of optimistic press coverage that the company itself receives. We then gather data on net debt issuance and net equity issuance under the governance of each CEO, and regress these financing decisions on our measure of CEO overconfidence. We find weak evidence that what we term overconfident CEOs deem equity financing relatively more expensive than debt financing, and thereby maintain higher than expected leverage ratios. We focus our data analysis on financing decision data from the decade 1997-2007, and examine capital structure decisions arising from CEO overconfidence in conjunction with differentials by industry and the effects of the dividend tax cuts from the 2003 Jobs and Growth Tax Relief Reconciliation Act.

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1. INTRODUCTION

1.1 Trade-off Theory and Pecking Order Theory for Capital Structure Decisions

The division between cash, equity, and debt portions in financing decisions has traditionally been explained by two theories, the trade-off theory and the pecking order theory. After Modigliani and Miller showed that the capital structure of a firm does not affect its value under absence of taxes, risk, bankruptcy costs, and asymmetric information assumptions, practical applications of this theory proved that the assumptions did not hold in the real world and set the stage for a new explanation that took these variables into account.²

One such theory is the trade-off theory, which states that debt is a cheaper source of financing because of tax deductibility but becomes more expensive through increased leverage, which increases the financial risk of the firm that must service debt regularly (unlike equity). Consequently, the trade-off theory states that the optimal division between debt and equity financing for a firm is to balance the lower average cost of capital with the increased financial risk brought on by debt financing.

A second theory often used to explain firms' financing decisions is the so-called pecking order theory. This theory bases itself on the fact that company executives typically want to send positive signals about the firm and keep as much control over it as possible, in which case the preferred method of financing would be internally through retained earnings followed by debt financing and lastly by equity financing.³ The theory rests on the presumptions that debt issuance sends a market signal that the firm is confident in its ability to service debt regularly while equity issuance sends a market signal that the firm may be overvalued, potentially leading to a share price drop.

However, both the trade-off theory and the pecking-order theory focus on direct benefits of debt and equity financing while failing to consider personal managerial traits of CEOs that may be affecting these decisions. In seeking to address the effects of these personal managerial characteristics, Malmendier, Tate, and Yan (2011) construct proxies for overconfidence, military

² The Modigliani-Miller Theorem. The New Palgrave Dictionary of Economics. Anne P. Villamil, University of Illinois.

³ Frank, Murray Z., and Vidhan K. Goyal. "Capital structure decisions: which factors are reliably important?" *Financial Management* 38.1 (2009): 1-37.

experience, and living during the Depression and discover that these characteristics are partially responsible for the financing choices executives undertake.⁴ While their data focuses on investment decisions between 1980 and 1994, we look to see how overconfidence motivations have or have not continued to influence financing decisions in the more recent decade 1997-2007, and in particular take into account the effects of different industries and the 2003 dividend tax cut act on corporate financing decisions.

The examination of CEO overconfidence has not been limited to its effect on corporate investment and financing decisions. In their research on mergers and acquisitions, Malmendier and Tate (2003) show that the number of such endeavors increases with managerial overconfidence, due to the overconfident CEOs' misguided beliefs that they will be able to generate abnormally high returns from the acquired companies.⁵ As a result, the market typically responds negatively to such takeover bids, especially when these bids are undertaken by overconfident CEOs. In line with the results discussed above regarding overconfident CEOs' preference for internal financing and debt financing over equity financing, most mergers and acquisitions by overconfident CEOs also occur in companies with substantial cash or untapped debt capacity.

This study regarding mergers and acquisitions is conducted over the same period of data for the period 1980-1994, which in our paper we supplement by considering the more recent decade 1997-2007. However, since we do not consider numbers of mergers and acquisitions directly, our results regarding financing decisions are insufficient to provide a clear view of whether, and if so how, CEO overconfidence influences company mergers and acquisitions decisions. Nevertheless, given the direct link between debt/equity financing preferences and the likelihood of merger and acquisition engagement, it would be a very relevant extension to our paper. We discuss possible directions for further research on this topic in our concluding section.

In an alternative direction, CEO overconfidence has also been linked to dividend payments. As will be discussed more in depth in the fourth section, dividend rates play a large role both in attracting investors and in making equity financing more or less lucrative for the company. The 2003 Jobs and Growth Tax Relief Reconciliation Act that relaxed dividend taxes,

⁴ Malmendier, Ulrike, Geoffrey Tate, and Jon Yan. "Overconfidence and early-life experiences: the effect of managerial traits on corporate financial policies." *The Journal of Finance* 66.5 (2011): 1687-1733.

⁵ Malmendier, Ulrike, and Geoffrey Tate. "Who makes acquisitions? CEO overconfidence and the market's reaction." *Journal of Financial Economics* 89.1 (2008): 20-43.

for instance, altered company equity financing preferences by making the company's equity appear more lucrative to investors, which in turn generated more demand and led to increased equity issuance by the company. The described effect has been supported by empirical research in a number of studies, among them by Chetty and Saez (2005), who document a 20 percent increase in the annual dividend payments immediately following the dividend income tax cut enacted in 2003. Deshmukh, Goel, and Howe (2009), meanwhile, demonstrate a link between dividend payout and CEO overconfidence, in accord with the intuitive prediction that CEOs overestimate the value of their equity sans dividends and consequently end up paying out lower dividend levels than their peers at comparable companies.⁶ We take into account the 2003 Jobs and Growth Tax Relief Reconciliation Act in our data analysis to ensure that it does not create a bias in our calculated effects of CEO overconfidence on financing decisions.

The proposed links between CEO overconfidence and corporate attributes extend far beyond, linking CEO overconfidence with such company characteristics as innovation. Galasso and Simcoe (2011), for instance, show that overconfident CEOs are more apt to lead their companies in a new technological direction, as measured by citation-weighted patent counts.⁷ This conclusion is supported by Hirshleifer, Low, and Toeh (2012), who demonstrate that overconfident CEOs do obtain more patents and patent citations for the company, though this success is somewhat limited to companies within innovative industries so that overconfident CEOs work best when exploiting innovative growth opportunities.

Once again, the first of these studies relates back to the Forbes 500 sample over the years 1980-1994 while the second truncates data at 2003, another reason we decide to consider more recent data for the decade 1997-2007. While these papers provide a very interesting link between CEO overconfidence and a company attribute that may not be immediately intuitively associated with it, the papers are also forced to deal with the hardly quantifiable notion of innovation. Although patents are a numerical measure that we would certainly expect to positively correlate with the "innovation" of a company, there are many other aspects such as a company's culture, employee composition, and product innovation that we would also expect to be inherent to an innovative company.

⁶ Deshmukh, Sanjay, Anand M. Goel, and Keith M. Howe. "CEO overconfidence and dividend policy." *Journal of Financial Intermediation* 22.3 (2013): 440-463.

⁷ Galasso, Alberto, and Timothy S. Simcoe. "CEO overconfidence and innovation." *Management Science* 57.8 (2011): 1469-1484.

In essence, this same difficulty of measuring a qualitative attribute is present in our paper and all those concerning CEO overconfidence research discussed above, since overconfidence itself can only be measured through a proxy. Nevertheless, debt and equity or mergers and acquisitions data for public companies are easily available, easily verifiable, and easily quantifiable. Since the same cannot be said about innovation and other qualitative attributes, it is much more difficult to form conclusions with a comparable level of certainty regarding how overconfidence influences them. For this reason, since we already deviate from previous papers by considering a later time period for our research, we choose to focus on the effects of overconfidence on the more easily quantifiable and replicable debt and equity issuance data in our paper. That is not to say, however, that the study of more recent data should not be extended to other meaningful, albeit slightly less quantifiable, characteristics. A note on the engaging nature of such potential future research follows in the conclusion.

1.2 Managerial Characteristics Approach

For our measure of CEO overconfidence, we construct a proxy based on an integral and well-documented component: the portrayal of the CEO in the press. We take this measure because it is a very individual and personal one. While financial statement analysis may yield a more unilateral portrayal of a CEO's decision-making style, press portrayal tends to describe the CEO in a more multi-faceted way. Since we are looking for a personality trait, namely overconfidence, press coverage – which includes both corporate and personal events in a Fortune 500 CEO's life – should be a good measure of how overconfident a CEO appears to be in all areas of life.

The press overconfidence measure is also a valid one because it does not come from a single source but rather from a multitude of aggregated opinions, thus forming a buffer against any single misrepresentative incidences. CEO representation in the media is additionally important because it allows us to distinguish how others perceive an overconfident CEO in relation to a typical rational CEO. In fact, to arrive at our final measure of CEO overconfidence we actually consider both the optimistic press coverage for the CEO and the optimistic press coverage for the CEO's company in general, in order not to misinterpret positive company performance and generally shared optimism for a CEO's overconfidence.

We next turn to say a few words regarding existing measures for CEO overconfidence, and why in our paper we decide to deal quantify it as described above. An interesting recent study by Hayward, Rindova, and Pollock (2004) regarding precisely this measure of “press” overconfidence showed that journalists typically attribute to a CEO characteristics that are either unique to the CEO or recurring in the CEO’s behavior.⁸ Furthermore, the paper demonstrated that CEOs are apt to internalize press representations of themselves, thereby perpetuating characteristics attributed to them by the press. Though this presents a peculiar view of how CEOs develop overconfidence, it nevertheless demonstrates a close link between actual CEO overconfidence and the depiction of this overconfidence by the press.

We do note that from the above description, it is evident that there is likely some overflow of company performance into press depiction of CEOs. There is indeed a possible reverse causality problem, since instead of gleaning CEO characteristics from press about the CEO, we may in actuality be gathering company characteristics. For this reason, as described in more detail under our second section, we include a company optimistic press measure to control for how the company itself, rather than the company and the CEO jointly, is presented by the press.

We do not include CEO options holding data in our overconfidence measure, as done by preceding papers on CEO overconfidence, because we believe this press measure to be sufficiently indicative of the CEOs’ levels of overconfidence. While Hayward, Rindova, and Pollock (2004) showed the strong link between press portrayal and CEO characteristics, no such study (to the best knowledge of the authors) has been conducted regarding options holding and CEO overconfidence. Holding options to expiration by the CEO can be simply indicative of a different risk profile, improved or deteriorating current personal financial situation, insider knowledge, or even a desire to signal confidence in the company when it may actually not be that high; for these reasons, we do not include a measure of CEOs’ options exercise prices and timeline in our measure for CEO overconfidence.

We describe the precise process of measuring CEO overconfidence via press in the following section. In terms of results, we note two major effects of overconfident CEOs on firm financing decisions. The first is that overconfident CEOs generally prefer to increase financing in

⁸ Hayward, Mathew LA, Violina P. Rindova, and Timothy G. Pollock. "Believing one's own press: The causes and consequences of CEO celebrity." *Strategic Management Journal* 25.7 (2004): 637-653.

order to finance investments whose returns they generally overestimate. This can be explained by the desire to maintain as much control over the firm and its investment decisions as possible, and is supported by Itzhak, Graham, and Harvey's (2007) result that overconfident CFOs recommend the repurchasing of company shares while issuing more debt.⁹ The second is a preference for debt over equity; if the CEO expects the firm's stock price to climb more than the average investor expects, issuing debt over equity becomes a rational decision, especially considering the relatively low debt rates afforded to Fortune 500 companies. Overall, regressing debt and equity issuance on our overconfidence measure shows that debt issuance is more positively affected than equity issuance.

2. CEO OVERCONFIDENCE

2.1 Press Measure

By nature of their occupations, and as reinforced by numerous psychological studies, CEOs tend to be overconfident individuals.¹⁰ Consequently, setting a benchmark for rational behavior as the mean level of CEO overconfidence may not be an accurate representation of true CEO overconfidence. Nevertheless, by comparing differences in overconfidence between CEOs we can examine the incremental effects of additional overconfidence on investment decisions.

In our paper, we follow a similar approach to Malmendier, Tate, and Yan (2011) in accessing overconfidence through the approach of CEO portrayal in the press. We cover 231 CEOs over the years 1997-2007 from the top 100 publicly traded companies as stated in the 2013 edition of *Fortune 500*.

The approach of optimistic CEO press coverage focuses on the personality portrayal of CEOs in news articles. We initially use Google news and manually search for articles that include both the CEO's full name and the keyword 'optimistic'. We use this keyword since it has a similar meaning to confident, and yields significantly more data searches. Since different CEOs

⁹ Ben-David, Itzhak, John R. Graham, and Campbell R. Harvey. "Managerial overconfidence and corporate policies." No. w13711. *National Bureau of Economic Research*, 2007.

¹⁰ Waldman, David A., et al. "Does leadership matter? CEO leadership attributes and profitability under conditions of perceived environmental uncertainty." *Academy of Management Journal* 44.1 (2001): 134-143.

enter office at different times, we do not limit our news search to a specific date span. However, to ensure that the measures are consistent with each other we do standardize them by dividing the total number of mentions of the CEO along with the 'optimistic' quality by the total number of mentions of the CEO in the press. This way we arrive at a percentage of articles concerning a particular CEO that refer to the CEO in a positive light. We try to limit cross-referencing different individuals with CEOs of the same names by manual checking of the articles. Once we calculate the percentage optimistic press variable for each CEO in our 100 company sample, we regress financing decisions of the CEOs on this overconfidence variable.

While the Google News source of data provides a good benchmark for CEO optimism, the archives are not extensive enough for our analysis of the decade 1997-2007, so we employ news searches in the Lexis Nexis database as well. We corroborate our initial overconfidence measures through a similar search process of optimistic press coverage for CEOs in the Lexis Nexis database. While this database does go farther back, it sets a limit of 1,000 on the number of search results, making it a sufficiently reliable source for lesser-known CEOs but an inadequate one for popular CEOs with a significant number of press mentions. Consequently, we keep our results for lesser-known CEOs as a new benchmark and move on to the ProQuest news database.

The ProQuest news database is the one ultimately used in building our overconfidence measure, but we double-check it for consistency with the Lexis Nexis measure. The measures match up very closely (up to .5% difference) for most lesser-known CEOs, as expected.

There are a couple intricacies to consider with this method. First of all, many CEO names are common ones that occur in the press not only in reference to the CEO of a given company but also in reference to other individuals of that same name; in such cases, we need to separate the relevant references from the non-relevant ones. We do so by searching the news articles in ProQuest not only for the full name of the CEO, e.g. "Ronald Compton" for Aetna, but also for that name plus a direct mention of the company name in the article, e.g. "Ronald Compton" AND Aetna. In this way, we weed out unnecessary and irrelevant references to individuals of the same name from our measure of a given CEO's overconfidence.

A second difficulty arises when we consider that a given CEO may be referenced in the press by a number of nicknames or different versions of his name. For instance, "James Dimon" of J.P. Morgan may be most often referred to as "Jamie Dimon" whereas "Steven Jobs" of Apple

may most often be referred to as “Steve Jobs”. In such cases, we use our knowledge of famous Fortune 100 CEO names to search for the most commonly used one, and rely on data to back up these assumptions. If a given search yields an uncharacteristically low number of results (as compared to other CEOs of similarly sized and well-known companies), then we verify that the name used is the most common for that CEO and, in the case it is not, re-run our search using the most common name. Even in the cases where two or more spellings of a name exist in more or less the same amount of usage, using one version (and using the same version when run together with the optimistic keyword) should not yield a wrong measure of overconfidence for that CEO, since we were consistent with the chosen version of the name.

Finally, some companies have come into existence after 1997, making it impossible to find mentions for the company names along with the CEO names of the predecessor companies. In such cases, such as with Roger Deromedi of Kraft, which later spun off Mondelez International, we need to individually research the histories of the companies and search for optimistic mentions of the CEO with the predecessor company (otherwise, we arrive at 0 mentions for the CEO and the current name of the spun-off company). We take note to avoid any such pitfalls by double-checking historical company information in all cases where number of total press mentions for the CEO name and company name is less than 100. We proceed similarly if the company had undergone a merger instead of a spin-off, as in the case of Conoco Inc. and Phillips Petroleum Co. merging to ConocoPhillips within our data sample companies. Once again, it is important to verify the historically relevant company for a CEO in a given time period. We choose to verify so in cases where it is apparent that the current company name alongside the CEO name does not yield many results; since the CEO was never actually the CEO of the company as it goes by the current name, such cases are easy to identify and address as necessary.

It is reassuring to see that while we see varying measures of overconfidence using our press measure, the percent of optimistic press for any given CEO remains within the 0-10% range for nearly all CEOs considered. This, in conjunction with our experience using Google News and Nexis Lexis for the press measure, gives additional confidence that the measure is robust and unlikely to provide misleading results for any CEO. To elaborate on the boundary cases, we provide the table below of the top 5 most confident CEOs:

CEO Name	Company	Industry	# Press Mentions	# Optimistic Press Mentions	% Optimistic Press Mentions
Robert Niblock	Lowe's Companies Inc.	Consumer Discretionary	813	70	8.61%
Robert Tillman	Lowe's Companies Inc.	Consumer Discretionary	272	18	6.62%
Leon Machiz	AVNET Inc.	Telecommunications Services	78	5	6.41%
Max Lukens	Baker Hughes Inc.	Energy	82	5	6.10%
Terry Lundgren	Macy's	Consumer Staples	2362	135	5.72%

As can be gathered from the table, even the most confident CEOs have percentages of optimistic press that lie within percents of each other. The same is true on the lower end of the overconfidence spectrum; there are a number of CEOs at each gradation of a lower percent of optimistic press mentions. We provide a visual of this with the table below, this time delving into more detail to demonstrate how the CEO overconfidence measure is composed of both CEO optimistic press coverage and company optimistic press coverage:

CEO Name	Co. Name	Industry	# Press	# Opt. Press	% CEO Opt.	% Co. Opt.	% CEO Overconfidence
Joe Foster	Baker Huges Inc.	Energy	23	0	0.00%	1.92%	-1.92%
Arthur Ryan	Prudential Financial Inc.	Financials	702	4	0.57%	2.31%	-1.74%
Thomas Frist	HCA Holdings Inc.	Health Care	1631	14	0.86%	2.35%	-1.49%
Barrett Toan	Express Scripts Holding	Health Care	286	1	0.35%	1.81%	-1.46%
Richard Clark	Merck & Co.	Health Care	613	5	0.82%	2.18%	-1.36%

While it may induce doubts that certain “most overconfident” or “least overconfident” CEOs by the press measure do not have much press in general, it is the nature of the media that makes it impossible for all individuals to garner an equal amount of press attention. We hope that any biases present in these small samples extend to large samples as well, and assume there should be no reason that a CEO with a small amount of press should have either a larger or smaller percentage of optimistic press than their more popular counterparts. The fact that almost all CEOs considered have at least some number of press mentions that include the optimistic keyword is a positive sign since then the correct ratio between optimistic press mentions and total press mentions can still be preserved. We reiterate here that the ProQuest database used for these overconfidence results has been the most extensive we could find; utilizing Google News for the measure led to overwhelmingly more results with 0 optimistic articles found, while Lexis Nexis reports led to gross overestimations of overconfidence for popular CEOs due to the unsightly cap on total news articles. As a result, data gathered through the ProQuest database was deemed most adequate for the purposes of this study, and the fact that all overconfidence measures fall into a rather compact range supports that the measure is reliable.

2.2 Controlling for Company Performance

As discussed above, percentage of optimistic press, both intuitively and as has been shown in practice (see cited works in introduction), has proven to be a valid method of estimating CEO overconfidence in the real world. As discussed in the introduction, there have even been papers noting the positive correlation and convergence of CEO overconfidence to press depiction of the CEO. Nevertheless, as with all proxy methods of estimating a qualitative characteristic, there are some caveats we need to consider.

First of all, overconfidence as measured by optimistic press mentions of CEOs often has, by the very construction of this method, included the company name alongside the CEO name in these optimistic mentions. However, we have insofar not separated how optimistic the company itself is regarded by the general population from how optimistic the CEO considers it. Because of the possibility of a company being considered optimistic by the public at large rather than only by the CEO (which would yield an overly high estimation of CEO overconfidence if we only

consider how the CEO regards the company), we need to consider CEO confidence relative to general confidence in the company. For example, in the technological sector many journalists and financial analysts may choose to describe the company as optimistic simply due to the quickly growing technological sector in which the firm operates, which could bias CEO overconfidence upwards if we do not take this into account.

For this reason, we consider a second measure: strictly company specific optimistic press percentage. To calculate this measure, we proceed similarly as to how we do above for the CEO optimistic press mentions calculations. We first count the total number of times a company is mentioned in the press. As in the case of CEO names, there are some intricacies with company names that we do our best to overcome in as seamless a way as possible; for instance, companies with generic names such as “Apple” or “Caterpillar” are searched in the database using the full extension of the name, i.e. “Apple Corp.” and “Caterpillar Inc.”, to avoid ambiguity in reference to the physical objects. We next count the number of times a company is mentioned alongside the keyword “optimistic” in the press. Once the calculations of total press mentions and optimistic press mentions for the company are created, the optimistic press mentions are divided by total press mentions to arrive at the percentage of optimistic press mentions for the given company.

Data for the averages of mentions under this method are summarized below:

Average Press Mentions - Company	Average Optimistic Press Mentions - Company	Average % Optimistic - Company
158,899	3,018	1.97%
Average Press Mentions - CEO	Average Optimistic Press Mentions - CEO	Average % Optimistic - CEO
2,405	63	2.77%
Average % Overconfidence		
0.80%		

The measure of company percent optimistic press mentions above can be understood as the confidence that the outside world, rather than the CEO, has in the company. The thousands of

articles or press that each company garners reflect the opinion of journalists, political figures, investors and financial consultancy companies alike, thus creating an amalgamation of opinion into an average confidence level in the company. The difference between this general level of optimism and the level of optimism the CEO has yields our measure of CEO overconfidence - essentially how much more confident in the company the CEO appears to be as compared to the general population.

3. FINANCING DECISION MEASURE

In order to evaluate the effects of CEO overconfidence on the firm's investment decisions, we use Compustat's North America – Annual Updates, Annual Snapshot database. We examine the variables “new issues of common and preferred stock”, “retired issues of common and preferred stock”, “new issues of long-term debt”, and “retired issues of long-term debt” to calculate net change in outstanding stock and net change in outstanding long-term debt. These measures of debt and equity issuance can then be regressed on the CEO overconfidence measure described above to see whether and how CEO overconfidence affects corporate investment decisions.

After documenting the measures for the net debt and equity issued by company, we subdivide these by year in order to be able to next group the years by CEO. In this way, we arrive at the net issuance of debt and equity by CEO. If a CEO change occurred in the first half of the year, then we attribute the debt/equity issued during that year to the individual who was CEO for the second half of the year; if a CEO change occurred in the second half of the year, then we attribute the deb/equity issued during that year to the individual who was CEO for the first half of the year. In this way, we attempt to group debt and equity disbursements with the CEO most directly responsible for them (or most likely to have been responsible for them, due to the long tenure that individual held as CEO).

A direct consequence of this approach is that we delete CEOs who were in office for less than half a year from our analysis. These CEOs, often either incapable of handling their responsibilities or simply acting as interim CEOs under extraordinary circumstances in the company until a suitable CEO has been found, often do not wield as much power as well-

established CEOs. Furthermore, their financing decisions may often be either entirely absent or more dictated by the current circumstances than by their personal preferences and characteristics.

We also note that several companies do not have data for all ten years of issuance – in this case, we assume that no such issuance occurred. We are able to do so as the amount of such instances is minimal and verifiable.

We also notice that there is a visible absence of equity financing in some corporations. We explain this fact due to the status of these companies; as members of the Fortune 500, all of these corporations were (especially in the generally optimistic, forward-looking period of the 1997-2007 decade that we examine) considered to be mostly risk-free and very unlikely to undergo and experience default. As a result, debt financing included a very modest rate that most corporations were more willing to incur rather than issuing equity and thereby giving up more control of the company. To account for this lack of equity financing, we place our analysis more heavily on the years and corporations where equity issuance and/or repurchases did take place in order to gauge the effect of overconfidence on financing decisions.

Throughout our debt decision analysis, we also note a surprising fact that appears to support our conclusion that overconfident CEOs issue more debt and that, more generally, CEO personal characteristics have an important (and not wholly rationally explicable) effect on the company's financing decisions. This is an important sidestep from the traditionally held view that financing decisions are entirely a result of rational decision-making and the trade-off between debt, equity, and cash funding costs and benefits.

This particular fact is that for several companies, once management changes all of the issuance of debt in preceding years under different management drops to 0. This occurs in several companies out of the top 100 that we examine, most notably for the 1994-1999 J.P. Morgan CEO Walter V. Shipley, 2000 Aetna CEO William H. Donaldson, and 2004-2007 Baker Hughes Inc. CEO Chadwick C. Deaton CEO changes. Hackbarth (2008) shows a similar effect when he considers how managerial traits from CEO to CEO create heterogeneity among otherwise identical firms.¹¹

Several intricacies arise, among them unique circumstances such as interim CEOs or joint CEOs under mergers, such as in the case of Verizon Communication's advent from GTE and

¹¹ Hackbarth, Dirk. "Managerial traits and capital structure decisions." *Journal of Financial and Quantitative Analysis* 43.04 (2008): 843-881.

Bell Atlantic, where Charles Lee and Ivan Seidenberg initially acted as co-CEOs of the company. In such cases, if the interim CEO was in power for less than half a year we attribute the debt and equity issuances during that time to other CEOs incumbent in that year. In the case of mergers and acquisitions, we review the history of the company's management to accurately decide which CEO to attribute the debt or equity issuance of a given year to.

We also introduce the notions of normalized debt increase and normalized equity increase, to be used in conjunction with our measure of CEO overconfidence and provide a more accurate measure of its effects on debt and equity increase. We arrive at normalized debt increase, and analogously normalized equity increase, by dividing the net debt increase for a given CEO by the number of years this CEO was in office within our data range. This gives an annual average increase or decrease in debt for that CEO. An analogous measure of normalized equity increase is constructed. Average data for both debt and equity follow:

(data in Millions)			
Average Net Debt Increase	Normalized Debt Increase	Average Net Equity Increase	Normalized Equity Increase
\$6,478	\$1,809	-\$4,548	-\$1,199

As can be seen from the above table, normalized debt and normalized equity increases are of comparable absolute value, though Fortune 500 companies prefer to issue debt and repurchase equity. We explain this intuitively as the well-known, well-established companies being past their initial growth phase and thus relying more strongly on low-rate debt available to them. In the past, debt financing for these companies came at a higher interest rate and therefore equity financing was a more enticing option than it is now, which accounts for the companies' preferences to repurchase their equity.

4. CAPITAL STRUCTURE IMPLICATIONS

4.1 Overview

The classical trade-off capital structure model assumes that a rational CEO would issue debt and equity to the point of balance between the additional tax-deductibility benefit of debt and the bankruptcy risk detriment of debt.

However, as discussed empirical evidence suggests that companies do not always adhere to the aforementioned model. In our sample of CEOs for the 100 largest Fortune 500 companies, for instance, the managerial characteristic of CEO overconfidence plays a role in the allocation of financing between debt and equity. This is an important move in understanding corporations' capital structures and better predicting whether a company would act in the interests of its shareholders, since attributing part of the financing decisions to the overconfidence of CEOs and measuring this overconfidence can lead us to predict future company financing decisions more accurately.

4.2 Hypotheses for the Effects of an Overconfident CEO on Capital Structure Choices

As mentioned above, we note two major effects of overconfident CEOs on firm financing decisions. The first is that overconfident CEOs generally prefer to raise more debt and equity in order to finance investments they deem lucrative. They do so since they likely overestimate the returns on such investments. The second effect observed is a preference for debt over equity; if the CEO expects the firm's stock price to climb more than the average investor expects, issuing debt over equity becomes a rational decision.

Indeed, overconfident CEOs prefer not to issue equity as a means of financing because it dilutes the claims of existing shareholders (including management and employees with employee stock options, an important personal consideration). Consequently, we expect overconfident CEOs to issue comparatively more debt as a percentage of their total financing needs.

However, there is an important consideration that minimizes the likelihood that overconfident CEOs issue debt as well. If CEOs believe in the sturdiness and success of their

companies, they believe their issued debt to be close to risk-free, and are reluctant to pay higher debt interest rates that take a higher probability of default or delayed payment into account.

From the above two points, it is evident that given no other motivations, overconfident CEOs would prefer to issue less equity (in order not to dilute shareholders' claims) and issue less debt (in order not to pay what they consider to be overpriced interest rates that creditors demand). In this scenario, then, overconfident CEOs would rely more heavily on accumulated cash to finance any projects requiring financing. If the accumulated cash on reserve is not sufficient, however (as it often is not), it becomes unclear whether overconfident CEOs would issue more or less debt and equity than their average confidence peers. While we know we expect overconfident CEOs to use debt financing more frequently than equity financing, the total amount of either can be justifiably both more or less than the corresponding amounts issued by CEOs of average confidence.

It thus becomes necessary to run our regressions of debt and equity issuance on the overconfidence of CEOs, both to corroborate our theories regarding debt issuance preference and to determine whether overconfident CEOs issue higher or lower levels of debt and equity on average. We predict that because overconfident CEOs overestimate the returns to their investments, they will still believe that the higher debt financing rates are justified as a necessary stepping-stone to higher future cash flows from the investment. We believe that while the overconfident CEOs may find the debt interest rates reasonably priced considering they overestimate their investment returns, giving up shareholders' claims via equity issuance may still be a barrier overconfident CEOs are unlikely to overcome. Consequently, we predict that overconfident CEOs will issue more debt than equity, and will issue more cumulative debt and less cumulative equity than average confidence CEOs.

4.3 Public Issuance Needs

In order to form an unbiased and accurate opinion regarding how overconfidence affects investment decisions, we must first account for the firm's external financing needs. While it is reasonable to propose that overconfident CEOs will have on average greater financing needs (or at least, believe that they have higher financing needs) due to their misled beliefs regarding higher returns on possible projects requiring financing, an even more overarching determinant of

financing needs would doubtlessly be the financial condition of the company, which would include future stock analyst forecasts regarding future returns and performance, any outstanding debt that needs to be refinanced, and similar financial characteristics of the company. Consequently, in order to form an unbiased (or minimally biased) estimation of the effects of CEO overconfidence on overall financing issuance, we need to account for the financing issuance directly precipitated by the company's financials.

4.4 Debt Effects

We first attempt to observe the effects of CEO overconfidence on the levels of debt issued. In order to do this, we collect press optimism data on each of the 231 CEOs of the top Fortune 500 companies, thereby constructing a measure of overconfidence for them, and regress the levels of debt issued on this measure. As explained above, we aggregate the debt issued and debt retired for each year that a certain individual acted as CEO for the company into a single value of net debt issued or retired by that CEO. This is the net debt increase value, defined NET_DEBT_INC in our model, that we use to generate normalized debt increase (NORM_DEBT_INT) that we regress on CEO overconfidence, the percentage of optimistic press mentions (NEWS_CEO_OPT). We arrive at the following results, summarized by the table below:

```
. reg NORM_DEBT_INC NEWS_CEO_OPT
```

Source	SS	df	MS			
Model	6373036.5	1	6373036.5	Number of obs =	232	
Residual	1.5430e+10	230	67088809.7	F(1, 230) =	0.09	
Total	1.5437e+10	231	66825970.8	Prob > F =	0.7582	
				R-squared =	0.0004	
				Adj R-squared =	-0.0039	
				Root MSE =	8190.8	

NORM_DEBT_~C	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
NEWS_CEO_OPT	8516.18	27631.01	0.31	0.758	-45926.07	62958.43
_cons	1572.785	935.1829	1.68	0.094	-269.8355	3415.406

where NORM_DEBT_INC refers to the normalized (average annual) net debt increase or decrease for a CEO and NEWS_CEO_OPT is the percentage optimistic press for the CEO (one way to measure CEO overconfidence) as explained above.

As can be seen from this table, there is a positive correlation between CEO overconfidence and debt issuance. This result is entirely in line with our hypothesis, which predicted that overconfident CEOs would overestimate the success and importance of the projects they would like to finance, be reluctant to give up more control of the company for what they consider an undervalued stock price by issuing more equity, and would therefore choose to issue more debt relative to their less confident peers.

At the same time, it is important to note that this result is not completely conclusive due to the lack of control variables and instrumental variables that are not yet present in the analysis as well as the wide 95% confidence interval, which currently includes 0 (i.e. no significant effect of overconfidence on debt issuance) in its range. We address the first of these two concerns below, when we introduce industry control dummy variables to account for debt financing variation not caused by CEO overconfidence.

We next turn to examine the results in terms of magnitude rather than plausibility; that is, we look at the consequences of the effects of CEO overconfidence on debt issuance if indeed the model predicted these effects correctly. The results below summarize the magnitude of these effects.

Average Debt Increase (\$ Millions)	CEO Overconfidence Regression Coefficient	1% Increase in absolute CEO Overconfidence	Predicted Debt Increase (\$ Millions) for 1% increase in CEO Overconfidence
\$1,809	8516.18	1%	\$85.16

That is, for a 1% absolute increase in CEO overconfidence, we expect an \$85,000,000 rise in the debt issued that year. This is $85.16/1809 = 4.7$, or roughly 5% of the total debt initially issued. A 1% increase in CEO overconfidence thus roughly corresponds to a 5% increase in issued debt levels, a sizable amount that is not so large as to be unbelievable. Therefore, if the

effects shown in the regression do hold true we see a large impact of CEO overconfidence on corporate financing decisions each year. However, since there is a large leeway for the coefficient on CEO overconfidence from the regression (as noted from the 95% confidence interval), we are unable to make any such statement regarding CEO effects on debt issuance levels with certainty.

4.5 Equity Effects

The second part of our direct analysis relates to how CEO overconfidence affects use of equity for financing purposes. Once again, similarly to the debt case, we look at press optimism as our measure of CEO overconfidence and this time consider the difference between the issuance of common and preferred stock and the repurchase of common and preferred stock as the net change in equity. In order to gather a unified measure of this net change in equity financing for each CEO, we sum up the annual changes in issued and repurchased common and preferred stock for the years that the CEO was incumbent at the company. We then regress this net change in equity (denoted NET_EQ_INC in our data) on the press optimism measure of the CEO (NEWS_OPT_PERC).

In this case, we predict the overconfident CEOs to be very reluctant to use equity as their primary source of financing because they believe their stock price is significantly underpriced. Consequently, for them it is not sensible to give up control of their company through stock at a very low price, especially considering how much they expect their stock price to rise in the future (since they expect their company to do very well). It makes much more sense for them to leverage their access to debt markets, with rates that, although slightly higher than what they would consider fair, are nonetheless quite low (especially so for a well-established, Fortune 500 company). We consider the results of our regression to see whether they support our hypothesis:

. reg NORM_EQ_INC NEWS_CEO_OPT

Source	SS	df	MS			
Model	5023.95105	1	5023.95105	Number of obs =	232	
Residual	1.6211e+09	230	7048081.27	F(1, 230) =	0.00	
Total	1.6211e+09	231	7017591.84	Prob > F =	0.9787	
				R-squared =	0.0000	
				Adj R-squared =	-0.0043	
				Root MSE =	2654.8	

NORM_EQ_INC	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
NEWS_CEO_OPT	239.1081	8955.856	0.03	0.979	-17406.9	17885.12
_cons	-1206.011	303.1147	-3.98	0.000	-1803.247	-608.774

where NORM_EQ_INC refers to the normalized (average annual) net equity increase or decrease for a CEO and NEWS_CEO_OPT is the percentage optimistic press for the CEO (one way to measure CEO overconfidence).

As evidenced from the table above, equity issuance exhibits a much lower correlation with CEO overconfidence than debt does. Once again, this is in line with our projections: overconfident CEOs would rather access the debt markets because of their comparatively low rates, and keep maximum possible control over a corporation they consider significantly overvalued and with great (though for many, unforeseen) potential.

Once again, however, the results are not unilateral. Rather than an unequivocal negative correlation, we notice a relatively weak positive one. In fact, 0 is well within the 95% confidence interval for the coefficient on NEWS_OPT_PERC, and the probability that the coefficient is in fact positive is high. Nevertheless, the weak low positive correlation is there and, even more importantly, it is significantly lower than the coefficient on NEWS_OPT_PERC when NET_DEBT_INC is run against it. That indicates a strong relative difference between debt issuance and equity issuance for an overconfident CEO: an overconfident CEO prefers to issue debt.

It is important not to limit our considerations to the confidence we have in the regression coefficient but also to consider the effects this coefficient would have if it were indeed accurate. Below we summarize the key statistics for the results:

Average Equity Increase (\$ Millions)	CEO Overconfidence Regression Coefficient	1% Increase in absolute CEO Overconfidence	Predicted Equity Increase (\$ Millions) for 1% increase in CEO Overconfidence
-1,199	239.1081	1%	\$2.39

As can be seen, a 1% absolute increase in CEO overconfidence leads to a \$2.39 million increase in debt issuance, which corresponds to $2.39/-1.199 = .199$ or roughly 2% increase in equity issuance. Since we initially expected CEOs to repurchase shares more than issue new ones (because of the negative coefficient on average equity increase), this is a significant deviation from expected behavior.

4.6 Accounting for Industry Differentials

While the data gathered indicates a large positive effect on debt issuance and slight positive effect on equity issuance of overconfident CEOs, it is important to consider other factors that may be partially responsible for these conclusions. In particular, due to the increased prominence of certain industry sectors such as technology (nominally infrastructure technology and telecommunications sectors in our data) and the decline of others such as auto manufacturing in recent years (nominally consumer discretionary sector in our data) we sought to separate the effects of industry on corporate financing decisions. For instance, it may be that CEOs of technology corporations routinely issue more equity funding regardless of overconfidence.

While the two points regarding technology and auto sectors above remain in full-force today and were very significantly impacted during and following the 08-09 financial crisis, some different financing attributes between industry sectors were certainly in place well before then. We note that our 1997-2007 decade data captures the 2000 dot com bust, for instance, as well as the rise and prominence of the financial sector. Consequently, we add the dummy variables for energy (EN), materials (MAT), industrials (IND), consumer discretionary (CONS_D), consumer staples (CONS_S), health care (HLTH), financials (FIN), infrastructure technology (IT), telecommunication services (TLCM), and utilities (UTIL) sectors to our regression.

The two regressions for the effects of CEO overconfidence on debt issuance and equity issuance then become:

$$(1): \text{NET_DEBT_INC} = a_1 * \text{NEWS_OPT_PERC} + b_1 * \text{EN} + b_2 * \text{MAT} + b_3 * \text{IND} + b_4 * \text{CONS_D} + b_5 * \text{CONS_S} + b_6 * \text{HLTH} + b_7 * \text{FIN} + b_8 * \text{IT} + b_9 * \text{TLCM} + b_{10} * \text{UTIL} + c_1$$

$$(2): \text{NET_EQ_INC} = a_1 * \text{NEWS_OPT_PERC} + b_1 * \text{EN} + b_2 * \text{MAT} + b_3 * \text{IND} + b_4 * \text{CONS_D} + b_5 * \text{CONS_S} + b_6 * \text{HLTH} + b_7 * \text{FIN} + b_8 * \text{IT} + b_9 * \text{TLCM} + b_{10} * \text{UTIL} + c_1$$

Where a_1 is the coefficient on the percent of optimistic press mentions for the CEO (our measure of the CEO's overconfidence) and the $b_i, i=1,..10$ are the coefficients on the different sectors into which the company may fall into, and c_1 is the regression constant.

Interestingly, upon running this regression we do not notice significant effects of industry on debt issuance. While this does not provide interesting revelations in terms of financing discrepancies between industries, it does corroborate our hypothesis that CEO overconfidence is an important determinant of debt and equity financing decisions, since the regression coefficients on NEWS_OPT_PERC remain close to the same.

The full results of the regression for debt follow:

```
. reg NORM_DEBT_INC NEWS_CEO_OPT EN MAT IND CONS_S CONS_D HLTH FIN IT TLCM
```

Source	SS	df	MS	Number of obs =	231
Model	2.1268e+09	10	212683083	F(10, 220) =	3.52
Residual	1.3310e+10	220	60499856.5	Prob > F =	0.0003
				R-squared =	0.1378
				Adj R-squared =	0.0986
Total	1.5437e+10	230	67116518.5	Root MSE =	7778.2

NORM_DEBT_~C	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
NEWS_CEO_OPT	8277.765	27676.52	0.30	0.765	-46267.27	62822.8
EN	-479.3513	3307.362	-0.14	0.885	-6997.519	6038.816
MAT	-326.72	3781.072	-0.09	0.931	-7778.477	7125.037
IND	715.8485	3030.323	0.24	0.813	-5256.329	6688.026
CONS_S	-348.9231	3043.341	-0.11	0.909	-6346.757	5648.91
CONS_D	1810.033	3118.797	0.58	0.562	-4336.509	7956.574
HLTH	183.8306	3077.282	0.06	0.952	-5880.893	6248.554
FIN	9284.299	3118.871	2.98	0.003	3137.61	15430.99
IT	-353.0637	3132.986	-0.11	0.910	-6527.571	5821.444
TLCM	11.99694	4438.041	0.00	0.998	-8734.519	8758.512
_cons	232.9668	2860.517	0.08	0.935	-5404.556	5870.489

where NORM_DEBT_INC refers to the normalized (average annual) net debt increase or decrease for a CEO, NEWS_CEO_OPT is the percentage optimistic press for the CEO (one way to measure CEO overconfidence), EN is energy sector, MAT is a dummy for material sector, IND is a dummy for industrials sector, CONS_S is a dummy for consumer staples sector, CONS_D is a dummy for consumer discretionary sector, HLTH is a dummy for health care sector, FIN is a dummy for financials sector, IT is a dummy for informationa technology sector, and TLCM is a dummy for telecommunications sectors (note that UTIL, dummy for utilities sector, is omitted in the above regression because it is collinear with the other industry sector variables present).

The regression table for equity issuance, run against the same variables as normalized debt issuance, is presented below. We note a negative correlation between equity issuance and CEO overconfidence, as expected by our initial predictions at the start of the section:

```
. reg NORM_EQ_INC NEWS_CEO_OPT EN MAT IND CONS_S CONS_D HLTH FIN IT TLCM
```

Source	SS	df	MS	Number of obs = 231		
Model	75575617.6	10	7557561.76	F(10, 220) = 1.08		
Residual	1.5455e+09	220	7024945.9	Prob > F = 0.3819		
Total	1.6211e+09	230	7048103.11	R-squared = 0.0466		
				Adj R-squared = 0.0033		
				Root MSE = 2650.5		

NORM_EQ_INC	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
NEWS_CEO_OPT	-1950.167	9430.957	-0.21	0.836	-20536.75	16636.42
EN	-1048.789	1127.006	-0.93	0.353	-3269.898	1172.32
MAT	989.5137	1288.425	0.77	0.443	-1549.722	3528.749
IND	708.5422	1032.603	0.69	0.493	-1326.517	2743.601
CONS_S	741.0413	1037.039	0.71	0.476	-1302.76	2784.843
CONS_D	324.317	1062.751	0.31	0.761	-1770.158	2418.792
HLTH	-27.80878	1048.604	-0.03	0.979	-2094.404	2038.786
FIN	-327.0772	1062.776	-0.31	0.759	-2421.602	1767.448
IT	-239.1966	1067.586	-0.22	0.823	-2343.201	1864.808
TLCM	1319.55	1512.292	0.87	0.384	-1660.883	4299.983
_cons	-1333.625	974.7401	-1.37	0.173	-3254.648	587.3981

where NORM_EQ_INC refers to the normalized (average annual) net equity increase or decrease for a CEO and the other variables have the same meanings as in the regression immediately preceding this one.

From these results, it is evident that the financial sector and consumer discretionary sector experience the strongest debt issuance trends, while materials, energy, and information technology sectors experience the least. This can potentially be attributed to the rise of the financial services industry through the late 90s and early 2000s, before the financial crisis of 2008-2009. Clearly, financial company CEOs and analysts alike were overconfident about the industry. This is in line with our prediction that overconfident CEOs would choose to issue more debt.

4.7 Tax Relief Act of 2003 Effects

While we distinguish between debt and equity financing decisions and run our regressions taking into account dummy variables for company industries, one aspect we do not consider is year fixed effects. Our reasons for this are two-fold. Firstly, with the limited sample of Fortune 500 CEOs, our data would be very sparse and potentially less conclusive if we do not consider all CEOs in one sample but rather break them apart year-by-year. Secondly, neither people's personal overconfidence nor corporate structure is likely to have changed significantly over 10 years.

However, there is an important piece of legislation that should theoretically strongly affect levels of equity issued, and which we therefore wish to consider in our analysis. This piece of legislation, the Jobs and Growth Tax Relief Reconciliation Act of 2003, falls squarely within our range of data and must therefore be taken as part of our analysis. We define a variable for whether a given CEO operated mostly during the period of 2003 and beyond, as 2003_DIV_TAX_RELIEF. This variable is 1 if the average of the CEO's start date year and end date year is greater than 2003, and 0 otherwise. In effect, it is a dummy variable loosely representing whether the CEO operated and made financing decisions once the law had been passed.

The Jobs and Growth Tax Relief Reconciliation Act of 2003 itself is a piece of legislation passed under the governance of President George W. Bush, with provisions for individual rate, capital gains, dividends, and estate tax cuts taking effect in 2003 and set to expire in 2010 (the provisions have since been renewed). In conjunction with the Economic Growth and Tax Relief Reconciliation Act of 2001, this act forms part of the “Bush tax cuts”, and among other provisions lowered taxes of income from dividends and capital gains. The capital gains tax decreased from rates of 8%, 10%, and 20% to 5% and 15%, while taxes on qualified dividends, which include most income from non-foreign corporations, were reduced to capital gains levels.¹²

Various literature on the subject indicates predictable effects of the act on corporation’s equity financing allocations. Brav, Graham, Campbell, and Michaely (2008) argue that there was a temporary increase in dividend disbursements, though this increase was not long-lasting. In fact, their data show that while dividend payments understandably increased immediately following the dividend tax cut act, there was a large increase in share repurchases shortly thereafter and surveyed CEOs claimed that the act had a very negligible effect on their decision-making.¹³ Chetty and Saez (2004), meanwhile, also demonstrate a spike in dividend payments immediately following the act, though they point out the spike is much more pronounced in firms of certain characteristics, such as those with lower levels of forecasted growth or those with large executive ownership and low levels of executive stock options outstanding.¹⁴ Since these papers demonstrate a pronounced change in financing allocation between debt and equity following the dividend tax cut act, we take this act into account as a control variable for the effects of overconfidence on capital structure decisions.

¹² Jobs and Growth Tax Relief Reconciliation Act (JGTRRA) of 2003 (PL 108-27)

¹³ Brav, Alon, John R. Graham, Campbell R. Harvey, and Roni Michaely. “The Effect of the May 2003 Dividend Tax Cut on Corporate Dividend Policy: Empirical and Survey Evidence.” *National Tax Journal* 61 (2008): 381-96.

¹⁴ Chetty, Raj and Emmanuel Saez. “Dividend Taxes and Corporate Behavior: Evidence from the 2003 Dividend Tax Cut.” *NBER Working Paper No. 10841* (2004)

The results of our regression including this control variable are as follows:

```
. reg NORM_EQ_INC _DIV_TAX_RELIEF
```

Source	SS	df	MS			
Model	101580388	1	101580388	Number of obs =	231	
Residual	1.5195e+09	229	6635298.37	F(1, 229) =	15.31	
Total	1.6211e+09	230	7048103.11	Prob > F =	0.0001	
				R-squared =	0.0627	
				Adj R-squared =	0.0586	
				Root MSE =	2575.9	

NORM_EQ_INC	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
_DIV_TAX_RELIEF	-1329.867	339.8862	-3.91	0.000	-1999.571	-660.163
_cons	-583.3906	231.3233	-2.52	0.012	-1039.185	-127.5964

Upon running our regression, however, we find support for Bray, Graham, Campbell, and Michaely's (2008) conclusion that the increase in dividends was short-lived, and was in fact followed by a large increase in share repurchases. The 95% confidence interval for the coefficient on `_DIV_TAX_RELIEF` in this case does not include 0, which indicates that there is strong evidence the dividend tax act did not have large long-term positive effects on equity issuance. Consequently, our results regarding the effects of overconfidence on equity issuance for the decade 1997-2007 remain unchanged.

5. CONCLUSION

Traditional theory emphasizes economic costs and benefits such as tax deductibility for justifying capital structure, but there has been observed stickiness in firms' capital structure decisions that cannot be completely explained through this trade-off analysis. In our paper, we attempt to explain this discrepancy by addressing the effects of the personal managerial characteristic of overconfidence on corporate investment decisions. We build on prior research concerning the effects of CEO overconfidence on debt and equity issuance, as well as relate this to research regarding how CEO overconfidence affects dividends or inspires innovation.

Most of the research for CEO overconfidence has insofar considered the period 1984-1990; since this sample data range has become less relevant with the passing of decades, we turn our research to determine whether CEO overconfidence effects on debt and equity issuance are still present in the decade 1997-2007. Demonstrating whether or not this is the case would not only enable these facts to be more relevant for present day investment decisions in companies with overconfident CEOs, but also demonstrate that the effect is extendable from decade to decade, supporting the belief that CEO overconfidence should be treated as an important variable in financing models. In the case of a stronger positive correlation between CEO overconfidence and equity rather than debt financing, meanwhile, we could potentially pave the way for ruling out the possibility that CEO overconfidence is a strong indicator of corporate financing decisions that overvalue debt and undervalue equity.

We build a proxy for CEO overconfidence through optimistic press coverage, and use this measure for regressions of the net equity issued and net debt issued by each CEO. For our sample of the top 231 CEOs from the top 100 Fortune 500 companies over the decade 1997-2007, we find that the values of regression coefficients do suggest that overconfidence plays a significant role in corporate financing decisions – a net increase in debt financing of 5% and net increase in equity financing of .2% is determined by the regression. This demonstrates that if the regression coefficients can be taken as given, overconfident CEOs prefer to issue debt over equity, and issue significantly more debt and slightly more equity than less overconfident CEOs. However, at the same time we experience a very tenuous link between CEO overconfidence and debt and equity financing because of the high probability with which we are able to reject the regression coefficient. We cannot conclude that this coefficient is nonzero for either debt or for

equity issuance; furthermore, the range for the 95% confidence intervals on these coefficients is very large, even when we take industry dummy variables into account and consider whether the Jobs and Growth Tax Relief Reconciliation Act may be affecting our results.

Consequently, we are unable to conclude with certainty that CEO overconfidence influences corporate financing decisions during the time period of the incumbent CEO, and ultimately our results show that the link between CEO overconfidence and financing decisions may not be as clear-cut or widespread as previously imagined. While our results show a subtle preference for debt over equity financing by overconfident CEOs, the fact that overconfidence as a variable explains so little of the deviation for financing decisions among these CEOs leads to the question of whether it is a significant determinant at all. To answer this question, we hope and suggest to pursue further research on CEO overconfidence and financing decisions, potentially considering different time periods from the two considered in previous research and this paper, or focusing attention on CEOs of smaller rather than larger Fortune 500 companies where the effects of managerial qualities may be more prominent and more directly transfer to the company's chosen financing strategy.

Alternative extensions, some influenced by the data observed in this paper, include the effects of industry and legislature on corporate financing decisions. In practical models, new legislature should always be taken into account (similarly to how the going discount rate is always updated in pricing models) by changing the initial environment variables within which the company is taken to initially operate. Similarly, from our data we have seen that industry appears to be a strong determinant of the level of debt and equity issuance the company is comfortable with; determining and testing the motivations for these industry differentials could be an interesting addition to the existing literature on capital structure decisions. Finally, CEO overconfidence itself could be extended to various other attributes, as has been done by the literature mentioned in the introductory section regarding mergers and acquisitions and innovation; managerial overconfidence is an important characteristic that has the potential to explain many previously perplexing deviations from rationally predicted behavior, and we hope to encourage further research concerning more recent time periods to help determine the significance of these overconfidence effects.

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