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We theoretically and empirically investigate the repercussions of credit market misvaluation for a firm's borrowing and investment decisions. Using an ex-post measure of the accuracy of credit ratings to capture debt market misvaluation, we find evidence that firms take advantage of inaccuracies by issuing more debt and increasing leverage. The result goes beyond a wealth transfer and has real investment implications: approximately 75% of the debt issuance funds increased capital expenditures and cash acquisitions. In the cross section, misvaluation affects financially constrained firms the most, supporting the theoretical prediction that debt overvaluation loosens financial constraints.

JEL: G31, G32, G34

Keywords: Debt Misvaluation, Capital Structure, Cash Holdings, Credit Ratings, Debt Issuance, Financing Constraints, Investment, Mergers and Acquisitions, Moody's, Moral Hazard

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The irrepressible idea that markets may overvalue assets can be found in much writing on economics from foundational works such as Smith (1776) and Keynes (1936) to modern day texts such as Shleifer (2000) or Barberis and Thaler (2003). Many authors have looked for the effects of overpriced stock on firm behavior. Starting with Morck, Shleifer, and Vishny (1990), several papers have explored managerial investment decisions in the presence of irrational stock prices.[1] The literature on mergers and acquisitions has also considered the effect of overvalued stock on merger activity.[2] While Baker and Wurgler (2002) and Welch (2004), among others, examine the effect of stock valuation on capital structure. However, the impact of bond market overvaluation on firm policies has received little attention.

The limited focus on potential debt market overvaluation is surprising given its size and importance to the economy– the U.S. corporate bond market comprised $7.7 trillion in assets in 2011.[3] Possibly more attention has focused on equities than debt because bonds are considered easier to correctly price and thus less likely to become overvalued. Recent work by Greenwood and Hanson (2013), however, investigates the forces driving the credit market to overheat, and shows that when aggregate credit increases, the average quality of issuers deteriorates, and that following periods when issuer quality is poor, corporate bonds significantly underperform Treasury bonds. On the other hand, Baker, Greenwood, and Wurgler (2003a) find that when firms issue more long-term debt future excess bond returns are low. Most likely the limited attention that the investigation of debt misvaluation has received is due to the lack of an empirical measure of bond market overvaluation.

Market efficiencies make it difficult to obtain a measure of misvaluation in real time. However, looking back it may be possible to find times when markets systematically over or under estimated the value of debt. We suggest that one such proxy may come not from examining

[1]See also Stein (1996), Baker, Stein, and Wurgler (2003b), Gilchrist, Himmelberg, and Huberman (2005), Panageas (2005), Polk and Sapienza (2009), and Bakke and Whited (2010).

[2]For instance, in Shleifer and Vishny (2003), Rhodes-Kropf, Robinson, and Viswanathan (2005) and Rhodes-Kropf and Viswanathan (2004).

[3]According to the Securities Industry and Financial Markets Association (SIFMA).

prices but instead looking at the quality of the bonds' ratings. The rating agency Moody's, one of the 'big three' bond rating agencies with 40% of the market share, looks back at the ratings it previously gave to a cohort of debt issuances and assesses the quality of those ratings. In this paper we use this ex-post rating quality assessment and examine whether and how it correlates with firm capital structure and investment decisions.

The determinants of a firm's capital structure choice is one of the most fundamental, and still not fully answered, questions in financial economics. The seminal capital structure work, such as Myers (1977), Myers and Majluf (1984) and Fischer, Heinkel, and Zechner (1989), laid out the central issues many decades ago. And although much work since has made progress on capital structure choice, Welch (2004) notes that "corporate issuing motives remain largely a mystery."[4] In particular, Korajczyk and Levy (2003), Faulkender and Petersen (2006) and Erel, Julio, Kim, and Weisbach (2012) argue and find evidence that it is not just firm characteristics but also supply-side factors that impact a company's capital structure. We build on this work by introducing the presence of misvaluation in debt markets and explore its consequences for corporate financial policy. We find that debt issuances and leverage are strongly correlated with ratings mistakes while controlling for all of the standard firm and market characteristics. This evidence is suggestive of managers' awareness of the mistakes in real time and an active exploitation of them.

We extend this analysis to examine how firms use the increase in cash due to their issuances during periods of market mistakes. From a financial economist's point of view, firms' investment decisions are as, if not more, important than their capital structure choices. The investment literature has long hypothesized and examined the determinants of corporate investment and the effect of credit frictions on corporate spending (for example, Fazzari, Hubbard, and Petersen., 1988; Whited, 1992; Kashyap, Lamont, and Stein, 1994; Kaplan and Zingales, 1997; Kiyotaki and

[4] An incomplete list includes Titman and Wessels (1988), Baker and Wurgler (2002), Fama and French (2002), Korajczyk and Levy (2003), Faulkender and Petersen (2006) and Leary and Roberts (2010).

Moore, 1997; Hubbard, 1998; Gomes, 2001), and much work mentioned above has considered the effects of overvalued equity on investment. We extend this work by examining how misvalued debt correlates with investment, acquisitions and cash holding decisions.

Before turning to our empirical analysis we develop a theory of how credit market overvaluation impacts issuance and investment decisions. As the market overestimates the strength of a firm's projects we show that firms raise debt to extract rents from investors while still meeting the incentive compatibility constraint that investors require in order to invest. This simultaneously allows firms to increase investment. These effects are greater for more constrained firms with lower cash balances in the sense that, under certain conditions, overvaluation loosens financial constraints. We show this in a model where the key driver is the interaction between the financial friction caused by a moral hazard problem between managers and investors and the difference in information sets between managers and investors.

Next, we take these ideas to the data. In order to do so we need a measure of credit market mistakes. Moody's analysis of the ratings it gave in the past results in the so called accuracy profile or average default position (henceforth AP), a measure of the rating's accuracy. AP varies from zero to one where a higher AP reflects better ex-post accuracy of Moody's ratings. If all firms that defaulted were initially given the lowest rating, then the AP would approach one, the maximum score. Alternatively if all defaulters were initially given a random rating then AP would be about 1/2. And if all defaulters were initially given the best rating then AP would approach zero. Thus, if more defaulters are given higher ratings then AP will fall.

In practice, ratings are thought to have many reasons to be optimistically biased and little reason to be systematically pessimistic. The conflict of interest that arises because Moody's is paid by the issuing firms has led researchers to look for and find overoptimistic ratings (He, Qian, and Strahan, 2012; Jiang, Stanford, and Xie, 2012). Also issuers should not challenge a rating they perceive as too high, but may dispute a rating perceived as too low. Furthermore, issuers 'shop' for the best rating and may only pay for the rating from the agency that offers the best rating (see Becker and Milbourn, 2011; Bolton, Freixas, and Shapiro, 2012; Chen, Lookman, Schrhoff, and Seppi, 2012). Theoretically, Bolton et al. (2012) and Bar-Isaac and Shapiro (2013) model why rating agencies will become optimistically biased during booms. To further support this argument we show that for most of the sample period the ratio of downgrades/upgrades exhibits more downgrades than upgrades (positive skewness), as well as downgrade correction spikes but no upgrade spikes. Therefore, empirically, a low AP should proxy for optimistic ratings.

We examine the correlation of Moody's AP with firm policies. That is, we look at firm actions in the year that Moody's issued ratings that ultimately turned out to be too high. We find that in a year in which Moody's gave more optimistic ratings, firms issued more debt. Furthermore, this increase in debt issuance is not offset by equity issuance and thus the capital structure shifts. This finding continues to hold even when we control for a host of firm, industry and macroeconomic variables used in the capital structure literature (see, for instance, Leary and Roberts, 2010; Korajczyk and Levy, 2003). Furthermore, the effect is larger for firms with less cash – these constrained firms should be more impacted by overvaluation. We find evidence that it is also larger for those firms that would be expected to react more to Moody's mistakes – rated firms and non-investment grade firms.

If firms are taking advantage of an overvalued debt market by issuing more debt, what do they do with the money? It is possible that although overvaluation affects the capital structure of the firm it does not alter any real investment decisions and firms just hold the cash on the balance sheet or repurchase equity. We find that Moody's AP is significantly negatively correlated with firm cash balances. That is, in times when Moody's gives more optimistic ratings, firm's build up their cash balances.

If this accumulation of cash was the only effect then overvaluation would only have limited impact, as misvaluation would just result in a transfer, at least initially. However, we find a significantly negative correlation between Moody's AP and firm investment. Thus, while our findings are consistent with the idea that firms take advantage of overvalued debt markets to increase their internal slack, they also seem to increase investment through capital expenditures. An alternative form of investment is to acquire another firm. When we replace investment with cash acquisitions we find a similarly strong correlation between Moody's AP and acquisition activity. This is particularly interesting in light of all the work that has shown the connection between equity overvaluation and stock acquisitions. This finding supports the idea that indeed debt overvaluation contributed to increased investment levels and not just to the accumulation of cash.

Mistakes by Moody's may be perfectly understood and accurately priced by bond market participants. Thus, we cannot be certain that AP captures any bond market misvaluation. However, Campbell and Taksler (2003) have shown that ratings do affect bond prices and we have shown that AP is strongly correlated with firm behavior in a way not captured by any other variable proposed in the literature, and in a way that is consistent with the theoretical predictions of a model of corporate financial decisions in the presence of overvaluation. If the accuracy score were low or high due to unexpected future events, then decisions made at the time the ratings were given should be uncorrelated with the ultimate accuracy score. Furthermore, we show that the effects we find operate through the channel we propose, i.e. through the firms' debt issuances. If we include both Moody's AP and the firm's change in debt in our investment specification, then Moody's AP should no longer significantly correlate with investment and acquisitions because our theory implies that the only way debt overvaluation should have an effect is through the issuance of debt. Even though Moody's AP remains significant with all other firm-level and macroeconomic control variables, when including the firm's change in debt, Moody's AP is no longer significant. This provides supportive evidence that Moody's AP is not just picking up the state of the economy over and above all the macroeconomic level controls.

One concern is that firms issue too much debt, overinvest, and the ratings ex-post turn out to be wrong, suggesting that the actions cause the ratings mistakes rather than vice versa.

We run alternative specifications that include Moody's AP lagged and leading values and find no evidence of reverse causality. Thus, it may be that misvaluation is operating as our theory suggests or, alternatively, something else is driving both bond rating mistakes and firm behavior. Moody's mistakes do seem to occur during boom times. However, in all regressions we control for many macro variables including the market-to-book ratio. Furthermore, the simultaneous cash build up of firms suggests limited current growth opportunities and instead that firms are taking advantage of the overheated debt market. Overall, it is not easy to articulate another theory that would be related to Moody's mistakes and affect the firm's choices on debt, cash balances, and investment in the patterns we uncover.

The remainder of the paper is organized as follows. The basic model and predictions are developed and explained in Section I. Data is explained in Section II. Section III presents the evidence on the issuance decision, cash holdings, investmentand acquisitions. Section IV addresses potential econometric concerns and the robustness of our results. Finally, Section V concludes.

I. A Simple Model of Misvaluation and Corporate Financial Policies

Our model builds on the simple moral hazard setting of Holmstrom and Tirole (1989). We choose this setting because it allows us to add the possibility of misvaluation and to make predictions about investment, financing constraints and securities issuance in a straightforward way. In order to incorporate misvaluation in this framework we follow Martos-Vila, Rhodes-Kropf, and Harford (2013).

The economy consists of two types of economic agents: managers and investors. They differ in both their abilities to generate returns and their information sets, in a way that will be clear shortly. All agents are risk-neutral.

As in Holmstrom and Tirole (1989) and Holmstrom and Tirole (1997), firms consist of a manager who owns a project. The project requires an investment I in period 1 to realize a return in period 2. Specifically, the investment generates a verifiable return equaling either 0 (failure) or RI (success). We later generalize this by allowing the failure state to return a non-zero cash flow. The probability that the project succeeds (and returns RI) is either p_H or p_L ($\Delta p = p_H - p_L > 0$) depending on the manager's project choice (or, equivalently, effort choice). Projects are run by managers who receive private benefits of 0 or BI where $B > 0$. Projects with a private benefit of BI also have a low success probability of p_L while projects that have no private benefits are successful with probability p_H. This can be interpreted either as reduced/increased effort affecting probabilities of success, or as a managerial pet project with higher private benefits but lower expected returns. Thus, without proper incentives managers will choose lower expected return projects with higher private benefits. We assume that investors require a return γ and that only the high probability projects are economically viable, i.e.,

$$p_H RI - \gamma I > 0 > p_L RI - \gamma I + BI. \tag{1}$$

The investment scale is endogenous and optimally chosen by managers, but there is a minimum scale I_{min}, below which the investment is not feasible, perhaps due to the existence of fixed costs. Managers have capital A. We also assume that there are infinitely many investors that demand an expected return of γ.

A. Uninformed Investors

We depart from the standard setting and assume that investors do not know and thus estimate with error the probabilities of success and failure. Whereas all managers know p_H and p_L, uninformed investors do not know the true probabilities and instead use the probabilities p'_H and p'_L in assessing expected values.

Probabilities used by managers that differ from those used by investors could rationally occur with asymmetric information. Alternatively, biases, irrationality, or limited cognitive ability and limits to arbitrage could cause differential perceptions of the probability of success (see Hirshleifer, 2001; Barberis and Thaler, 2003; Shleifer, 2000, for summaries). In this paper we assume that it is possible for investors to be mistaken, but we take no stand on what drives the mistake; anecdotal evidence suggests that this is a plausible assumption.[5]

We assume that uninformed investors still require a return γ and have probability beliefs such that only the good projects are economically viable, i.e.,

$$p'_H R - \gamma > 0 > p'_L R - \gamma + B. \quad (2)$$

In order to analyze how the moral hazard problem and its corporate governance implications are affected by the possibility of misvaluation, we will add some additional structure. In particular, we will think of p'_H and p'_L not just as parameters but functions of an underlying variable that measures the extent of asymmetric information or misvaluation, μ. That is, with a slight abuse of notation, let us define $p'_H \equiv p'_H(\mu)$ and $p'_L \equiv p'_L(\mu)$, where p' is a continuous, differentiable and strictly increasing function of μ over its domain: $(-\infty, +\infty)$, it is bounded between 0 and 1 and $1 \geq \Delta p' \equiv p'_H - p'_L > 0$, $\forall \mu$. Moreover we shall note that $p'_H(0) = p_H$ and $p'_L(0) = p_L$; namely, in the absence of misvaluation ($\mu = 0$) the perceived probability p' coincides with the true probability, p, and since $0 \leq p' \leq 1$, we also require that $\lim_{\mu \to \infty} p'(\mu) = 1$ and $\lim_{\mu \to -\infty} p'(\mu) = 0$. In order to simplify the model we also assume that $\partial p'_H / \partial \mu \geq \partial p'_L / \partial \mu$. The implication of this assumption is that an increase in overvaluation lowers the perceived moral hazard problem.[6]

Given this structure, $\mu > 0$ results in overvaluation while $\mu < 0$ results in undervaluation.

[5]Under asymmetric information, uninformed investors would update their beliefs conditional on informed player actions. While it is beyond the scope of the paper to study updating, the ideas we present here would continue to hold with updating as long there was enough noise in the model that informed actions were not fully revealing.

[6]For a lengthier treatment of this see Martos-Vila et al. (2013).

B. The Investment Decision: Investment Scale and Financing Constraints

One optimal contract requires the manager to invest A, and the uninformed investors to provide the balance $I - A$. The contract then pays everyone nothing if the project fails and divides the payoff RI into $R_m > 0$ for the manager and $R_u > 0$ for the uninformed investor if the project succeeds, where a resource constraint requires $R_m + R_u = RI$.

First, the manager will only choose the good project if $p_H R_m \geq p_L R_m + BI$, therefore $R_m \geq BI/\Delta p$. This is the true incentive compatibility (IC) constraint for the manager. On the other hand and given equation (2) uninformed investors will only invest if they believe the manager will choose the better project. However, uninformed investors have a different view of the manager's IC constraint. It is only rational for investors to provide funding for the project as long as they *perceive* the IC constraint to hold. The perceived IC constraint for the manager to choose the 'good' project is

$$Investor's\ view\ of\ (IC) \qquad R_m = RI - \gamma(I - A)/p'_H \geq BI/\Delta p'. \tag{3}$$

This leads directly to the following lemma.

LEMMA 1: *The firm invests if*

$$A \geq \overline{A} = I_{min}\left[1 - \frac{p'_H}{\gamma}\left(R - \frac{B}{\Delta p'}\right)\right]. \tag{4}$$

Proof. The result follows immediately after rearranging the terms in equation (3) at $I = I_{min}$.

Lemma 1 demonstrates the form of the financial constraint – a firm can only invest if it has enough cash that it can borrow the remaining money needed to invest and still satisfy the perceived incentive compatibility constraint. Using this lemma, our first proposition shows that overvaluation loosens this financial constraint.

PROPOSITION 1: *Overvaluation loosens the firm's financing constraint; that is,* $\partial\overline{A}/\partial\mu < 0$.

The proposition above contains the first important implication of credit market overvaluation, namely, alleviating financial constraints. According to the proposition, financial constraints will ease as market overvaluation increases. This predicts that market overvaluation affects positively the access to credit by financially constrained companies, everything else equal. Overvaluation causes investors to believe that the firm's pledgeable income is larger than it really is hence requiring less internal funds than they otherwise would require. This generates a clear cross-sectional prediction: financially constrained firms, or firms with low cash, should be more impacted by debt overvaluation than those that are not. We will take this prediction to the data. Next we summarize the decision on the optimal investment scale.

PROPOSITION 2: *The firm's investment scale is given by*

$$\overline{I} \equiv A\left[1 - \frac{p'_H}{\gamma}\left(R - \frac{B}{\Delta p'}\right)\right]^{-1}, \tag{5}$$

if $\overline{I} \geq I_{min}$*, otherwise the firm does not invest. Moreover, overvaluation causes investment to increase,* $\partial\overline{I}/\partial\mu > 0$.

In line with our first result, this proposition explains that market overvaluation causes firms to invest more. The intuition for this result is parallel to the reason why financing constraints are loosened; when debt is overvalued investors believe that the investment shadow value is larger than it actually is. This allows firms to increase investment since it is optimal to do so (it is easy to see that the surplus brought about by investment is proportional to I). In using this result to extract empirical predictions one should note several points. First, the notion of investment can be interpreted as organic growth but also as acquisitions. Therefore in overvalued times we should observe either more organic growth, more acquisitions, or both. Second, this model is static and hence assumes that there is a positive net present value project readily available for a firm to invest in. If instead invest opportunities arrived each period with some probability, an optimal policy by a firm could well be to take advantage of the market overvaluation by raising funds which would then be saved or accumulated in cash in order to fund investments in the future when profitable investments might come available.

C. The Leverage Decision: The Advantage of Debt

In this subsection we examine whether a firm prefers debt or equity in the presence of overvaluation. In order to distinguish an equity contract from a debt contract in our environment we allow the failure state to return a strictly positive cash flow per unit invested. Therefore with probability p the investment returns R^s per unit of investment and with probability $1-p$, $R^f > 0$, $R^s > R^f$. We also need to assume that debt is risky, so $R^f < (I-A)/I$.

PROPOSITION 3: *A firm prefers using a debt contract over an equity to finance its investment opportunity. Therefore, overvaluation causes leverage and the leverage ratio to increase.*

The intuition for the result above follows from the logic of the previous proposition. First, in this moral hazard setting debt is generally the contract that allows the company to reach the highest level of investment. This is because it is the best contract from the view point of providing incentives and alleviating the moral hazard problem. Therefore a firm optimally chooses to issue debt relative to equity. Misvaluation does not alter the advantage of debt, however, because it affects the equilibrium investment scale (as shown in proposition 2), it affects the leverage ratio.

In order to generate a prediction about how misvaluation affects the choice of securities, assume that there is a bankruptcy cost c that investors will face in case the firm defaults, so that depending on the importance of this cost an equity contract might be preferred, absent any misvaluation. This cost modifies the investor's individual rationality constraint so it affects (negatively) the investment scale, however overvaluation makes the perception of this cost decrease in expected value adding to the other effects of misvaluation discussed earlier. The result below confirms that with bankruptcy costs, debt is preferred as long as bankruptcy costs are small, but more importantly that overvaluation increases the set of firms for which debt is chosen over equity. We summarize this result in the next proposition.

PROPOSITION 4: *A firm prefers to issue debt over equity if bankruptcy costs are relatively small. For those firms, overvaluation causes leverage and leverage ratios to increase. Moreover, there exists a μ^* such that for all $\mu \geq \mu^*$, overvaluation increases the set of firms that find preferable to issue a debt contract.*

In the next section we will first look at whether misvaluation affects debt issuance positively (following the result above) and then move on towards other corporate financial policies. But first, we need to describe our data and particularly our measure of debt market misvaluation. We do this next.

II. Data

A. *Measuring Misvaluation in Credit Markets*

When corporations issue debt, credit rating agencies assign a rating that grades the debtor's ability to make timely payments, the likelihood of default and the loss given default. The majority of debt ratings are done by the "big three" rating agencies (Moody's, S&P, and Fitch) who together account for 95% of the market. In the aftermath of the financial crisis the popular press as well as academic work has called into question the accuracy of these ratings (Becker and Milbourn, 2011; He et al., 2012; Chen et al., 2012; Jiang et al., 2012; Bolton et al., 2012; Bar-Isaac and Shapiro, 2013).

Moody's tracks the ex-post accuracy of its rating measures by examining the initial rating of firms that default in the subsequent 5 years. According to Moody's, the position of any debt issuance (also called a credit) is defined as the share of credits in a cohort rated better than it in the year the debt was issued. It assumes each debt issuance occupies the midpoint of its rating category. For example, the position of every Aa2 credit is the share of the cohort rated Aaa or Aa1 plus half the share rated Aa2. The 5-year Average Position (henceforth, AP) is calculated as simply the average of the positions of the debt issuances that defaulted within 5 years. Intuitively, a more powerful rating system should have low rated defaults and high rated non-defaulters, meaning the AP should be high.

Debt issuances in each rating category have an expected probability of default. This leads to an expected or average AP. However, if, in a particular cohort, some credits were given rating too high, then a higher percentage of credits than expected would default in the higher rating categories. In which case the AP would fall. Alternatively, if some firms were given a lower rating than they deserved, then a lower percentage of low rated credits would default, and the AP would also fall. In both examples the AP falls because the accuracy of the ratings have fallen, so the relative position of the average defaulting firm is lower. Thus, theoretically a higher AP reflects better ex-post accuracy of Moody's ratings. An alternative intuition comes from noting that if all defaulters were initially given the lowest rating, then the AP would approach one. While if all defaulters were initially given a random rating then the AP would be about 1/2. And if all defaulters were initially given the best rating then the AP would approach zero. However, if a proportionally larger or lower number of credits defaulted in all rating categories then the AP would not change. Thus, if the world turns out to be worse or better than expected then the AP would have the same expected value. Only when more defaulters are given higher ratings is the AP expected to fall. Table B in the appendix provides numerical examples that demonstrate how AP changes with different ratings changes.

Thus, theoretically low AP captures rating mistakes. However, there are many reasons to believe that in practice a low AP will tend to reflect ratings that are too high rather than too low. Moody's ratings are paid for by the firms issuing the credits. Much work has suggested that this conflict leads to over optimistic ratings. He et al. (2012), for example, shows that important issuers get better ratings, while Jiang et al. (2012) shows that the rating agency S&P assigned higher ratings after it switched from investor-pay to issuer-pay in 1974. Issuers also engage in ratings "shopping" (see Becker and Milbourn, 2011; Bolton et al., 2012; Chen et al., 2012) in which they pay to be rated by the rating agency that will give them the highest rating. Rating agency's may trade-off reputation for short-run profits. The president and chief operating officer of Moody's Investor's Service acknowledged that, "There is a lot of rating shopping that goes on...What the market doesn't know is who's seen certain transactions but wasn't hired to rate those deals."[7] Furthermore, a firm whose issuance is given what they perceive as too low a rating spends effort to convince rating agencies that they are more sound, while firms stay quiet if given too high a rating. Also, recent work by Bar-Isaac and Shapiro (2013) and Bolton et al. (2012) provides a theoretical model that suggests that ratings agencies should be more prone to inflate ratings in booms.[8]

Figure 1 provides further evidence that AP is likely to capture overvaluation. It plots Moody's ratio of downgrades-to-upgrades for the period of 1980-2009. We want to highlight two patterns. First, that most of the corrections made by Moody's are downwards rather than upwards. And second, that the spikes coming from downgrade corrections are not found in upgrade corrections. AP has a negative correlation of -0.36 with the ratio of ratings downgrades to upgrades three years after the year of interest, i.e., when the accuracy of the ratings was low there were more downgrades relative to upgrades three years later. If AP empirically equally captured positive and negative mistakes then the correlation should be zero, although downgrades-to-upgrades is not cohort specific so it makes it difficult to identify exactly when the ratings mistakes occurred. In summary, empirically a low AP proxies for optimistic ratings.

[Figure 1 here]

[7] "Bond-Rating Shifts Loom in Settlement; N.Y..s Cuomo Plans Overhaul of How Firms Get Paid", Aaron Lucchetti, Wall Street Journal, June 4, 2008, as noted in Bolton et al. (2012)

[8] Evidence from Ashcraft, Goldsmith-Pinkham, and Vickery (2010) and Griffin and Tang (2012) provide support for this idea.

Moody's has provided us with the 5-year AP of annual issuing cohorts from 1983 to 2005 (we stop in 2005 because we need 5 years of data to construct AP and Moody's shared with us data through 2010). Applying the restriction that our observations have the necessary data in Compustat and CRSP for our regressions yields a total of 67,700 firm-years during our sample period. We also use Moody's raw data to construct a variable called $FF12AP$ for each of the Fama-French 12 industries.

B. *Firm-level and Market-level Data*

Our initial dataset is based on the analysis in Leary and Roberts (2010) that incorporates most variables used to date to explain capital structure decisions. Our goal is to test whether managers issue debt to take advantage of debt market misvaluation. We attempt to control for other factors that influence the security issuance choice. We discuss their specification in detail in the next section, but it requires standard data from the Compustat and CRSP databases. Appendix B contains the exact definition for all the firm-level variables used.

We supplement firm-level data with other measures of bond market and macroeconomic activity and conditions, in order to capture both business and credit cycles. Credit market controls include the 5-year Treasury rate (the yield to maturity for 5-year Treasuries), the term spread, the high-yield credit spread (the difference between the Bank of America Merrill Lynch High-yield 100 index yield and the 5-year Treasury Yield) and the average spread over the Federal Funds rate for commercial and industrial loans (the spread between the average rate on commercial and industrial loans and the Federal Funds rate (Series E.2 from the Federal Reserve)). These variables have been used in previous studies. In order to control for the business cycle and any other non-financial macroeconomic activity we use the average Market-to-Book ratio (the median of the market-to-book ratio for Compustat firms, winsorized at the 1st and 99th percentile); the Hodrick-Prescott filtered log real GDP and the real industrial production growth from the Federal Reserve, the real consumption growth from the Bureau of Economic Activity, a recession indicator (based on the NBER definition) and, as in Greenwood and Hanson (2013), the consumption wealth ratio (*cay*) from Lettau and Ludvigson (2001). Figure 2 plots the time series of AP alongside some other credit market variables.

[Figure 2 here]

A quick glance at Figure 2 suggests that our measure of overvaluation is related to the credit cycle. In particular, the years with the lowest AP score (most inaccurate ratings or highest overvaluation) are 1985-87 and 2004-05 (recall that our sample ends in 2005), followed closely by 1988 and 1997-98. These are all periods that have been previously documented as credit booms. Holmstrom and Kaplan (2001) relate the mid-to-late 80s boom with a leverage buyout wave and the junk-bond market boom. And recent papers characterize the credit boom that started in 2004 as driven by residential mortgages and structured products (see Demyank and Hemert, 2011), and private equity (see Martos-Vila et al., 2013).

Finally, Table I presents summary statistics for the variables used in our analysis and a correlation matrix for AP and all the macroeconomic controls.

[Table I here]

III. Evidence

A. Issuance Decision

We start by testing the basic prediction that overvaluation, as captured by our empirical proxy, AP, leads firms to issue more debt. We derived that result in proposition 3. We estimate panel regressions with firm fixed-effects and robust standard errors where the dependent variable is the firm's change in debt in year t. The change in debt is calculated as book debt in year t less book debt in year $t-1$, all scaled by book assets in year $t-1$. The full set of explanatory variables includes AP and other macroeconomic-level credit market and business cycle variables in year t, denoted by M_t, as well as firm-specific characteristics at the end of year $t-1$, denoted by X_{it-1}. Specifically the econometric model is

$$(Debt_{it} - Debt_{it-1})/Assets_{it-1} = \beta_1 AP_t + \beta_2 M_t + \beta_3 X_{it-1} + \gamma_i + \mu_{it} \tag{6}$$

Table II presents the results of estimating (6). In the first column, we show that AP and firm debt issuance are negatively correlated; when AP is low, meaning debt is mispriced (overvalued), firms issue more debt. Next, we add other contemporaneous credit market controls as well as the average market-to-book in the Compustat population and a battery of business cycle controls. Higher equity values, as captured by higher average market-to-book, reduces firm's debt issuance, as do higher term spreads. On the other hand, the consumption-wealth ratio and consumption growth affect positively the decision to issue debt. The coefficient on C&I spread is also positive, suggesting a flight-to-quality dominating effect, as suggested in Erel et al. (2012). AP is still negative and significant at the 1% level.

In column (3), we add firm-specific controls. The coefficient on AP actually increases in magnitude once we control for time-varying firm characteristics (even columns (1) and (2) included firm fixed-effects to control for time-invariant firm characteristics). Most of the control variables have the expected sign, such as the positive effect on debt issuance for dividend payers, firms further from distress (Z-score), and those with more tangible assets. All these effects have been previously reported in the literature. Some are not as expected, such as the negative sign on profitability. While theoretically, profitability should lead to more leverage, empirically, the negative relationship has been found in many regressions (see, for example, Kayhan and Titman, 2007), and explained by models such as Strebulaev (2007).

The coefficient on AP is statistically strongly significant and also economically significant. The coefficient reported in column 3 reveals that a one standard deviation decrease in AP would increase debt (relative to assets) issuance for a given company by 1.9% (this is relative to a mean of 3% and median of 0%).

[Table II here]

We construct an alternative measure of firms' preference for debt issuance as follows. First, we calculate the change in debt as above. We next identify equity issuances using the statement of cash flows sale of common and preferred stock, net of repurchases, again scaled by book assets at the end of year $t-1$. We then take the difference of these two variables–change in debt net of change in equity–as a continuous measure of the firm's preference for issuing debt vs. equity in year t.

The results of our specifications designed to explain the preference for issuing debt over equity are also presented in table II, columns 4 through 6. Again, all specifications include firm fixed effects. In column 4, we simply establish the basic relation between AP and issuance. The coefficient is negative, indicating that when AP is lower, meaning less accurate (overvalued) debt, firms issue more debt relative to equity. In the second specification (column 5), we show that this finding is incremental to the explanatory power of other standard debt market variables. In column 6, we introduce the variables from the Leary and Roberts (2010) specification. While the magnitude of the misvaluation coefficient drops, its explanatory power survives the addition of all of these firm-specific variables that have been shown to help explain the issuance decision. Some of the control variables, such as market-to-book, have the expected sign now that we have taken equity issuance into account. The high-yield spread now has the expected negative sign as well. It is also interesting to note that the negative coefficient sign attached to GDP (and to industrial production growth) points at the counter-cyclicality of debt issuance and preference for debt. Erel et al. (2012) find that non-investment public bond issuances are pro-cyclical whereas investment-grade debt is counter-cyclical. Our results would suggest that, overall, the effect coming from investment-grade borrowers dominates.

Again, the economic significance is large. A one standard-deviation decrease in AP would increase the debt to equity (relative to assets) issuance for a given company by 1.7% (this is relative to a mean of 0.4% and median of -.1%). If we compute the mean of the absolute value of the debt issuance minus the equity issuance scaled by assets, we obtain 11.9% (median is 5.3%).

B. Cross-sectional Variation in Issuance Decision

In table III, we test the prediction that the effect of debt misvaluation will be more pronounced for more financially constrained firms, inspired by proposition 1. Specifically, we include an indicator variable, *lowcash*, which is set to one when a firm's cash-to-assets ratio is below its industry's 25th percentile ratio. We interact *lowcash* with AP to identify the incremental effect of debt misvaluation on constrained firms. As predicted, the effect of misvaluation on constrained firms is about 25% greater than that for unconstrained firms, if we look at debt issuance, and slightly smaller if we instead look at net debt issuance. To make sure this result is robust, we use other proxies for financially constrained firms, following the work of Hadlock and Pierce (2010). Using their approach, we calculate the Size-Age index (henceforth, SA) of financial constraints. We then create a dummy to indicate belonging to the bottom quartile of the index (which are the most financially unconstrained companies) and interact it with Moody's AP. We find that the interaction term is positive and significant, which is a sign that the effect is stronger for more rather than less constrained firms, in line with the results from using our previous proxy, *lowcash*, and of about the same order of magnitude.

[Table III here]

Overall, the results in tables II and III show that debt misvaluation, as captured by AP, influences financing decisions by firms. Controlling for overall credit conditions, unobservable time-invariant firm characteristics, and a host of firm-specific characteristics that predict issuance decisions, firms are incrementally more likely to issue debt when our measure says it is overvalued.

We now turn to further examine the effect of potential misvaluation in the cross-section of firms. Similar to testing and confirming the increased effect of overvaluation for financially constrained firms, we look for firms that should ex-ante be expected to react more to misvaluation. We hypothesize that the effect of overvaluation should be larger for firms that are rated, and hence have the potential to take more advantage of ratings mistakes. We find some support for this idea in a regression that includes an interaction between AP and an indicator for whether the firm is rated by a credit rating agency. The interaction term is insignificant when the dependent variable is the change in debt but becomes significant and negative when we explain net debt issuances. Additionally, one would also expect those firms with lower ratings to react more to overvaluation, hence the effect should be lower for investment grade companies. We estimate our baseline regressions with an interaction of AP with a dummy variable indicating an investment-grade firm. We find that in both specifications the interaction term is positive and significant, as predicted. We present these results in table IV.

[Table IV here]

We now test two final debt issuance predictions to support a channel that operates through debt misvaluation. First, if managers are responding to misvaluation in credit markets, one would expect that they would prefer to take advantage of it by using relatively longer maturity debt, in order to maximize the transfer from investors. We take this idea to the data and redefine our dependent variables, separating longer and shorter maturity issuances. That is, we split issuances by those with less than 5 years maturity and those with 5 or more years maturity. The way we construct these new dependent variables is as follows. For each year we know the amount of debt maturing in 1, 2, 3, 4 and 5 years. Assuming that debt maturing in $x+1$ years at $t-1$ becomes debt with maturity of x years at t, we can identify the net issuance with maturity x from $t-1$ to t as the difference between the total amount of debt with maturity x at t minus debt with maturity $x+1$ at $t-1$. The results of this specification are in table V.

[Table V here]

As it is immediate to see, the effect of AP is clearly stronger for longer maturity issuances. The coefficient of Moody's AP is of larger magnitude in the regression where the dependent variable is long-maturity debt issuance (-.31 vs. -.07). We find that this is consistent with firms responding to overvaluation in a way to be expected; and it is suggestive of longer-term effects in their capital structures coming from debt issuance in times when debt markets are overvalued. Second, and related to firms preferring longer-term debt instruments during misvalued times, we should observe higher refinancing and rollover activity during such times, precisely to roll debt into longer terms, or simply to take the most advantage of overvaluation. Therefore if managers are responding to misvalued credit markets, one would expect that their rollover activity would increase during such times. Recall that our baseline econometric model looked at debt issuance as the change in debt from one year to the next. While this captures changes in capital structure it does not capture refinancing activity or debt being rolled over. In order to test this idea we construct a simple measure of rollover activity as $Debt\ Issuance_t - \max(Net\ Debt\ Issuance_t, 0)$, where net debt issuance is defined as in our issuance specification, $Debt_{it} - Debt_{it-1}$.

[Table VI here]

The estimates in table VI show evidence that not only do firms increase the amount of debt net of equity when Moody's is more inaccurate but also rollover more of their existing debt. In conjunction with the maturity evidence presented in table V it appears that firms, during misvalued years, firms tend to rollover more debt and into longer maturities. This is consistent with managers reacting to the existence of overvalued credit markets. In the remaining subsections of the paper, we examine what the immediate use of the proceeds from issuing debt is in times when credit markets appear to be overvalued.

C. Cash Holdings

It is possible that firms simply take advantage of temporary misvaluation to issue overvalued debt and hold the proceeds as cash. In this case, debt market misvaluation would have no real effects, instead representing a transfer from the debt buyers to the debt issuers. We start by estimating standard specifications to explain cash holdings, and add the debt mispricing measure to them. Our base cash specification draws on the corporate cash holdings literature (see, for example, Harford, 1999; Opler, Pinkowitz, Stulz, and Williamson, 1999; Bates, Kahle, and Stulz, 2009). The results are presented in table VII.

[Table VII here]

We build the specifications out as in our issuance regressions. In the first column, we simply show that debt misvaluation is correlated with cash holdings. Specifically, lower AP, meaning more misvaluation, is associated with higher cash holdings. In the second column, we add the other credit market variables: AP continues to incrementally explain cash holdings; and credit spreads and the treasury yield have the expected sign and are consistent with the results in Bates et al. (2009). Cay, industrial production growth, consumption growth, the recession dummy and GDP all affect cash holdings negatively. Finally, in column (3), we include firm-level variables that have been shown to explain cash holdings. We find, consistent with prior studies, that cash-flow volatility, the cash flow-to-assets ratio, the firm's market-to-book and research and development expenses have positive and significant coefficients, whereas firm size, debt and capital expenditures have negative and significant coefficients and thus lower the amount of cash firms hold. Again, even in the presence of these firm-specific characteristics, debt misvaluation continues to incrementally explain firm's cash holdings.

In sum, the results in table VII show that firms hold more cash when debt misvaluation allows them to issue debt. Thus, some of the effect is a transfer, at least in the short-run. In terms of economic magnitude, a one standard deviation decrease in AP leads to an increase in cash of

0.45% of assets. Given that a one standard deviation decrease in AP led to a 1.87% increase in debt issuance relative to assets this suggests that approximately 24.23% of the issuance is saved in cash. However, because firms can both add to cash and increase investment, or some firms can add to cash while others increase investment, in the next section we examine the impact of debt misvaluation on subsequent investment, in order to understand the unexplained component (76%) of debt issuance.

D. *Investment*

As we explained in the discussion of the cash holdings results we now estimate regressions to explain investment through capital expenditures. The results are in table VIII. We follow the specifications used in Faulkender and Petersen (2011) to explain investment decisions. Their specification calls for year indicators, but since our AP measure is an annual variable, we replace their year indicators with all our macroeconomic controls, including the same credit market variables as in previous tables. Most of the studies essentially control for a measure of Tobin's Q and a measure of cash flows scaled by capital or assets. The first column shows that investment is inversely correlated with debt market misvaluation-when firms are able to issue overvalued debt, capex is higher. Next, we add the other credit market and business cycle characteristics and show that AP is still incrementally significant in explaining investment. In column (3), we introduce the remaining variables from Faulkender and Petersen (2011), which while significant in explaining a firm's capex, only minimally impact the coefficient on AP. As expected, both market-to-book and profitability have positive and significant coefficients. In terms of economic significance, the capex effect is of the same order of magnitude as the cash balance effect.

[Table VIII here]

A one standard deviation in AP leads to additional investment of 0.52% of assets, so 27.76% of the effect of AP on issuance is invested.

If our theory is correct, and debt market misvaluation is leading firms to issue overvalued debt and then use the proceeds to increase investment, then debt misvaluation acts through the firm's debt issuance. If we control for this channel, then the indirect effect of AP on investment should no longer be significant. So, we re-estimate the full specification from column (3), but including the firm's change in debt as an independent variable (not tabulated). The firm's change in debt positively explains investment and simultaneously eliminates the explanatory power of AP. This is evidence of debt issuance being the channel through which AP acts, and reinforces our conclusion that AP is indeed capturing debt mispricing rather than proxying for some other omitted macroeconomic variable that is correlated with investment.

E. Acquisitions

In our final test, we examine cash acquisitions (taken from the statement of cash flows), testing whether debt market misvaluation affects only internal, so-called greenfield investment (capex), or whether it also impacts external investment through acquisitions. Table IX mirrors table VIII, starting by showing that AP is negatively correlated with cash acquisitions. We then add the other market variables. Finally, column (3) includes the market-to-book ratio and profitability. In all cases, debt misvaluation, as measured by AP, explains cash acquisition spending. This result adds to the M&A literature by showing that the overvaluation theories of M&A are not exclusive of stock acquisitions but can also be linked to cash acquisitions. And in terms of economic significance, a one standard deviation decrease in AP leads to additional cash acquisitions of 0.87% of assets, representing that about 46.54% of the debt issuance goes to acquisitions. All together, the proceeds from the additional debt allowed by misvaluation are allocated, on average, as follows: 24.2% to cash, another 27.8% to capex and 46.5% to cash acquisitions. Thus we are examining the three main uses for the additional amount of debt raised in times of misvalued debt markets.

[Table IX here]

Once again, we test our hypothesis that AP acts through debt issuance by re-estimating the full specification with the firm's change in debt included as an additional variable. We find once again that the change in debt is strongly significant in explaining acquisition spending, while eliminating the indirect effect of AP in explaining acquisitions. This suggests that the change in debt is the channel through which debt misvaluation affects acquisition spending. Combined with the results in table VII, this provides evidence supporting our interpretation of AP as a measure of debt market misvaluation.

IV. Robustness and Endogeneity Concerns

A potential econometric concern that could plague our analysis is one of omitted variables. In the cross section, any biases stemming from firm-level unobserved heterogeneity are unlikely to contaminate our results since we use firm fixed effects in all of our regressions, as mentioned in the results' section. Perhaps more importantly, one might be concerned about AP being correlated with a macroeconomic variable that we might have omitted in our specifications. We believe that we have attenuated such concern by including all the usual macroeconomic variables found in the literature to be determinant. And the inclusion of the exhaustive number of macroeconomic controls increases the point estimates of Moody's AP in all of our specifications, and especially the debt issuance ones. Therefore we think it is unlikely that an omitted macroeconomic factor is driving the results. Moreover we have demonstrated that in our investment regressions the channel is through debt issuance and have shown that AP does not affect equity. We, however, take additional steps to address this concern. We run the issuance decision regressions with AP measured at the industry level (we label this variable *FF12 AP*), where industry is defined using the Fama-French twelve-industry classification. That is, we measure AP following Moody's procedure but for each industry separately. It is worth noting that while we think that industry AP is theoretically a good way of capturing credit market overvaluation, its measure might be less precise than market-wide AP. This is because industry AP is calculated with defaults of companies in a particular industry and the smaller sample makes the AP measure subject to more measurement error. Having this caveat in mind, if we indeed were picking up a macroeconomic factor with market-wide AP we would expect industry-wide AP to be insignificant. The results of such specification are in table X. We find that the coefficient on industry AP is still significantly negative, further confirming that it is unlikely that our specifications suffer from a an omitted macroeconomic variable.

[Table X here]

Another potential concern is reverse causality. First, it is not clear whether reverse causality is actually a concern in this setting. If debt issuance was higher in some periods (for some unexplained reason), firms would then have either too much debt and/or invest poorly. This could cause them to default more than they otherwise would have. But this would not cause the ratings to turn out to have been wrong unless Moodys simultaneously makes mistakes exactly during these periods. Recall that more defaults does not lower AP, rather ratings mistakes lower AP. A true reverse causality argument requires that all firms coordinate to issue more debt (for some unexplained reason) and that higher debt issuance level causes Moody's to rate the credit of companies less accurately. This could be the case if their analysts became overwhelmed and devoted less time to assess each company. One way to check this concern is to test whether the aggregate (economy-wide) change in debt causes (in the sense of Granger) AP. If anything, we find that the aggregate change in debt weakly positively Granger causes AP. Note that this is the opposite of what would be a concern for the causal interpretation of our results (increases in aggregate debt issuance makes AP more accurate). Notably, we indeed find that AP weakly Granger causes the aggregate change in debt in the right direction (negatively). We also run the main specification including lags and leads of AP. We find that the one-year (also two-year) lagged AP is negative and strongly significant confirming the direction of causality, especially since the one-year lead AP is not statistically significant. The results of these regressions are in table XI.

[Table XI here]

Table VI provides additional arguments against reverse causality. If it was the increased amount of debt the one causing the rating's misvaluation then we should not see any effect of Moody's AP on the amount of debt rolled over, for only the increase in debt should matter. But table VI reveals this is also useful as a counter to the reverse causality story–rolling over debt cannot expost cause the ratings to be wrong.

As we discussed in the investment subsection, if our theory is correct, and debt market misvaluation is leading firms to issue overvalued debt and then use the proceeds to increase investment, then debt misvaluation acts through the firm's debt issuance. When we re-estimate the full specification from table VIII, column (3), but include the firm's change in debt as an independent variable, the firm's change in debt positively explains investment and simultaneously eliminates the explanatory power of AP. This is evidence of the idea that AP acts through debt issuance and reinforces the notion that AP is indeed capturing debt mispricing, and that AP is not just a proxy for an omitted macroeconomic variable that is correlated with investment.

Finally, our regressions could be subject to econometric problems typical in models with time-series variation. In particular, one could be concerned about excessively serially correlated errors (especially because our variable is constructed with data that is realized in the future). We estimate (but not tabulated) our main issuance regression with Newey-West standard errors and obtain similar results, the coefficient for AP is significantly negative. Moreover the Durbin-Watson test statistic is not less than one, which alleviates concerns of excessive positive serial correlation. Note that the Newey-West procedure does not allow for fixed effects, so it comes at a cost. Alternatively, we run a fixed-effects panel regression allowing for AR(1) estimation errors-transforming the data to remove the autocorrelation. Untabulated results show that the coefficients on AP and FF12 AP are still significantly negative.

V. Concluding Remarks

The potential for overvaluation to impact firm decision-making is a potent idea with a long history in the economic literature. However, virtually all work on this idea has considered the potential for *equity* overvaluation to have an impact. This has left the potential impacts of bond market overvaluation an understudied phenomenon.

We fill this gap in the literature by introducing the idea that mistakes made by the rating agencies should be correlated with bond pricing mistakes. We then examine the correlation in bond rating mistakes with the issuance decisions of firms as well as their cash holding, investment and acquisition decisions. We find that mistakes by Moody's correlate with increased issuance of debt, increased cash holding, increased investment and increased acquisition activity.

Thus, we have found a variable that has relevance for two of the most important questions in financial economics – Why do firm's choose to issue debt or equity? What causes firms to invest?

Although our work is only a first step, and much work needs to be done in this area, our findings suggest the potential for researchers to find a very rich set of impacts of overvalued debt.

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Figure 1. Moody's Downgrade-to-Upgrade Ratio

The figure plots Moody's ratio of downgrades to upgrades (1980-2009). We present the yearly average of the quarterly ratios provided by Moody's.

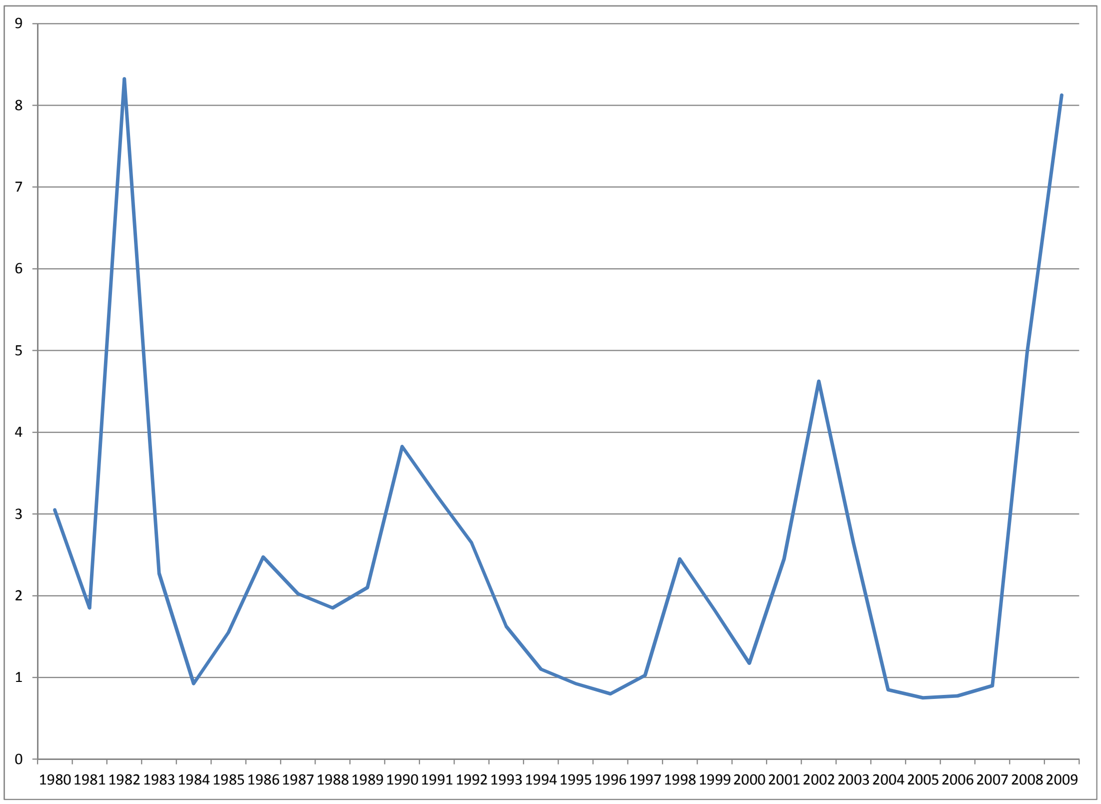

Figure 2. Moody's AP, Financial Markets and the Business Cycle

The figure plots Moody's AP (right axis) and the 5-year Treasury rate (percentage), the Commercial and Industrial (C&I) loan spread (percentage x10), High-yield spread (percentage), the overall Market-to-book ratio (x10) and the H-P filtered log GDP (x100).

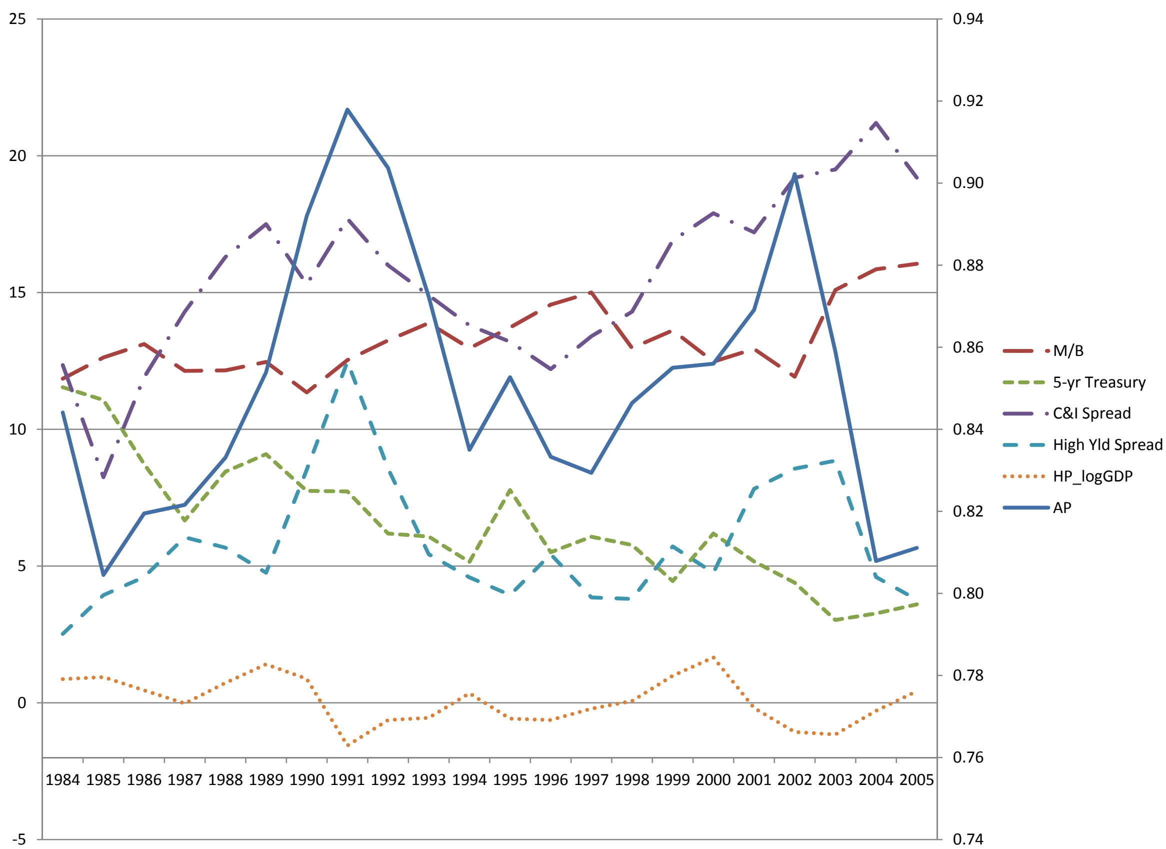

Table I. Summary Statistics

The sample consists of all non-financial and non-utility firms in the Compustat database from 1983 to 2005. All firm-level variables are formally defined in appendix B. Macroeconomic variables are defined in section II. AP is Moody's 5-year average position, a measure of the accuracy of a given year's bond ratings over the following 5 years.

	Mean	Median	S.D.	5th Pctile	95th Pctile	Obs
Chg Debt Net of Chg Equity	0.004	-0.001	0.229	-0.272	0.301	67700
Chg Debt / TA	0.030	0	0.174	-0.153	0.303	67700
Moody's AP	0.852	0.853	0.030	0.808	0.904	67700
Cash/TA	0.130	0.062	0.166	0.002	0.492	67700
Investment/TA	0.104	0.064	0.221	-0.050	0.379	67700
Capex/TA	0.076	0.050	0.090	0.006	0.236	66716
Acq/TA	0.029	0.000	0.096	0.000	0.170	64866
Average M/B	1.335	1.297	0.126	1.185	1.585	67700
5-yr Treasury Yield	6.336	6.070	2.157	3.270	11.070	67700
C&I Rate Spread	1.568	1.600	0.292	1.190	1.950	67700
Cay	0.014	0.014	0.014	-0.016	0.034	67700
Ind. Prod. Growth	0.239	-0.103	1.592	-0.778	5.132	67700
Consumption Growth	3.585	3.500	1.216	2.000	5.500	67700
Recession	0.093	0.000	0.291	0.000	1.000	67700
H-P Filtered Log Real GDP	0.001	-0.000	0.008	-0.012	0.017	67700
Term Spread	1.888	1.700	1.013	0.210	3.150	67700
High-Yield Spread	5.828	5.431	2.265	3.771	8.854	67700
Pecking Order	0.129	0.143	0.407	-0.550	0.757	67700
Size	5.843	5.594	1.870	3.276	9.367	67700
Age	17.195	13.000	12.266	4.000	42.000	67700
Cash-flow Volatility	0.141	0.076	0.295	0.016	0.398	67700
Dividend Payer	0.488	0.000	0.500	0.000	1.000	67700
Z-Score	1.739	1.945	1.873	-1.192	4.110	67700
R&D / Sales	0.077	0.000	0.443	0.000	0.191	67700
No R&D Reported	0.432	0.000	0.495	0.000	1.000	67700
M/B	1.627	1.258	1.171	0.715	3.833	67700
Tangible Assets	0.327	0.274	0.230	0.041	0.792	67700
Prior one-year return	0.153	0.038	0.690	-0.646	1.335	67700
Industry Leverage	0.226	0.230	0.096	0.072	0.389	67700
Profitability	0.073	0.089	0.176	-0.211	0.296	67700
Investment Grade	0.121	0	0.326	0	1	67700
Rated	0.224	0	0.417	0	1	67700
Low Cash	0.510	1	0.500	0	1	67700
Size-Age Index	-3.360	-3.295	0.685	-4.624	-2.315	67700
Size-Age Fin. Constraint	0.500	0	0.500	0	1	67700

Panel B: Correlation Matrix

	AP	Avg M/B	Tr. Yd.	C&I	Cay	In.Prod.	C Gth.	Recess.	GDP	Term	H-Y
AP	1										
Avg M/B	-0.4111	1									
Tr. Yd.	-0.0663	-0.6207	1								
C&I Sp.	0.3212	0.287	-0.6739	1							
Cay	0.5039	-0.3578	0.3265	-0.4074	1						
Ind. Prod.	-0.1796	-0.3374	0.1691	-0.0852	-0.2165	1					
Cons. Gth.	-0.5347	0.0046	0.1669	-0.3852	-0.3518	0.2029	1				
Recess.	0.3011	-0.2864	-0.01	0.0718	0.1319	-0.0205	-0.312	1			
GDP	-0.4098	-0.3167	0.4182	-0.2143	-0.3148	0.4689	0.6084	0.0974	1		
Term Sp.	0.1031	-0.0053	0.0166	-0.0481	-0.0815	-0.1878	-0.1354	-0.1939	-0.4789	1	
H-Y Sp.	0.7832	-0.2196	-0.2331	0.4218	0.2987	-0.19	-0.7404	0.3213	-0.5713	0.2889	1

Table II. Debt Issuance

The table presents panel regressions explaining the one-year change in debt (Models 1-3) and change in debt net of change in equity (Models 4-6). The dependent variables are defined in section III.A and appendix B. The sample consists of all non-financial and non-utility firms in the Compustat database from 1983 to 2005. All firm-level and macroeconomic-level variables are also defined in section II and appendix B. AP is Moody's 5-year average position, a measure of the accuracy of a given year's bond ratings over the following 5 years. Robust standard errors are in parenthesis. *** indicates $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	$\Delta Debt$			$\Delta Debt - Equity$		
Moody's AP	-0.4259***	-0.5741***	-0.6231***	-0.4293***	-0.6517***	-0.5609***
	(0.0210)	(0.0541)	(0.0531)	(0.0266)	(0.0667)	(0.0661)
Average M/B		-0.0757***	-0.0754***		-0.1490***	-0.1413***
		(0.0108)	(0.0104)		(0.0135)	(0.0135)
5-yr Treasury Yield		0.0017***	-0.0004		-0.0010	-0.0051***
		(0.0007)	(0.0008)		(0.0008)	(0.0011)
C&I Rate Spread		0.0030	0.0362***		0.0190**	0.0474***
		(0.0061)	(0.0065)		(0.0075)	(0.0078)
Cay		0.4820***	0.3506***		0.1373	0.2901**
		(0.1111)	(0.1098)		(0.1367)	(0.1356)
Ind. Prod. Growth		-0.0035***	-0.0032***		-0.0082***	-0.0062***
		(0.0006)	(0.0006)		(0.0008)	(0.0008)
Cons. Growth		0.0068***	0.0116***		0.0076***	0.0109***
		(0.0014)	(0.0014)		(0.0017)	(0.0017)
Recession		-0.0136***	-0.0011		-0.0038	0.0052
		(0.0030)	(0.0030)		(0.0039)	(0.0040)
H-P Log GDP		-0.1768	-0.9935***		-0.6164**	-1.1210***
		(0.2039)	(0.2226)		(0.2527)	(0.2715)
Term Spread		-0.0080***	-0.0123***		-0.0106***	-0.0118***
		(0.0010)	(0.0012)		(0.0013)	(0.0014)
High-Yield Spread		0.0008	0.0022***		-0.0014	-0.0024***
		(0.0007)	(0.0007)		(0.0009)	(0.0009)
Pecking Order			-0.0633***			-0.0882***
			(0.0040)			(0.0055)
Size			-0.0462***			-0.0068**
			(0.0021)			(0.0027)
Age			0.0002			-0.0009*
			(0.0004)			(0.0005)
Cash-flow Volatility			-0.0008			0.0045
			(0.0079)			(0.0137)
Dividend Payer			0.0262***			0.0300***
			(0.0032)			(0.0038)
Z-Score			0.0200***			0.0339***
			(0.0014)			(0.0025)
R&D / Sales			0.0053			-0.0302***
			(0.0036)			(0.0091)
No R&D Reported			-0.0074			-0.0132**
			(0.0052)			(0.0060)
M/B			0.0140***			-0.0110***

			(0.0014)			(0.0024)
Tangible Assets			0.0299**			-0.0150
			(0.0120)			(0.0154)
Prior One-year Return			0.0055***			-0.0043**
			(0.0014)			(0.0019)
Industry Leverage			-0.0693***			-0.1163***
			(0.0222)			(0.0262)
Profitability			-0.0305***			-0.0293*
			(0.0097)			(0.0152)
Constant	0.3930***	0.5862***	0.7873***	0.3697***	0.7364***	0.6763***
	(0.0179)	(0.0473)	(0.0481)	(0.0227)	(0.0586)	(0.0596)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	67,700	67,700	67,700	67,700	67,700	67,700
R-squared	0.0058	0.0149	0.0691	0.0036	0.0105	0.0566
Number of gvkey	8,634	8,634	8,634	8,634	8,634	8,634

Table III. Financial Constraints and Debt Issuances

The table presents panel regressions explaining the one-year change in debt (Models 1 and 3) and change in debt net of change in equity (Models 2 and 4). The dependent variables are defined in section III.A and appendix B. The sample consists of all non-financial and non-utility firms in the Compustat database from 1983 to 2005. All firm-level and macroeconomic-level variables are also defined in section II and appendix B. AP is Moody's 5-year average position, a measure of the accuracy of a given year's bond ratings over the following 5 years. Robust standard errors are in parenthesis. *** indicates $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	(1)	(2)	(3)	(4)
Variables	$\Delta Debt$	$\Delta Debt - \Delta Equity$	$\Delta Debt$	$\Delta Debt - \Delta Equity$
Moody's AP	-0.5619***	-0.5078***	-0.7296***	-0.7296***
	(0.0573)	(0.0712)	(0.0602)	(0.0602)
Low Cash	0.1008***	0.0658		
	(0.0363)	(0.0469)		
AP x Low Cash	-0.1225***	-0.0991*		
	(0.0422)	(0.0548)		
Size-Age Fin. Const.			-0.1780***	-0.1780***
			(0.0366)	(0.0366)
AP x SA			0.1994***	0.1994***
			(0.0425)	(0.0425)
Average M/B	-0.0758***	-0.1405***	-0.0742***	-0.0742***
	(0.0105)	(0.0135)	(0.0104)	(0.0104)
5-yr Treas. Yield	-0.0004	-0.0052***	-0.0002	-0.0002
	(0.0008)	(0.0011)	(0.0008)	(0.0008)
C&I Rate Spread	0.0362***	0.0479***	0.0361***	0.0470***
	(0.0065)	(0.0078)	(0.0065)	(0.0065)
Cay	0.3532***	0.3110**	0.3089***	0.3089***
	(0.1099)	(0.1355)	(0.1100)	(0.1100)
Ind. Prod. Growth	-0.0032***	-0.0062***	-0.0032***	-0.0032***
	(0.0006)	(0.0008)	(0.0006)	(0.0006)
Cons. Growth	0.0116***	0.0110***	0.0115***	0.0115***
	(0.0014)	(0.0017)	(0.0014)	(0.0014)
Recession	-0.0010	0.0056	-0.0010	-0.0010
	(0.0030)	(0.0040)	(0.0030)	(0.0030)
H-P Log GDP	-0.9980***	-1.1302***	-1.0085***	-1.0085***
	(0.2226)	(0.2712)	(0.2226)	(0.2226)
Term Spread	-0.0122***	-0.0117***	-0.0123***	-0.0123***
	(0.0012)	(0.0014)	(0.0012)	(0.0012)
High-Yield Spread	0.0022***	-0.0026***	0.0022***	0.0022***
	(0.0007)	(0.0009)	(0.0007)	(0.0007)
Pecking Order	-0.0625***	-0.0843***	-0.0634***	-0.0634***
	(0.0040)	(0.0056)	(0.0040)	(0.0040)
Size	-0.0460***	-0.0058**	-0.0450***	-0.0450***
	(0.0021)	(0.0027)	(0.0022)	(0.0022)
Age	0.0002	-0.0008*	0.0004	0.0004
	(0.0004)	(0.0005)	(0.0004)	(0.0004)
Cash-flow Volatility	-0.0011	0.0039	-0.0006	-0.0006
	(0.0080)	(0.0137)	(0.0079)	(0.0079)

Dividend Payer	0.0262***	0.0298***	0.0265***	0.0265***
	(0.0032)	(0.0038)	(0.0032)	(0.0032)
Z-Score	0.0199***	0.0338***	0.0201***	0.0201***
	(0.0014)	(0.0025)	(0.0014)	(0.0014)
R&D / Sales	0.0052	-0.0308***	0.0053	-0.0302***
	(0.0036)	(0.0091)	(0.0036)	(0.0036)
No R&D Reported	-0.0074	-0.0133**	-0.0075	-0.0130**
	(0.0052)	(0.0060)	(0.0052)	(0.0052)
M/B	0.0140***	-0.0114***	0.0138***	0.0138***
	(0.0014)	(0.0024)	(0.0014)	(0.0014)
Tangible Assets	0.0320***	-0.0028	0.0304**	0.0304**
	(0.0122)	(0.0155)	(0.0120)	(0.0120)
Prior One-year Return	0.0055***	-0.0043**	0.0056***	0.0056***
	(0.0014)	(0.0019)	(0.0014)	(0.0014)
Industry Leverage	-0.0718***	-0.1280***	-0.0717***	-0.0717***
	(0.0222)	(0.0263)	(0.0222)	(0.0222)
Profitability	-0.0304***	-0.0295*	-0.0313***	-0.0313***
	(0.0097)	(0.0152)	(0.0097)	(0.0097)
Constant	0.7359***	0.6309***	0.8710***	0.8710***
	(0.0510)	(0.0632)	(0.0542)	(0.0542)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Observations	67,700	67,700	67,700	67,700
R-squared	0.0693	0.0576	0.0695	0.0695
Number of gvkey	8,634	8,634	8,634	8,634

Table IV. Debt Issuance: Further Cross-sectional Tests

The table presents panel regressions explaining the change in debt (Models 1 and 3) and the change in debt net of change in equity (Model 2 and 4); see section III.A and appendix B for the definition of all the variables. The sample consists of all non-financial and non-utility firms in the Compustat database from 1983 to 2005. Moody's AP is Moody's 5-year average position, a measure of the accuracy of a given year's bond ratings over the following 5 years. Robust standard errors in parenthesis. *** indicates $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	(1)	(2)	(3)	(4)
Variables	$\Delta Debt$	$\Delta Debt - \Delta Equity$	$\Delta Debt$	$\Delta Debt - \Delta Equity$
Moody's AP	-0.6413***	-0.5562***	-0.6501***	-0.5749***
	(0.0547)	(0.0680)	(0.0543)	(0.0674)
Rated	-0.0520	0.0453		
	(0.0405)	(0.0486)		
AP x Rated	0.0319	-0.0932*		
	(0.0470)	(0.0565)		
Investment Grade			-0.1593***	-0.0789*
			(0.0416)	(0.0476)
AP x Inv. Grade			0.2110***	0.1095**
			(0.0480)	(0.0551)
Average M/B	-0.0776***	-0.1456***	-0.0745***	-0.1407***
	(0.0105)	(0.0135)	(0.0104)	(0.0135)
5-yr Treasury Yield	-0.0014*	-0.0063***	-0.0001	-0.0048***
	(0.0008)	(0.0011)	(0.0008)	(0.0011)
C&I Rate Spread	0.0403***	0.0517***	0.0359***	0.0470***
	(0.0065)	(0.0078)	(0.0065)	(0.0078)
Cay	0.3813***	0.3327**	0.3272***	0.2733**
	(0.1097)	(0.1354)	(0.1098)	(0.1355)
Ind. Production Growth	-0.0031***	-0.0061***	-0.0033***	-0.0063***
	(0.0006)	(0.0008)	(0.0006)	(0.0008)
Consumption Growth	0.0115***	0.0107***	0.0116***	0.0109***
	(0.0014)	(0.0017)	(0.0014)	(0.0017)
Recession	-0.0008	0.0052	-0.0009	0.0053
	(0.0030)	(0.0040)	(0.0030)	(0.0040)
HP Filtered Log GDP	-1.0577***	-1.1779***	-0.9923***	-1.1157***
	(0.2228)	(0.2718)	(0.2231)	(0.2719)
Term Spread	-0.0132***	-0.0128***	-0.0120***	-0.0116***
	(0.0012)	(0.0014)	(0.0012)	(0.0014)
High-Yield Spread	0.0020***	-0.0025***	0.0021***	-0.0025***
	(0.0007)	(0.0009)	(0.0007)	(0.0009)
Pecking Order	-0.0623***	-0.0868***	-0.0630***	-0.0880***
	(0.0040)	(0.0055)	(0.0040)	(0.0055)
Size	-0.0434***	-0.0029	-0.0475***	-0.0077***
	(0.0022)	(0.0028)	(0.0021)	(0.0027)
Age	0.0000	-0.0011**	0.0002	-0.0009*
	(0.0004)	(0.0005)	(0.0004)	(0.0005)
Cash-flow Volatility	-0.0003	0.0051	-0.0007	0.0045
	(0.0079)	(0.0136)	(0.0079)	(0.0137)
Dividend Payer	0.0260***	0.0297***	0.0258***	0.0297***

	(0.0032)	(0.0038)	(0.0032)	(0.0038)
Z-Score	0.0195***	0.0333***	0.0200***	0.0340***
	(0.0014)	(0.0025)	(0.0014)	(0.0025)
R&D/Sales	0.0054	-0.0301***	0.0052	-0.0302***
	(0.0036)	(0.0091)	(0.0036)	(0.0091)
No R&D Reported	-0.0074	-0.0131**	-0.0072	-0.0130**
	(0.0052)	(0.0060)	(0.0052)	(0.0060)
M/B	0.0140***	-0.0110***	0.0138***	-0.0112***
	(0.0014)	(0.0024)	(0.0014)	(0.0024)
Tangible Assets	0.0268**	-0.0192	0.0302**	-0.0147
	(0.0121)	(0.0155)	(0.0120)	(0.0154)
Prior One-year Return	0.0053***	-0.0046**	0.0057***	-0.0042**
	(0.0014)	(0.0019)	(0.0014)	(0.0019)
Industry Leverage	-0.0641***	-0.1097***	-0.0701***	-0.1169***
	(0.0222)	(0.0262)	(0.0221)	(0.0261)
Profitability	-0.0289***	-0.0272*	-0.0306***	-0.0293*
	(0.0097)	(0.0152)	(0.0097)	(0.0152)
Constant	0.8007***	0.6697***	0.8132***	0.6902***
	(0.0491)	(0.0608)	(0.0491)	(0.0607)
Firm Fixed Effects	Yes	Yes	Yes	Yes
Observations	67,700	67,700	67,700	67,700
R-squared	0.0702	0.0579	0.0697	0.0568
Number of gvkey	8,634	8,634	8,634	8,634

Table V. The Maturity of Debt Issuances

The table presents panel regressions explaining debt issuance with less than 4 years maturity (Models 1-3) and debt issuances of 5 years or more maturity (Models 3-6). See section III.A for the construction of the dependent variable. The sample consists of all non-financial and non-utility firms in the Compustat database from 1983 to 2004. All firm-level and macro-economic variables are also defined in section II and appendix B. AP is Moody's 5-year average position, a measure of the accuracy of a given year's bond ratings over the following 5 years. Robust standard errors in parenthesis. *** indicates $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	$\Delta Debt < 4$			$\Delta Debt > 4$		
Moody's AP	0.0108	-0.0388	-0.0686**	-0.2928***	-0.3205***	-0.3058***
	(0.0123)	(0.0301)	(0.0310)	(0.0166)	(0.0405)	(0.0411)
Average M/B		-0.0441***	-0.0462***		0.0080	0.0137*
		(0.0062)	(0.0065)		(0.0082)	(0.0083)
5-yr Treasury Yield		-0.0006	-0.0002		0.0022***	0.0007
		(0.0004)	(0.0005)		(0.0005)	(0.0006)
C&I Rate Spread		0.0015	0.0071*		-0.0034	0.0091*
		(0.0035)	(0.0037)		(0.0046)	(0.0049)
Cay		0.0271	-0.0105		0.1569*	0.1429*
		(0.0605)	(0.0613)		(0.0834)	(0.0846)
Ind. Prod. Growth		-0.0011***	-0.0010***		-0.0007	-0.0006
		(0.0003)	(0.0003)		(0.0004)	(0.0004)
Cons. Growth		0.0003	0.0013		0.0050***	0.0063***
		(0.0008)	(0.0008)		(0.0010)	(0.0011)
Recession		-0.0042**	-0.0014		-0.0015	0.0026
		(0.0019)	(0.0020)		(0.0024)	(0.0025)
H-P Log GDP		0.1713	0.0385		-0.5945***	-0.8527***
		(0.1192)	(0.1305)		(0.1583)	(0.1751)
Term Spread		-0.0010*	-0.0015**		-0.0057***	-0.0073***
		(0.0006)	(0.0007)		(0.0008)	(0.0009)
High-Yield Spread		-0.0003	0.0002		0.0014***	0.0017***
		(0.0004)	(0.0004)		(0.0005)	(0.0005)
Pecking Order			-0.0149***			-0.0249***
			(0.0020)			(0.0030)
Size			-0.0164***			-0.0052***
			(0.0011)			(0.0015)
Age			0.0005**			-0.0006**
			(0.0002)			(0.0003)
Cash-flow Volatility			0.0045			-0.0049
			(0.0062)			(0.0071)
Dividend Payer			0.0078***			0.0110***
			(0.0017)			(0.0024)
Z-Score			-0.0022***			0.0087***
			(0.0007)			(0.0011)
R&D/Sales			-0.0012			0.0028
			(0.0017)			(0.0029)
No R&D Reported			-0.0055*			0.0033
			(0.0029)			(0.0040)

M/B			0.0036***			0.0067***
			(0.0006)			(0.0010)
Tangible Assets			-0.0037			0.0468***
			(0.0065)			(0.0088)
Prior One-year Return			-0.0017**			0.0046***
			(0.0008)			(0.0010)
Industry Leverage			-0.0154			-0.0403**
			(0.0119)			(0.0169)
Profitability			-0.0037			-0.0028
			(0.0051)			(0.0076)
Constant	0.0073	0.1128***	0.2137***	0.2519***	0.2394***	0.2116***
	(0.0105)	(0.0258)	(0.0275)	(0.0141)	(0.0350)	(0.0364)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	67,700	67,700	67,700	67,700	67,700	67,700
R-squared	0.0000	0.0023	0.0135	0.0048	0.0081	0.0227
Number of gvkey	8,634	8,634	8,634	8,634	8,634	8,634

Table VI. Rollover of Debt and Moody's AP

The table presents panel regressions explaining rollover decision by firms. See section III.A for the construction of the dependent variable. The sample consists of all non-financial and non-utility firms in the Compustat database from 1983 to 2004. All firm-level and macro-economic variables are also defined in section II and appendix B. AP is Moody's 5-year average position, a measure of the accuracy of a given year's bond ratings over the following 5 years. Robust standard errors in parenthesis. *** indicates $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Variables	(1)	(2)	(3)
Moody's AP	-0.0656***	-0.0793	-0.1463***
	(0.0218)	(0.0547)	(0.0555)
Average M/B		0.0277***	0.0096
		(0.0086)	(0.0093)
5-yr Treasury Yield		-0.0025***	-0.0007
		(0.0006)	(0.0007)
C&I Rate Spread		0.0278***	0.0164***
		(0.0061)	(0.0062)
Cay		0.5848***	0.4728***
		(0.1373)	(0.1399)
Ind. Prod. Growth		0.0013***	0.0004
		(0.0005)	(0.0005)
Cons. Growth		0.0069***	0.0053***
		(0.0016)	(0.0015)
Recession		0.0114***	0.0065**
		(0.0027)	(0.0026)
H-P Log GDP		-0.6002***	-0.3589**
		(0.1896)	(0.1778)
Term Spread		-0.0049***	-0.0043***
		(0.0010)	(0.0010)
High-Yield Spread		-0.0009	-0.0000
		(0.0006)	(0.0006)
Pecking Order			0.0239***
			(0.0035)
Size			-0.0129***
			(0.0025)
Age			0.0022***
			(0.0004)
Cash-flow Volatility			-0.0051
			(0.0111)
Dividend Payer			-0.0027
			(0.0035)
Z-Score			0.0008
			(0.0013)
R&D/Sales			0.0033***
			(0.0012)
No R&D Reported			-0.0071
			(0.0064)
M/B			-0.0014

			(0.0009)
Tangible Assets			0.0624***
			(0.0127)
Prior One-year Return			0.0045***
			(0.0012)
Industry Leverage			0.0453*
			(0.0266)
Profitability			0.0305***
			(0.0082)
Constant	0.1216***	0.0495	0.1443***
	(0.0186)	(0.0426)	(0.0445)
Firm Fixed Effects	Yes	Yes	Yes
Observations	57,174	57,174	57,174
R-squared	0.0002	0.0076	0.0148
Number of gvkey	7,547	7,547	7,547

Table VII. Cash Holdings

The table presents panel regressions explaining cash holdings (as defined in section III.C and appendix B). The sample consists of all non-financial and non-utility firms in the Compustat database from 1983 to 2005. All firm-level and macroeconomic-level variables are defined in section II and appendix B. AP is Moody's 5-year average position, a measure of the accuracy of a given year's bond ratings over the following 5 years. CF/TA, NWC/TA, Debt/TA and INV/TA are winsorized at 1%. Robust standard errors in parenthesis. *** indicates $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Variables	(1)	(2)	(3)
Moody's AP	-0.106***	-0.150***	-0.151***
	(0.0160)	(0.0322)	(0.0324)
Average M/B		-0.0045	-0.0002
		(0.0057)	(0.0058)
5-yr Treasury Yield		0.0023***	0.0012***
		(0.0004)	(0.0004)
C&I Rate Spread		-0.0011	0.0067**
		(0.0032)	(0.0033)
Cay		-0.557***	-0.656***
		(0.0615)	(0.0614)
Ind. Prod. Growth		-0.0018***	-0.0017***
		(0.0003)	(0.0003)
Consumption Growth		-0.0039***	-0.0019**
		(0.0009)	(0.0009)
Recession		-0.0037**	0.0013
		(0.0016)	(0.0017)
HP Filtered Log GDP		-0.272**	-0.659***
		(0.123)	(0.125)
Term Spread		0.0025***	-0.0004
		(0.0006)	(0.0006)
High-Yield Spread		0.0006	0.0010***
		(0.0004)	(0.0004)
Cash-flow Volatility			0.0198***
			(0.0077)
M/B			0.0091***
			(0.0010)
Log Sales			-0.0193***
			(0.0016)
CF/TA			0.0696***
			(0.0085)
NWC(No Cash)/TA			-0.0069
			(0.0051)
Debt/TA			-0.0416***
			(0.0040)
Investment/TA			-0.0475***
			(0.0042)
R&D/Sales			0.0117***
			(0.0041)
Dividend Payer			-0.0030
			(0.0021)
Constant	0.220***	0.266***	0.351***
	(0.0136)	(0.0290)	(0.0298)
Firm Fixed Effects	Yes	Yes	Yes
Observations	67,700	67,700	65,151
R-squared	0.001	0.011	0.058
Number of gvkey	8,634	8,634	8,426

Table VIII. Investment: Capital Expenditures

The table presents panel regressions explaining capital expenditures (as defined in section III.D and appendix B). The sample consists of all non-financial and non-utility firms in the Compustat database from 1983 to 2005. All firm-level and macroeconomic-level variables are defined in section II and appendix B. AP is Moody's 5-year average position, a measure of the accuracy of a given year's bond ratings over the following 5 years. Robust standard errors in parenthesis. *** indicates $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Variables	(1)	(2)	(3)
Moody's AP	-0.170***	-0.178***	-0.173***
	(0.0126)	(0.0315)	(0.0310)
Average M/B		-0.0175***	-0.0164***
		(0.0055)	(0.0054)
5-yr Treasury Yield		0.0021***	0.0020***
		(0.0003)	(0.0003)
C&I Rate Spread		-0.0345***	-0.0296***
		(0.0038)	(0.0038)
Cay		0.193***	0.207***
		(0.0571)	(0.0560)
Ind. Production Growth		0.0010***	0.0002
		(0.0003)	(0.0003)
Consumption Growth		-0.0026***	-0.0028***
		(0.0008)	(0.0007)
Recession		-0.0034***	-0.0052***
		(0.0013)	(0.0013)
H-P Log GDP		0.551***	0.591***
		(0.0984)	(0.0973)
Lag H-P Log GDP		-0.689***	-0.540***
		(0.0936)	(0.0925)
Term Spread		-0.0040***	-0.0024***
		(0.0009)	(0.0009)
High-Yield Spread		0.0017***	0.0018***
		(0.0005)	(0.0005)
M/B			0.0156***
			(0.0009)
Profitability			0.0603***
			(0.0046)
Constant	0.223***	0.297***	0.252***
	(0.0107)	(0.0321)	(0.0314)
Firm Fixed Effects	Yes	Yes	Yes
Observations	66,716	66,716	66,716
R-squared	0.003	0.025	0.058
Number of gvkey	8,588	8,588	8,588

Table IX. Investment: Acquisitions

The table presents panel regressions explaining Cash Acquisition decisions (as defined in section III.E and appendix B). The sample consists of all non-financial and non-utility firms in the Compustat database from 1983 to 2005. All firm-level and macroeconomic-level variables are defined in section II and appendix B. AP is Moody's 5-year average position, a measure of the accuracy of a given year's bond ratings over the following 5 years. Robust standard errors in parenthesis. *** indicates $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Variables	(1)	(2)	(3)
Moody's AP	-0.243***	-0.299***	-0.290***
	(0.0176)	(0.0542)	(0.0546)
Average M/B		-0.0476***	-0.0468***
		(0.0103)	(0.0103)
5-yr Treasury Yield		-0.0008	-0.0010*
		(0.0006)	(0.0006)
C&I Rate Spread		-0.0074	-0.0040
		(0.0063)	(0.0064)
Cay		-0.107	-0.0909
		(0.115)	(0.114)
Ind. Prod. Growth		-0.0014**	-0.0018***
		(0.0006)	(0.0006)
Cons. Growth		0.0035***	0.0035***
		(0.0013)	(0.0013)
Recession		-0.0053**	-0.0063**
		(0.0025)	(0.0025)
H-P Log GDP		-0.686***	-0.676***
		(0.174)	(0.174)
Lag H-P Log GDP		-0.154	-0.0561
		(0.132)	(0.132)
Term Spread		-0.0090***	-0.0080***
		(0.0014)	(0.0014)
High-Yield Spread		0.0009	0.0009
		(0.0006)	(0.0007)
M/B			0.0089***
			(0.0017)
Profitability			0.0483***
			(0.0069)
Constant	0.240***	0.370***	0.338***
	(0.0150)	(0.0489)	(0.0480)
Firm Fixed Effects	Yes	Yes	Yes
Observations	64,866	64,866	64,866
R-squared	0.003	0.005	0.010
Number of gvkey	8,585	8,585	8,585

Table X. Robustness: Net Debt Issuance and Industry AP

The table presents panel regressions explaining the change in debt net of change in equity (as defined in section IV and appendix B). The sample consists of all non-financial and non-utility firms in the Compustat database from 1983 to 2005. All firm-level and macroeconomic-level variables are defined in section II and appendix B. FF12 AP is Moody's 5-year average position calculated at the industry level, according to the Fama-French 12 industries classification. Robust standard errors in parenthesis. *** indicates $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Debt			Debt−Equity		
FF12 AP	-0.1470***	-0.0401***	-0.0543***	-0.1616***	-0.0545***	-0.0485***
	(0.0105)	(0.0127)	(0.0125)	(0.0139)	(0.0164)	(0.0160)
Average M/B		-0.0113	-0.0238**		-0.0853***	-0.0923***
		(0.0107)	(0.0104)		(0.0137)	(0.0133)
5-yr Treasury Yield		0.0063***	-0.0018		0.0034***	-0.0172***
		(0.0011)	(0.0033)		(0.0013)	(0.0043)
C&I Rate Spread		-0.0825***	0.0005		-0.0481***	0.1275***
		(0.0097)	(0.0263)		(0.0123)	(0.0345)
Cay		-1.4070***	-0.6046		-1.3826***	1.0752**
		(0.2083)	(0.3904)		(0.2584)	(0.5134)
Ind. Prod. Growth		-0.0069***	-0.0045***		-0.0115***	-0.0032*
		(0.0008)	(0.0012)		(0.0010)	(0.0016)
Cons. Growth		-0.0012	0.0039		0.0014	0.0150***
		(0.0018)	(0.0024)		(0.0022)	(0.0031)
Recession		-0.0241***	-0.0062		-0.0102**	0.0267***
		(0.0036)	(0.0061)		(0.0046)	(0.0081)
H-P Log GDP		0.5725***	-0.4668		0.0248	-2.3507***
		(0.2154)	(0.4377)		(0.2688)	(0.5570)
Term Spread		-0.0058***	-0.0120***		-0.0068***	-0.0170***
		(0.0015)	(0.0026)		(0.0018)	(0.0031)
High-Yield Spread		-0.0005	-0.0023		-0.0044***	-0.0118***
		(0.0007)	(0.0015)		(0.0010)	(0.0019)
Pecking Order			-0.0706***			-0.0951***
			(0.0045)			(0.0065)
Size			-0.0519***			-0.0069**
			(0.0026)			(0.0033)
Age			-0.0003			-0.0065***
			(0.0012)			(0.0016)
Cash-flow Volatility			-0.0057			0.0096
			(0.0080)			(0.0149)
Dividend Payer			0.0241***			0.0277***
			(0.0037)			(0.0044)
Z-Score			0.0205***			0.0362***
			(0.0016)			(0.0029)
R&D/Sales			0.0029			-0.0340***
			(0.0038)			(0.0094)
No R&D Reported			-0.0077			-0.0122*
			(0.0063)			(0.0072)
M/B			0.0142***			-0.0122***

			(0.0016)			(0.0027)
Tangible Assets			0.0317**			-0.0236
			(0.0144)			(0.0183)
Prior One-year Return			0.0054***			-0.0040*
			(0.0015)			(0.0021)
Industry Leverage			-0.0820***			-0.1492***
			(0.0254)			(0.0302)
Profitability			-0.0425***			-0.0456***
			(0.0106)			(0.0173)
Constant	0.1514***	0.2195***	0.4118***	0.1355***	0.2799***	0.2539***
	(0.0087)	(0.0325)	(0.0355)	(0.0115)	(0.0409)	(0.0449)
Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	54,360	54,360	54,360	54,360	54,360	54,360
R-squared	0.0040	0.0158	0.0730	0.0028	0.0108	0.0601
Number of gvkey	7,849	7,849	7,849	7,849	7,849	7,849

Table XI. Robustness: Net Debt Issuance and AP Dynamics

The table presents panel regressions explaining the change in debt net of change in equity (as defined in section IV and appendix B). The sample consists of all non-financial and non-utility firms in the Compustat database from 1983 to 2005. All firm-level and macroeconomic-level variables are defined in section II and appendix B. FF12 AP is Moody's 5-year average position calculated at the industry level, according to the Fama-French 12 industries classification. Robust standard errors in parenthesis. *** indicates $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Variables	(1)	(2)	(3)
FF12 AP(t+1)		0.0220	0.0244
		(0.0278)	(0.0342)
FF12 AP	-0.0655***	-0.0176	-0.0797**
	(0.0151)	(0.0249)	(0.0347)
FF12 AP(t-1)		-0.0696***	-0.0453
		(0.0179)	(0.0279)
FF12 AP(t-2)			-0.0628***
			(0.0210)
Average M/B	-0.0680***	-0.0457***	-0.0382***
	(0.0105)	(0.0132)	(0.0139)
5-yr Treasury Yield	-0.0053***	-0.0067***	-0.0094***
	(0.0012)	(0.0013)	(0.0017)
CI Rate Spread	0.0094	0.0178**	0.0094
	(0.0058)	(0.0087)	(0.0093)
High-Yield Spread	-0.0067***	-0.0075***	-0.0068***
	(0.0005)	(0.0007)	(0.0008)
Pecking Order	-0.0950***	-0.0929***	-0.0968***
	(0.0065)	(0.0083)	(0.0096)
Size	-0.0067**	-0.0105**	-0.0140***
	(0.0033)	(0.0044)	(0.0048)
Age	-0.0003	0.0001	-0.0006
	(0.0005)	(0.0005)	(0.0007)
Cash-Flow Volatility	0.0091	0.0003	-0.0142
	(0.0149)	(0.0197)	(0.0214)
Dividend Payer	0.0274***	0.0257***	0.0311***
	(0.0044)	(0.0057)	(0.0064)
Z-Score	0.0364***	0.0478***	0.0481***
	(0.0029)	(0.0042)	(0.0047)
RD / Sales	-0.0344***	-0.0360***	-0.0308*
	(0.0094)	(0.0138)	(0.0168)
No RD Reported	-0.0134*	-0.0119	-0.0114
	(0.0072)	(0.0098)	(0.0104)
M/B	-0.0121***	-0.0111***	-0.0074**
	(0.0027)	(0.0032)	(0.0035)
Tangible Assets	-0.0242	-0.0155	-0.0071
	(0.0183)	(0.0239)	(0.0269)
Prior one-year return	-0.0057***	-0.0074***	-0.0083***
	(0.0021)	(0.0026)	(0.0028)
Industry Leverage	-0.1916***	-0.1961***	-0.1494***
	(0.0299)	(0.0361)	(0.0379)
Profitability	-0.0428**	-0.0685***	-0.0702***
	(0.0174)	(0.0226)	(0.0262)
Constant	0.2687***	0.2348***	0.3448***
	(0.0316)	(0.0459)	(0.0603)
Observations	54,360	38,100	31,341
R-squared	0.0568	0.0622	0.0652
Number of gvkey	7,849	5,954	5,119

Appendix A: Proofs

Proof of Proposition 1. The obtention of $\overline{A}$ follows immediately from the steps explained in the main text and summarized in Lemma 1. To prove the effect of market overvaluation, differentiate the equilibrium expression for $\overline{A}$ with respect to μ to find

$$\frac{\partial \overline{A}}{\partial \mu} = -\frac{\partial p'_H}{\partial \mu}\left(\frac{R}{\gamma} - \frac{B}{\gamma \Delta p'}\right) - \frac{p'_H B}{\gamma \Delta p'^2}\left(\frac{\partial p'_H}{\partial \mu} - \frac{\partial p'_L}{\partial \mu}\right) \leq 0,$$

where the last inequality follows from applying equation (2) and the overvaluation condition, $\frac{\partial p'_H}{\partial \mu} \geq \frac{\partial p'_L}{\partial \mu}$. *Q.E.D.*

Proof of Proposition 2. Using the expression for the equilibrium investment scale, which is immediate to obtain by following the steps explained in the main text, we find that by differentiating with respect to μ,

$$\begin{aligned} sign\left[\partial I^*/\partial \mu\right] &= -sign\left[\frac{\partial}{\partial \mu}\left(1 - \frac{p'_H}{\gamma}\left(R - \frac{B}{\Delta p'}\right)\right)\right] \\ &= -sign\left[-\frac{\partial p'_H}{\partial \mu}\left(\frac{R}{\gamma} - \frac{B}{\gamma \Delta p'}\right) - \frac{p'_H}{\gamma} B\left(\frac{\partial p'_H}{\partial \mu} - \frac{\partial p'_L}{\partial \mu}\right)\right] > 0, \end{aligned}$$

where the first equality follows from the expression for the equilibrium investment scale and the second by noting that the derivative of the expression coincides with the derivative with respect to A solved for in proposition 1 above. The last inequality follows from equation (2) and the fact that, $\frac{\partial p'_H}{\partial \mu} \geq \frac{\partial p'_L}{\partial \mu}$. *Q.E.D.*

Proof of Proposition 3.

Let us first fully characterize a debt contract. We know that $R^i_u + R^i_m = R^i I$, $\forall i \in \{s, f\}$. The investor's (IR) constraint is

$$p'_H R^s_u + (1 - p'_H) R^f I \geq I - A,$$

using the perceived (IC) constraint we can rewrite it as

$$p'_H (R^s I - BI/\Delta p') + (1 - p'_H) R^f I \geq I - A$$

which yields an investment scale of

$$I \leq \frac{A}{1 - p'_H(\Delta R - B/\Delta p') - R^f} \equiv I^d.$$

On the other hand, an equity contract makes the manager's perceived IC constraint look like

$$p'_H \alpha R^s I + (1 - p'_H)\alpha R^f I \geq p'_L \alpha R^s I + (1 - p'_L)\alpha R^f I + BI,$$

which implies that the fraction (equity share) for the investor must fulfill

$$\alpha \geq \frac{B}{\Delta p' R^s - \Delta p' R^f} = \frac{B}{\Delta p' \Delta R}$$

On the other hand, the investor's IR constraint is given by

$$(1-\alpha)\left[p'_H R^s I + (1-p'_H) R^f I\right] \geq I - A$$

which implies an investment scale

$$I \leq \frac{A}{1-(1-\alpha)\left[p'_H R^s + (1-p'_H) R^f\right]} \equiv I^e.$$

The following claim compares the equilibrium investment that arises from both contracts.

Claim 1. $I^d > I^e$. Proof. Note that we can rewrite the denominator of I^e as $1-\left[p'_H \Delta R + R^f\right] + \frac{B}{\Delta p' \Delta R}\left[p'_H \Delta R + R^f\right]$ which is larger than the denominator of I^d since $p'_H < p'_H + R^f/\Delta R$.

Given the claim above and since the payoff to the firm is proportional to their investment scale a debt contract results in higher expected profits and the firm would choose to issue debt. Also note that since leverage is given by $I^* - A$, and since by proposition 2 overvaluation causes I^* to increase, then leverage increases with overvaluation, that is, $\partial\left(I^* - A\right)/\partial\mu$ and the firm will issue debt when debt markets become overvalued. *Q.E.D.*

Proof of Proposition 4. The proof follows the same steps as in 3. The investor's (IR) constraint is now

$$p'_H R^s_u + (1-p'_H)\left(R^f I - c\right) \geq I - A,$$

using the perceived (IC) constraint we can rewrite it as

$$p'_H (R^s I - BI/\Delta p') + (1-p'_H)\left(R^f I - c\right) \geq I - A$$

which yields an investment scale of

$$I \leq \frac{A-(1-p'_H)c}{1-p'_H(\Delta R - B/\Delta p') - R^f} \equiv I^d.$$

On the other hand, an equity contract looks exactly the same as in proposition 3, therefore the investment scale is

$$I \leq \frac{A}{1-(1-\alpha)\left[p'_H R^s + (1-p'_H) R^f\right]} \equiv I^e.$$

The following claim compares the equilibrium investment that arises from both contracts.

Claim 2. $I^d > I^e$ for c low enough. Proof. Using the above definitions of I^d and I^e it easy to obtain the following expression equivalent to $I^d > I^e$, which is,

$$c < \frac{ABR^f}{(1-p'_H)\left[BR^f + 1 - p'_H(\Delta R - B/\Delta p') - R^f\right]} \equiv \widetilde{c}.$$

which proves the claim.

For the second part of the proposition, first define $D \equiv 1 - p'_H(\Delta R - B/\Delta p') - R^f > 0$. Since $\frac{\partial p'_H}{\partial \mu} \geq \frac{\partial p'_L}{\partial \mu}$ we have shown that $\partial D/\partial \mu < 0$. Then we can express the set of parameter values such that $I^d > I^e$ as

$$\frac{A - (1-p'_H)c}{D} > \frac{A}{D + \frac{BR^f}{\Delta p' \Delta R}},$$

which is equivalent to

$$\left[A - (1-p'_H)c\right] BR^f - (1-p'_H)c\Delta p' \Delta R D > 0.$$

The derivative of the expression above with respect to μ is

$$cBR^f \frac{\partial p'_H}{\partial \mu} - c(1-p'_H)\Delta p' \Delta R \frac{\partial D}{\partial \mu} + cD\Delta R \left[\Delta p' \frac{\partial p'_H}{\partial \mu} - (1-p'_H)\left(\frac{\partial p'_H}{\partial \mu} - \frac{\partial p'_L}{\partial \mu}\right)\right] > 0.$$

The first two terms are positive (recall that $\partial D/\partial \mu < 0$) and the last two terms are positive if $\Delta p' - (1-p'_H) > 0$, which is true for a large enough value of μ because $\lim_{\mu \to \infty} \Delta p' - (1-p'_H) = 0$.

Finally, $\partial I^d/\partial \mu > 0$ follows immediately from the fact that, $\frac{\partial p'_H}{\partial \mu} \geq \frac{\partial p'_L}{\partial \mu}$ and $\partial p'_H/\partial \mu > 0$. *Q.E.D.*

Appendix B: Variable Definitions

Variables are defined by their Compustat mnemonics, in capital letters.

Variable	Definition
Cash Acquisitions	AQC/AT(t-1)
Cash Holdings	CHE/AT
Cash Flow Volatility	std dev(Profitability) over years $t-1$ up to $t-10$
Capex	CAPX/AT(t-1)
Chg in Debt	$[Debt(t) - Debt(t-1)]/AT(t-1)$
Chg in Equity	$(SSTK - PRSTKC)/AT(t-1)$
Chg in Debt, Net	Chg in Debt $-$ Chg in Equity
Debt	DLTT + DLC
Dividend Payer	$I[DV(t-1) > 0]$
Firm Size	$ln(AT * ConsumerPriceIndex(CPI)deflator)$
Firm Age	number of years since first observation in Compustat
Pecking Order	Investment – Cash + Debt; as in Leary and Roberts (2010)
Industry Leverage	$median(Book\ Leverage(t-1))$,
	among firms in the same two–digit SIC group
Investment	$= CAPX + IVCH + AQC + FUSEO - SPPE - SIV$
	format code 1, 2 and 3
	$= IVCH - SIV + CAPX - SPPE + AQC - IVACO$
	format code 7
Marginal Tax Rate	Before–financing MTR,
	kindly provided by John Graham,
	(http://faculty.fuqua.duke.edu/jgraham/taxform.html)
Market-to-Book	$(AT - BookEquity + (PRCC\_F * CSHO))/AT$
Profitability	$IB + XINT + TXT/AT(t-1)$
RD / Sales	$XRD/SALE$ (set to zero if XRD missing)
RDD	$I[RD/Sales = 0]$
Size-Age Fin. Const.	Dummy to indicate belonging to the bottom quartile of the Hadlock and Pierce (2012)
Stock Return	$(PRCC\_F/(lag(PRCC\_F) * (AJEX/lag(AJEX)))) - 1$
Tangible Assets	$PPENT/AT$
Total Assets	AT
Z–Score	$[3.3 * (IB + XINT + TXT)$
	$+SALE + 1.4 * RE + 1.2 * (ACT - LCT)]/AT$

Appendix C Table: The Effect of Misvaluation on Moody's AP Specifications

In this table we demonstrate numerical examples of the extent to which Moody's AP captures the accuracy of the ratings. Using historical default probabilities for each Moody's rating category at origin (see Altman's website) as our benchmark case, we calibrate the effect of ratings on AP. We compute AP following the method used by Moody's, which is the sum of the number of defaults in each rating category times the position of credits in that category all divided by the total number of defaulting credits, i.e., the average default position (AP). Panel A, examines two types of potential mistakes. The assumed effect of the Moody's mistake is to shift 10% of the issuances in each rating category to the category above or below. Furthermore, this mistake uniformly affects the population of issuances. Panel A shows that either type of mistake lowers the AP . Panel B examines less verses more accurate ratings. In Panel B the mistake moves 10% of the credits that default up a rating category while simultaneously moving the same number of credits that do not default down a rating category (this holds the total number of credits in a rating category constant and is unambiguously a worse set of ratings.) In the more accurate example, 10% of the credits that ultimate default are given a lower rating, while simultaneously moving the same number of credits that do not default up a rating category (this is unambiguously a better set of ratings). One can look at many different examples, but in general any time credits that ultimately default are given higher ratings the AP falls.

Panel A: Assumes 10% of issues in each rating category moves up or down, both are less accurate than baseline.

	Baseline					Less Accurate = Too High Ratings					Less Accurate = Too Low Ratings				
10%	Issuances	Def Prob	Defaults	Position	D x P	Issuances	Def Prob	Defaults	Position	D x P	Issuances	Def Prob	Defaults	Position	D x P
Aaa	1000	0.10%	1.000	7%	0.071	1100	0.11%	1.18	8%	0.093	900	0.10%	0.90	6%	0.058
Aa	1000	0.18%	1.800	21%	0.386	1000	0.21%	2.09	23%	0.478	1000	0.17%	1.72	20%	0.344
A	1000	0.47%	4.700	36%	1.679	1000	0.62%	6.17	37%	2.292	1000	0.44%	4.41	34%	1.512
Baa	1000	1.94%	19.400	50%	9.700	1000	2.77%	27.68	51%	14.235	1000	1.79%	17.93	49%	8.709
Ba	1000	10.22%	102.200	64%	65.700	1000	11.88%	118.77	66%	78.049	1000	9.39%	93.92	63%	59.035
B	1000	26.79%	267.900	79%	210.493	1000	29.37%	293.73	80%	234.984	1000	25.13%	251.33	77%	193.883
C	1000	52.62%	526.200	93%	488.614	900	52.62%	473.58	94%	443.136	1100	50.27%	552.99	92%	509.541
Total or Avg	7000		923.2		AP 0.841	7000		923.2		AP 0.838	7000		923.20		AP 0.837

Panel B: Less Accurate Vs More Accurate - Assumes 10% of defaulters in each rating category moves up (Less Accurate) or down (More Accurate) replaced by nondefaulters

	Baseline					Less Accurate = Defaulters Up - Nondefaulters Down					More Accurate = Defaulters Down - Nondefaulters Up				
10%	Issuances	Def Prob	Defaults	Position	D x P	Issuances	Def Prob	Defaults	Position	D x P	Issuances	Def Prob	Defaults	Position	D x P
Aaa	1000	0.10%	1.00	7%	0.071	1000	0.12%	1.18	7%	0.084	1000	0.09%	0.90	7%	0.064
Aa	1000	0.18%	1.80	21%	0.386	1000	0.21%	2.09	21%	0.448	1000	0.17%	1.72	21%	0.369
A	1000	0.47%	4.70	36%	1.679	1000	0.62%	6.17	36%	2.204	1000	0.44%	4.41	36%	1.575
Baa	1000	1.94%	19.40	50%	9.700	1000	2.77%	27.68	50%	13.840	1000	1.79%	17.93	50%	8.965
Ba	1000	10.22%	102.20	64%	65.700	1000	11.88%	118.77	64%	76.352	1000	9.39%	93.92	64%	60.377
B	1000	26.79%	267.90	79%	210.493	1000	29.37%	293.73	79%	230.788	1000	25.13%	251.33	79%	197.474
C	1000	52.62%	526.20	93%	488.614	1000	47.36%	473.58	93%	439.753	1000	55.30%	552.99	93%	513.491
Total or Avg	7000		923.20		AP 0.841	7000		923.20		AP 0.827	7000		923.20		AP 0.847

Def Prob = Default Probability - is the historical default probability for each rating category from Moody's at origin from Altman's website.