



Determinants of corporate borrowing: A behavioral perspective [☆]

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ABSTRACT

This article integrates an earnings-based capital structure model into a simple real options framework to analyze the effects of managerial optimism and overconfidence on the interaction between financing and investment decisions. Several empirical implications follow from solving the model. Notably, my analysis reveals that managerial traits can ameliorate bondholder–shareholder conflicts, such as the debt overhang problem. While debt delays investment inefficiently, mildly biased managers can overcome this problem, even though they tend to issue more debt. Similar properties and results are discussed for other real options, such as the asset stripping or risk-shifting problems.

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1. Introduction

Since the irrelevance result of [Modigliani and Miller \(1958\)](#), a myriad of possible explanations for the relevance of financial policy has emerged.¹ In a seminal article, [Myers \(1977\)](#) demonstrates that if the firm has risky debt outstanding and managers act to maximize equity value rather than total firm value (i.e., debt plus equity), then managers have an incentive to defer investment inefficiently. The reason for underinvestment is that pre-existing, risky debt creates an overhang problem because it captures some of the investment benefits without bearing investment costs. Rational bondholders can anticipate shareholders' investment incentives. The underinvestment problem therefore makes debt more costly. That is, it forces firms to behave inefficiently *ex post*, as a result of the debt overhang, and it is impounded into corporate debt values *ex ante*, as an agency cost of debt. These agency costs of debt tend to increase with the amount of debt in the firm's capital structure and with the number of growth options in the firm's investment opportunity set. It is thus widely accepted that these agency conflicts between bondholders and shareholders affect a firm's capital structure.

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¹ Excellent surveys of capital structure research are, e.g., [Harris and Raviv \(1991\)](#), [Hart \(1995\)](#), and [Myers \(2001\)](#).

Modern corporate financial theory has largely ignored common personality traits of managers in modeling the complex decision-making process of corporate executives. At the present time, we have, at best, a hunch of what the economic consequences of well-documented managerial traits, e.g., excessive optimism and overconfidence, are for, e.g., firms' financing and investment decisions. Optimism is defined as the subjective belief that favorable future events are more likely than they actually are, the better-than-average effect. Overconfidence in the sense of miscalibration, on the other hand, means that people's subjective probability distributions over future events are too tight, the narrow-confidence-interval effect.

The main objective of this article is to advance a behavioral perspective for studying bondholder–shareholder conflicts that are due to the endogenous interaction between financing and investment decisions. For this purpose, I integrate a real options model into an earnings-based contingent claims capital structure environment to measure the agency costs of debt. The firm's EBIT (Earnings Before Interest and Taxes) of assets already in place is governed by a lognormal diffusion process with constant growth rate and volatility. In addition to assets in place, the firm holds an investment opportunity to enhance its profitability in exchange for an irreversible capital outlay.

Analytic solutions are derived for arbitrary beliefs, with rational beliefs as a special case, when financing and investment decisions are endogenously linked by optimality (i.e., smooth-pasting) conditions. A lower default and an upper investment boundary obtain. Rational bondholders anticipate that, after debt issuance, rational managers will implement equity rather than firm value-maximizing default and investment boundaries. So, the commitment problem of underinvestment creates a wedge between the equity value-maximizing (later) and the firm value-maximizing (earlier) investment decisions. The model produces quantitative estimates for the agency costs of debt.

Biased beliefs originate from optimism and/or overconfidence, which are characteristics of individuals, not of firms or markets.² This paper consequently looks at what happens inside the firm when managers are rational in all respects, except for how they perceive the firm's future. Similar to DeLong, Shleifer, Summers, and Waldmann (1991), optimistic managers overestimate the growth rate of assets in place. Overconfident managers underestimate the riskiness of assets in place. Biased managers are assumed to maximize the perceived (i.e., subjective) value of equity. In contrast, bondholders and shareholders have rational expectations. Investors can therefore fully anticipate the implications of decision-makers' behavioral biases for financing and investment decisions, in particular when setting security prices. Hence prices of corporate securities are efficient.

Perhaps surprisingly, managers with biased beliefs can play a positive role. There are two counterbalancing effects. (1) Leverage effect: Biased managers choose higher debt levels than rational managers. Higher debt levels, *ceteris paribus*, exacerbate underinvestment. (2) Timing effect: Biased managers invest, *ceteris paribus*, earlier, than rational managers. This attenuates underinvestment. For mild biases, the timing effect outweighs the leverage effect, which means that the benefits of managerial biases exceed their costs. Debt overhang agency costs decline and thus investor (i.e., initial shareholder) welfare improves.³

Although my formal analysis focuses on the underinvestment problem, the trade-off between the leverage effect and the timing effect extends to many other real option exercise decisions. For example, Leland (1998) points out that even if the manager's risk-shifting policy can be committed to at time 0 to maximize joint benefits of bondholders and shareholders, it will nevertheless be optimal to increase investment risk at some sufficiently low cash flow level prior to default. The commitment problem of asset substitution manifests itself in the wedge between the equity value-maximizing (earlier) and the firm value-maximizing (later) switch point. By waiting a bit longer, biased managers can attenuate the asset substitution problem. Similar arguments apply to asset stripping options, contraction options, and mothballing options, just to name a few. As a result, the bottom-line of this paper is the more general, agency-theoretic observation that mildly biased managers can ameliorate bondholder–shareholder conflicts. Intuitively, mild biases act like commitment devices to approaching first-best real option exercise strategies of debt–equity financed firms.

Moreover, I show that managerial optimism about the magnitude of future investment benefits moderates the above-mentioned leverage effect, which results from managerial optimism or overconfidence about assets in place. Managerial biases about assets in place and about gains from investment increase the region in which the timing effect dominates the leverage effect. Hence this extension provides more scope for positive net benefits to a debt–equity-financed firm from hiring biased managers. In addition, this extension helps explaining the debt conservatism puzzle of seemingly too low leverage ratios observed in practice (Graham, 2000).

Employing either direct survey responses or indirect empirical proxies to identify managerial optimism and overconfidence, the major implications of the model are testable and can be summarized as follows.⁴ Managers biased in this way (1) invest more, (2) issue more debt, and, as a result, (3) default more often. (4) Notably, mild managerial biases can play a positive role for debt–equity financed firms in that they can increase firm performance by helping to overcome conflicts of interest between bondholders and shareholders.⁵ (5) In contrast to unlevered firms, levered firms' shareholders should therefore rationally seek out the labor market of managers for candidates who are mildly optimistic and/or overconfident. (6) Finally, allowing also for optimism about future investment benefits can further strengthen the positive role of biased managers.

The structure of the paper is as follows. The next section reviews some related research. Section 3 studies the timing effect within a real options model of an all-equity firm, which is integrated into a contingent claims capital structure environment in

² Managers' biased beliefs may be attributable to cognitive errors (Kahneman et al., 1982).

³ Similarly, Kyle and Wang (1997) find that overconfidence acts as a commitment device in a Cournot duopoly.

⁴ For example, Ben-David, Graham, and Harvey (2006) and Puri and Robinson (2007) use a survey methodology, while Malmendier and Tate (2005) and Malmendier, Tate, and Yan (2007) rely on an empirical identification. Their studies are consistent with the view that these managerial biases affect firms' financing and investment decisions.

⁵ For empirical evidence on bondholder–shareholder conflicts, see, e.g., Hennessy (2004) or Eisdorfer (2008).

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