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Debt, equity, and information

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ABSTRACT

Most firms issue financial assets such as debt or equity (e.g. bonds or stock) to outside investors. While these financial assets differ greatly in their characteristics, their diversity has received little attention in the literature. Filling this important gap in the literature, this paper views debt and equity as financial contracts, and asks why they are optimal instead of other financial contracts. By endogenizing the bankruptcy process, this paper shows how debt and equity arise as a consequence of an optimal allocation of cash-flow rights and monitoring rights, and how equity leads to dividend signaling.

1. Introduction

There is a large literature that considers deals between financiers and those who need financing, for example deals between outside investors and small startup companies. A central question in this literature is to ask why certain financial assets such as debt and outside equity are optimal, and why we do not observe financial assets with fundamentally different characteristics. While the security design literature has made great strides in explaining a large number of stylized facts, its key challenge is that it often views debt and equity as results of changes in model assumptions as opposed to changes in model parameters.[1] In the sense that a model is an abstraction of the real world, the security design literature shows that, in one world, all firms issue only debt, while in another world all firms issue only equity. Clearly, these results are not a fully satisfactory description of reality, and it is of great economic import to bring both worlds together.

This paper bridges both worlds by rationalizing a substantial number of stylized facts about debt and equity using a single parsimonious model. This parsimony is a significant contribution to the literature because it allows one to investigate novel interactions between economic forces that would otherwise be hard to explore. In doing so, this paper combines two strands of the security design literature. On the one hand, there are papers that focus on the assignment of control rights, but where contracts are incomplete (see Aghion and Bolton (1992)). On the other hand, there are papers that rely on informational frictions to derive the optimal structure of contracts (see Townsend (1979)). Combining these two strands of the literature, this paper generates both debt and equity contracts without having to assume incompleteness for the set of contracts. In particular, this paper shows how the interaction of cash-flow rights and monitoring rights results in optimal allocations giving rise to debt and equity contracts. Furthermore, it shows how equity contracts lead to endogenous dividend signaling. Finally, the paper provides novel implications for bankruptcy, making a case for reorganization (e.g. out-of-court private negotiation or Chapter 11 bankruptcy) instead of liquidation (e.g. Chapter 7 bankruptcy).

A major difference between this paper and most of the previous literature is the way bankruptcy is conceptualized. The previous literature often assumes perfect ex post enforcement of contracts through an exogenous unmodeled authority.[2] While this assumption has served as an important building block for laying out the foundations of security design, it is not a fully satisfactory descriptive tool. This paper thus relaxes this assumption and, building on Krasa and Villamil (2000), makes bankruptcy endogenous

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[1] Notable exceptions that endogenize some or all security characteristics of both debt and equity include Dewatripont and Tirole (1994), Berglöf and von Thadden (1994), Fluck (1998), Fulghieri and Lukin (2001), Biais et al. (2007), and DeMarzo and Fishman (2007).

[2] Prior research interprets bankruptcy as a bad signal about the state of nature and the resulting transfer of control (see Aghion and Bolton (1992)), a low payout (see Diamond (1984)), the act of verification (see Townsend (1979) and Gale and Hellwig (1985)), or the intervention of outside investors in management (see Dewatripont and Tirole (1994)).

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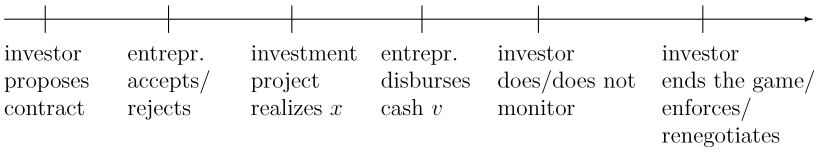

Fig. 1. Timeline.

along two dimensions. First, the investor may file with a court for bankruptcy protection and seize assets by enforcing a transfer payment. Second, the transfer payment itself is endogenous and is part of the contract. This approach to modeling bankruptcy is important, because it endogenizes cash-flow rights. Furthermore, it shows a novel way to alleviate managerial moral hazard by incentivizing the entrepreneur to signal private information through monetary payouts, thus furthering our understanding of optimal payout policy and dividend signaling.

The economic intuition driving this paper's results follows from considering two extreme cases for illustration: a small startup company, e.g. a high-tech startup in Silicon Valley such as Google in 1999, and a mature company, e.g. an automaker in Detroit such as General Motors. The startup (e.g. Google) has risky cash flows because it is uncertain whether it survives. If it survives, however, it can become highly profitable. This profitability, together with the fact that there is asymmetric information between an outside investor and the entrepreneur who runs the company, means that there is also a large profit to hide. To deal with this problem, the outside investor can audit (i.e. monitor) the firm at a cost. Since this cost is still low for the small startup, the optimal contract has monitoring rights, especially since there may be a large profit to hide. To capitalize on this large profit, the investor also requires state-contingent cash-flow rights. These state-contingent cash-flow rights coupled with monitoring rights are consistent with equity contracts that are used for venture capital financing of startups like Google.[3] In contrast, the monitoring of the mature company (e.g. General Motors) is very costly, because the company is large and old. Furthermore, the company's cash flows are stable, with a low growth potential. These low-risk cash flows coupled with high monitoring costs make monitoring unattractive. The investor thus relinquishes his/her monitoring rights and is content with state-independent cash-flow rights, yielding debt as the optimal contract.

The rest of this paper is organized as follows. Section 2 introduces the model. The key results are summarized in Section 3 by showing the relation to debt and equity and deriving empirical predictions. The model is formally solved in Section 4, while Section 5 provides a model extension to many states of nature. Finally, Section 6 concludes. For easier cross-referencing, results throughout this paper are summarized in the form of lemmata and propositions, culminating in the paper's main theorem. The proof of the main theorem is contained in the Appendix.

Related Literature. In a closely related paper, Krasa and Villamil (2000) show that debt and equity contracts arise as a consequence of an economic friction that determines whether the original contract can be renegotiated. The key difference is that this paper considers renegotiation in the spirit of Rubinstein bargaining, while Krasa and Villamil consider a repeat-contract approach.

In the same spirit as this study, Dewatripont and Tirole (1994) examine why debt and equity differ fundamentally. Dewatripont and Tirole have several outside investors, which allows for the *simultaneous* issuance of debt and equity (one investor is the residual claimant on cash-flow rights). In contrast, there is only one outside investor in this study, which precludes the simultaneous issuance of debt and equity.

This paper also relates to the bankruptcy procedure literature, since some of its results can be interpreted as reorganization (e.g. out-of-court private negotiation or Chapter 11 bankruptcy) versus liquidation (e.g. Chapter 7 bankruptcy). There exists an extensive law and economics literature that is primarily concerned with finding optimal bankruptcy procedures (see Roe (1983), Baird (1986), Bebchuk (1988), Aghion et al. (1994), and Berkovitch and Israel (1999)). Similar in spirit, part of the financial contracting literature studies the effects of bankruptcy procedures on managers' incentives (see Aghion and Bolton (1992), Bolton and Scharfstein (1996), and Berkovitch et al. (1998)) and the protection of creditors' claims (see Cornelli and Felli (1997)).

2. The model

This section describes the model, whose timeline is summarized by Fig. 1. Consider two risk-neutral agents, an investor with deep pockets ("she") and a penniless entrepreneur ("he"). The entrepreneur has an investment opportunity and needs outside financing. To finance the project, the investor proposes a contract that the entrepreneur can accept or reject.[4] If the entrepreneur rejects the financing, the project becomes worthless. Ex ante, both agents share a common prior $\beta := P(X = x_H) \in (0, 1)$ about the project's random cash flow $X \in \{x_L, x_H\}$, where $x_L < x_H$. The common prior β represents agents' belief about the extent to which the entrepreneur has a profit to hide. An alternative interpretation of β is agents' beliefs about the growth potential of the company. After the contract is signed, nature makes a draw and determines the project's cash-flow realization $x \in \{x_L, x_H\}$. As a result, an informational asymmetry arises: the entrepreneur observes the project's cash flow, but the investor does not. In this ex post sense, I refer to an entrepreneur with the low cash-flow realization x_L as of *low type*, while an entrepreneur with x_H is of *high type*.

After the cash-flow realization, the entrepreneur has the opportunity to pay out parts of this cash flow to the investor. This payout could correspond to dividends in equity contracts, or to coupon payments in debt contracts. This payout, denoted by $v \geq 0$, is voluntary, and it represents money on the table that cannot be withdrawn subsequently. Note that v may be zero or strictly positive, and that there is no inherent restriction on v that prevents the entrepreneur from overpaying or underpaying. Furthermore, it is important to keep in mind that v is not an announcement, but an actual payout. As such, the voluntary payout has the dual role of transferring wealth and acting as a potential signaling device. After receiving the payout v, the investor updates her belief about the project according to Bayes' rule to $\beta_v := P(X = x_H | V = v)$. She conditions on the event $\{V = v\}$, where the conditional distribution of the random variable $V|X = x_E$ represents the entrepreneur's endogenous payout strategy for $E \in \{L, H\}$.

[3] There are also small firms whose outside funding mainly consists of bank loans, i.e. debt. An example for this type of firm is an entrepreneur running a restaurant. These firms, however, often do not have a high growth potential or do not have very risky cash flows. They are thus unlikely to receive venture capital (i.e. equity) financing. This is consistent with this paper as long as the relatively low growth potential or the relatively stable cash flows dominate the cost-efficient information policy.

[4] This approach is in the spirit of Bolton and Scharfstein (1990) and Kaplan and Strömberg (2003).