PRIVATELY HELD OR PUBLICLY OWNED? THE ROLE OF DEBT FINANCING

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Abstract

This paper examines the decision to go public under the issuance of both debt and equity financing. The decision to go public, the debt ratio and the shape of the ownership structure depend on the combination of debt and ownership structures that maximizes the initial owners' wealth. Our model is based on a contest in which owners/managers and shareholders exert costly efforts to increase their probability of winning part of the value of the public firm where the outcome of the contest and the listing decision are affected by the cost of debt. We differ from previous research in that we model the interaction between shareholders, debtholders, and managers as a contest. Our results are largely consistent with previous research in the field where we show that in industries displaying decreasing returns to scale (or slower growth industries) it is always preferred to raise funds through the issuance of debt rather than equity while in industries displaying increasing returns to scale (or high growth industries) a positive relationship obtains between the interest rate and the issuance of equity.

Keywords: Ownership Structure, Corporate Governance, Agency Costs, Monitoring, Managerial Conflict, Legal Protection, Investor Protection

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1. INTRODUCTION

In economics, the behavior of firms can be characterized as that of profit maximization: the managers of a firm make those choices that maximize the firm's profits or more accurately its present value. Our paper helps explain how the conflicting objectives of the individual participants (shareholders, debtholders, and managers) are brought into equilibrium to yield this result. Specification of individual rights determines how costs and rewards will be allocated among the participants in the firm. Since the specification of rights is generally affected through contracting, individual behavior in organizations, including the behavior of managers, will depend upon the nature of these contracts.

Castillo and Skaperdas (2005) examine how the legal protection of outside shareholders and the appropriative costs that they induce influence the incentives for private firms to go public. They model the conflict between the owner/manager and outside shareholders as a contest to secure part of the value of the public firm. Their findings indicate that owners are more likely to go public when outside shareholders are better protected with the share of ownership retained by the owner/manager being non-monotonic in the variable that measures increased protection of outside shareholders.

We are proposing a game-theoretic analysis like Castillo and Skaperdas (2005), with the exception that in a levered firm the game-theoretic problem will involve three groups: shareholders, debtholders, and managers. In stage one of the game, the original

founders will contemplate whether to take their privately held company public. In stage two of the game and upon deciding to take their company public, the initial owners/managers will choose the optimal debt ratio and the optimal ownership structure that maximizes their wealth. In stage three of the game, agency costs will be incurred due to the conflicting objectives of debtholders, shareholders, and owners/managers. Shareholders will choose their optimal efforts based on maximal return on equity while debt holders will choose their optimal efforts based on their guaranteed return on debt.

Glushkov, Khorana, Rau, and Zhang (2018) examine characteristics of firms that choose to go public through debt rather than equity. The authors compare these firms to contemporaneous IPO (initial public offering) firms to analyze why these firms choose to go public through the debt market. Firms that choose the debt market route are larger, more likely to be backed by a financial sponsor such as venture capital or private equity firm, and less likely to face information asymmetry than traditional IPO firms. Meluzín, Zinecker, Balcerzak, and Pietrzak (2018) surveyed sixty-five chief financial officers (CFOs) at non-public and non-financial companies in the Czech Republic and Poland that are considered candidates for an IPO to document their propensity to decline to launch an IPO and maintain private ownership. The authors found that the majority of the managers do not see the capital market as a source of cheaper and more flexible financing compared to bank loans and other sources.

Kazmierska-Jozwiak, Marszałek, and Sekuła (2015) analyze the determinants of the capital structure of Polish enterprises. Their results indicate that there is evidence of a significant negative relationship between growth rate and the level of total debt. Cole and Sokolyk (2018) find that high-growth, high-quality start-up firms with better performance prospects are more likely to use debt and, in particular, business debt. Compared to all-equity firms, firms using debt at the initial year of operations are significantly more likely to survive and achieve higher levels of revenue three years after the firm's start-up. Ratih (2019) analyzes and evaluates the impacts of equity market timing on corporate capital structure policies in Indonesia. The author's findings are consistent with equity market timing theory where the results suggest that firms tend to issue equities when their market valuations are relatively higher than their book values and their past market values are high.

Jovanovic and Rousseau (2004) study the relation between IPO investment and the rate of interest and they find that at low rates of interest firms delay their IPOs. This happens because during the pre-IPO period the firm forgoes earnings that do not matter as much at low-interest rates. Brau, Francis, and Kohers (2003) investigate external factors that can influence the relative attractiveness of IPOs for private firms and they conclude that there is a positive relation between the nominal interest rate and IPO volume.

Our results indicate that entrepreneurs operating in industries displaying decreasing returns to scale (or slower growth industries) prefer the issuance of debt to equity when external financing is required while entrepreneurs operating in industries displaying increasing returns to scale (or high growth industries) are less likely to take their company public and will rely on debt financing when the cost of debt is low and are more likely to take their company public and will rely on equity financing when the cost of debt is high.

The remainder of this paper is organized as follows. Section 2 reviews the related literature, Section 3 describes the model, Section 4 reports the results, Section 5 discusses the results, Section 6 concludes with concluding remarks, research limitations, and implications for future research.

2. LITERATURE REVIEW

Jensen and Meckling (1976) define an agency relationship as a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf, which involves delegating some decision-making authority to the agent. They argue that if both parties to the relationship are utility maximizers, there is good reason to believe that the agent will not always act in the best interests of the principal. The principal can limit divergences from his interest by establishing appropriate incentives for the agent and by incurring monitoring costs designed to limit the aberrant activities of the agent. In addition, in some situations, it will pay the agent to expend resources (bonding costs) to guarantee that he will not take certain actions that would harm the principal or ensure that the principal will be compensated if he does take such actions. However, it is generally impossible for the principal or the agent at zero cost to ensure that the agent will make optimal decisions from the principal's viewpoint. In most agency relationships, the principal and the agent will incur positive monitoring and bonding costs (non-pecuniary as well as pecuniary), and in addition, there will be some divergence between the agent's decisions and those decisions that would maximize the welfare of the principal. The dollar equivalent of the reduction in welfare experienced by the principal as a result of this divergence is also a cost of the agency relationship, and they refer to this latter cost as the "residual loss". They define agency costs as the sum of the monitoring expenditures by the principal, the bonding expenditures by the agent, and the residual loss.

According to the trade-off theory of capital structure (Brealey & Myers, 1996), the manager should choose the debt ratio that maximizes firm value. Modigliani and Miller (1963) argue that the value of the levered firm will equal its value if all-equity-financed plus the present value of any tax-shields minus the present value of the costs of financial distress minus the present value of agency costs. Bliss and Flannery (2001) show that different investors may evaluate management differently. In contrast to shareholders, debt holders, for example, are less interested in the upside potential than in insuring that default is avoided. Even though debt holders and shareholders differ in their investment objectives in the firm, they both share a common interest in protecting firm value by closely monitoring management. Zingales (1995) focuses on the role of an IPO in maximizing the proceeds an initial owner obtains in selling his company. Whether a company should be private or public, as well as the insider's ownership in public

companies, depends on the particular combination of majority control and dispersed ownership which maximizes the incumbent's wealth.

Jensen (1986) argues that debt can be an effective substitute for dividends. By issuing debt in exchange for stock, managers are bonding their promise to pay out future cash flows in a way that cannot be accomplished by simple dividend increases. These effects are especially important in organizations that have low growth prospects and are not as important for rapidly growing organizations with large and highly profitable investment projects. Pagano, Panetta, and Zingales (1998) find that the main factor affecting the probability of an IPO is the market-to-book ratio at which firms in the same industry trade. Their results indicate that a one-standard-deviation increase in the market-to-book ratio raises the odds of an IPO by 25%. They argue that this positive relationship may reflect a higher investment need in sectors with high growth opportunities (and correspondingly high market-to-book ratios). They also show that IPOs tend to involve companies that before the IPO grew faster and were more profitable. Jovanovic and Rousseau (2004) study the relation between IPO investment and the rate of interest and they find that at low rates of interest firms delay their IPOs. This happens because during the pre-IPO period the firm forgoes earnings that do not matter as much at low-interest rates. Brau et al. (2003) investigate external factors that can influence the relative attractiveness of IPOs for private firms and they conclude that there is a positive relation between the nominal interest rate and IPO volume.

Kazmierska-Jozwiak et al. (2015) analyze the determinants of the capital structure of Polish enterprises. Their results indicate that there is evidence of a significant negative relationship between growth rate and the level of total debt. Cole and Sokolyk (2018) find that high-growth, high-quality start-up firms with better performance prospects are more likely to use debt and, in particular, business debt. Compared to all-equity firms, firms using debt at the initial year of operations are significantly more likely to survive and achieve higher levels of revenue three years after the firm's start-up. Ratih (2019) analyzes and evaluates the impacts of equity market timing on corporate capital structure policies in Indonesia. The author's findings are consistent with equity market timing theory where the results suggest that firms tend to issue equities when their market valuations are relatively higher than their book values and their past market values are high.

Glushkov et al. (2018) study the characteristics of firms that choose debt financing rather than equity financing when deciding to go public. The authors compare the characteristics of those firms to other IPO firms to analyze why these firms choose to go public through debt financing. Their results show that firms that choose debt market financing are larger. Meluzín et al. (2018) examined non-public and non-financial companies in the Czech Republic and Poland that are candidates for an IPO to analyze their decision whether to go public or remain private. The authors concluded that most of the managers do not consider the capital market as a source of cheaper and more flexible financing compared to bank loans and other sources.

3. RESEARCH METHODOLOGY

The owners/managers decide to take their privately held firm public and raise funds through issuing debt and through selling a share of the company to outside shareholders (we do not make the distinction between large and dispersed shareholders). After the company goes public, managers, outside debtholders, and outside shareholders will engage in an appropriative struggle to receive/maintain a share of the firm's value. Because this struggle is costly, the sum of the payoffs of the outside shareholders will, in general, be lower than the gross value of the public firm. Managers will undertake costly actions to the appropriate part of the value of the firm, whereas outside shareholders and outside debtholders will exert costly efforts to protect their investment in the firm.

Assumption 1: Similar to Castillo and Skaperdas (2005), founders of the private firm will also act as managers of the public firm due to their unique expertise in running the firm. Castillo and Skaperdas (2005) assume that the owner retains managerial control of the firm because he may have expertise that is indispensable to the functioning of the firm. They argue that even when outside shareholders acquire the majority of the firm, the incumbent owner often retains some prominent managerial position within the firm due to him having first-hand knowledge of the daily operations of the firm. The share of equity owned by the managers do play the role in this model. The shareholders include the manager himself who keeps a share of the firm.

Assumption 2: All funds raised from selling equity will be reinvested in the firm.

Assumption 3: Absence of corporate tax-shields.

Assumption 4: There exists an exogenous probability of financial distress as a result of the destruction of firm assets due to natural disasters, acts of vandalism, or political instability.

There are three stages to the game:

Stage 1: Owners decide whether to take their company public through an initial public offering, an initial public debt offering, or some combination of the two.

Stage 2: In the case of going public, owners/managers decide on the optimal value of debt, the optimal fraction *1−α* of the shares to sell to shareholders, and the optimal fraction *α* of the shares to keep.

Stage 3: Agency costs incurred due to divergent shareholders', debt holders' and managers' objectives. According to the principal-agent problem, managers have an incentive to further their own interest at the expense of stakeholders who include both shareholders and debtholders. Shareholders will incur costs in monitoring the management to make sure that they act in a manner that maximizes shareholders' value in the long run while debtholders also incur costs in monitoring the management to protect their investment in the firm. Debtholders and stockholders do not necessarily share the same objectives for the firm since debtholders' claims have seniority over equity holder's claims. If a financially strong firm is wasting money on executive perks, they will still be able to pay debtholders, therefore, debtholders may be less active in monitoring than stockholders.

The going public decision is modeled as a three-stage game. The three stages of the game are shown in Figure 1 below.

Figure 1. The going public decision modeled as a three-stage game
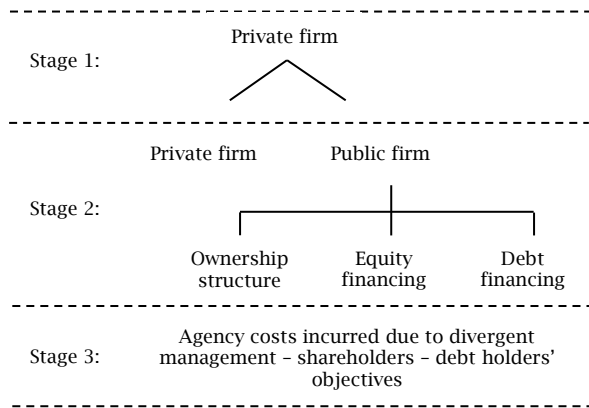
The outcome of the distributional struggle is modeled as a contest in which the participants exert costly efforts to increase their probability of winning part of the value of the public firm (Derek & Riis, 1997; Skaperdas, 1996; Tullock, 1980). The share of the gross value of the public firm received by

$$V_B = \begin{cases} (1-\bar{P})(1+r)D - e_B - D, \\ (1-\bar{P})(1-q_m)V_P - e_B, \end{cases} \quad \begin{array}{l} if\,(1-q_m)V_P \geq (1+r)D \\ if\,(1-q_m)V_P < (1+r)D \end{array} \qquad (2)$$

where, e_B represents costly efforts exerted by bondholders to protect their investment in the firm; $\bar{P}$ represents the exogenous probability of destruction of firm assets; r represents the return on debt to bondholders; D represents the amount of debt owed to bondholders; $V_P\,(S+D)$ represents the gross value of the public firm and is increasing in the amount of both debt and equity financing with $V'_P\,(S+D) \geq 0$; q_m represents the share of the gross value of the public firm expropriated by the owners/managers; $(1-\bar{P})(1+r)D - e_B - D$ represents the expected return to bondholders when the amount of debt plus interest is less than or equal to the value of the expropriated firm; and $(1-\bar{P})(1-q_m)V_P$ represents the expected return to bondholders when the amount of debt plus interest is greater than the value of the expropriated firm.

With complete information, bondholders will not allow the amount of debt plus interest to exceed the value of the expropriated firm. This implies that bondholders do not need to exert any effort monitoring the managers ($e_B = 0$) and the payoff to bondholders can be represented by:

$$V_B = (1-\bar{P})(1+r)D - D \qquad (3)$$

with bondholders exerting zero effort in monitoring the owners/managers, the share of the net value[1] of the public firm expropriated by the owners/managers is a function $q(e_m, e_s)$ of two kinds of effort, with e_m representing costly efforts exerted by the owners/managers to expropriate part of the value of the public firm, while e_s represents

the owners/managers is a function of the two kinds of effort:

$$q(e_m, e_s) = \frac{(1-\theta)e_m}{(1-\theta)e_m + \theta e_s} \qquad (1)$$

with e_m representing costly actions taken by owners/managers to expropriate part of the value of the public firm while e_s represents costly actions taken by large shareholders to protect their investment in the public firm. $1 - q\,(e_m, e_s)$ represents the share of the gross value of the public firm received by shareholders (including the owners/managers who keep a share of the firm).

θ represents the efficiency of the judiciary and law enforcement system in a country (or the degree of legal protection of outside shareholders from expropriation or "tunneling" by the insiders) and it varies between 0 and 1. An increase in θ towards 1 would indicate stronger law enforcement or a more efficient legal system. Conversely, a movement of θ toward 0 would indicate weaker law enforcement or a less efficient legal system. Based on the outcome of the struggle, the owners/managers decide on the optimal value of debt and the optimal ownership structure that maximize their payoff.

Equation (2) below represents the sources of value to bondholders:

costly efforts exerted by shareholders to protect their investment in the firm. Obviously, $q(e_m, e_s)$ is increasing in e_m and decreasing in e_s. $1 - q(e_m, e_s)$ represents the share received by shareholders (including the owners/managers who keep a share of the firm).

Equation (4) below represents the two sources of value to the owners/managers minus costly efforts (e_m) exerted by the owners/managers to expropriate part of the value of the public firm. $q(e_m, e_s)(V_P(S + D) - (1 + r)D)$ represents the value gained from expropriating part of the net value of the public firm while $\alpha(1 - q)(e_m, e_s))(V_P(S + D) - (1 + r)D)$ represents the value gained from being shareholders where $\alpha \in (0,1)$ is the share of the firm retained by the owners/managers.

Equation (5) below represents the source of value to shareholders $(1 - \alpha)(1 - q(e_m, e_s))(V_P(S + D) - (1 + r)D)$ minus their costly efforts (e_s) exerted to protect their investment in the firm.

Shareholders and owners/managers choose their equilibrium efforts simultaneously and in a manner that maximizes their total payoffs in stage three of the game. Given values of the owners/managers share in the public firm (α) and the value of the public firm to shareholders (S) we solve for the owners/managers and shareholders equilibrium efforts e_m^* and e_s^* respectively by taking the first-order conditions with respect to e_m (equation (4) above) and with respect to e_s (equation (5) above). Substituting the equilibrium efforts e_m^* and e_s^* into equations (4) and (5) above, we get the equilibrium payoffs to the owners/managers V_m^* and to shareholders V_s^*.

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[1] Net value of the public firm equals the gross value of the public firm minus debt and interest liabilities to bondholders.

$$V_m = (e_m, e_s: \alpha, S, D) = (q(e_m, e_s) + \alpha(1 - q(e_m, e_s)(V_P(S + D) - (1 + r)D) - e_m \tag{4}$$

$$V_s = (e_m, e_s: \alpha, S, D) = (1 - \alpha)(1 - q(e_m, e_s))(V_P(S + D) - (1 + r)D) - e_s \tag{5}$$

The expected payoff to owners/managers

The expected payoff to the owners/managers from taking their private firm public equals the equilibrium payoff (V_m^*). The expected payoff to shareholders (*S*) equals the equilibrium payoff to shareholders (V_s^*) or how much shareholders value their share in the public firm. The proceeds from the sale of equity equal the value that the prospective shareholders expect to receive, so that:

$$S = V_s^*(\alpha, S, D) \tag{6}$$

Choosing the optimal ownership structure to owners/managers

Owners/managers choose the optimal debt value (*D**) and the proportion of shares to sell to shareholders (*1 − α*) in a manner that maximizes their expected payoff from taking their company public.

$$\max_{a,D} V_m^* (\alpha, S, D) \tag{7}$$

First-order conditions

We solve for the owners/managers equilibrium efforts by differentiating equation (4) above with respect to e_m and setting it equal to zero:

$$\frac{\theta(1 - \theta)e_s^*}{((1 - \theta)e_m^* + \theta e_s^*)^2}(1 - \alpha)(V_P(S + D) - (1 + r)D) = 1 \tag{8}$$

In order to solve for shareholders' equilibrium efforts, we differentiate equation (5) above with respect to e_s and we set it equal to zero:

$$\frac{\theta(1 - \theta)e_m^*}{((1 - \theta)e_m^* + \theta e_s^*)^2}(1 - \alpha)(V_P(S + D) - (1 + r)D) = 1 \tag{9}$$

Dividing equations (8) and (9) above, we get:

$$e_s^* = e_m^* \tag{10}$$

Plugging equation (10) back into equations (8) and (9) above, we can solve for the owners'/ managers' and shareholders equilibrium efforts as given by equations (11) and (12) below:

$$e_m^* = \theta(1 - \theta)(1 - \alpha)[V_P(S + D) - (1 + r)D] \tag{11}$$

$$e_m^* = \theta(1 - \theta)(1 - \alpha)[V_P(S + D) - (1 + r)D] \tag{12}$$

Substituting equations (11) and (12) into equations (4) and (5) above we get the equilibrium payoffs to the owners/managers and to shareholders respectively:

$$V_m^*(\alpha, S, D) = [(1 - \alpha)(1 - \theta)^2 + \alpha][1 - \bar{P}][V_P(S + D) - (1 + r)D] \tag{13}$$

$$V_s^*(\alpha, S, D) = [\theta^2(1 - \alpha)][1 - \bar{P}][V_P(S + D) - (1 + r)D] \tag{14}$$

Choosing the optimal debt value and ownership structure to owners/managers

We assume that that the value of the public firm is determined through a Cobb-Douglas-like form:

$$V_P(\alpha, S, D) = K(S + D)^y, \text{where } y > 0, K > 0 \tag{15}$$

K represents the firm's production technology.

4. RESEARCH RESULTS

4.1. Case 1: Decreasing returns to scale

$$V_P(\alpha, S, D) = K(S + D)^{0.5}, \text{where } K > 0 \tag{16}$$

The proceeds from the sale of equity equal the discounted value that the prospective shareholders expect to receive (the zero-profit condition for shareholders imply that they are willing to pay a share price *S* equal to the market value of their share in the firm divided by one plus the risk-free return they can get in the open market), so that:

$$(1 + r)S = V_s^*(\alpha, D) = [\theta^2(1 - \alpha)(1 - \bar{P})][K(S + D)^{0.5} - (1 + r)D] \tag{17}$$

Solving for *S*, we get:

$$S = \frac{K^2\theta^4(1-\alpha)^2(1-\bar{P})^2}{2(1+r)^2} - \theta^2(1+r)D(1-\alpha)(1-\bar{P}) + \frac{K\theta^2(1-\alpha)(1-\bar{P})}{2(1+r)}\sqrt{\frac{K^2\theta^4(1-\alpha)^2(1-\bar{P})^2+4D(1+r)^2(1-\theta^2(1-\alpha)(1-\bar{P}))}{(1+r)^2}} \tag{18}$$

To determine the optimal values of α^* and D^* that maximize the expected payoff to the owners/ managers, we plug equations (18) and (16) into the maximization problem shown in equation (7)

above. Taking the derivative $\frac{\partial V_m^*(\alpha,S,D)}{\partial D}$ and setting it equal to zero, we can solve for the optimal value of debt (*D**) that maximizes the expected payoff to the owners/managers:

$$D^* = \frac{K^2[1 - 2\theta^2(1 - \alpha)(1 - \bar{P})]^2}{4(1 + r)^2[1 - \theta^2(1 - a)(1 - \bar{P})]} \tag{19}$$

To determine the optimal value of α^*, we plug in the value of D^* into the maximization problem

shown in equation (14) above. Taking the derivative $\frac{\partial V_m^*(\alpha,S,D^*)}{\partial \alpha}$, we can solve for the optimal value of α^*:

$$\frac{\partial V_m^*(\alpha, S, D^*)}{\partial \alpha} = \frac{K^2 \theta (1 - \bar{P})(2 - 2\theta + \theta \bar{P})}{4(1+r)[1 - \theta^2(1 - \bar{P})(1 - \alpha)]^2} > 0 \qquad (20)$$

Equation (20) above implies that $\alpha^* = 1$ and $D^* = \frac{K^2}{4(1+r)^2}$.

Our results indicate that entrepreneurs operating in industries displaying decreasing returns to scale (or slower growth industries) prefer the issuance of debt to equity when external financing is required. The optimal value of debt is increasing in the production technology K and decreasing in the cost of debt r.

4.2. Case 2: Increasing returns to scale

$$V_P(\alpha, S, D) = K(S + D)^2, where\ K > 0 \qquad (21)$$

Due to the increasing returns to scale technology, the rate of return on equity is increasing in the price that shareholders pay for their shares which implies an optimal value of S close to infinity (corner solution). Assume F equals $(S + D)$. Owners/managers maximization problem then becomes, $max_{\alpha,F} [(1 - \alpha)(1 - \theta)^2 + \alpha][1 - \bar{P}][K(F)^2 - (1 + r)D]$, which implies that as long as the firm is solvent[2], the owners will choose an optimal value of F close to infinity (corner solution). To obtain a solution that is characteristic of what is observed, we assume an upper bound on the value of $(S + D)$ to equal $\bar{F}$ which results in the maximum potential value of the firm. In accordance with their maximization problem shown in equation (13) above, owners/managers will choose the value of $(S + D)$ to equal the upper bound value of $\bar{F}$.

Similar to the case of decreasing returns to scale above, the proceeds from the sale of equity equal the discounted value that the prospective shareholders expect to receive (the zero-profit condition for shareholders imply that they are willing to pay a share price S equal to the market value of their share in the firm divided by one plus the risk-free return they can get in the open market), so that:

$$(1 + r)S = V_S^*(\alpha, D) = [\theta^2(1 - \alpha)(1 - \bar{P})][K(\bar{F})^2 - (1 + r)(\bar{F} - S)] \qquad (22)$$

Solving for S, we get:

$$S = \frac{\theta^2(1-\alpha)(1-\bar{P})[K(\bar{F})^2 - (1+r)\bar{F}]}{(1+r)[1 - \theta^2(1-\alpha)(1-\bar{P})]} \qquad (23)$$

To determine the optimal values of α^* that maximizes the expected payoff to the owners/managers, we plug equations (21) and (23) into the maximization problem shown in equation (7) above. Taking the derivative $\frac{\partial V_m^*(\alpha)}{\partial \alpha}$ and setting it equal to zero, we can solve for the optimal value of debt (α^*) that maximizes the expected payoff to the owners/managers:

$$\frac{\partial V_m^*(\alpha)}{\partial \alpha} = \frac{[2\theta(1-\theta)+\theta^2\bar{P}][1-\bar{P}]K(\bar{F})^2 - (1+r)\bar{F}]}{[1 - \theta^2(1-\alpha)(1-\bar{P})]^2} \qquad (24)$$

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[2] A solvent firm is one whose assets exceed its liabilities and one that can pay its creditors in full. In the example above, this condition will be satisfied as long as the value of the public firm, $K(F)^2$ is greater than its liabilities $(1 + r)D$.

$\frac{\partial V_m^*(\alpha)}{\partial \alpha}$ is positive when $r \leq (K\bar{F} - 1)$ and negative otherwise.

Our results show that in industries displaying increasing returns to scale (or high growth industries), a positive relationship obtains between the nominal interest rate and the numbers of IPOs. Entrepreneurs operating in such industries are less likely to take their company public and will rely on debt financing when $r \leq (K\bar{F} - 1)$. The same entrepreneurs are more likely to take their company public and will rely on equity financing when $r > (K\bar{F} - 1)$. The share retained by the owner/manager is non-monotonic in the rate of interest or the cost of debt r, increasing for low values and decreasing for high values.

5. DISCUSSION

Our findings show that in industries displaying decreasing returns to scale (or slower growth industries), it is always preferred to raise funds through the issuance of debt rather than equity while in industries displaying increasing returns to scale (or high growth industries) it is more likely that firms will raise funds through the issuance of equity. Our findings are consistent with Jensen (1986), who argues that debt can be an effective substitute for dividends. By issuing debt in exchange for stock, managers are bonding their promise to pay out future cash flows in a way that cannot be accomplished by simple dividend increases. These effects are especially important in organizations that have low growth prospects and are not as important for rapidly growing organizations with large and highly profitable investment projects. Our results are also consistent with Pagano et al. (1998), who find that the main factor affecting the probability of an IPO is the market-to-book ratio at which firms in the same industry trade. Their results indicate that a one-standard-deviation increase in the market-to-book ratio raises the odds of an IPO by 25%. They argue that this positive relationship may reflect a higher investment need in sectors with high growth opportunities (and correspondingly high market-to-book ratios). They also show that IPOs tend to involve companies that before the IPO grew faster and were more profitable. Our findings are also consistent with Kazmierska-Jozwiak et al. (2015), who analyze the determinants of the capital structure of Polish enterprises. Their results indicate that there is evidence of a significant negative relationship between growth rate and the level of total debt. Our results are also consistent with Ratih (2019), who analyzes and evaluates the impacts of equity market timing on corporate capital structure policies in Indonesia. The author's findings are consistent with equity market timing theory where the results suggest that firms tend to issue equities when their market valuations are relatively higher than their book values and their past market values are high.

Our results are partially consistent with the findings of Cole and Sokolyk (2018), who find that high-growth, high-quality start-up firms with better performance prospects are more likely to use debt and, in particular, business debt. In our

findings, firms in high-growth industries were more likely to raise funds through the issuance of debt when the interest rate is low and through the issuance of equity when interest rates were high. The authors also found that compared to all-equity firms, firms using debt at the initial year of operations are significantly more likely to survive and achieve higher levels of revenue three years after the firm's start-up.

Our findings show that in industries displaying increasing returns to scale (or high growth industries) a positive relationship obtains between the interest rate (cost of debt) and the issuance of equity. Our findings are consistent with Jovanovic and Rousseau (2004) who study the relation between IPO investment and the rate of interest, and they find that at low rates of interest firms delay their IPOs. This happens because during the pre-IPO period the firm forgoes earnings that do not matter as much at low-interest rates. Our findings are also consistent with Brau et al. (2003), who investigate external factors that can influence the relative attractiveness of IPOs for private firms and they conclude that there is a positive relation between the nominal interest rate and IPO volume.

6. CONCLUSION

The results reached in the analysis above are driven by the assumption that debt holders have access to complete information and will not allow the amount of debt plus interest to exceed the value of the appropriated firm. This implies that debt holders do not need to exert costly efforts in monitoring management and agency costs are only incurred due to monitoring by shareholders. The asymmetry in monitoring implies that in industries displaying decreasing returns to scale (or slower growth industries) it is always preferred to raise funds through the issuance of debt rather than equity while in industries displaying increasing returns to scale (or high growth industries) a positive relationship obtains between the interest rate (cost of debt) and the issuance of equity. We acknowledge some limitations of our study. First, we do not allow for debt holders to monitor management, and agency costs are only incurred due to monitoring by shareholders. Second, we assume an exogenous probability of financial distress as a result of the destruction of firm assets due to natural disasters, acts of vandalism, or political instability. Future analysis is planned where both debt holders and shareholders incur agency costs in monitoring managers. Future work is also planned to endogenize the probability of financial distress and examine its effect on the choice of the optimal debt ratio and the optimal ownership structure.

REFERENCES

1. Bliss, R. R., & Flannery, M. J. (2002). Market discipline in the governance of U.S. bank-holding companies: Monitoring vs. influencing. *Review of Finance, 6*(3), 361-396. https://doi.org/10.1023/A:1022021430852
2. Brau, J. C., Francis, B., & Kohers, N. (2003). The choice of IPO versus takeover: Empirical evidence. *The Journal of Business, 76*(4), 583-612. https://doi.org/10.1086/377032
3. Brealey, R. A., & Myers, S. C. (1996). *Principles of corporate finance.* New York, NY: McGraw-Hill.
4. Castillo, R., & Skaperdas, S. (2005). All in the family or public? Law and appropriative costs as determinants of ownership structure. *Economics of Governance, 6*(2), 93-104. https://doi.org/10.1007/s10101-005-0103-4
5. Cole, R. A., & Sokolyk, T. (2018). Debt financing, survival, and growth of start-up firms. *Journal of Corporate Finance, 50,* 609-625. https://doi.org/10.1016/j.jcorpfin.2017.10.013
6. Derek, C., & Riis, C. (1997). Contest success functions: An extension. *Economic Theory, 11,* 201-204. https://doi.org/10.1007/s001990050184
7. Glushkov, D., Khorana, A., Rau, P. R., & Zhang, J. (2018). Why do firms go public through debt instead of equity? *Critical Finance Review, 7*(1), 85-110. https://doi.org/10.1561/104.00000057
8. Jensen, M. C. (1986). Agency costs of free cash flow, corporate finance, and takeovers. *The American Economic Review, 76*(2), 323-329. Retrieved from http://www.jstor.org/stable/1818789
9. Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics, 3*(4), 305-360. https://doi.org/10.1016/0304-405X(76)90026-X
10. Jovanovic, B., & Rousseau, P. L. (2004). *Interest rates and initial public offerings* (Working Paper No. 10298). https://doi.org/10.3386/w10298
11. Kazmierska-Jozwiak, B., Marszałek, J., & Sekuła, P. (2015). Determinants of debt-equity choice-evidence from Poland. *EMAJ: Emerging Markets Journal, 5*(2), 1-8. https://doi.org/10.5195/EMAJ.2015.76
12. Meluzín, T., Zinecker, M., Balcerzak, A. P., & Pietrzak, M. B. (2018). Why do companies stay private? Determinants for IPO candidates to consider in Poland and the Czech Republic. *Eastern European Economics, 56*(6), 471-503. https://doi.org/10.1080/00128775.2018.1496795
13. Modigliani, F., & Miller, M. (1963). Corporate income taxes and the cost of capital: A correction. *American Economic Review, 53*(3), 261-297. https://www.jstor.org/stable/1809167
14. Pagano, M., Panetta, F., & Zingales, L. (1998). Why do companies go public? An empirical analysis. *Journal of Finance February, 53*(1), 27-64. https://doi.org/10.1111/0022-1082.25448
15. Ratih, D. (2019). Equity market timing and capital structure: Evidence on post-IPO firms in Indonesia. *International Journal of Emerging Markets.* Advance online publication. https://doi.org/10.1108/IJOEM-04-2018-0197
16. Skaperdas, S. (1996). Contest success functions. *Economic Theory, 7,* 283-290. https://doi.org/10.1007/BF01213906
17. Tullock, G. (1980). Efficient rent seeking. In J. Buchanan, R. Tollison, & G. Tullock (Eds.), *Toward a theory of rent seeking society* (pp. 97-112). College Station, TX: A&M University Press.
18. Zingales, L. (1995). Insider ownership and the decision to go public. *The Review of Economic Studies, 62*(3), 425-448. https://doi.org/10.2307/2298036