A Theory of Family Firms *

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Abstract

We develop a financial contracting model to analyze the effect of family control on corporate risk-taking. The *ex post* optimal (second best) risk-taking policy maximizes the controlling party's interest and usually fails to internalize those of other claimholders. This may give rise to inefficiency as financiers capitalize the risk-taking policy into financial contracts and, therefore, the *ex ante* optimal (first best) risk-taking has to maximize the total firm value. We show that family control emerges as an optimal mechanism because a family owner's propensity to take on risk features both an equity component (equity ownership stake) and a debt-like component (default-able private benefits). Therefore, the optimal family ownership is an outcome of a trade-off between alleviating over-conservatism and reducing excessive risk-taking. The model generates several novel empirical predictions and policy implications.

Keywords: Family firms, altruism, ownership structure, risk-taking

*Acknowledgment: We are grateful to Renée Adams, Heitor Almeida, Kevin Davis (Sirca Young Researchers Workshop discussant), Ran Duchin, David Feldman, Daniel Ferreira, Richard Holden, Andrew Karolyi, Kai Li, Angie Low, Randall Morck, Vikram Nanda, Nandkumar Nayar (FMA Asia discussant), Marco Pagano, Peter Kien Pham, Albert Tsang (AsianFA discussant), James Vickery, Jun Yang, Alminas Zaldokas, Jason Zein, and seminar participants at the University of New South Wales, AsianFA 2014, FMA Asia 2014 and Sirca Young Researchers Workshop 2014. Pavle Radicevic would also like to thank his supervisor, Ron Masulis, for invaluable advice and Tokyo Foundation for the Ryochi Sasakawa SYLFF Fellowship grant. All errors are our responsibility.

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1 Introduction

Since the seminal work of Berle and Means (1932), one of the primary research questions in corporate finance is to analyze the interaction between ownership and value maximizing corporate policies. The basic unit of the analysis is a diffusively held firm run by a professional manager and financed by outside investors (see for example Jensen and Meckling (1976) and Grossman and Hart (1986)). Yet, the extant evidence on ownership structure shows a widespread global commonality of family ownership in firms, irrespective of the strength of legal protection.[1] While there is a rapidly growing strand of empirical literature on the prevalence of family ownership, recognizing its distinct features and economic significance,[2] theoretical advances on family ownership and its interactions with corporate policies are limited.[3]

In this paper, we develop a financial contracting model of a family firm's external financing and subsequent risk-taking decisions in the presence of agency conflicts between the firm's owner and different classes of outside financiers. After the financing stage, the owner can undertake a non-contractible interim action that may alter the riskiness of the firm's future cash flow. We refer to this action as corporate risk-taking. Ideally, the first best corporate risk-taking should be chosen to maximize the total firm value because in rational expectations equilibrium outside financiers capitalize the owner's risk-taking into

[1]For example, La Porta, Lopez-De-Silanes, and Shleifer (1999) find that family owners on average control about 30% of the largest firms in 27 wealthy countries. Holderness (2009) shows that the fraction of firms owned by families in the U.S. (53%) is similar to that (59%) elsewhere.

[2]For studies examining the presence of family firms around the world see La Porta, Lopez-De-Silanes, and Shleifer (1999), Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2008), and Faccio and Lang (2002). For studies addressing control considerations of family firms see Villalonga and Amit (2009) and Masulis, Pham, and Zein (2011); firm performance see Anderson and Reeb (2003a), Villalonga and Amit (2006), Adams, Almeida, and Ferreira (2009), and Fahlenbrach (2009); leverage see Anderson and Reeb (2003b) and Anderson, Mansi, and Reeb (2003); corporate transparency see Anderson, Duru, and Reeb (2009); informed trading see Anderson, Reeb, and Zhao (2012); and the effects of inheritance law and legal protection on investment see Ellul, Pagano, and Panunzi (2010).

[3]See, e.g., Burkart, Panunzi, and Shleifer (2003), Almeida and Wolfenzon (2006), and Ellul, Pagano, and Panunzi (2010); more on these papers later.

financial contracts. However, after financing is arranged, the moral hazard problem arises as the owner's *ex post* optimal risk-taking maximizes her own utility rather than those of shareholders and creditors. Comparing the family owner's *ex post* optimal corporate risk-taking (second best) with the *ex ante* optimal risk-taking (first best), we are able to quantify the agency cost of external financing. More importantly, we derive the endogenous family ownership concentration that allows the owner to credibly commit to the first best corporate risk-taking.

What determines the optimal family ownership? At the foundation of our model is the altruistic preference of a family owner. One of the first references to this rational characteristic of agents in the economic theory can be traced back to Adam Smith who refers to it as benevolence (Smith (1790)). The altruistic preference is most pronounced between family members and slowly dissipates as we move away toward friends and acquaintances, and ultimately turns to malevolence toward the individuals we dislike (see Coase (1976)).[4] Such preference implies that the owner ties the welfare of the family to that of the firm, and is the primary characteristic emphasized in prior family firm studies.[5]

To model the owner's altruistic preference, we allow the owner to derive utility from retaining the control of her firm, i.e., the family benefits of control. To be precise, the benefits include the non-pecuniary benefits derived from the family's association with the firm.[6] Intuitively, the utility derived based on the control benefits should vanish when the owner loses her control of the firm. Hence, we assume that the family benefits are lost upon default in which creditors take over the firm and its control.

[4]The empirical examination of savings intended for bequest confirms the existence of altruistic concern of parents for their children (see Laitner and Juster (1996)).

[5]For example, Demsetz and Lehn (1985), Burkart, Panunzi, and Shleifer (2003), and Ellul, Pagano, and Panunzi (2010) refer to this preference as the "amenity potential", Anderson and Reeb (2003a) as longer investment horizons, and Anderson, Mansi, and Reeb (2003) and Bertrand and Schoar (2006) as nepotism. We will use terms family's benefits of control and altruistic preferences interchangeably.

[6]Note that this type of benefits is not (directly) at the expense of other claimholders, e.g., minority shareholders. Rather, they are interpreted as a "commitment device"because they are usually lost in bad states (see, e.g., Ross (1977) and Zwiebel (1996)).

In addition to the family benefits, the owner derives utility from receiving dividends proportional to her equity ownership stake. Taken together, these two sources alter the owner's risk preference in the opposite direction. On the one hand, the default-able family benefits discourage the owner's risk-taking incentive as the expected benefits decreases in default probability. On the other hand, the equity ownership stake encourages the owner to take on risk as levered shareholders hold a call option on the firm's asset. Intuitively, these two countervailing forces point out a potential solution to the moral hazard problem: through adjusting her equity ownership stake, the family owner may be able to internalize the interests of minority shareholders and creditors.

How can this goal be achieved? To reduce the agency cost of external financing, it is in the best interest of the owner to find a way to credibly commit her *ex post* risk-taking to the first best efficient outcome. We argue that in this case the owner may use her ownership stake as a credible commitment. Recall that the owner's utility is akin to a"hybrid"security with both equity and a debt-like features. For negligibly low equity stake, the owner's risk preference should be aligned with that of creditors. As we gradually increase the owner's equity stake, the risk taking preference tilts toward that of shareholders due to her cash flow rights.

At a critical level of ownership, her propensity to take on risk may achieve an efficient outcome, in which the interests of minority shareholders and creditors are balanced. That is, the optimal family ownership is derived based on a trade-off between alleviating the agency cost of debt (excessive risk-taking) and reducing the agency cost of equity (severe risk-avoidance). At the optimum, the optimal family ownership concentration ensures that the second best risk-taking implements the first best risk-taking.

The model delivers three novel empirical predictions on the optimal family ownership. We show that the optimal family ownership: (1) increases in the family benefits of control; (2) decreases in financial leverage; and (3) increases in creditor recovery rates. The intuition is simple. First, to implement the first best risk-taking, the owner has to ensure that her equity incentive is optimally chosen relative to her debt-like incentive. If the family's benefits of control increase, her risk preference becomes more aligned with that of creditors. To offset the imbalance, the owner has to hold more inside equity to avoid committing to an excessively conservative risk policy. Secondly, risky debt "levers" up the owner's risk-taking incentive. To keep her promise (to the creditors) that she will not engage in excessive risk-shifting, she has to hold less inside equity to "de-lever" her risk-taking preference. Thirdly, creditors' loss in the default state becomes smaller as their recovery rates become larger. This implies that the agency cost of debt becomes less important relative to the agency cost of equity. Hence, the owner holds higher equity stake to ensure her risk-taking incentive is better aligned with that of shareholders.

In addition, the model generates an interesting empirical prediction for family firms' corporate diversification. For a family firm, corporate risk-taking increases in family ownership because the owner overweights cash-flow incentives as her ownership stake becomes larger.[7] These model predictions appear to be consistent with the existing empirical evidence. For example, Anderson and Reeb (2003b) show that family-controlled firms have higher operational risk. Schmid, Achleitner, Ampenberger, and Kaserer (2014), using a large-scale survey, document higher R&D intensity among family owned firms.

Next, we extend the model to examine the effect of financial constraint on corporate risk-taking. In such a world, the optimal family ownership features a corner solution if the constraint is binding. That is, when the family owner is facing binding financing constraints she will take the value-enhancing risks, because it is incentive compatible to do so, but it falls short of the socially optimal level. This implies that the model predictions noted above are more relevant to financially unconstrained family firms. For financially constrained firms, the optimal family ownership increases in the owner's net worth and decreases in investment

[7]In the model, both family's benefits of control and family ownership stake affect the family owner's risk-taking incentive. Therefore, to test the model prediction, one may need to control for not only a family presence but also the level of family ownership.

costs.

This paper belongs to the vast and expanding academic research on the role of family owners in economic growth. The existing family firm theories build on principal-agent models and assume imperfect investor protection. For example, Burkart, Panunzi, and Shleifer (2003) derive endogenous family ownership based on a trade-off between costly monitoring and alleviating agency conflicts. Almeida and Wolfenzon (2006) propose an"internal capital market"model that rationalizes the pyramidal structure in family business groups. Ellul, Pagano, and Panunzi (2010) examine the effect of inheritance law on family firm investment. They show tighter inheritance law reduces family firms' pledgeable income and, consequently, corporate investment.

Our paper complements the existing theories of family firms in three aspects. First, our paper provides a unified framework with endogenous family ownership and corporate risk-taking policies with stochastic future cash flows. We focus on the effect of family ownership on risk-shifting incentives and derive the optimal family ownership that implements the first best corporate risk-taking. Second, in addition to the conflict of interests between the owner and minority shareholders, we introduce the agency conflict between the family owner and creditors. Third, while the existing family firm models have strong implications for cross-country heterogeneity in family ownership and are quite successful explaining the popularity of family owned firms in countries with relatively weak investor protection, our model generates cross-sectional/industry variation that is also relevant for countries with good investor protection (e.g., the U.S.).[8] Moreover, the model seems to be able to provide a rational explanation on why some firms remain family owned several decades after initial public offering.

Our paper fits into the theoretical literature on shareholder-bondholder conflicts over

[8]As noted before, family firms are not only global phenomena but represent a significant component of U.S. publicly listed firm population. Once private firms are accounted for, which are by definition mostly family owned, their significance becomes much more pronounced.

investment policy. Jensen and Meckling (1976) demonstrate how financial leverage distorts shareholders' preferences toward risk-shifting incentives. Smith and Warner (1979) analyze the role of debt covenants in mitigating shareholder-bondholder conflicts. Green (1984) shows that convertible debt helps alleviate asset substitution problem.[9] Leland (1998) shows that shareholders have incentives to increase the volatility of the firm's assets *ex-post* at the expense of creditors. He further analyzes the role of debt maturity in alleviating shareholders' risk-shifting incentives. Building on Leland (1998), Childs, Mauer, and Ott (2005) find that short-term debt can help resolve under-/over-investment problems. Bhanot and Mello (2006) analyze the inclusion of a credit rating trigger in a debt contract and its effect on a firm's *ex post* risk-taking behavior. Our model adds to the literature by showing that allocating control rights of risk-taking policy to a party whose preference exhibits both equity and debt-like claims has a potential to *costlessly* implement the *ex ante* optimal risk-taking policy.

The paper is related to the literature on the role of large shareholder in corporate diversification. Cronqvist and Fahlenbrach (2009) show that large shareholders make influential impact on corporate policies such as R&D investment. In particular, individual owners are as active as other large investors. Adams, Almeida, and Ferreira (2005) find that stock returns are more volatile for firms run by Founder-CEOs. Fahlenbrach (2009) document that Founder-CEOs invest more into R&D and make considerably more non-diversifying acquisitions than non-Founder-CEOs. Related to the prior discussion on the effect of risk-aversion on corporate risk-taking, Amihud and Lev (1981) find that corporate diversification is less likely when a controlling shareholder is more diversified. Similarly, Faccio, Marchica, and Mura (2011) show that more diversified large shareholders engage in more corporate risk-taking.

The remainder of the paper is organized as follows. Section 2 presents the main model that shows the conflict of interests among the owner and different classes of financiers. In

[9]For related literature on the use of financial derivatives in resolving shareholder-bondholder conflicts see Haugen and Senbet (1981) and Brennan and Kraus (1987).

addition, we solve for the optimal family ownership that allows the owner to credibly commit the *ex post* optimal risk-taking to coincide with the *ex ante* optimal risk-taking. Three model predictions are derived and discussed. Section 3 extend the model to account for financing constraints and its effects on optimal family ownership and corporate risk-taking. Section 4 concludes.

2 The Model

2.1 Economic Environment

Time is discrete and has four dates ($t = 0$, 1, 2, and 3). We consider a firm that is controlled and initially owned by a family. Although the family members may own shares individually, their interests in the firm are aggregated and modelled as that of a representative family owner. The family owner has a unique access to an investment project that requires the firm to purchase an asset. The project produces a future random cash flow $\tilde{X}$ equal to X^S if the project succeeds and $X^F \in [0, X^S)$ if it fails. We denote the difference in project cash flows by $X = X^S - X^F > 0$. The project succeeds with probability p and fails with probability $1 - p$.

At date $t = 0$, the owner raises external funds from outside financiers to acquire the productive asset. We take debt and equity contracts as given.[10] Precisely, financial contracts specify: (1) a zero coupon debt with a face value (repayment) r; and (2) $1 - \theta$ shares of equity entitled to (residual) cash flow rights. The owner retains θ shares and remains in the control of corporate decision making.

[10]We decide to restrict the contracting space to debt and equity contracts that are commonly used in real financial markets rather than solve for an optimal security design problem for two reasons. First, we want to build the model on the conflict of interests between different classes of financiers, i.e., creditors vs. shareholders, when corporate risk-taking decision is made. Second, and perhaps as equally important, given that the model has two states of nature, the contracting space consisting of equity and debt contracts seems to be rich enough. While some of the related literature focuses on the characteristics of the debt contract, we want to show that controlling equity can be a viable alternative solution to the risk shifting problem.

At date $t = 1$, the owner takes an interim action which cannot be contracted upon at the initial financing stage. The action allows the owner to choose $i \in [0, I]$ that affects the project's success probability $p(i)$ and generates an immediate cash flow $\delta(i)$ accruing to all shareholders at date $t = 2$.[11] Alternatively, we may interpret $\delta(i)$ as $p(i)\Delta(i)$. Using this interpretation, we can show that the cash flow in the success state becomes $X^S + \Delta(i)$ while the cash flow in the failure state remains unchanged. This is commonly referred to as the "asset substitution"(or "risk shifting") in the literature. Without loss of generality, we normalize I to 1. Broadly interpreted, the family owner's choice of i models corporate risk-taking. The immediate cash flow $\delta(i)$ can be justified as the cash flow generated by substituting a riskier asset for that of the firm's existing asset or reduction in costs resulting from corporate diversification.

At date t=3, the final cash flow $\tilde{X}$ is realized. With probability $p(i)$, the project succeeds and returns X^S. Proceeds from the project are distributed to all claimholders according to financial contracts. The owner is entitled to a θ proportion of cash flow rights as a shareholder. In addition, to reflect her altruistic preference, we let $\eta > 0$ where η is a parameter capturing the family benefits of control measured in monetary units. Note that, in our model, the altruistic preference of the owner is different from that of non-pecuniary benefits of other blockholders or executives. Of course, the model could easily incorporate other types of private (pecuniary and non-pecuniary) benefits, such as expropriation and reputational concerns, which are general to both family owners and other types of blockholders.[12]

With probability $1 - p(i)$, the project fails and yields X^F. With risk-free borrowing, i.e., $r < X^F$, cash flows are allocated in the same way as in the event of success. However, with

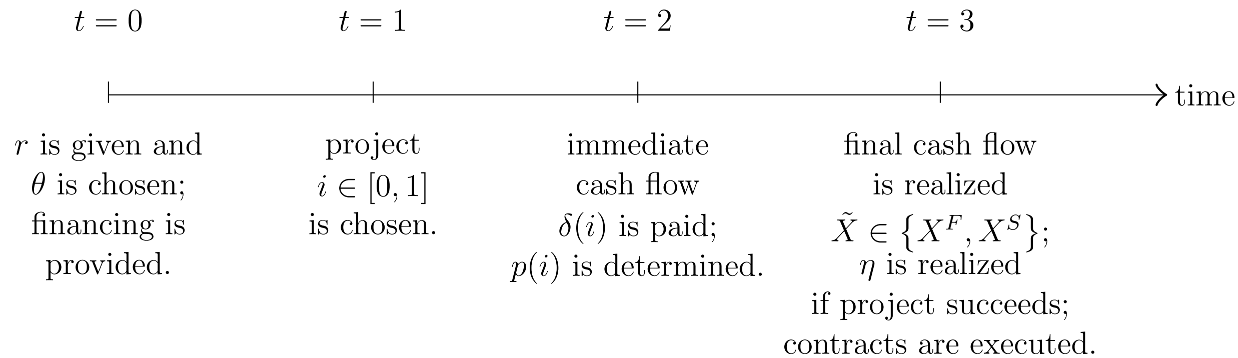
[11]The elapsed time between $t = 1$ and $t = 2$ is not crucial to the model and its solutions.

[12]By blockholders we mean types of shareholders who posses the effective control over corporate policies, such as some types of institutional investors and entrepreneurs who do not have children and do not plan on having a family in the future. Moreover, the timing of portfolio investment could be different for institutional investors, as too frequently they are not present as shareholders when the firm is created. Because the purpose of the analysis is not to focus on the differences between different classes of blockholders for simplicity, and without the loss of generality, we normalize the value of these common pecuniary and non-pecuniary benefits to zero.

risky borrowing, i.e., $r > X^F$, the owner has to relinquish both the control rights and cash flow rights to creditors who take over the firm.[13] Therefore, the owner receives zero cash flow (as do outside shareholders) and foregoes the family's benefits of control.[14]

The timing of financial contracting under risk-taking is summarized in Figure 1 below.

Figure 1: Time Line



Before proceeding with the analysis, we make the following three assumptions to ensure the owner's problem is well-defined. The first assumption summarizes the agents' risk preference and macroeconomic environment. The second assumption describes the project opportunity set. The last assumption, for ease of exposition, specifies an exogenous capital structure of the family firm.

Assumption 1. *Both the family owner and financiers are risk neutral. The owner is not*

[13] There is a strand of empirical literature on how creditors take over control rights of covenants violating firms' corporate policies including investment, leverage, payout, and executive turnover decisions (see, e.g., Chava and Roberts (2008), Roberts and Sufi (2009), Nini, Smith, and Sufi (2012)). Similarly, the existing literature documents pervasive evidence on creditor control in corporate restructuring following technical default or formal bankruptcy proceedings (see, e.g., Gilson (1989), Gilson (1990), Gilson, John, and Lang (1990), Wruck (1990), Gilson and Vetsuypens (1994), James (1995), James (1996), Hotchkiss and Mooradian (1997), and Andrade and Kaplan (1998)).

[14] Here we implicitly assume limited liability of the owner. This assumption may be more appropriate for the case of dispersed shareholders, as in practice the family owner may put up personal guarantees on the loan. In such case the η term could be adjusted upward to account for this personal "bankruptcy" cost. Hence, we interpret the term as the aggregate value of family's benefits.

financially constrained. Financial markets are perfectly competitive, complete, and arbitrage-free. The risk-free rate of return is normalized to zero.

While assumptions about financial markets and risk-free rate are standard, risk neutrality may seem to be a fairly strong restriction. We do this for two reasons. First, we assume risk neutrality for ease of exposition. It is still common to assume risk neutral agents in the financial contracting literature (see Innes (1990), Aghion and Bolton (1992), Dewatripont and Tirole (1994), Hart and Moore (1994)) and, in particular, the theory models of family firms (Burkart, Panunzi, and Shleifer (2003), Almeida and Wolfenzon (2006), and Ellul, Pagano, and Panunzi (2010)). Second, recent evidence in entrepreneurial finance appears to be inconsistent with risk aversion. For example, Robb and Robinson (2014) show that entrepreneurs hold levered equity claims in their start-ups and rely heavily on both outside and inside debt financing even when firms have access to outside equity finance. While the use of outside debt is consistent with risk aversion (see Chen, Miao, and Wang (2010)), we would not expect the entrepreneurs to lever-up on the personal account if they are risk averse.

No financial constraint is another limitation of the main model. Nevertheless, we relax the assumption of unconstrained family firms in Section 3.

Assumption 2. *Corporate risk-taking decreases the success probability of the project and increases the project's immediate cash flow accruing to the shareholders. The project opportunity set exhibits decreasing returns to scale. Precisely,*

1. $p' < 0$ *and* $1 \geq p(0) > p(1) \geq \frac{1}{2}$.
2. $\delta' > 0$.
3. $p'' \leq 0$, $\delta'' \leq 0$ *where at least one condition holds with strict inequality.*

Assumption 2.1 states that by taking on more risk the success probability decreases. This assumption also captures creditors' disincentive to take on more risk as their expected returns are increasing in the success probability. We let the probability of success to be bounded between 1 and $\frac{1}{2}$ because a further decrease in the probability may result in an increase in the variability of the final cash flow.[15] While the results of the model still hold, it becomes difficult to interpret the project choice as corporate risk-taking for $p(i) < \frac{1}{2}$. Assumption 2.2 requires the immediate cash flow to increase as the owner takes on more risk. This assumption represents shareholders' incentive to take on more risk.

Assumption 2.3 imposes a sufficient condition to ensure an interior solution to the owner's optimization problem. Intuitively, we assume that shareholders' benefits of engaging in risk-taking increases at an decreasing rate ($\delta'' \leq 0$) and that the project's success probability decreases at an increasing rate ($p'' \leq 0$). While these conditions may not be necessary, they are consistent with a commonly accepted belief that the investment opportunity sets generally exhibit decreasing returns to scale.[16]

Assumption 3. *Corporate borrowing is exogenous and risky, i.e., and* $X^S > r > X^F$.

To focus on the agency problem associated with corporate risk-taking, we abstract from other frictions, such as the owner's hidden information about the project's quality and hidden effort that may affect the projects success probability. These frictions are shown to be able to rationalize the prevalence of risky debt contracts.[17] Therefore, we model these frictions in reduced-form by assuming an exogenous and risky corporate debt contract. There are other rationales for assuming an exogenous capital structure. For example, it allows us to simplify the analysis and focus on risky borrowing that is an important determinant of corporate risk-taking (we elaborate on this point later). Moreover, it provides a tractable framework to solve for endogenous family ownership and corporate risk-taking policies in closed form

[15] Recall that the variance of a Bernoulli random variable is $p(1-p)$ that is maximized at $p = \frac{1}{2}$.

[16] Morellec (2004) and Miao (2005) model the production function in the same manner.

[17] See, e.g., Townsend (1979), Gale and Hellwig (1985), Innes (1990), Aghion and Bolton (1992), Hart and Moore (1994), Dewatripont and Tirole (1994) and more recent models advanced by DeMarzo and Sannikov (2006) and DeMarzo and Fishman (2007).

expressions.[18]

2.2 Optimal Corporate Risk-Taking

In principle, corporate risk-taking should be chosen to maximize the aggregate value of all securities at date $t = 0$. This is because the financiers in rational expectations equilibrium capitalize the firm's risk-taking decision into financial contracts. However, financial contracts are priced *ex ante* and the non-contractible interim risk-taking decision is made *ex post*. This creates a moral hazard problem because the family owner's *ex post* objective function does not include the interests of outside financiers.

In this section, we analyze the family firm's corporate risk-taking policy under three different scenarios. First, we derive the *ex ante* optimal risk-taking that maximizes the total value of the family firm. Second, we show the conflict of interests between shareholders and creditors when making *ex post* risk-taking choice. Furthermore, we argue that neither shareholder control nor creditor control is socially optimal. Third, we solve for the family owner's *ex post* optimal risk-taking and define the agency cost associated with corporate risk-taking.

At date $t = 0$, the owner's total utility consists of three parts: (1) the expected value of her cash flow rights and the family's benefits of control realized at date = 3; (2) equity capital provided by shareholders; and (3) debt capital supplied by creditors. Therefore the owner's expected utility, V^f, is equal to the proceeds from the sale of securities and family's

[18] Alternatively, we could incorporate endogenous financial leverage decision by introducing the trade-off between tax benefits against financial distress costs. With reasonably calibrated parameter values, one should expect risky borrowing to be optimal. Hence, what is important for the analysis is the existence of risky debt in the capital structure and not the endogenous choice of debt. Indeed, we (numerically) solve the continuous-time version of the model with endogenous debt and discrete choice of risk taking. The results remain unchanged and are available upon request from the authors.

benefits as follows:[19]

$$V^f = \theta\left[\delta(i) + p(i)\left(X^S - r\right)\right] + p(i)\eta. \tag{1}$$

Next, the values of external claims are valued in the rational expectations equilibrium and reflect the net present value of expected future cash flows given the level of risk-taking. Specifically, under Assumption 1, the value of equity capital is equal to the expected value of shareholders' future cash flows, V^E, and the financing provided by creditors is identical to the expected value of their future cash flow, V^D.

$$V^E = (1-\theta)\left[\delta(i) + p(i)\left(X^S - r\right)\right]; \tag{2}$$

and

$$V^D = p(i)r + (1-p(i))X^F = X^F + p(i)(r - X^F). \tag{3}$$

In sum, the owner's total welfare at date $t = 0$ is

$$\begin{aligned} &\underbrace{V^f}_{\textbf{expected value}} + \underbrace{V^E + V^D}_{\textbf{proceeds from external financing}} \\ &= X^F + p(i)(X+\eta) + \delta(i) \\ &= V^F(\textbf{total value of the firm to the family owner}). \end{aligned} \tag{4}$$

[19]The assumption of additional utility to the family owner is not critical per se. Equivalently, we could model disutility to the owner upon default, akin to personal bankruptcy costs, in which case the expected utility is equal to

$$V^f = \theta\left[\delta(i) + p(i)\left(X^S - r\right)\right] - (1-p(i))\eta.$$

It can be easily shown that the first order condition, equation 11, remains unchanged. Since our arguments are based on marginal effects, as we show later, it does not drive our results. This is consistent with the treatment of amenity potential in Burkart, Panunzi, and Shleifer (2003), where the additional benefits (not at the direct expense of other claimholders) incur to family owners as long as she is in control. In our model, the loss of control is associated with default. Therefore, the critical assumption that we make is the defaultability of family's benefits of control and not the additional utility that the family owner derives.

Therefore, at date $t = 0$, maximizing the owner's total welfare is equivalent to maximizing the total value of the firm *inclusive* of the family's benefits.[20] Let i^F denote the corporate risk-taking that maximizes the total firm value:[21]

$$i^F = \arg\max_{i \in [0,1]} \delta(i) + X^F + p(i)(X + \eta). \tag{5}$$

Given Assumption 2.3, the total firm value is strictly concave in project choice i.[22] Hence, we need to solve the following first order condition for i^F:

$$\delta'(i^F) + p'(i^F)(X + \eta) = 0. \tag{6}$$

If shareholders are in control of corporate risk-taking, they will choose the project (i^E) that maximizes the equity value as follows:

$$i^E = \arg\max_{i \in [0,1]} \delta(i) + p(i)\left(X^S - r\right). \tag{7}$$

The first order condition for equity-value maximizing project choice is given by

$$\delta'(i^E) + p'(i^E)(X^S - r) = 0. \tag{8}$$

Instead if creditors are in control, they will make corporate risk-taking decision (i^D) to maximize the value of debt. Hence,

$$i^D = \arg\max_{i \in [0,1]} X^F + p(i)(r - X^F). \tag{9}$$

[20]This comes from additively separable property of the value function.

[21]We also use the terms *ex ante* optimal risk-taking and first best risk-taking interchangeably throughout the paper.

[22]Strict concavity property holds for almost all objective functions in the paper. Unless specified otherwise, we always solve the first order conditions throughout the paper.

The first order condition is

$$p'(i^D)(r - X^F) < 0. \tag{10}$$

It is evident that, as the success probability $p(i)$ decreases in risk-taking, creditors will prefer not to take on any risk, i.e., $i^D = 0$.

To sum up, the *ex ante* optimal risk-taking decision is based on a trade-off between receiving the immediate cash flow (at date $t = 2$) and the expected loss of the firm's future profit at date $t = 3$. However, the *ex post* optimal risk-taking decisions of the outside financiers are different from the first best efficient policy. While shareholders benefit from the date-2 cash flow associated with taking on more risk, they share the expected loss of the firm's future profit at date $t = 3$ with creditors. On the contrary, creditors do not participate in the profit sharing at date $t = 2$ but suffer the expected loss of the firm's future cash flow at date $t = 3$. In sum, the value of equity (debt) is more convex (concave) in future cash flows than the total firm value. Therefore, shareholders (creditors) are more (less) incentivized to take on risk. This in turn leads to a conflicts of interest between the respective financiers in terms of risk-taking policy. We summarize these results in the following proposition.

Proposition 1. *Assume i^F is an interior solution. When deciding the corporate risk-taking at date $t = 1$,*

1. *shareholders take on more risk than the ex ante optimal level, i.e., $i^E > i^F$.*
2. *creditors take on less risk than the ex ante optimal level, i.e., $i^D < i^F$.*

Proof. From equation (6) we know that $\delta'(i^F) = -p'(i^F)(X + \eta)$. Evaluating shareholders' first order condition at i^F, we obtain

$$\begin{aligned}\delta'(i^F) + p'(i^F)(X^S - r) &= p'(i^F)(X^S - r - X - \eta) \\ &= p'(i^F)(X^F - r - \eta) \\ &> 0.\end{aligned}$$

It is evident that i^F is suboptimal for shareholders. The above equality implies that, evaluated the first best risk-taking i^F, shareholders' net marginal benefit of taking on risk is positive. Given that shareholders' objective function is strictly concave in risk-taking i, we prove that $i^E > i^F$.

Analogously, we evaluate creditors' first order condition at i^F and obtain

$$p'(i^F)(r - X^F) < 0.$$

As $p'' \leq 0$, a further decrease in risk-taking helps reduce creditors' marginal expected loss. $\square$

Last, we solve for the family owner's *ex post* risk-taking decision i^f. Before proceeding further we define the concept of family firm.

Definition 1. *Firm is considered to be a family firm if* $\theta \in (0, 1]$, *if the owner has the effective control over the firm's corporate policies and enjoys family's benefits of control* $\eta > 0$.

This definition states that family owner must hold at least a positive stake if the firm is to be family controlled. While the commonly accepted ownership level for family control is, depending on the study, anything between $5 - 20\%$ of voting rights, for the purposes of the modeling we only require the family ownership to be at least positive. While we do not distinguish between voting and cash-flow stakes in our model, we assume that they are positively correlated, which is consistent with the empirical evidence (see La Porta, Lopez-De-Silanes, and Shleifer (1999)).

Next, recall that the owner's utility at date $t = 1$ is

$$V^f = \theta \left[\delta(i) + p(i) \left(X^S - r\right)\right] + p(i)\eta.$$

Note that the owner's value function includes both an equity component because of her shareholding and a debt-like component because her private benefits of control are lost in the failure state.

The first order condition for the owner's problem is

$$\theta \left[\delta'(i^f) + p'(i^f) \left(X^S - r + \frac{\eta}{\theta} \right) \right] = 0. \tag{11}$$

Given $\theta > 0$ for family ownership and simplifying, we get

$$\underbrace{\delta'(i^f) + p'(i^f) \left(X^S - r \right)}_{\text{equity incentive}} + \underbrace{p'(i^f) \frac{\eta}{\theta}}_{\text{debt-like incentive}} = 0. \tag{12}$$

Inherited from the value function, the owner's marginal value of taking on risk features an equity incentive and a debt-like incentive as shown in equation (12). The agency cost of family-controlled corporate risk-taking is defined as the value reduction in the *ex ante* value of the firm. Hence,

$$\begin{aligned} AC(\theta) &= X^F + p(i^F)(X + \eta) + \delta(i^F) - \left(X^F + p(i^f(\theta))(X + \eta) + \delta(i^f(\theta)) \right) \\ &= \left(p(i^F) - p(i^f(\theta)) \right)(X + \eta) + \left(\delta(i^F) - \delta(i^f(\theta)) \right) \geq 0. \end{aligned} \tag{13}$$

The last (weak) inequality follows from the definitions of i^F and i^f. In the following section, we elaborate on how the family ownership can be used to alleviate the agency cost.

2.3 Optimal Family Ownership

Ideally, if the owner would be able to credibly commit to the *ex ante* optimal risk-taking, i.e., $i^f = i^F$, she could achieve the first-best outcome. A casual look at the owner's first order condition (equation (12)) suggest that i^f is a function of the family ownership θ. More important, an increase (a decrease) in θ tends to amplify (attenuate) her equity incentive relative to her debt-like incentive. We state this intuition formally in the following proposition.[23]

[23]The results in Proposition 2 is consistent with the empirical evidence documented in Anderson and Reeb (2003b).

Proposition 2. *Assume sufficient regularity conditions on p and δ. The owner's equity stake encourages corporate risk-taking, i.e.,* $\dfrac{\partial i^f(\theta)}{\partial\theta} > 0$*. Moreover, there exists a* $\theta^* \in (0,1]$ *such that* $i^f(\theta^*) = i^F$*.*

Proof. As p and δ are assumed to satisfy sufficient regularity conditions, we obtain that i^f is continuous in θ. Note that equation (12) holds for all $\theta \in (0,1]$, it should also hold once we take the first derivative of both sides with respect to θ:

$$\left(\delta''(i^f) + p''(i^f)\left(X^S - r\right) + p''(i^f)\frac{\eta}{\theta}\right)\frac{\partial i^f(\theta)}{\partial\theta} + p'(i^f)\eta\frac{-1}{\theta^2} = 0.$$

Rearranging yields,

$$\underbrace{\left(\delta''(i^f) + p''(i^f)\left(X^S - r\right) + p''(i^f)\frac{\eta}{\theta}\right)}_{<0}\frac{\partial i^f(\theta)}{\partial\theta} = \underbrace{p'(i^f)\eta\frac{1}{\theta^2}}_{<0}.$$

It is evident that both the first term (in the parentheses) of the left side of the equation and the right side of the equation are negative. Therefore, we prove that $\dfrac{\partial i^f(\theta)}{\partial\theta} > 0$.

Next, using similar derivations as in Proposition 1, it can be readily shown that $i^f(0) = 0$ and $i^f(1) > i^F$.[24] Given continuity, we can immediately deduce that there exists a $\theta^* \in (0,1]$ so that $i^f(\theta^*) = i^F$ by the Intermediate Value Theorem. □

Proposition 2 shows that, with a deliberately designed family ownership at date $t = 0$, the owner is able to credibly commit her *ex post* corporate risk-taking decision to being *ex ante* optimal.[25] That is, it is always in the best interest of the family owner to implement the

[24] The proof is skipped for brevity but available upon request.

[25] It is worth noting that there are three alternative mechanisms that could implement the *ex ante* optimal risk-taking policy. For example, the owner can write a debt contract with tight covenants that allocates the control right of the excessively risky project to creditors (see Smith and Warner (1979)). However, we argue that tight covenants are not a costless substitute for optimal family ownership because transferring some control rights to creditors may reduce the family's benefits of control. Next, the owner may issue a convertible debt to alleviate agency costs of debt(see Green (1984)). Yet, convertibility may increase the likelihood of losing control as the converted investors (or their delegated representative) may seek to challenge the owner

first best level of risk-taking. We state the optimal family ownership in the next proposition.

Proposition 3. *The optimal family ownership that implements the ex ante optimal corporate risk-taking is*

$$\theta^* = \frac{p'(i^F)\eta}{p'(i^F)\eta + p'(i^F)(r - X^F)} = \frac{\eta}{\eta + r - X^F} \in (0,1). \tag{14}$$

Proof. Equation (14) follows immediately from substituting i^F into equation (12) for i^f and solving for θ^*. □

The following corollary summarizes the comparative statics on the optimal family ownership.

Corollary 1. *The optimal family ownership increases in altruistic preference η, decreases in leverage r, and increases in debt recovery X^F.*

Proof.

$$\frac{\partial\theta^*}{\partial\eta} = \frac{1}{\eta + r - X^F}\left(1 - \frac{\eta}{\eta + r - X^F}\right) = \frac{1}{\eta + r - X^F}(1 - \theta^*) > 0, \tag{15}$$

$$\frac{\partial\theta^*}{\partial r} = -\frac{\eta}{(\eta + r - X^F)^2} = -\frac{\theta^*}{\eta + r - X^F} < 0, \tag{16}$$

and

$$\frac{\partial\theta^*}{\partial X^F} = \frac{\eta}{(\eta + r - X^F)^2} = \frac{\theta^*}{\eta + r - X^F} > 0. \tag{17}$$

□

for control rights. The empirical evidence would also suggest that convertible debt is not a popular form of financing (see Hovakimian, Opler, and Titman (2001) and Rauh and Sufi (2010)). Last, Myers (1977) notes that if the debt matures before cash flows from the project are realized, risk shifting problem disappears. However, short maturity is costly because it transfers the control from family owner to debtholders, and as we shown will not imply the first best. Moreover, in the cases where the debt is rolled over family owners face a substantial floatation (issuance) costs.

2.4 Discussion of Results

The intuition underlying the optimal family ownership is simple and relies on the default-able family's benefits. In contrast to non-controlling minority shareholders, the family owner derives utility from two sources: (1) equity stake (cash flow rights) and (2) controlling the firm (control rights). While the former incentivizes the owner to take on risk as a shareholder, the latter is subject to default risk and tilts her risk-taking preference towards that of creditors. Taken together, the family owner's risk-taking incentive is a mix of incentives of both shareholders and creditors. Further, her risk-taking preference depends crucially upon her equity ownership *relative to* her default-able family's benefits of control.

Keeping family's benefits of control fixed, the owner can credibly commit to "de-levering" her *ex post* risk-taking incentive by lowering her equity stake in the firm. Rational creditors capitalize the commitment into the debt contract through offering favorable borrowing terms, e.g., an increased value of debt (a reduced cost of debt) in the model. Formally, the credit spread s in our model can be defined as

$$s = \frac{r}{p(i^f(\theta))r + (1 - p(i^f(\theta)))X^F} - 1. \tag{18}$$

As θ increases, the owner starts to take on more risk, i.e., i increases. Hence, the market value of the debt, i.e., the denominator of the first term on the right side, decreases and the credit spread increases.

Nevertheless, reducing the owner's equity stake is a double-edged sword. Minority shareholders' interests are expropriated by the owner when she controls the firm with disproportionally low equity. In the model, with sufficiently low equity stake the family owner becomes excessively conservative and may pass up value-enhancing corporate risk-taking opportunities, such as investments in R&D or other innovative activities.[26] Rational shareholders

[26]See, e.g., La Porta, Lopez-De-Silanes, Shleifer, and Vishny (2002) and Burkart, Panunzi, and Shleifer (2003) for analyzing other types of agency conflicts between controlling shareholders and minority share-

price this "over-conservatism"into the value of equity during the offering process. To avert excess conservatism and reduce cost of equity capital, the owner has to hold sufficiently high inside equity. Taken together, the optimal family ownership arises from a trade-off between reducing excessive risk-taking (reducing cost of debt capital) and alleviating conservative risk-taking policy (reducing cost of equity capital).

To see how the optimal family ownership is determined in the equilibrium, we start by analyzing the owner's risk-taking policy. At date $t = 1$ when the corporate risk-taking decision is made, the owner holds θ shares of equity and one unit of family's benefits. It is worthwhile to note that the owner's marginal propensity to taking on risk is not going to change if we rescale her utility by a factor of $\frac{1}{\theta}$.[27] That is, the owner's risk-taking choice remains unchanged if she holds all equity and $\frac{1}{\theta}$ units of family's benefits. At the optimum, we have to equate the owner' risk-taking choice to the *ex ante* optimal risk-taking policy, i.e., $i^f = i^F$. Hence, we deduce that

$$\underbrace{\delta'(i^F) + p'(i^F)\left(X^S - r\right)}_{\textbf{equity incentive}} + p'(i^F)\eta \times \frac{1}{\theta} = \underbrace{\delta'(i^F) + p'(i^F)\left(X^S - r\right)}_{\textbf{equity incentive}} + \left[p'(i^F)\eta + p'(i^F)(r - X^F)\right].$$

Rescaling the owner's marginals allows us to cancel out the marginal propensity to taking on risk due to equity incentive on both sides of the equation. Hence,

$$\underbrace{p'(i^F)\eta}_{\textbf{debt-like incentive}} \times \frac{1}{\theta^*} = \underbrace{p'(i^F)\eta + p'(i^F)(r - X^F).}_{\textbf{debt incentive}} \tag{19}$$

In equation (19), the first term on the left side is the owner's *ex post* marginal bankruptcy cost and the term on the right side is the firm's *ex ante* bankruptcy cost. The difference is caused by the fact that the owner does not account for creditors' loss when making *ex post*

holders.

[27] Precisely, this argument can be seen from comparing equation (11) with (12).

corporate risk-taking decision. To eliminate the moral hazard, the owner has to equate her marginal bankruptcy loss to that of the firm. Equation (19) shows that she can achieve that through dividing her marginal loss by the optimally designed family ownership θ^*. Thus, the owner's utility (derived from her equity stake and family's benefits of control) can be interpreted as a claim to a hybrid security that can be designed such that the family owner commits to the first best risk-taking policy.

There are several implications we can draw from the optimal family ownership derived in Proposition 3. First, for risky borrowing, $r > X^F$, 100% family ownership can never be optimal, i.e., levered private family firms cannot implement the socially optimal risk-taking policy. Second, divergence between control and cash flow rights (control wedge) may not necessarily be suboptimal in the presence of altruistic preferences.[28] However, the model remains silent on the mechanism of implementation, e.g., dual-class structure, pyramidal structure, cross holdings, or disproportionate representation of the board.[29]

The comparative statics on the optimal family ownership in Corollary 1 deliver three novel empirical predictions. First, family ownership increases in the altruistic preference of the family owner η, e.g., amenity potential. The intuition is that high family's benefits of controls can be interpreted as greater commitment to reducing risk-shifting. Technically, since higher family's benefits increase the concavity of her preference (higher loss upon default), she ought to make her preference more convex in cash flow by holding more equity. While the existing family firm literature links the relation between family ownership and

[28]Note that we assume that pecuniary benefits of control are zero, implying that potential negative consequences of concentrated ownership are ignored. However, we wish to focus on the distinguishing feature of family ownership as argued by the literature and point out that altruistic preferences per se have a positive effect on social welfare. In the countries with good legal protection, such as U.S., the consumption of pecuniary private benefits is strictly positive but unlikely to be significant (see Adams and Ferreira (2008)). Our purpose is not to re-examine these issues, as they have been already addressed in the previously mentioned theory models of family firms.

[29]We also abstract away from succession problem, but this could be easily incorporated in the spirit of Ellul, Pagano, and Panunzi (2010). The consequence of presence of additional non-controlling blockholder is that controlling heir would have to sell a lower fraction of the firm to outsider in order for the risk-taking to reach the first-best level.

family's benefits of control,[30] quantitative guidance with solid theoretical foundation would benefit future empirical research. To the best of our knowledge, this paper is the first to show a positive relation between family ownership and amenity potential.

Relatedly, this prediction implies that the control wedge should decrease in amenity potential. The prediction appears to be counterintuitive because private benefits, together with frictions such as risk aversion and/or financial constrain, should give rise to control wedge. However, the positive relation is derived based on analyses of all equity financed family firms and does not reflect the conflict of interests between shareholders and creditors. One the contrary, our model predicts that family ownership (cash flow rights) increases in amenity potential. As a consequence, the control wedge becomes narrowed as amenity potential increases. Admittedly, our prediction on the negative relation between control wedge and amenity potential is expected to be attenuated when the family owners are risk averse and/or face financial constraint.[31]

Second, the model predicts an inverse relation between corporate borrowing, r, and family ownership.[32] While financial leverage is exogenously set in the model, the inverse relation between two holds regardless of the level of financial leverage. The underlying rationale for this relations is financial leverage amplifies the owner's risk-taking incentive as a levered shareholder. Therefore, the owner of a high-levered firm should lower insider equity stake.[33]

Third, family ownership increases in debt recovery, X^F. Intuitively, excessive risk-taking becomes marginally less costly to the firm when creditors' can recover a higher proportion of their initial investment. Therefore, the owner should tilt her risk-taking preference towards that of shareholders by holding greater inside ownership.

[30] See, e.g., Demsetz and Lehn (1985) posit that amenity potential is more prevalent in some industries dominated by family ownership, while Bertrand and Schoar (2006) argue that family owners may find it difficult to disassociate business from family matters due to nepotism.

[31] We extend our model and study the effect of financial constraint in the next section.

[32] This is consistent with the observation that family firms tend to be underlevered (see Strebulaev and Yang (2013)).

[33] As previously noted, we also solve the continuous-time version with endogenous debt and the negative relationship between leverage and ownership still holds in this setting.

2.5 An Example

To gain further insight of model predictions, we present a parametrized model with specific functions that capture the effects of risk-taking on the success probability and immediate cash flow. Precisely, we let

$$p(i) = 1 - \frac{1}{2}i^2$$

and

$$\delta(i) = \frac{X+\eta}{2}i$$

for all $i \in [0,1]$. We need to check whether the conditions assumed in Assumptions 2 hold. It is evident that $p' = -i < 0, p'' = -1 < 0, \delta' = \frac{X+\eta}{2} > 0$ and $\delta'' = 0$. Moreover, $1 \geq p(i) \geq \frac{1}{2}$ for all $i \in [0,1]$.

The first order condition for the *ex ante* optimal project risk decision is

$$-i^F(X+\eta) + \frac{1}{2}(X+\eta) = 0$$

and therefore $i^F = \dfrac{1}{2}$. The first order condition for the debt value maximizing choice is

$$-i^D(r - X^F) < 0,$$

implying a corner solution, i.e., $i^D = 0 < i^F$. The first order condition for equity value maximizing policy is

$$-i^E(X^S - r) + \frac{1}{2}(X+\eta) = 0$$

and hence $i^E = \dfrac{1}{2}\dfrac{X+\eta}{X^S - r} > i^F$. Consistent with the general model, this example shows that shareholders prefer more risk-taking and creditors prefer less risk-taking than the *ex ante* optimal risk-taking policy.

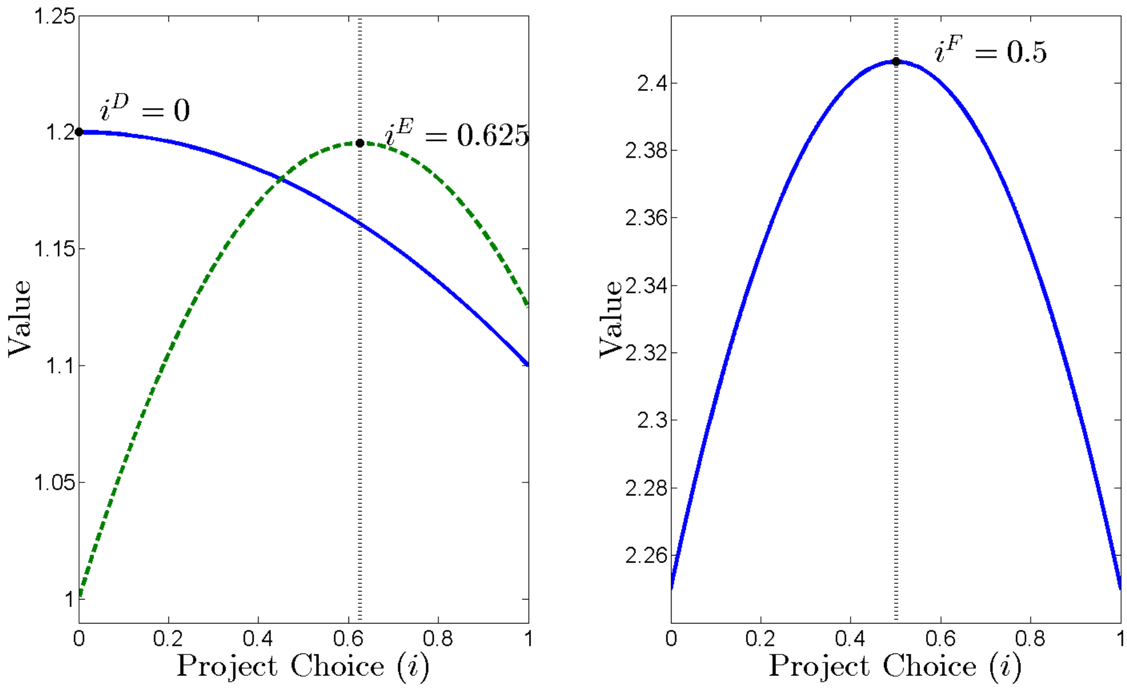
Next, we solve for the owner's *ex post* risk-taking policy for an arbitrary θ. The first order condition for maximizing the owner's utility is

$$-i^f\left(X^S - r + \frac{\eta}{\theta}\right) + \frac{1}{2}(X+\eta) = 0,$$

implying $i^f(\theta) = \frac{1}{2}\frac{X+\eta}{X^S - r + \frac{\eta}{\theta}}$. It is easy to verify that: (1) $\lim_{\theta\to 0} i^f(\theta) = 0$; (2) $i^f(1) = \frac{1}{2}\frac{X+\eta}{X^S - r + \eta} > i^F$; and (3) $i^f(\theta)$ is continuous in θ on $(0,1]$. Therefore, the optimal family ownership results in $i^f(\theta^*) = i^F$. Solving for θ^*, we obtain that $\theta^* = \frac{\eta}{\eta + r - X^F}$. This example shows that the optimal family ownership does not depend on the specific functional forms of the success probability and immediate cash flow, confirming the optimal family ownership is derived in the general model.

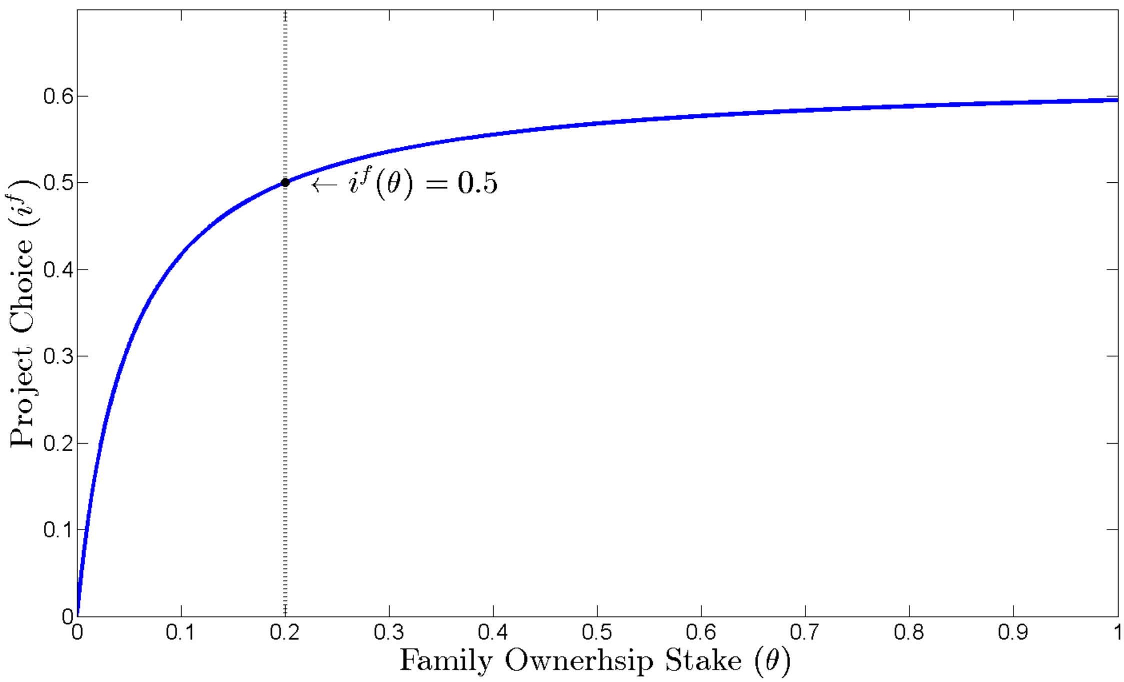
In the following, we set $X^F = 1$, $X^S = 2.2$, $r = 1.2$, and $\eta = 0.05$ and plot the values of financial claims as functions of risk-taking, i.e., project choice (i), in Figure 2. The market values of debt and outside equity as functions of project choice are plotted in the left panel and the total value of the firm, inclusive of family benefits, in the right panel. The plots show that the debt-value-maximizing risk-take policy is $i^D = 0$, the equity-value-maximizing risk-taking policy is $i^E = 0.625$, and the total firm-value-maximizing risk-taking policy is $i^F = 0.5$. Consistent with the results stated in Proposition 1, the optimal risk-taking policies demonstrate that creditors (shareholders) are more conservative (aggressive) in taking on risk than the total welfare maximizer.

Figure 2: The values of financial claims as functions of risk-taking. The market values of debt and outside equity as functions of project choice are plotted in the left panel and the total value of the firm, inclusive of family benefits, in the right panel. $X^F = 1$, $X^S = 2.2$, $r = 1.2$ and $\eta = 0.05$.



Next, in Figure 3 we plot the family owner's optimal risk-taking decision as a function of her family's ownership stake.

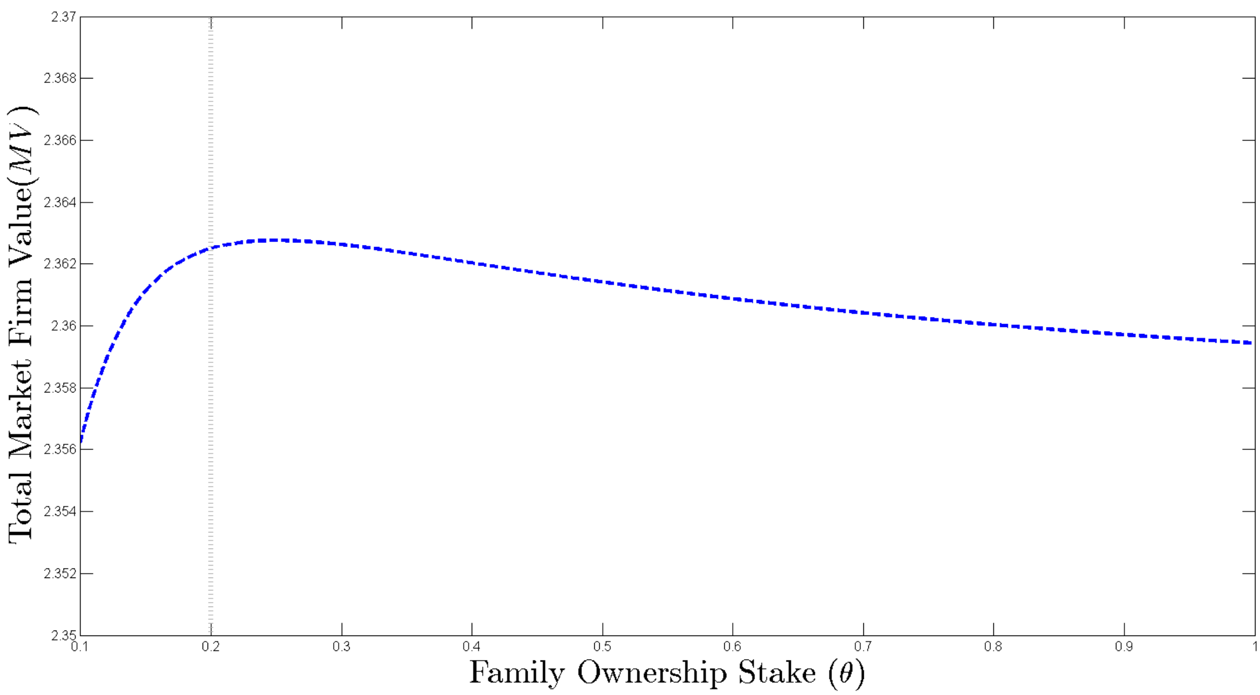
Figure 3: The owner's optimal risk-taking as a function of family ownership. $X^F = 1$, $X^S = 2.2$, $r = 1.2$, and $\eta = 0.05$.



There are two worthwhile observations in the figure. First, we find that the owner's optimal risk-taking (i^f) is continuous and increases in her family's ownership stake. The continuity and monotonicity ensure that there exists a unique family ownership stake that maximizes the firm's total welfare. Second, the optimal ownership level is found at $\theta = 20\%$ where the owner's risk-taking decision $i^f(20\%)$ coincides with the first best risk-taking (i^F). These findings together provide an illustrative example supporting the results shown in Propositions 2 and 3.

Last, we proceed to analyze the effect of family ownership on the market value of the firm. To this end, we plot the total market value of the firm, excluding the family's benefits of control, as a function of family ownership because private benefits are not valued by outside investors.

Figure 4: The total market value of the firm as a function of family ownership. $X^F = 1$, $X^S = 2.2$, $r = 1.2$, and $\eta = 0.05$.



We find that the market value of the firm first increases in family ownership stake and then starts to decline as ownership increases further. The non-linearity, in particular the hump sharped curve, documented in the figure is consistent with the empirical evidence in Anderson and Reeb (2003a) who find that firm performance increases up to an approximately 30% of ownership and then it declines as family ownership increases.[34]

[34] Note that the optimal family ownership $\theta = 20\%$ maximizes the total welfare including the values of marketed claims and the family benefits. Figure 3 shows that the level of family ownership that maximizes the total market value, excluding the family's private benefits, is close to 30%.

3 Extension: Financial Constraint

In Section 2, we impose some structure on the model. For example, we consider the family owner to have "deep pockets"and be risk neutral. As standard in the literature, these modelling choices are made primarily for ease of exposition and delivering baseline intuition. While the assumption of risk neutrality can be justified by recent empirical evidence, the assumption of financing constraint may be somewhat restrictive for modelling family owners and family firms in real financial markets. In this section, we intend to provide intuition about the effects of relaxing this restriction on the model predictions.

We consider a family owner with limited net worth A. To undertake the project at date $t = 0$, an initial investment $K > A$ needs to be financed. Hence, the owner's external financing has to satisfy the following financial/budget constraint

$$\delta(i) + X^F + p(i)(X + \eta) - \theta \left[\delta(i) + p(i)(X^S - r)\right] - p(i)\eta \geq K - A, \tag{20}$$

where the left side is the total firm value less the owner's utility (i.e., the sum of equity and debt values) and the right side is the shortfall in capital that requires external financing.

Taking the first derivative (with respect to θ) of the left side of the inequality and recognizing that $i = i^f(\theta)$, we obtain

$$\left(\delta'(i^f(\theta)) + p'(i^f(\theta))(X + \eta)\right) \frac{\partial i^f(\theta)}{\partial \theta} - \left[\delta(i^f(\theta)) + p(i^f(\theta))(X^S - r)\right] - (\cdots).$$

By the Envelope Theorem, we can readily show that the omitted terms $(\cdots)$ are zero. Next, we make the following assumption to simplify the analysis.

Assumption 4. *The sum of the equilibrium values of debt and equity, i.e., the amount of external financing, decreases in the owner's family ownership. That is,*

$$-\left[\delta(i^f(\theta)) + p(i^f(\theta))(X^S - r)\right] + \left(\delta'(i^f(\theta)) + p'(i^f(\theta))(X + \eta)\right) \frac{\partial i^f(\theta)}{\partial \theta} < 0.$$

In the model, the owner's inside equity stake affects the amount of external financing in two ways. First, fixing corporate risk-taking i, her insider equity stake decreases the amount of external financing through selling less shares to the outsiders. We call this the first (order) effect. Second, family ownership affects the owner's risk-taking incentive that is capitalized in the value of equity and debt contracts. We term this the second (order) effect. While the first order effect is always negative, it is hard to pin down the direction of the second order effect.

Assumption 4 states that the first order effect always dominates. Hence, there exists a unique upper bound of family ownership $\overline{\theta} \equiv \overline{\theta}(K, A)$ such that the financial constraint is always satisfied if

$$\theta \leq \overline{\theta}; \tag{21}$$

otherwise the constraint is breached. It is evident that $\overline{\theta}$ increases in A and decreases in K. Note that Assumption 4 greatly simplifies the analysis without imposing too strong of a restriction on the model. Intuitively, the assumption indicates that the owner has to sell more equity $(1 - \theta)$ the greater the initial investment K and the lower the net worth A.

The owner's goal is to find an optimal family ownership that implements i^F at date $t = 1$. Recall that the optimal family ownership (without the financial constraint) in Section 2 is denoted by θ^*. Now consider two cases. In the first case,

$$\theta^* \leq \overline{\theta}.$$

In such a case, if the owner decides to hold θ^* shares of equity at date $t = 0$, then she will be incentivized to choose $i^f(\theta^*) = i^F$ at date $t = 1$. Rational financiers correctly anticipate the owner's incentive compatible risk-taking and price the equity and debt contracts accordingly. This suggests that the financial constraint (21) is satisfied and external financing is provided. Therefore, we show the existence of such an equilibrium. Put differently, we solve a relaxed problem by ignoring the financial constraint and then verify the resulted optimal family ownership indeed satisfies the constraint.

Denote the optimal family ownership under financial constraint by $\tilde{\theta}$. We obtain that

$$\tilde{\theta} = \theta^*, \quad \text{if} \quad \theta^* \leq \overline{\theta}.$$

In the other case, we have

$$\theta^* > \overline{\theta}.$$

It is obvious that the owner is not able to implement the *ex ante* optimal risk-taking any longer. If the owner's date 0 total welfare is concave in θ and takes its global maximum at $\theta = \theta^*$, then it is optimal for the owner to choose a largest possible θ, i.e., a corner solution at $\theta = \overline{\theta}$. Taken together, the discussion suggests the following proposition of the optimal family ownership with (potentially binding) financial constraint.

Proposition 4. *Suppose the family owner has limited net worth A and undertaking the project at date $t = 0$ requires an initial investment $K > A$. Let θ^* be the optimal family ownership in the absence of financial constraint and $\overline{\theta}$ be the largest family ownership that satisfies the financial constraint (20). The optimal family ownership $\tilde{\theta}$ in the presence of financial constraint is*

$$\tilde{\theta} = \min\left(\theta^*, \overline{\theta}\right).$$

Proof. The discussion prior to the proposition proves the first case ($\theta^* \leq \overline{\theta}$). See the appendix for the proof of the second case ($\theta^* > \overline{\theta}$). □

The above analysis shows that the model predictions derived in Section 2 are more relevant for financially unconstrained family firms, e.g., large, old, and dividend-paying family firms; and less relevant for financially constrained family firms, e.g., small, young, and non-dividend-paying family firms, controlling for family firms' risk-taking opportunity sets.

Equally important, the analysis predicts that the owner's family ownership increases in her net worth and decreases in investment costs if she is financially constrained.[35]

In addition to empirical predictions, the model has policy implications. The unconstrained equilibrium suggests that family owners are naturally inclined to undertake the first best level of risk-taking. However, when for exogenous reason the owner is facing binding financing constraint this social optimum is unattainable. More precisely, the level of risk taking would fall short of optimal. Given the importance of family firms on the aggregate economic level, regulators could look at ways to ease such impediments to underlying economic growth potential.

4 Conclusion

This paper sheds new light on rudimentary questions about family firms: Why does family control arise as an optimal mechanism of corporate control for a large proportion of firms? Why does family-controlled firms prevail in countries with strong investor protection, where the family ownership is thought to be a costless substitute for large shareholder monitoring? What is the economic significance of family firms as a distinct organizational form? We provide answers to these questions by utilizing and focusing on a unique feature of a family owner - the altruistic preference of the owner towards her family - which we model as default-able family's benefits of control. Incorporating the owner's altruistic preference into a financial contracting model with non-contractible corporate risk-taking, we show that family control with optimally designed family ownership stake may provide a solution to align the interests of different classes of financiers.

Consistent with the empirical evidence, the family owner is assumed to be in control of the

[35]The binding level is endogenous in our model. For a given investment outlay, family owners with higher altruistic preference are more likely to be a subject to a binding financial constraint. Because of this characteristic, our model is consistent with a notion that control wedge increases with non-pecuniary private benefits.

firm and is entitled to residual cash flow rights as a shareholder. As the family benefits are lost upon default, the owner's propensity to taking on risk exhibits both a debt-like and an equity features. Optimal family ownership endogenously emerges at the point that balances these two opposing incentives. Hence, with the optimally designed family ownership, akin to a hybrid security, the owner is able to credibly commit the non-contractible risk-taking to the first-best efficient outcome. The model provides a theoretical support for the optimality of divergence voting and cash flow right, although it is silent on the method of implementation.

We provide several novel empirical predictions and show that the optimal family ownership depends on three characteristics. The family's ownership stake is larger (1) the greater the owner's family benefits of control are; (2) the lower the firm's financial leverage is; and (3) the higher the creditors' recovery rates are. Moreover, the model predicts that a family firm's corporate risk-taking is increasing in the owner's equity stake. Furthermore, we hypothesize that in the cross-section the corporate risk-taking increases in family ownership, ceteris paribus.

We extend our model to allow for binding financing constraint. With limited net worth, the family owner is forced to raise external financing. This sets a upper bound of the family ownership stake. If the upper bound turns out to be lower than the optimal ownership stake, then the owner will become constrained and unable to implement the first best risk-taking policy. As family firms form substantial part of the aggregate economy and given the deficiency in governmental policies specifically targeted at family firms, our model seeks to emphasize the importance of family's risk-taking tendencies and showcase possible causes for market failure.

The results have strong policy implications and imply that it is important to reduce the reliance of family business on external finance, by strengthening the capital base and by improving profitability, and by relaxing financing constraints. While this requires a bigger view of things, some of the most apparent regulatory changes could for example include establishment of grant and training schemes, tax credits to providers of capital and extending the duration of patent/innovation rights. As the current research generally agrees that family firms take on long-term perspective on their investments, easement of financing constraints would create a strong foundation for the economy in the long-run. In sum, our results highlight a need for a policy shift as family firms are under-represented when growth-stimulating policies are being formulated.

It is worthwhile noting that we abstract from the succession problem, the monitoring role, and the control-enhancing mechanisms of family firms that have been investigated in the existing theoretical models on family firms. Rather, we stress on the important roles of financial leverage and risk-taking in determining family ownership structure using a quantitative and tractable discrete-time model. Incorporating other features of family firms into our current model may generate fruitful future research on family firms.

Appendix

Proof of Proposition 4

Lemma 1. *The sign of the change in the total firm value with respect to the family ownership is the same sign as that of the change in the total firm value with respect to the risk-taking choice.*

$$sign\left(\frac{\partial V^F}{\partial \theta}\right) = sign\left(\frac{\partial V^F}{\partial i}\right)$$

Proof. We can write the total firm value as a function of family ownership because the equilibrium risk-taking depends on family ownership. Hence, $V^F = \delta(i^f(\theta)) + p(i^f(\theta))(X + \eta) + X^F$. Taking its partial derivative with respect to θ and using the chain rule, we obtain

$$\left(\frac{\partial V^F}{\partial \theta}\right) = \left(\frac{\partial V^F}{\partial i}\right)\frac{\partial i^f(\theta)}{\partial \theta}.$$

The assertion is then proved because $\frac{\partial i^f(\theta)}{\partial \theta} > 0$ (see Proposition 2). □

Lemma 2. *The total firm value is strictly concave in family ownership. In particular,*

$$\frac{\partial V^F}{\partial \theta} > 0, \quad \forall \theta < \theta^*,$$
$$\frac{\partial V^F}{\partial \theta} = 0, \quad \theta = \theta^*,$$
$$\frac{\partial V^F}{\partial \theta} < 0, \quad \forall \theta > \theta^*.$$

Proof. Using Assumption 2 (and assuming an interior solution for the interesting case), we can immediately deduce that the total firm value is strictly concave in corporate risk-taking.

$$\frac{\partial V^F}{\partial i} > 0, \quad \forall i < i^F = i^f(\theta^*),$$
$$\frac{\partial V^F}{\partial i} = 0, \quad i = i^F = i^f(\theta^*),$$
$$\frac{\partial V^F}{\partial i} < 0, \quad \forall i > i^F = i^f(\theta^*).$$

The assertion in Lemma 2 then follows from taking the above strict concavity together with the results derived in Lemma 1 and $\frac{\partial i^f(\theta)}{\partial \theta} > 0$ (Proposition 2). □

Last, recall that, in the second case $\theta^* > \overline{\theta}$, the owner is restricted to search for an optimal family ownership such that $\theta \leq \overline{\theta} < \theta^*$. But from Lemma 2, we know that the objective function is increasing in θ for this interval. Hence, we obtain a corner solution at $\theta = \overline{\theta}$. This proves Proposition 4.

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