Optimal Capital Structure of Family Firms *

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Job Market Paper

Abstract

I develop a theory of optimal capital structure and endogenous ownership for family firms based on a trade-off between maintaining family control and alleviating moral hazard. Depending on the severity of the agency costs of free cash flow, my model generates wide dispersion in leverage ratios, both within the cross-section and across different investor protection regimes. Because the family owner values amenity potential, in the absence of severe agency problems she will prefer lower optimal leverage in order to reduce her personal bankruptcy cost. If the amenity potential is sufficiently large, family firms in my model may become optimally under-levered, consistent with recent findings by Strebulaev and Yang (2013). The results are robust to the assumption of risk aversion when leverage provides additional diversification benefits to the family owner who faces an incomplete market. In contrast, family firms with severe agency costs of free cash flow use more leverage in order to commit not to expropriate minority shareholders, thus securing higher proceeds from the sale of equity. Overall, the model generalizes the presence of concentrated owners with control motivations into the trade-off theory of capital structure in a manner consistent with the theoretical foundations of agency.

Keywords : Family firms, amenity potential, moral hazard, capital structure

*Acknowledgment: I am grateful to Renée Adams, Utpal Bhattacharya, Tony Berrada, Murillo Campello, Sudipto Dasgupta, Ran Duchin, David Feldman, Daniel Ferreira, Stefano Giglio, Chang Mo Kang, Andrew Karolyi, Leonid Kogan, Ernst Maug, Randall Morck, Vikram Nanda, Marco Pagano, Peter Kien Pham, Alejandro Rivera (FMA Annual meeting discussant), James Vickery, David Yermack, Jason Zein, and seminar participants at the Forum on 2014 Global Financial Stability and Prosperity, and the University of New South Wales. I would also like to thank my supervisor Ron Masulis and Jin Yu, for invaluable advice and the Tokyo Foundation for the Ryochi Sasakawa SYLFF Fellowship grant. All errors are my responsibility.

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1 Introduction

There is some disagreement in the existing literature whether family firms have higher or lower leverage when compared to firms with fully dispersed ownership. Anderson, Mansi, and Reeb (2003) examine the relationship between family ownership and agency costs of debt. Using a sample of S&P500 firms, they show that family firms tend to be over-levered relative to non-family firms. In sharp contrast, Strebulaev and Yang (2013) find that substantial fraction of US firms are (almost) zero-levered and that family firms are significantly more likely to have zero-leverage than non-family firms. Using a large international sample of family business groups, Masulis, Pham, and Zein (2011) show that family firms near the apex of the pyramidal structures have higher leverage than both their matched non-group peers and the firms in the lower layers of the pyramid. While these differences could be due to sample selection, this alone is insufficient to explain cross-sectional heterogeneity in observed leverage ratios for family firms.

There are several reasons as to why it is important to study the capital structure decision of family firms. First, the empirical evidence suggests that family firms fundamentally differ from a public corporation run by a professional manager. Second, family ownership is common and persistent phenomenon.[1] However, capital structure theories abstract away from these considerations, making it difficult to reconcile the conflicting cross-sectional evidence on leverage ratios. My aim is to shed some light on these matters by providing analytically tractable framework that can be used to generate quantitatively plausible estimates on optimal leverage and family ownership under empirically relevant scenarios.

In this study, I examine the effects of concentrated ownership and agency costs of equity on the capital structure decision. I focus on a setting where family controlled firm is raising

[1]La Porta, Lopez De Silanes, and Shleifer (1999) point out that families control 30% of the largest corporations around 27 wealthy countries, which is confirmed by Anderson and Reeb (2003a) for the S&P500 sample. Holderness (2009) points out that once the wider firm population is considered, these estimates severely underestimate the prevalence of family control. He provides compelling evidence that family firms represent more than half of the firm population.

capital from outside investors. The family owner captures a portion of free cash flow to equity as private benefits of control, which is made endogenous in my model, and is assumed to derive utility from retaining control due to the presence of altruistic preferences toward family members.[2] One prominent type of the non-pecuniary benefit resulting from altruistic preference in the family firm literature is the amenity potential of control.[3] Lower ownership stake of the founder will make it incentive compatible to divert/tunnel a proportion of free cash flow to equity as private benefits, within the limits of what is allowed by the legal protection. However, a lower stake also implies that the founder needs to exert costly effort and/or make a side payment to shareholders or their representatives on the board of directors, if the family is to retain control. Consequently, the founder can remain in control as long as she holds a positive ownership stake in the firm, however, the (deadweight) cost of retaining control may be prohibitively high for disproportionately low family ownership.[4]

Following Grossman and Hart (1982) and Zwiebel (1996), amenity potential or non-priced and non-pecuniary private benefit serves as a commitment device in my model because it is lost in the default states. In addition to the features of the trade-off theory in the spirit of Leland (1994) and the state contingent allocation of control of Aghion and Bolton (1992), family founder uses leverage as a commitment device not to expropriate minority shareholders consistent with studies in agency theory (see e.g., Jensen (1986) and Harvey, Lins, and Roper

[2]These are the two prominent characteristics of family ownership in the family firm literature. First, because of the large concentrated stake, the family owners may be able to use firm resources for their own benefit at the expense of minority shareholders (see e.g., Morck, Shleifer, and Vishny (1988)). Second, family owners tie their own welfare to that of the firm and show preference for passing on the productive asset to future generations (see e.g., Bertrand and Schoar (2006)).

[3]See Demsetz and Lehn (1985) for the justification of amenity potential. For the use of amenity potential in theory models of family firms see Burkart, Panunzi, and Shleifer (2003) and Ellul, Pagano, and Panunzi (2010).

[4]One may argue that the model may apply to the case of public corporation with dispersed public ownership which is run by a professional manager. Calibrating the model with realistic parameter values generates relatively high optimal ownership consistent with the empirical literature on family firms (20 to 30% depending on the level of risk aversion), and far above 0.75% average ownership stakes observed for professional CEOs (see Ofek and Yermack (2000)). However, the model can be applied to an owner controlled entrepreneurial firm if the owner-manager derives non-pecuniary benefits that are not at the direct expense of other shareholders.

(2004)). By levering up, the founder is able to raise the valuation of the external equity she sells, but will also reduce the expected value of the amenity potential of control due to the increase in probability of default. Therefore, the founder will trade-off perpetuating control against alleviating agency costs of equity. If the amenity potential of control dominates the (deadweight) agency costs of equity, the family firm becomes under-leveraged relative to the otherwise identical firm with fully dispersed ownership structure. Conversely, if alleviating the agency problem dominates, the family firm becomes over-levered. This forms the main trade-off in my model.

However, shareholder protection serves an important role in the model as it makes the founder's diversion technology inefficient. If the shareholder protection is sufficiently strong, the amenity potential always dominates and the family firm will have strictly lower leverage than non-family firm. Furthermore, if the amenity potential is approximately 10% of initial firm value, then the model generates zero optimal leverage for a family firm.[5] In contrast, if shareholder protection is poor, then family firms may have higher or lower leverage than non-family firms and this will be a function of family's ownership concentration. The non-linear relationship between family ownership and leverage is influenced by marginal cost of retaining control. In my model, if the ownership stake of the founder is sufficiently low, she will have to exert costly effort or make side payments to minority shareholders or their representatives if she is to remain in control. This cost of retaining control acts as a substitute to shareholder protection because it reduces the value of leverage as a commitment device in limiting expropriation. In such a case the leverage ratio of family firms converges to that of non-family firms from above. For high ownership stakes, the founder neither has strong incentives to divert cash flows nor is facing costs of retaining control, and consequently will optimally lower leverage to reduce the probability of losing amenity potential. In this region, family firms are optimally under-levered even if shareholder protection is relatively poor.

[5]This result holds even if leverage provides additional diversification benefits when the founder is risk averse. More on this later.

I further relax the assumptions of risk neutrality and exogenous ownership stake in order to provide more realistic scenario of capital structure decision of family firms. As in Chen, Miao, and Wang (2010) debt plays a diversification role, providing an additional benefit to leverage when the founder is facing an incomplete market. By levering up, the founder is able to induce risk sharing between different states of the world, effectively generating a non-transferable American put option which helps complete the markets. These diversification benefits are a direct consequence of risky debt creating state-contingent insurance for the family owner. Effectively, levering up induces risk-sharing between different states of the world on one hand, as the equity she holds in the firm is made riskier, while on the other her exposure to the firms equity is reduced. [6] The portfolio effect dominates as the risk of her total wealth is reduced. I show that diversification benefit of leverage is high for highly concentrated family ownership, however, these benefits diminish in dilution of family's ownership stakes. Overall, despite these additional advantage to leverage, main results remain qualitatively unchanged.

My work relates to several strands of literature. First, it adds to the relatively scarce theoretical literature on family firms [7]. Bhattacharya and Ravikumar (2001) study the evolution of family business as a function of capital market imperfections. Burkart, Panunzi, and Shleifer (2003) examine the succession problem faced by the family patriarch. In their model, ownership and control are never separated when the amenity potential of control is very large, rather the separation is induced by the discrepancy in the managerial ability relative to the founder(or heir). Ellul, Pagano, and Panunzi (2010) consider a similar succession problem where the ownership structure is determined by inheritance law. Almeida

[6] In Chen, Miao, and Wang (2010) this is a consequence of wealth constraints, as she is required to put up less of her own liquid assets in the firm in order to fund the investment opportunity.

[7] Empirical literature on family firms examines the relationship between the presence of family owners in the ownership structure and firm performance (Demsetz and Lehn (1985), Morck, Shleifer, and Vishny (1988), Demsetz and Villalonga (2001), Anderson and Reeb (2003a) and Mehrotra, Morck, Shim, and Wiwattanakantang (2013)), corporate control and firm performance (Villalonga and Amit (2006), Villalonga and Amit (2009)), corporate disclosure (Ali, Chen, and Radhakrishnan (2007)) and organisational form (Masulis, Pham, and Zein (2011)).

and Wolfenzon (2006) consider control motivations of the founding families that give rise to pyramidal structure of family business groups. I add to this literature by showing how control considerations and moral hazard of the family owner impacts the financing decision.

Second, I complement the literature on low-leverage (see Lemmon and Zender (2010)) and zero-leverage puzzles (Korteweg (2010) and Strebulaev and Yang (2013)), by showing that once the control considerations of the dominant shareholders are considered, I am able to generate low/zero leverage, even when risky debt has a diversification benefit. In my model, when the amenity potential of control dominates alleviating moral hazard (which also may be due to good shareholder protection), the family firm will optimally become under-levered when compared to the identical firm with fully dispersed ownership. Moreover, if the amenity potential of control is sufficiently large, the family firm may choose zero-leverage as the optimal policy in order to avoid loosing the benefits in the default states.

Third, I complement the emerging literature on the effects of incomplete markets on controlling shareholder's corporate policies, providing a more tractable alternative to Chen, Miao, and Wang (2010). While the two theories are complementary, they seek to address different questions. They model entrepreneur's IPO decision and examine the role of debt when the entrepreneur faces incomplete capital markets. My modelling of family ownership applies beyond the initial floating of equity, and seeks to address the question of how family ownership characteristics influence the capital structure decision. Thus, their focus is on the incomplete market and mine is on the ownership structure.

Last, I build on the contingent claims framework in the context of trade-off theory of capital structure. In the static model proposed by Leland (1994), the value of the firm reflects the tax benefits of debt up to default and bankruptcy costs associated with debt financing. The optimal capital structure is implied by the debt level that maximises the total firm value. Fischer, Heinkel, and Zechner (1989) present a dynamic model which shows the effects of costly recapitalisation on capital structure choice. While Leland and Toft (1996) and Leland (1998) consider the effects of capital structure choice on the risk taking incentives,

these classical models assume fully dispersed equity ownership. Morellec (2004), using static setup, and Morellec, Nikolov, and Schurhoff (2012), using dynamic setup, examine the effects of manager-shareholder conflicts of interest on the corporate leverage policy and are able to generate low-leverage. However, these models are more suitable for firms with dispersed ownership structure and run by professional managers, which is confirmed by the empirical tests in Morellec, Nikolov, and Schurhoff (2012). In their sample the managers are indeed exposed to firm's equity but the ownership is mostly of institutional nature, making the model unsuitable for relating controlling ownership stakes to the zero leverage puzzle as observed by Korteweg (2010) and Strebulaev and Yang (2013). I build on the trade-off theory, to accommodate concentrated ownership structure and conflicts of interest between large controlling and minority shareholders.

The remainder of the paper is structured as follows. Section II assumes risk neutrality of the founder in order to provide economic intuition for the key trade-off between alleviating agency costs of equity against retaining the amenity potential of control. Section III introduces risk aversion for the founder in order to explicitly endogenize the ownership structure and to emphasize additional diversification benefit of debt. Section IV concludes.

2 Risk-Neutral Family Owner and Exogenous Family Ownership

Time is continuous and indefinite. Financial markets are perfectly competitive, complete, and there is absence of arbitrage. Therefore, there exists a unique stochastic discount factor (SDF)

$$\frac{dM}{M} = -rdt - \psi dW^{A,P}, \tag{1}$$

where r is the equilibrium risk-free rate, ψ is the market price of risk, and $dW^{A,P}$ is an

incremental Brownian motion that governs the aggregate risk under the physical probability measure (P).

I assume that firm i's earnings before interest and taxes (EBIT) dynamics under the physical measure (P) follow a geometric Brownian Motion

$$\frac{dy^i}{y^i} = \mu_i dt + s_i dW^{C,P} + \omega_i dW^{i,P}, \tag{2}$$

where μ_i is the instantaneous growth rate, s_i is the instantaneous volatility with respect to the aggregate risk ($dW^{C,P}$), and ω_i is the instantaneous volatility with respect to an idiosyncratic risk ($dW^{i,P}$). Given the stochastic discount factor in Equation 1, the firm's cash flow dynamics under the risk neutral measure (Q) becomes[8]

$$\frac{dy^i}{y^i} = \mu_i^Q dt + s_i dW^{C,Q} + \omega_i dW^{i,Q}, \tag{3}$$

where $\mu_i^Q = \mu_i - \psi s_i$, $dW^{C,P} = -\psi dt + dW^{C,Q}$ and $dW^{i,P} = dW^{i,Q}$.

For ease of exposition, we can rewrite the risk neutral cash flow dynamics as[9]

$$\frac{dy}{y} = \mu^Q dt + \sigma dW, \tag{4}$$

where $\sigma^2 = s^2 + \omega^2$ is the total instantaneous cash flow volatility and W is a Brownian motion defined by $\sigma W = sW^{C,Q} + \omega W^{i,Q}$.

Unlike Leland (1994), I examine the optimal capital structure of a firm run by a family owner, e.g., a founder. Two distinguishing features of family-owned businesses are largely ignored in the existing capital structure theories where ownership is assumed to be fully dispersed. First, a family owner can extract private benefits of control at the expense of minority shareholders. More precisely, I model the private benefits of control as the family

[8]Complete and arbitrage-free financial markets ensure the existence and the uniqueness of the risk neutral measure.

[9]From here on, I suppress the superscript i, for ease of exposition.

owner's ability to divert/tunnel a fraction ξ of free cash flow to equity.[10]

Second, the family owner receives the amenity potential of control that does not reduce firm profits.[11] While diversion/tunnelling may be present among non-family firms with controlling shareholders and/or managers, amenity potential accrues to family owner as long as she remains in control. This feature is uniquely tied to the family-owned firms.[12] In this section, the primary focus of my model is to analyze how diversion/tunnelling and amenity potential affect the family firm's corporate leverage policy.

I assume that the family owner, for exogenous reasons, retains a θ fraction of the firm's equity, and sells the remaining $1-\theta$ fraction of the shares to fully dispersed external shareholders. In addition to selling a fraction of shares, the family owner decides how much to borrow. This assumption is realistic due to the sticky nature of ownership concentration.[13] Borrowing is modelled through a perpetual debt contract with an instantaneous coupon repayment b.

In my model, the debt contract is defaultable. The firm is assumed to go bankrupt and be liquidated when its internally generated cash flow (y_t) is not sufficient to meet its debt obligation (b), i.e., liquidity default.[14] Hence, we define the (stochastic) default time T as

$$T \equiv \inf \{t > 0 | y_t = b\} . \tag{5}$$

[10] A similar assumption is made in Lambrecht and Myers (2008) and Morellec, Nikolov, and Schurhoff (2012) that analyze the interaction between capital structure and agency costs of equity. See, e.g., Shleifer and Vishny (1997) and Johnson, La Porta, Lopez de Silanes, and Shleifer (2000) for evidence on the ways that controlling shareholders can extract private benefits of control from diversion.

[11] See Demsetz and Lehn (1985) for more detailed discussion on amenity potential.

[12] Amenity potential of control should be distinguished from perquisite consumption of the management.

[13] I make this assumption for tractability and relax it in the subsequent section where I model a risk-averse family owner and solve for endogenous ownership and capital structures. However, the assumption is realistic for family firms where the current owners have inherited the controlling equity stake or in circumstances where the ownership concentration cannot be changed in the short run.

[14] In the case of endogenous (strategic) default, the existence of amenity potential will provide the family owner with incentives to default later. However, this extension requires the assumption of "deep pockets" or, alternatively, costly refinancing in distress. While both methods have merits, I assume exogenous default for simplicity.

2.1 Security Valuation

For each instantaneous time period $[t, t+dt]$, the firm produces a total EBIT of $y_t dt$. After paying interest and taxes, the free cash flow to equity becomes $(1-\tau)(y_t - b)dt$, where τ is the Miller's effective tax rate

$$\tau = 1 - \frac{(1-\tau^c)(1-\tau^e)}{1-\tau_i}, \tag{6}$$

and τ^c, τ^e, τ^i are respective corporate, dividend, and personal income taxes. Unlike fully dispersed external shareholders, the family founder derives utility from three sources until the time of default.

First, motivated by Jensen (1986), I assume that the founder can exert her control rights and divert a fraction ξ of free cash flow to equity, $\xi(1-\tau)(y_t - b)dt$, as private benefits of control. However, it is costly for the her to retain control. More precisely, if the family stake drops below 50% of ownership, the founder is still assumed to be in control, and be able to divert cash flow, but retention will be costly. To put matters into perspective, let us assume that a family's board representation is, perhaps weakly, greater than its equity ownership. When the owner's equity stake, θ, is lower than the level of ownership required to retain the absolute control, she has to solicit other directors, representing minority shareholders' interests, in order to gain support for actions or corporate policies. This soliciting process could be very costly, and may take monetary or non-monetary form. For example, there could be disutility to the founder because she has to invest time and exert effort into the process, which can be otherwise spent on other activities, such as leisure. Even more so, soliciting votes could be a hard bargaining process requiring substantial effort or the founder may have to pay side payments to the directors/other shareholders in order to retain the control. The lower the founder's stake the more effort(higher side payments) she has to face. Alternatively, the founder's diversion may be restricted by the pressure coming from market for corporate control, i.e., takeover threats and proxy fights.

The lower the family owner's equity stake, the higher the chance of being taken over. The cost function $e^{-\delta\theta}\xi(1-\tau)(y_t-b)dt$ with a positive shape parameter δ captures this feature. In particular, proportional costs $e^{-\delta\theta} \to 1$ as $\theta \to 0$. That is, it becomes more costly for the founder to exert control and divert as her equity ownership is diluted. [15] Therefore, the founder can exert control without costs as long as she holds the absolute majority, i.e., 50%, of the firm's equity. In addition, following La Porta, Lopez de Silanes, Shleifer, and Vishny (2002), Albuquerue and Wang (2008), and others, we assume that investor/legal protection affects the cost-of-diversion function. Precisely, to divert a ξ fraction of firm cash flows, the owner has to pay (or her disutility is) $\frac{1}{2}\phi\xi^2(1-\tau)(y_t-b)dt$ in order to circumvent shareholder legal protection regardless of her equity ownership.

Second, the founder is entitled to a dividend payment equal to $\theta(1-\xi)(1-\tau)(y_t-b)dt$, i.e., dividends are proportional to her cash flow rights. Given the owner's equity ownership and diversion costs, her optimal expropriation solves

$$\xi = \underset{\tilde{\xi}\in[0,1]}{\arg\max}\left[\theta(1-\tilde{\xi}) + \tilde{\xi}(1-e^{-\delta\theta}) - \frac{1}{2}\phi\tilde{\xi}^2\right](1-\tau)(y_t-b) = \frac{1-e^{-\delta\theta}-\theta}{\phi}. \tag{7}$$

Intuitively, the founder becomes less interested to divert free cash when her ownership is greater, $\xi \to 0$ as $\theta \to 1$. Furthermore, my model features optimal diversion that converges to zero when the founder's equity stake decreases to zero, $\xi \to 0$ as $\theta \to 0$. It is worth noting that the diversion occurs after taxes and after lenders have been paid out. Therefore, I abstract away from conflicts of interest between the founder and the lenders and the tax revenue service.

Last, the founder receives the amenity potential of control $\eta(y_t-b)dt$, where η is the altruistic preference parameter. This may be thought of as the family's expected welfare from

[15] In the numerical analysis, I deliberately choose values of δ so that $e^{-\delta\times 0.5}$ is "numerically"indifferent from zero.

being associated with the firm, which the founder cares about. For example, the founder may derive utility from having her heirs run the firm and/or firm bearing her family name (Burkart, Panunzi, and Shleifer (2003)), or simply a form of capital preservation for future generations (Anderson and Reeb (2003a) and Anderson, Mansi, and Reeb (2003)). Some well known family patriarchs, as noted by the popular press, view the family business interests as an inheritance to be protected and passed on to the future generations, rather than their own possessions (Bertrand and Schoar (2006)). Besides the preservance of control from which the founder derives utility, there are additional amenities provided to the family by their active presence in the firm. For example, political and social connections could be very valuable. As Bertrand and Schoar (2006) note, securing government funding, contracts and favourable legislation is particularly valuable in countries with more prominent corruption.[16] Demsetz and Lehn (1985) argue that the amenity potential could also be derived from running firms in industries such as media and sport clubs which, by nature, ensure family's social prestige. In addition, the magnitude of the total amenities of control is potentially determined by the inheritance and taxation laws, cultural norms, family values and likely by the age of the family patriarch. These factors are expected to vary across countries.[17] Therefore, family's welfare is positively correlated with the value of the firm, or more precisely the equity stake proportional to the family's controlling interest. I assume that this part of utility decreases when her ownership stake is diluted. Specifically, I assume the same cost function as the one I use to model the costs of diversion. [18]The net amenity potential is $\eta(1 - e^{-\delta\theta})(y_t - b)dt$.

At the time of default ($t = T$), having lost the control of the firm to lenders, founder no longer receives dividends, the private benefits and the amenity potential of control.

[16]Good example of this could be the benefits Indonesia's Suharto and Italy's Agnelli families have managed to derive from connections to, or involvement in politics.

[17]For example, increase in inheritance taxes should reduce the value of expected amenity potential, because it becomes costlier for the founder to pass on the firm to descendants. Unexpected deaths of family members are also likely to reduce the value of amenity potential to the founder. Hence, comparative statics with respect to changes in η will provide guidance as to the effects on the capital structure decision.

[18]Intuitively, the net value of amenity potential should be tied to the founders ability to retain control.

Pooling the terms together, we can write the family owner's expected utility, $\mathbf{F}(y;b,\theta)$, as

$$\begin{aligned}\mathbf{F}(y;b,\theta) =&\mathbb{E}^{\mathbb{Q}}\left[\int_0^T e^{-rt}[\theta(1-\xi)(1-\tau)(y_t-b)+\xi(1-e^{-\delta\theta})(1-\tau)(y_t-b)\right.\\&\left.-\frac{1}{2}\phi\xi^2(1-\tau)(y_t-b)+\eta(1-e^{-\delta\theta})(y_t-b)]dt\right].\end{aligned}\tag{8}$$

Next, perfectly competitive financial markets imply outside equity and debt investors earn zero profits. Hence, the market value of a security should be equal to the risk neutral expected value of its future cash flows.

The market value of external equity that accounts for $1-\theta$ of total equity shares is equal to

$$\mathbf{E}(y;b,\theta)=\mathbb{E}^{\mathbb{Q}}\left[\int_0^T e^{-rt}(1-\theta)(1-\xi)(1-\tau)(y_t-b)dt\right],\tag{9}$$

where $\mathbf{E}(y;b,\theta)$ is the equity value function.

Debt market equilibrium implies that the debt value is given by

$$\mathbf{D}(y;b)=\mathbb{E}^{\mathbb{Q}}\left[\int_0^T e^{-rt}bdt+\int_T^\infty e^{-r(s-T)}(1-\alpha)(1-\tau)y_s ds\right],\tag{10}$$

where α is the proportional bankruptcy costs parameter. That is, debtholders receive coupon repayment b when $t<T$. However, at time $(t=T)$ the firm declares a bankruptcy and debtholders reposes the firm's assets which are valued net of bankruptcy costs.

2.2 Ordinary Differential Equations and Value Functions

Using the standard argument (see Dixit (1993)), it is evident that the market values of external equity and debt contracts as well as the founder's expected utility are the solutions to the following generic ordinary differential equation (ODE)

$$rH(y) = \mu y H^{'}(y) + \frac{1}{2}\sigma^2 y^2 H^{''}(y) + my + k, \tag{11}$$

with appropriate boundary conditions. The general solution is

$$H(y) = \frac{my}{r - \mu^Q} + \frac{k}{r} + Ay^{x_1} + By^{x_2}, \tag{12}$$

where x_1 and x_2 are the solutions to the fundamental quadratic of the ODE, and A and B are the constants to be determined by the boundary conditions.

When the debt contract is valued, we have $m = 0$ and $k = b$. Boundary conditions are

$$\mathbf{D}(y)|_{y=y_T=b} = (1-\alpha)(1-\tau)\frac{b}{r - \mu^Q}, \tag{13}$$

and

$$\mathbf{D}(y)|_{y\to\infty} = \frac{b}{r}. \tag{14}$$

It follows that the market value of debt is given by

$$\mathbf{D}(y) = \frac{b}{r}\left[1 - \left(\frac{y}{b}\right)^x\right] + (1-\alpha)(1-\tau)\frac{b}{r - \mu^Q}\left(\frac{y}{b}\right)^x, \tag{15}$$

where x is the negative root of the fundamental quadratic as follows:

$$x = \frac{-(\mu^Q - \frac{1}{2}\sigma^2) - \sqrt{(\mu^Q - \frac{1}{2}\sigma^2)^2 + 2r\sigma^2}}{\sigma^2}. \tag{16}$$

When the external equity contract is valued, we have $m = -k = (1-\theta)(1-\xi)(1-\tau)$. Boundary conditions are

$$\mathbf{E}(y)|_{y=y_T=b} = 0, \tag{17}$$

and

$$\mathbf{E}(y)|_{y\to\infty} = (1-\theta)(1-\tau)(1-\xi)\left[\frac{y}{r-\mu^Q} - \frac{b}{r}\right]. \tag{18}$$

The value of external equity is therefore equal to

$$\mathbf{E}(y) = (1-\theta)(1-\tau)(1-\xi)\left[\frac{y}{r-\mu^Q} - \frac{b}{r} - \left(\frac{b}{r-\mu^Q} - \frac{b}{r}\right)\left(\frac{y}{b}\right)^x\right]. \tag{19}$$

The founder's expected utility has three components: (1) proportional dividend payments, (2) the private benefits of control, i.e., diversion net of costs, and (3) the net amenity potential of control. It can be readily shown that

$$m = -k = \underbrace{\theta(1-\xi)(1-\tau)}_{\text{part (1)}} + \overbrace{\left(\xi(1-e^{-\delta\theta}) - \frac{1}{2}\phi\xi^2\right)(1-\tau)}^{\text{part (2)}} + \underbrace{\eta(1-e^{-\delta\theta})}_{\text{part (3)}}. \tag{20}$$

Similar to external shareholders, the owner receives zero due to limited liability in the event of bankruptcy. As y becomes infinitely large relative to b, corporate default is not of a concern. Therefore, boundary conditions are

$$\mathbf{F}(y)|_{y=y_T=b} = 0, \tag{21}$$

and

$$\begin{aligned}\mathbf{F}(y)|_{y\to\infty} =& \theta(1-\tau)(1-\xi)\left[\frac{y}{r-\mu^Q} - \frac{b}{r}\right] + \left[\xi(1-e^{-\delta\theta}) - \frac{1}{2}\phi\xi^2\right](1-\tau)\left[\frac{y}{r-\mu^Q} - \frac{b}{r}\right] \\ &+\eta(1-e^{-\delta\theta})\left[\frac{y}{r-\mu^Q} - \frac{b}{r}\right].\end{aligned} \tag{22}$$

Hence, the owner's expected utility is

$$\begin{aligned}\mathbf{F}(y) =&\theta(1-\tau)(1-\xi)\left[\frac{y}{r-\mu^Q}-\frac{b}{r}-\left(\frac{b}{r-\mu^Q}-\frac{b}{r}\right)\left(\frac{y}{b}\right)^x\right]\\&+\left[\xi(1-e^{-\delta\theta})-\frac{1}{2}\phi\xi^2\right](1-\tau)\left[\frac{y}{r-\mu^Q}-\frac{b}{r}-\left(\frac{b}{r-\mu^Q}-\frac{b}{r}\right)\left(\frac{y}{b}\right)^x\right]\\&+\eta(1-e^{-\delta\theta})\left[\frac{y}{r-\mu^Q}-\frac{b}{r}-\left(\frac{b}{r-\mu^Q}-\frac{b}{r}\right)\left(\frac{y}{b}\right)^x\right].\end{aligned}\tag{23}$$

Rearranging terms, we can write the owner's expected utility as

$$\begin{aligned}\mathbf{F}(y) =&\left(\theta(1-\xi)+\xi\right)(1-\tau)\left[\frac{y}{r-\mu^Q}-\frac{b}{r}-\left(\frac{b}{r-\mu^Q}-\frac{b}{r}\right)\left(\frac{y}{b}\right)^x\right]\\&-\left[\xi e^{-\delta\theta}+\frac{1}{2}\phi\xi^2\right](1-\tau)\left[\frac{y}{r-\mu^Q}-\frac{b}{r}-\left(\frac{b}{r-\mu^Q}-\frac{b}{r}\right)\left(\frac{y}{b}\right)^x\right]\\&+\eta(1-e^{-\delta\theta})\left[\frac{y}{r-\mu^Q}-\frac{b}{r}-\left(\frac{b}{r-\mu^Q}-\frac{b}{r}\right)\left(\frac{y}{b}\right)^x\right],\end{aligned}\tag{24}$$

where

$$\left[\theta(1-\xi)+\xi\right](1-\tau)\left[\frac{y}{r-\mu^Q}-\frac{b}{r}-\left(\frac{b}{r-\mu^Q}-\frac{b}{r}\right)\left(\frac{y}{b}\right)^x\right]\equiv\mathbf{CF}(y)\tag{25}$$

is the owner's expected present value of future cash flows, including diversion,

$$\left[\xi e^{-\delta\theta}+\frac{1}{2}\phi\xi^2\right](1-\tau)\left[\frac{y}{r-\mu^Q}-\frac{b}{r}-\left(\frac{b}{r-\mu^Q}-\frac{b}{r}\right)\left(\frac{y}{b}\right)^x\right]\equiv\mathbf{AC}(y)\tag{26}$$

is the agency costs of free cash flows, and

$$\eta(1-e^{-\delta\theta})\left[\frac{y}{r-\mu^Q}-\frac{b}{r}-\left(\frac{b}{r-\mu^Q}-\frac{b}{r}\right)\left(\frac{y}{b}\right)^x\right]\equiv\mathbf{AP}(y)\tag{27}$$

is the amenity potential of control.

While the cash flow component, $\mathbf{CF}(y)$, is straightforward, the agency costs of free cash

flows, $\mathbf{AC}(y)$ and the amenity potential of control, $\mathbf{AP}(y)$, merit more discussion.

In my model, the agency cost of free cash flow is measured as the deadweight cost of diversion. As previously noted, there are two sources of costs keeping the owner from expropriating outside shareholders. First, family owner's control rights are usually positively correlated with their cash flow rights, and she has to exert effort or pay side payments to gain control if her equity stake is lower than the level needed for absolute control. Second, regardless of the owner's equity stake, minority shareholders are protected by external mechanisms such as legal system and accounting standards. I follow the well documented literature on the differences in shareholder protection around the world and their effects on the agency conflicts between controlling and minority shareholders and various methods of expropriation, with families taking prominent position (La Porta, Lopez de Silanes, Shleifer, and Vishny (1998), La Porta, Lopez De Silanes, and Shleifer (1999), La Porta, Lopez de Silanes, Shleifer, and Vishny (2000), La Porta, Lopez de Silanes, Shleifer, and Vishny (2002) and Djankov, La Porta, Lopez de Silanes, and Shleifer (2008)). In general, the evidence suggests that better protection of property rights, efficient judicial system and the quality of accounting standards impede the controlling shareholder's diversion technology. Leuz, Nanda, and Wysocki (2003) examine systematic differences in earnings management in over 30 countries. They show that earnings management is decreasing in investor protection as it limits insider's ability to capture private benefits of control and conceal the true firm performance. Therefore, it becomes costly for the owner to circumvent these external governance mechanisms and divert firm's free cash flow, as manipulating the firm's earnings becomes costlier in countries with stronger legal protection. In addition, my model is consistent with Jensen (1986), as borrowing reduces the agency costs of free cash flow. More precisely, equation (26) shows that deadweight losses due to diversion are decreasing in the coupon payment b.

I assume that the amenity potential of control to be proportional to the equity value. The family owner enjoys such additional benefits as long as she remains in control. However, the

owner's control rights can be lost when (1) her equity stake is low as I have argued before and (2) the firm goes bankrupt and debtholders takeover control. Equation (27) reflects that the amenity potential of control diminishes as more external financing (both external equity and borrowing) is raised. This is intuitive because the founder originally captures the full amenity potential if she is the sole owner of the firm. However, her control rights become diluted as soon as she brings more external investors to the firm. Of course, despite disutility from losing control, external financing can be valuable to the founder for various reasons such as reducing corporate taxes and diversifying away idiosyncratic risk.[19]

At date 0, the owner chooses the optimal capital structure to maximize the sum of her expected utility and the proceeds from issuing external equity and debt.

$$\max_{b} \mathbf{F}(y;b) + \mathbf{D}(y;b) + \mathbf{E}(y;b) \equiv \mathbf{V^F}(y), \tag{28}$$

where $\mathbf{V^F}(y)$ is *ex-ante* expected utility of the family founder.

Specifically,

$$\begin{aligned}\mathbf{V^F}(y) =&(1-\tau)\frac{y}{r-\mu^Q} + \tau\frac{b}{r}\left[1-\left(\frac{y}{b}\right)^x\right] - \alpha(1-\tau)\frac{b}{r-\mu^Q}\left(\frac{y}{b}\right)^x \\ &+\left[\eta(1-e^{-\delta\theta}) - (\xi e^{-\delta\theta} + \frac{1}{2}\phi\xi^2)(1-\tau)\right]\left[\frac{y}{r-\mu^Q} - \frac{b}{r}\left[1-\left(\frac{y}{b}\right)^x\right] - \frac{b}{r-\mu^Q}\left(\frac{y}{b}\right)^x\right] \\ =&\mathbf{V^{LH}} + K\left[\frac{y}{r-\mu^Q} - \frac{b}{r}\left[1-\left(\frac{y}{b}\right)^x\right] - \frac{b}{r-\mu^Q}\left(\frac{y}{b}\right)^x\right],\end{aligned} \tag{29}$$

where

$$\mathbf{V^{LH}} = (1-\tau)\frac{y}{r-\mu^Q} + \tau\frac{b}{r}\left[1-\left(\frac{y}{b}\right)^x\right] - \alpha(1-\tau)\frac{b}{r-\mu^Q}\left(\frac{y}{b}\right)^x \tag{30}$$

[19] I analyze the effect of risk aversion and endogenous ownership structure in the subsequent section.

is the value of the firm featuring the trade-off between tax benefits against bankruptcy costs in Leland (1994) and

$$K = \eta(1 - e^{-\delta\theta}) - (\xi e^{-\delta\theta} + \frac{1}{2}\phi\xi^2)(1 - \tau) \tag{31}$$

summarizes the additional considerations I have introduced in my family firm model. It is easy to show that K increases in the amenity potential parameter η and decreases in diversion ξ.

2.3 Optimal Leverage under Risk Neutrality of the Founder

Rearranging the terms, the family owner's *ex ante* expected utility at $t = 0$ becomes

$$\mathbf{V^F}(y) = (1 - \tau + K)\frac{y}{r - \mu^Q} + (\tau - K)\frac{b}{r}\left[1 - \left(\frac{y}{b}\right)^x\right] - [\alpha(1 - \tau) + K]\frac{b}{r - \mu^Q}\left(\frac{y}{b}\right)^x. \tag{32}$$

It is evident that the $\mathbf{V^F}$ with $\mathbf{V^{LH}}$ share similar functional form. Intuitively, one can reinterpret a public firm as an otherwise identical family firm with fully dispersed shareholder base. Nevertheless, there are two notable changes from the Leland benchmark: (1) tax benefits parameter is weakened by K from τ to $\tau - K$; and (2) bankruptcy costs parameter is amplified by K from $\alpha(1 - \tau)$ to $\alpha(1 - \tau) + K$.

It can be readily shown that the optimal coupon that maximizes the objective in equation 28 is given by

$$\begin{aligned} \mathbf{b^F} &= y\left\{\frac{r}{\tau - K}(1 - x)\left[\frac{\tau - K}{r} + \frac{\alpha(1 - \tau) + K}{r - \mu^Q}\right]\right\}^{\frac{1}{x}} \\ &= y\left\{(1 - x)\left[1 + \frac{(\alpha(1 - \tau) + K)r}{(\tau - K)(r - \mu^Q)}\right]\right\}^{\frac{1}{x}}, \end{aligned} \tag{33}$$

and the optimal coupon that maximizes the otherwise identical "Leland"firm ($\mathbf{V^{LH}}$) is given by

$$\begin{aligned}\mathbf{b^{LH}} &= y\left\{\frac{r}{\tau}(1-x)\left[\frac{\tau}{r}+\frac{\alpha(1-\tau)}{r-\mu^{Q}}\right]\right\}^{\frac{1}{x}} \\ &= y\left\{(1-x)\left[1+\frac{\alpha(1-\tau)r}{\tau(r-\mu^{Q})}\right]\right\}^{\frac{1}{x}}.\end{aligned} \tag{34}$$

Before proceeding to characterization of the model, I define the family firm

Definition 1. *Firm is considered to be a family firm if for* $\forall t \in [0,T]$*, the family owner has control over firm's corporate policies,* $\theta \in (0,1]$ *and* $\eta \geq 0$*. When* $\lim\theta \to 0$*, the family firm converges to the firm with fully dispersed ownership base.*

This definition simply says that for any time up to default the founder must own positive amount of equity, however small that is, and that the amenity potential is non-negative. The definition also implies that the founder may not short the firm's equity, however, if the exit is made the family firm converges to the otherwise identical firm with fully dispersed shareholder base, i.e. the "Leland"firm. Also, note that for $\theta = 1$ the market leverage is not defined, however, the focus of my analysis is not on these two polar cases as my model does not provide any economic intuition beyond that of Leland (1994).

I can now state my main result on optimal capital structure for the family firm in the following proposition

Proposition 1.

If the founder is relatively more concerned about:

(i) perpetuating control rather than alleviating agency problems with outside shareholders, then the optimal leverage would be lower than in the case of otherwise identical firm with fully dispersed shareholder base.

(ii) alleviating agency problems with outside shareholders rather than perpetuating control, then the optimal leverage would be higher than in the case of otherwise identical firm with fully dispersed shareholder base.

Proof Inspecting the equation (31) implies that $K > 0$ if $\eta > \frac{(\xi e^{-\delta\theta} + \frac{1}{2}\phi\xi^2)(1-\tau)}{(1-e^{-\delta\theta})}$, i.e. amenity potential is higher than the sum of the deadweight costs adjusted for the loss of control, then $b^F < \mathrm{b}^{\mathrm{LH}}$, otherwise $\mathrm{b}^{\mathrm{F}} > \mathrm{b}^{\mathrm{LH}}$.

□

For $K > 0$, I expect that the family firm becomes "under-levered"relative to an otherwise identical firm with fully dispersed shareholders, because it weakens the "tax benefit"effect and amplifies the "bankruptcy cost"effect. Thus my model implies that when $K > 0$ maintaining control dominates alleviating agency problems and, consequently, positive values of K predict lower optimal leverage when compared to the "Leland "benchmark.

Conversely, for $K < 0$ I expect that the family firm should become "over-levered"relative to an otherwise identical firm with fully dispersed shareholders, because it amplifies the "tax benefit"effect and weakens the "bankruptcy cost"effect. In this case, my model shows that maintaining control is dominated by alleviating agency when $K < 0$. Therefore, negative values of K indicate higher optimal leverage when compared to the "Leland "benchmark. In sum, I refer to K as the net incremental costs to leverage for the family firm, which reflects the trade-off between alleviating agency costs against maintaining the amenity potential of control.

The following lemma characterizes the effect of net incremental costs to leverage for the family firm on the founder's optimal leverage decision.

Lemma 1. *For any* $\theta \in (0, 1]$, $\frac{\partial b^F}{\partial K} < 0$.

Proof Applying chain and quotient rules to the equation (33), respectively:

$$\frac{\partial b^F}{\partial K} = y(1-x)^{\frac{1}{x}} \frac{1}{x} \left[1 + \frac{[\alpha(1-\tau)+K]\,r}{(\tau-K)(r-\mu^Q)}\right]^{\frac{1-x}{x}} \frac{r}{r-\mu^Q} \frac{\partial \frac{\alpha'(1-\tau)}{\tau'}}{\partial K} < 0, \tag{35}$$

Where

$$\frac{\partial \frac{\alpha'(1-\tau)}{\tau'}}{\partial K} = \frac{\alpha(1-\tau)+\tau}{(\tau-K)^2} > 0.$$

The condition holds because we take the negative root of the fundamental quadratic. □

Optimal coupon is decreasing in net incremental costs to leverage for the family firm. Since the term K summarizes the trade-off for the family owner, it implies that whenever the amenity potential of control increases in relative importance relative to the agency conflicts with outside shareholders, or alternatively when agency conflicts decrease in importance, the founder will find it optimal to lower the leverage.

This would indicate that the net incremental cost to leverage for the family firm is increasing in the amenity potential of control. Intuitively, this effect would be more pronounced the higher the ownership concentration of the family holdings because the deadweight cost due to loss of control is reduced. This is formally stated in Lemma 2.

Lemma 2. *For any* $\theta \in (0,1]$, $\frac{\partial K}{\partial \eta} > 0$ *and* $\frac{\partial K^2}{\partial \eta \partial \theta} > 0$.

Proof

It directly follows from the equation (31):

$$\begin{aligned} &\frac{\partial K}{\partial \eta} = (1-e^{-\delta\theta}) > 0, \forall \theta \in (0,1], \\ &\frac{\partial K^2}{\partial \eta \partial \theta} = \delta e^{-\delta\theta} > 0, \forall \theta \in (0,1]. \end{aligned} \tag{36}$$

□

Preceding results enable us to directly link the effects of founder control considerations and the ownership concentration on the optimal leverage choice. Proposition 2 formally states the result.

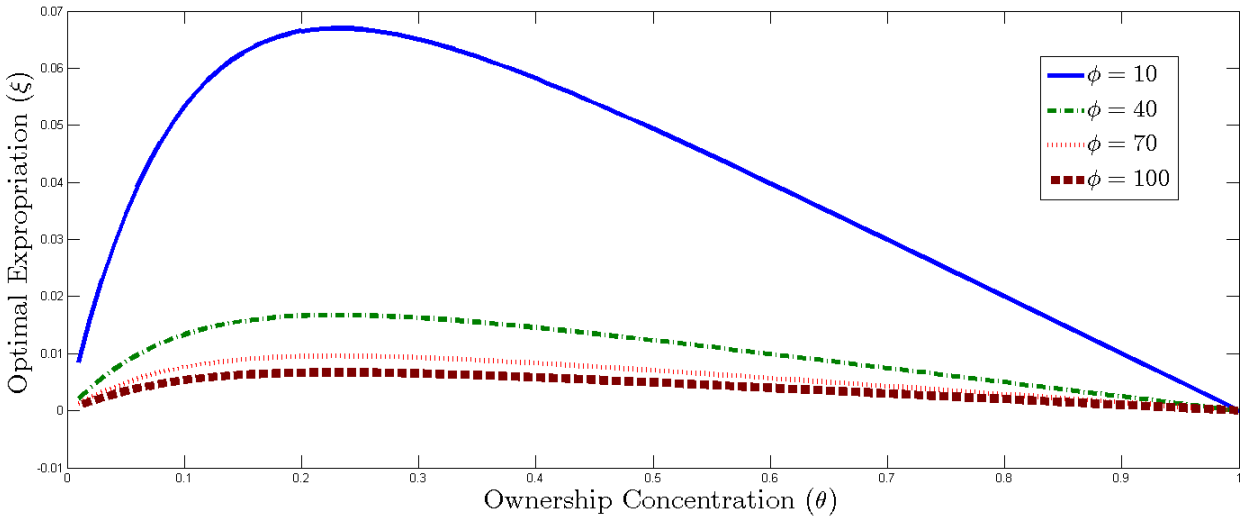
Proposition 2. *For the family firm,* $\forall\theta \in (0,1]$*, the optimal coupon is decreasing in altruistic preference of the founder,* $\frac{\partial b^F}{\partial \eta} < 0$*, and this effect is stronger in ownership concentration of the family holdings,* $\frac{\partial}{\partial \theta}\left(\frac{\partial b^F}{\partial \eta}\right) < 0$*.*

Proof It follows from Lemma 1 as $\frac{\partial b^F}{\partial K} < 0$ and Lemma 2 as $\frac{\partial K}{\partial \eta} > 0$ and $\frac{\partial K}{\partial \eta \partial \theta} > 0$. □

The optimal coupon is decreasing in amenity potential of the family founder, and this effect is increasing in ownership concentration of the family. This naturally leads from Lemma 1. As the level of expected net amenity benefits increases, the founder would optimally chose lower level of debt to reduce the probability of default or equivalently increase the probability of actually receiving the amenity. Secondly, higher ownership would imply a lower (deadweight) costs associated with the costly effort or side payments s/he needs to extend to shareholders or their board representatives in order to regain control. This would further raise the amount of net amenity potential that is received. Both of these effects lead to reduction in debt financing. Figure 1. plots the optimal expropriation as a function of ownership concentration for different values of investor protection, while the Figure 2. plots the relationship between the amenity potential and optimal coupon and market leverage.

Figure 1: Optimal Expropriation under different investor protection regimes

Optimal expropriation as a function of ownership concentration with varying investor protection. It is assumed that $r = 4\%$, $\tau = 11.29\%$, $\mu^Q = 1\%$, $\sigma = 25\%$, $\alpha = 2\%$ and $\delta = 12$.

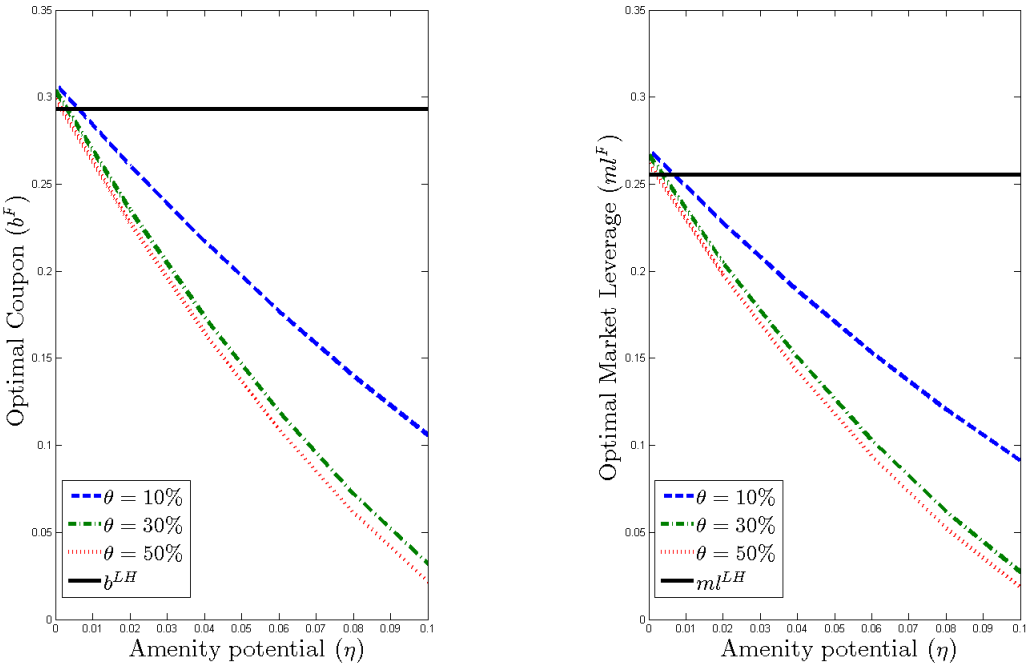


Note that the magnitude of agency costs in our model is in line with Morellec, Nikolov, and Schurhoff (2012) who report that the (exogenous) agency costs of 1.5% on average (or 0.45% at median) are sufficient to resolve the low leverage puzzle. My model generates comparable agency costs endogenously using comparable parameter values.[20] At the 20% ownership concentration range, in the regimes with good investor protection the magnitude of the agency costs is in the 0.4% to 1.5% range. In contrast, the maximum diversion in the regimes with the poor investor protection is approximately 6.5%.

[20]The parameter values used in the calibration with a brief explanation of the numerical method are disclosed in the Appendix.

Figure 2: Amenity Potential effects on Optimal Coupon and Market Leverage

Optimal coupon and market leverage as a function of amenity potential of control with varying family ownership values. It is assumed that $r = 4\%$, $\tau = 11.29\%$, $\mu^Q = 1\%$, $\sigma = 25\%$, $\alpha = 2\%$, $\phi = 80$, and $\delta = 12$.



I now turn to the analysis of investor protection and its effects on the family firm decision making. The following lemma characterizes the effects of the strength of investor protection on net incremental benefits to leverage

Lemma 3. *For any* $\theta \in (0, 1]$, $\frac{\partial K}{\partial \phi} > 0$.

Proof Substituting 7 into equation (**??**equ:K) and differentiating with respect to ϕ yields

$$\frac{\partial K}{\partial \phi} = \frac{(1-\tau)}{2\phi^2}(1 - e^{-\delta\theta} - \theta)(1-\theta) > 0, \forall \theta \in (0, 1). \tag{37}$$

□

As previously noted, better legal protection should make the founder's diversion technology less efficient. Proposition 3 states the result.

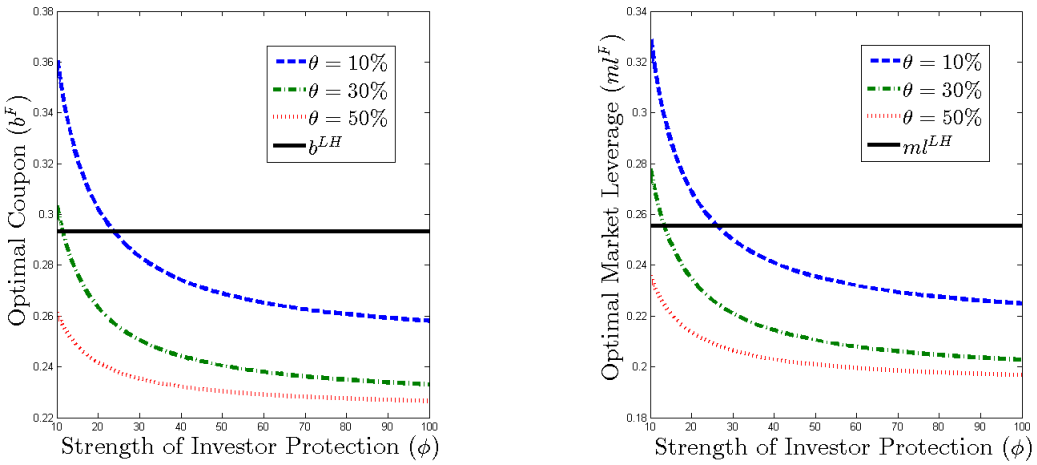
Proposition 3. *The use of leverage by the founder in order to commit not to expropriate outside shareholders diminishes in the strength of investor protection,* $\frac{\partial b^F}{\partial \phi} < 0$.

Proof It follows from Lemma 1 as $\frac{\partial b^F}{\partial K} < 0$, and Lemma 3 as $\frac{\partial K}{\partial \phi} > 0$. □

The intuition is as follows. In my model, the amenity potential of control serves as an *ex ante* commitment device not to expropriate outside shareholders. Intuitively, in the countries with strong shareholder protection this benefit of debt diminishes but it becomes important in the parts of the world where, for example, weak judicial systems and the corruption are prominent. If the legal environment does not limit diversion, no investor will chose to buy the firm's securities. Founder will optimally chose to commit not to expropriate by levering up, which in turn increases the value of the securities she sells to investors. However, higher borrowing also implies higher default probability, which creates a disutility to the owner. As the legal protection improves she will optimally reduce the level of leverage as the benefits of commitment are less pronounced. Thus, my model suggests that shareholder protection and debtholder monitoring are substitutes. In addition, higher ownership stake would, in general, imply better incentive alignment between the family owners and outside shareholders. Thus for relatively high ownership concentration the effects of the legal protection would be less pronounced. Figure 2. plots the relationship between the strength of legal protection and optimal coupon and market leverage for varying degrees of ownership concentration.

I now turn to the characterization of the changes in ownership concentration on the net incremental cost to leverage (and consequently on optimal choice of debt). This relationship is non-monotonic $\forall \theta \in (0, 1]$, when ϕ is sufficiently low. To see this, consider

Figure 3: Effects of Investor Protection on Optimal Coupon and Market Leverage
Optimal coupon and market leverage as a function of the strength of investor protection with varying family ownership values. It is assumed that $r = 4\%$, $\tau = 11.29\%$, $\mu^Q = 1\%$, $\sigma = 25\%$, $\alpha = 2\%$, $\eta = 2\%$, and $\delta = 12$.

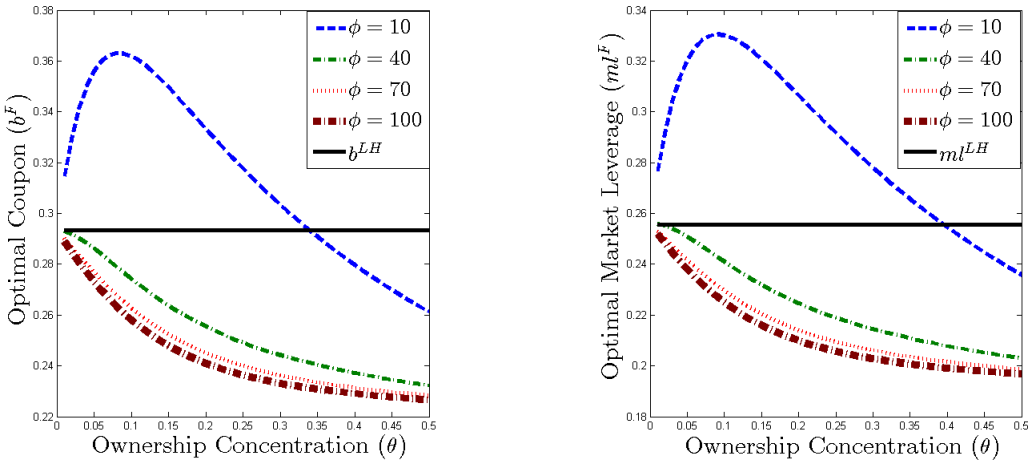


$$\frac{\partial K}{\partial \theta} = \frac{(1-\tau)(1-\theta) + \delta[\eta\phi - (1-\tau)e^{-\delta\theta}]e^{-\delta\theta}}{\phi}. \tag{38}$$

Since $e^{-\delta\theta} \leq 1$ and the first term is always non-negative, it is sufficient to say that if $\eta \geq (1-\tau)/\phi$ net incremental costs to leverage will be increasing in ownership and consequently lowering the optimal level of borrowing, i.e. $\frac{\partial K}{\partial \theta} > 0$. In the regimes with good investor protection the founder's diversion technology will be inefficient. That is, if investor protection is sufficiently high, the founder would be prioritising the perpetuation of control (amenity potential) over alleviating the agency conflicts as leverage as a governance mechanism is substituted away $\frac{\partial b^F}{\partial \theta} < 0$.

However, if $\eta \leq (1-\tau)/\phi$, i.e. for sufficiently low level of investor protection, net incremental costs to leverage could be decreasing in ownership depending on the ownership concentration of the founder. To see this, recall that the equilibrium diversion is given by

Figure 4: Effects of Ownership on Optimal Coupon and Market Leverage
Optimal coupon and market leverage as a function of founder's ownership concentration with varying of the strength of investor protection. It is assumed that $r = 4\%$, $\tau = 11.29\%$, $\mu^Q = 1\%$, $\sigma = 25\%$, $\alpha = 5\%$, $\eta = 2\%$, and $\delta = 12$.



$\frac{(1-\theta)-e^{-\delta\theta}}{\phi}$ where $(1-\theta)$ is the marginal benefit of diversion and $e^{-\delta\theta}$ is the marginal cost of diversion. If $\theta \geq e^{-\delta\theta}$, i.e. sufficiently high family ownership, the optimal diversion is decreasing in θ, as it becomes less incentive compatible for the owner to divert free cash flow to equity. At the same time, amenity potential is increasing in theta, i.e. $\frac{\partial \eta(1-e^{-\delta\theta})}{\partial\theta} = \eta\delta e^{-\delta\theta} > 0, \forall\theta \in (0,1]$. The amenity potential dominates and net incremental cost to leverage is decreasing in ownership concentration, $\frac{\partial K}{\partial\theta} > 0$. In turn, $\frac{\partial b^F}{\partial\theta} < 0$. Conversely, if $\theta \leq e^{-\delta\theta}$, i.e. sufficiently low family ownership, diversion becomes significant and dominates the amenity potential of control to the founder. This implies there are incremental benefits to leverage, $\frac{\partial b^F}{\partial\theta} > 0$. Consequently, the founder will benefit from increase in the value of securities that are sold to outside investors by using debt in order to commit not to expropriate i.e. $\frac{\partial b^F}{\partial\theta} > 0$. While it is not possible to pin down analytically the exact analytical value of theta for which this occurs, I plot the optimal coupon and market leverage as a function of θ for different investor protection regimes in Figure 3. which confirms the

intuition.

3 Risk-Averse Family Owner and Endogenous Family Ownership

In this section, I extend the analysis to allow for risk-aversion of the founder and endogenous family ownership. While the dispersed investors are assumed to face complete markets, the founder holds a concentrated stake and is made to bear idiosyncratic risk. If the founder is risk neutral, this has no bearing on the capital structure decision and the results of the previous section hold. Risk aversion, however, will affect his portfolio choice. Hence, the primary role of risk aversion in my model is to facilitate endogenous ownership, as now she makes simultaneous optimal capital structure decision b and optimal ownership structure θ at $t = 0$.[21]

Burkart, Panunzi, and Shleifer (2003) is the closest to my study, in a sense that ownership structure and equity issuance decisions of the family firm are endogenous. Their theoretical argument is based on the assumption that family derives utility from perpetuating control of the firm, with a focus on pecuniary benefits of control. The setting considers the case where the founder is looking to retire from actively management and is considering delegating this authority to a professional manager, heir or to remain in control but as less than an ideal type. While the model acknowledges the importance of retention of control, borrowing is not considered. It is not clear whether in this setting ownership structure is important at all except in the case of extremely weak legal protection regimes. Their model also ignores uncertainty and potential risk aversion of the founder, which is one of the key distinguishing

[21]Early work of Demsetz (1983) was first the to point out the endogenous nature of ownership, as an outcome of the interaction between the investors who own the equity and those who are willing to acquire it. As such the ownership structure should reflect the interests and incentives of the parties involved in the market for firm's equity.

features of the family owners (Anderson, Mansi, and Reeb (2003)). [22]

Chen, Miao, and Wang (2010) derive a dynamic model of entrepreneurial finance. [23] They show that when the entrepreneur is overexposed to the firm's equity and faces financing constraints, borrowing can help mitigate the problem caused by incomplete markets by providing diversification benefits.

Family and entrepreneurial firms potentially share the same feature, in that the controlling shareholders are potentially overexposed to the firm's equity. However, there are several notable differences between the approach of Chen, Miao, and Wang (2010) and mine. Firstly, the focus of their analysis is the diversification role of debt and IPO/exit decision of the entrepreneur in the presence of market incompleteness. The focus of my model is to analyze the effect of control retention considerations of the family owner on capital and ownership structures. Secondly, they model market incompleteness in equilibrium and in a more structural manner than us. In contrast, my modelling of endogenous ownership is more structural, through the recognition of amenity potential and control considerations of the decision maker.[24] Thirdly, I am able to show the diversification role of debt while achieving better tractability. In addition, in terms of diversification, ceteris paribus, in my model borrowing and equity issuance are substitutes. Lastly, I am able to show that for conservative parameter values these diversification benefits of debt are decreasing in ownership concentration. Intuitively, as the founder reduces her stake there is less need to diversify.

I assume the exogenous stochastic discount factor (SDF) for the family owner is given by[25]

[22] Villalonga and Amit (2009) find that direct ownership accounts for 62% of the total family holdings in the firm, while 80 % of the firms use various indirect ownership mechanisms. Although it is commonly argued that families tend to be overexposed to the firm's equity, as in Masulis, Pham, and Zein (2011), their total portfolio holdings are unobservable.

[23] Hall and Woodward (2010) also consider the exit of under-diversified entrepreneur backed by a venture capitalist in the presence of moral hazard and adverse selection problems.

[24] They do not consider the presence of non-priced private benefits.

[25] For the justification please refer to the section 5.1 of the Appendix.

$$\frac{dm_i}{m_i} = -rdt - \psi dW^{A,P} - \lambda_i dW^{i,P}. \tag{39}$$

Recall the equation (2), where we have assumed that firm i's earnings before interest and taxes (EBIT) dynamics under the physical measure (P) follow a geometric Brownian Motion

$$\frac{dy^i}{y^i} = \mu_i^Q dt + s_i dW^{C,P} + \omega_i dW^{i,P},$$

where μ_i is the instantaneous growth rate, s_i is the instantaneous volatility with respect to the aggregate risk ($dW^{A,P}$), and ω_i is the instantaneous volatility with respect to an idiosyncratic risk ($dW^{i,P}$).

Given the SDF, under this family owner's risk neutral measure Q^i, the EBIT dynamics becomes

$$\frac{dy^i}{y^i} = \mu_i^F dt + s_i dW^{C,Q_i} + \omega_i dW^{i,Q_i}, \tag{40}$$

where $\mu_i^F = \mu_i^Q - \eta s_i - \lambda_i \omega_i$, $dW^{C,P} = -\eta dt + dW^{A,Q_i}$ and $dW^{i,P} = -\lambda_i dt + dW^{i,Q_i}$.

Therefore for the undiversified family owner, suppressing the superscript i,the cash flow dynamics under her risk neutral measure is given by

$$\frac{dy}{y} = \mu^F dt + \sigma d\bar{W}, \tag{41}$$

where $\sigma^2 = s^2 + \omega^2$ is the total instantaneous cash flow volatility and B is a Brownian motion defined by $\sigma\bar{W} = sW^{C,Q_i} + \omega W^{i,Q_i}$.

While I assume that the founder cannot short sell the firm's equity, arbitrage opportunities in bond and equity markets are ruled out in the equilibrium [26]. If the family firm's cash flows are unaffected by the capital and ownership structures, and given the risk aversion $\mu^F < \mu^Q$, she will have a lower valuation of firm's securities than their ongoing price in the

[26]This will allow us to define an admissible valuation function for the founder.

capital markets. This will induce the owner to sell and exercise the arbitrage opportunities available to her/him, and will completely dispose of the debt and equity in the absence of frictions. Initially, the founder gains diversification benefits from selling securities and as her equity stake reduces, it becomes incentive compatible to divert free cash flow from the firm. However, at some level the founder's utility will start decreasing as she incurs agency cost of equity, deadweight costs due to loss of control and bankruptcy costs. The founder stops issuing financial claims at the point where these marginal benefits and costs perfectly offset each other. At this point optimal ownership and capital structures are achieved.

Since external debt and equity are still owned by perfectly diversified investors, their respective valuations are not affected by founders risk aversion and will remain the same as in the previous section. However, there is a change in founder's *ex-ante* expected utility as the result of incomplete market assumption. Therefore I restate the cash flow component $\mathbf{CF}(y)$, the agency costs of free cash flows, $\mathbf{AC}(y)$ and the amenity potential of control, $\mathbf{AP}(y)$ respectively as

$$\mathbf{CF}(y) \equiv \left[\theta(1-\xi)+\xi\right](1-\tau)\left[\frac{y}{r-\mu^F} - \frac{b}{r} - \left(\frac{b}{r-\mu^F} - \frac{b}{r}\right)\left(\frac{y}{b}\right)^z\right], \tag{42}$$

$$\mathbf{AC}(y) \equiv \left[\xi e^{-\delta\theta} + \frac{1}{2}\phi\xi^2\right](1-\tau)\left[\frac{y}{r-\mu^F} - \frac{b}{r} - \left(\frac{b}{r-\mu^F} - \frac{b}{r}\right)\left(\frac{y}{b}\right)^z\right], \tag{43}$$

$$\mathbf{AP}(y) \equiv \eta(1-e^{-\delta\theta})\left[\frac{y}{r-\mu^F} - \frac{b}{r} - \left(\frac{b}{r-\mu^F} - \frac{b}{r}\right)\left(\frac{y}{b}\right)^z\right], \tag{44}$$

where z is the negative root of the fundamental quadratic for the under-diversified family owner

$$z = \frac{-(\mu^F - \frac{1}{2}\sigma^2) - \sqrt{(\mu^F - \frac{1}{2}\sigma^2)^2 + 2r\sigma^2}}{\sigma^2}. \tag{45}$$

3.1 Optimal ownership and capital structures

Although it has been argued that ownership structure is determined endogenously (Demsetz (1983), Demsetz and Lehn (1985), Demsetz and Villalonga (2001) and Burkart, Panunzi, and Shleifer (2003)), I emphasise the importance of interaction between the ownership and capital structures. My view is that both should be modelled simultaneously, as leverage directly impacts the decision maker's utility. In terms of diversification benefits only, borrowing and equity issuance by the founder act as substitutes. However, they affect the founder's objective function differently. Equity issuance, on one hand increases the optimal amount of diversion while on the other it dilutes the founder's control and increases the deadweight costs of diversion. In contrast, by levering up the founder commits not to expropriate thus increasing the valuation of family firm's equity by the outside investors, the decision of how much equity to issue is directly affected by the borrowing. In addition, since the founder has a claim on residual cash flows of the firm, more borrowing implies that the control rights are immediately transferred to the lenders up to the borrowing level b and thus reduces the amount of amenity potential to be received. Ultimately, the founder will trade-off between retaining the amenity potential of control and diversification benefits against alleviating agency costs of equity.

Given that the model is tractable up to the optimization problem of the founder, I numerically solve for optimal ownership and capital structures and examine the effects of changes in parameters values on the optimal choice of the founder.[27] In doing so I use reasonable parameter estimates consistent with the prior theoretical literature. Comparative statics are presented in Table 1.

Compared to the "Leland" benchmark, my baseline results (in bold) indicate lower market leverage for both good and poor investor protection regimes (25.5% versus 21% and 21.6% respectively). This is despite the fact that leverage has additional diversification benefit. In

[27]Given the smoothness of the objective function, I rely on grid search algorithm to find the value of b and θ that maximize the founder's objective function.

Table 1: Comparative Statics
For base case it is assumed that $r = 4\%$, $\tau = 11.29\%$, $\mu^Q = 1\%$, $\sigma = 25\%$, and $\alpha = 5\%$.

Base	$\phi = 80$			$\phi = 10$		
	b^F	ml^F	θ	b^F	ml^F	θ
Leland	**0.2934**	**0.2557**				
η						
0%	0.2930	0.2554	0.0000	0.2930	0.2554	0.0000
2%	**0.2410**	**0.2101**	**0.3070**	**0.2460**	**0.2156**	**0.8480**
4%	0.1740	0.1516	0.3920	0.1770	0.1541	0.8540
δ						
10	0.2410	0.2101	0.3430	0.2460	0.2156	0.8410
12	**0.2410**	**0.2101**	**0.3070**	**0.2460**	**0.2156**	**0.8480**
26	0.2400	0.2090	0.1820	0.2460	0.2156	0.8480
μ^F						
0.94%	0.2460	0.2148	0.2460	0.2500	0.2294	0.7740
0.96%	**0.2410**	**0.2101**	**0.3070**	**0.2460**	**0.2156**	**0.8480**
0.98%	0.2330	0.2025	0.4670	0.2340	0.2038	0.9240

the regimes with relatively good legal protection the optimal market leverage turns out to be 21% while the optimal family ownership around 31% similar to empirical estimates found in Anderson and Reeb (2003b). It is worth noting, that in the baseline model, the amenity potential of 10% proportional to initial firm value is sufficient to resolve zero-leverage puzzle for the family firms.

While the market leverage does not differ significantly across the investor protection regimes, the optimal family ownership does (30.7% versus 84.8%). In equilibrium, because levering up increases the probability of bankruptcy and therefore reduces the value of net amenity potential, the founder will choose to limit diversion by selling less of the firm's equity. Since the efficiency of the founder's diversion technology is limited by the effectiveness of investor protection, this effect is more pronounced in the regimes with poor investor protection. Overall, the model implies that founder firms in the countries with relatively poor investor protection, or enforcement of legal rules, should on average exhibit higher ownership concentration.

As argued before, the amenity potential of control is likely to vary across families and time. For example, the founder may value family legacy closer to the retirement and therefore I should expect the value of amenity potential to increase in founder's tenure/age. Furthermore, this is likely to be higher than the heir's estimate upon succession. Alternatively, for families with more children I would expect this to be more pronounced.[28] Consistent with the Proposition 2, I document that a 2% increase in η (proportional to initial firm value), reduces the optimal market leverage to approximately 15% across both investor protection regimes. In contrast, if $\eta = 0$ the founder makes an exit and the family firm converges to the Leland firm.

In the baseline specification I assume that the absolute control threshold is 50% ownership, which is modelled by setting $\delta = 12$. That is, the founder can sell up to 50% of

[28]I would also expect that unexpected deaths of family members reduce the value of expected amenity potential.

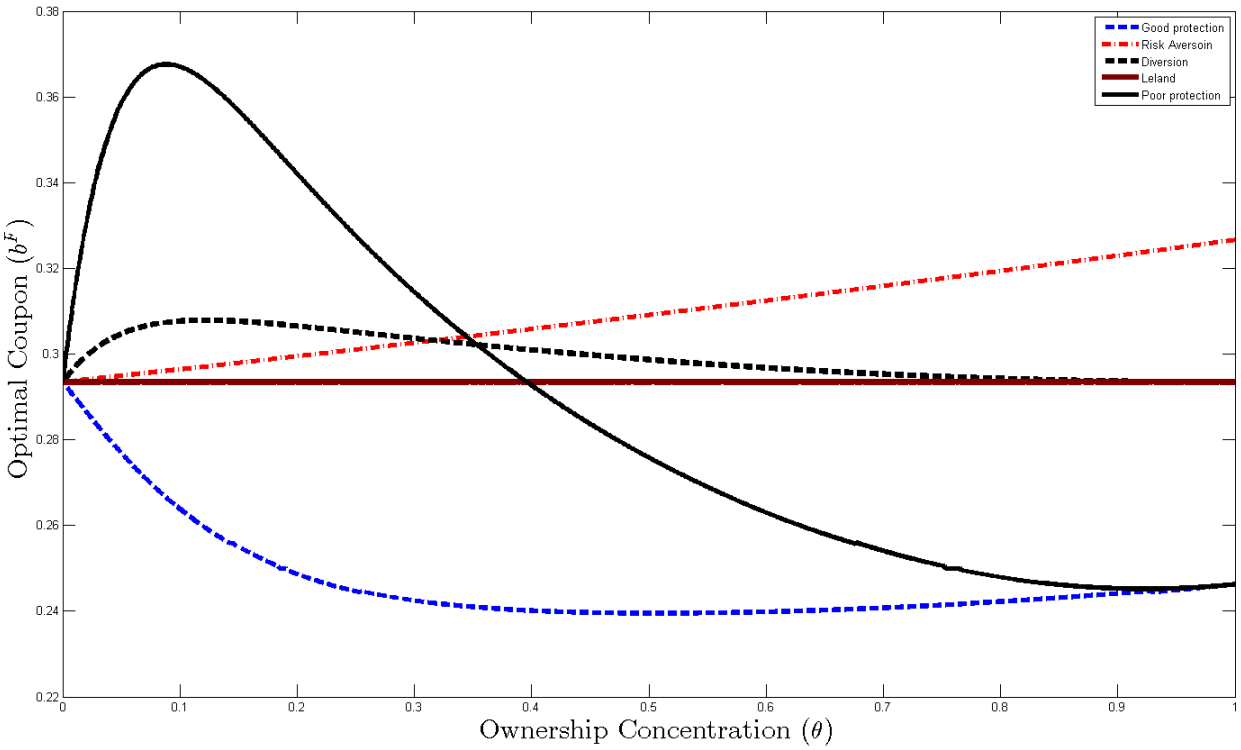
the firm's equity without incurring costs of retaining control. A decrease in the absolute control threshold to 25% of equity, which corresponds to approximately $\delta = 26$, and because I assume that the founder is risk averse the optimal ownership drops to 18.2% in the regime with good investor protection. In contrast, when I assume that absolute control threshold is 75% (U.S. institutional feature), which corresponds to approximately $\delta = 10$, the optimal ownership increases to 34.3%. Intuitively, lower control threshold reduces the costs of control retention which would provides the founder with the opportunity to reduce the ownership concentration without much effect on leverage. That is, the portfolio effect drives the result. Because the reduction in control threshold to 25% or an increase to 75% is off-the-equilibrium path for poor investor protection regime, the optimal ownership is insensitive to any changes in the absolute control threshold.

In the calibration of the model I have assumed that founder is risk averse. A decrease in μ^F, or equivalently an increase in risk aversion, will affect both the optimal leverage and ownership concentration. Specifically, there is an increase in market leverage and decrease in optimal ownership across both investor protection regimes. However, the optimal ownership is more sensitive to changes in risk aversion parameter than optimal leverage. While the leverage provides diversification benefits as in Chen, Miao, and Wang (2010), levering up in my model is costly because it reduces the net amenity potential. In contrast, the costs of control retention increase and optimal diversion decrease when the founder's equity stake is reduced. Overall, the results imply that the diversification benefits of leverage are not very high if the agent derives non-pecuniary benefits which are subject to default.

When the ownership concentration is not constrained, the portfolio effect is dominated by control considerations. In terms of resolving the agency problem, leverage and equity issuance are substitutes mechanisms. While the risk aversion ensures the founder reduces the ownership stake bellow 100%, this reduction may not be large enough to offset the effects of amenity potential. As the degree of risk aversion increases, the founder will substitute away from using equity to control the agency problem in favour of higher leverage. While the

results of this section imply to contradict the results of the previous analysis about the use of leverage as a commitment device, it is worth noting that ownership concentration tends to be sticky over time and the assumption of exogenous ownership concentration may be a better alternative, e.g., in the case of heir's inherited control.

Figure 5: Optimal coupon for any given level of ownership
It is assumed that $r = 4\%$, $\tau = 11.29\%$, $\mu^Q = 1\%$, $\mu^F = 0.96\%$, $\sigma = 25\%$, $\alpha = 5\%$, $\eta = 2\%$, $\delta = 10$, $\phi = 10$ for the poor shareholder protection regime and $\phi = 80$ for the poor shareholder protection regime.



To provide some intuition on what occurs in the model in the presence of risk aversion, I deliberately shut down different components for the exogenously set ownership concentration.

In Figure 4, I show that the optimal coupon for any given θ and confirm that in good (poor) investor protection regimes the optimal leverage can indeed turn out to be substantially lower (higher) than what is predicted by the Leland (1994) model, confirming my previous results. If we only consider the effects of risk aversion, with amenity and diversion effects shut down, the diversification benefits of leverage appear to be approximately linear in ownership concentration of the family owner, and diminishing as the ownership stake falls. This is intuitive as the ownership concentration decreases there is less need for the founder to use leverage in order to complete the market. However, note that scale implies that the diversification benefits are economically significant.

4 Conclusion

The primary purpose of this study is to examine the effects of concentrated ownership and agency costs of equity on the capital structure decision. I show how the interaction between decision maker's control considerations, moral hazard and risk aversion impact financing decisions. In this I follow the previous family firm and capital structure literatures, and provide the analytically tractable framework which makes it possible to generate quantitative predictions on family firm ownership and capital structure decisions under realistic and empirically relevant scenarios.

In my model, the trade-off between amenity potential of control against alleviating the agency costs of equity will have an incremental impact on the capital structure choice of the family founder, over and above tax benefits to leverage and bankruptcy costs. When the amenity potential dominates the agency considerations, the family firm will be optimally under-levered. Moreover, if the amenity potential of control is sufficiently large, zero leverage may be observed. These results hold even in the case when risky debt provides diversification benefits to the family owner. In contrast, if the agency problem dominates, the founder may choose higher leverage in order to commit not to expropriate outside shareholders. In

addition, the strength of investor protection has the ability to determine the severity of the trade-off faced by family founder, as it affects the (endogenous) amount of diversion. When the investor protection is good, amenity potential of control is likely to dominate the trade-off implying that in the developed countries we should observe relatively lower leverage for family firms. In contrast, in the countries with relatively poor investor protection we should observe higher leverage ratios for the family firms.

Therefore, my model is able to reconcile some of the conflicting empirical evidence on leverage ratios of family firms not only across firms, but also across different investor protection regimes. Second, I complement the literature on low-leverage and zero-leverage puzzles by showing that once the control consideration of the dominant shareholders are considered, I am able to generate low/zero leverage even in the case where debt has a diversification benefit. In addition I complement the theoretical capital structure literature by showing that the ownership concentration can have an impact on capital structure decision, which is sufficient to generate a wide dispersion in leverage ratios, inclusive of zero leverage. Third, I complement the small but emerging literature on the effects of incomplete markets on controlling shareholder's corporate policies, providing a more tractable alternative to Chen, Miao, and Wang (2010).

5 Appendix

5.1 Calibration - Base parameter values

Variable	Description	Estimate
α	Bankruptcy cost.	5%
δ	Control cost parameter.	12
η	Amenity benefits of control.	2 %
θ	Insider ownership stake.	Exogenous
ξ	Diversion technology.	Endogenous
ϕ	Strength of investor protection.	80
τ	Miller's effective tax rate.	11.29%
r	Risk-free rate.	4%
σ	Cash flow volatility.	25%

For the numerical analysis, I use a grid search algorithm and solve the optimization problem for each of the 1000 points in the interval $\theta \in [0, 1]$.

5.2 Consumption Growth and Stochastic Discount Factor

I assume an exogenous aggregate consumption growth process under the physical probability measure (P)[29]

$$\frac{dC}{C} = g_C dt + \sigma_C dW^{A,P}, \tag{46}$$

where $dW^{A,P}$ is the aggregate shock to the consumption growth process. Investors are modeled in the representative agent framework with the following power utility function

$$U(C) = \frac{C^{1-\gamma}}{1-\gamma}. \tag{47}$$

[29]To preserve tractability, I assume the consumption growth process is the "optimal"consumption path derived from the agent's utility maximization problem that I abstract away from. See Chen (2010), Bhamra, Kuehn, and Strebulaev (2010a) and Bhamra, Kuehn, and Strebulaev (2010b) for a similar treatment.

Hence, the stochastic discount factor (SDF) is given by

$$M_t = e^{-\beta t} C_t^{-\gamma}, \tag{48}$$

where β is the subjective discount rate. Applying Ito's formula to equation (48) and substituting in the consumption dynamics, we obtain

$$\frac{dM}{M} = -r dt - \psi dW^{A,P}, \tag{49}$$

where $r = \beta + \gamma g_C - \frac{1}{2}\gamma(\gamma+1)\sigma_C^2$ is the equilibrium risk-free rate and $\psi = \gamma\sigma_C$ is the market price of (aggregate) risk.

Unlike perfectly diversified investors, family owner i's consumption growth process under the physical probability measure (P) is assumed to be exposed to both the aggregate shock and an idiosyncratic shock

$$\frac{dc_i}{c_i} = g_i dt + \sigma_C dW^{C,P} + \sigma_i dW^{i,P}, \tag{50}$$

where $\sigma_i dW^{i,P}$ models the family owner's idiosyncratic risk exposure (hence the superscript i) that arises from her substantial stake in her firm (firm i).

The family owners' preference is represented by the same utility function. Specifically, family owner i's utility function is

$$U(c_i) = \frac{c_i^{1-\gamma}}{1-\gamma}, \quad \forall i \in \mathcal{I}^F. \tag{51}$$

Her stochastic discount factor is

$$m_{i,t} = e^{-\beta t} c_{i,t}^{-\gamma}. \tag{52}$$

Applying Ito's formula to equation (52) and substituting in the consumption dynamics, we

obtain

$$\frac{dm_i}{m_i} = -r_i dt - \psi dW^{A,P} - \lambda_i dW^{i,P}, \tag{53}$$

where $r_i = \beta + \gamma g_i - \frac{1}{2}\gamma(\gamma+1)\sigma_C^2 - \frac{1}{2}\gamma(\gamma+1)\sigma_i^2$, $\psi = \gamma\sigma_C$ is the market price of (aggregate) risk, and $\lambda_i = \gamma\sigma_i$ is her specific price of non-diversified idiosyncratic risk.

To rule out arbitrage opportunities in risk-free bond market, I impose the following condition

$$r_i = r, \quad \forall i,$$

which can be reduced to assume

$$g_C = g_i - \frac{1}{2}(\gamma+1)\sigma_i^2, \quad \forall i.$$

Hence, we can rewrite the dynamics of an individual family owners stochastic discount factor as

$$\frac{dm_i}{m_i} = -r dt - \psi dW^{A,P} - \lambda_i dW^{i,P}. \tag{54}$$

Last, I discuss the mechanisms that prevent arbitrage opportunities in corporate bond and equity markets in the main text.

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