# Control Motivations and Firm Growth*

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**Abstract**

Using data on a large panel of European firms, we investigate whether blockholders' control motivations affect firm growth through their influence on financing decisions. Theoretical work has already established that debt has different effects on control rights compared to equity. We use family blockholding as our laboratory since these blockholders tend to show higher preferences to keep a tighter grip on firm control. We estimate a structural model of control, financing decisions, and managerial effort in a setting with corporate taxation, costly bankruptcy, adverse selection, and agency issues to explain the differential growth of family-owned firms compared to non-family owned firms. The structural model allows us to disentangle control motivations from the other frictions of importance. We find that family ownership has a negative impact on firm growth because of the private value attached to control: in a counterfactual scenario where control has no private value, the firm grows 1.54 times more than in the estimated model. Family control also makes the firm riskier in equilibrium by inducing higher leverage. We rule out the capital productivity and profitability hypotheses as potential explanations. Overall, our results are consistent with the view that since family control does not significantly improve performance, the founder's reluctance to issue equity to keep control generates a deadweight loss for the economy.

**Keywords**: firm growth, corporate control, investments, family firms, blockholdings

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*"... the slogan 'small is beautiful' is not only false, but it creates an illusion of tranquillity that stops any urgency of change."*

**Leonardo Del Vecchio (founder and chairman of Luxottica), interview with Federico Rubini, *Corriere della Sera*, December 2021**

# 1 Introduction

Evidence from both developed countries (Davis et al. 1998; Maksimovic et al. 2019) and developing ones (Ayyagari et al. 2021; Hsieh and Klenow 2014) finds that firms begin small and, conditional on surviving, experience growth over their lifecycle. Less is known about the reasons that can explain the significant cross-sectional heterogeneity in this size-age profile, specifically why some firms grow faster than others. In this paper we investigate whether firm blockholders' control motivations – that can arise from the private value they attach to their ownership position – limit firm growth through their influence on financing choices. To do so, we use family ownership as the laboratory for our investigation. We ask two questions. First, from a theoretical point of view, how do different ownership types, differing in terms of their control motivations, influence firm growth through the financing choices between equity and debt? Theoretical work has already shown that debt and equity have different effects on firm control (Harris and Raviv 1988; Israel 1991; Stulz 1988). We build on existing work and explore how these financial choices driven by control motivations end up impacting firm growth. Second, from an empirical perspective, in what way the family blockholder's control motivations impact firm growth, after controlling for other firm-level characteristics that may differ between family and non-family firms?

There are several reasons why we investigate this question in the context of family ownership. First, empirical literature shows that family ownership is suited for our investigation because family blockholders, unlike other types of large blockholding, tend to have long-term ownership, sometimes spanning over generations, and high control motivations. A tighter grip over control rights can be explained by the higher preference of founders to keep control within the family when faced with a succession decision rather than employing a professional outside manager (Bennedsen et al. (2007)). These control motivations are unlikely to be found in the case of other types of large blockholders. Second, family firms are the most common model of economic organization around the world (e.g., La Porta et al. 1999; Claessens et al. 2000; Faccio and Lang 2002). Family control has been found to matter in a wide range of decisions and outcomes, such as firm performance, employment, investments, and organizational decisions (e.g., Burkart et al. 2003; Anderson and Reeb 2003; Bennedsen et al. 2007; Ellul et al. 2010) but no systematic evidence exists regarding the important dimension of growth. Given the preeminent position of family firms in many countries, their growth is likely to have broader implications for economy-wide outcomes.

We begin our analysis by presenting preliminary descriptive evidence showing that family ownership and control is associated with smaller firm size in an international sample of firms. Our source of data is Orbis organized by the Bureau van Dijk, which provides information about corporate shareholders and several economic and financial indicators on a large panel of European firms from France, Germany, Italy and Spain. Our dataset includes approximately 1.307 million firms from 2010 to 2017, for a total of around 5.860 million firm-year observations. The size of the average family-owned firm in our sample is about 2/3 of that of the average non-family owned firm. This size gap is the most notable difference between these two types of firms and is unlikely to be explained by operating performance differences that can proxy for managerial ability. At the same time, the reduced form estimations show that leverage is higher in family firms, consistent with the prediction that blockholders that value control may rely disproportionately more on debt to finance operations.

The difference in size between family and non-family firms can potentially be driven by a number of disparate factors or a combination of the same. Our mechanism is the desire of the founding family to retain firm control that could introduce distortions in the firm's financing decisions and, as a result, limit its growth. However, family firms may also be associated with many other characteristics that may influence growth as well. Family owned firms may suffer from low capital productivity and/or profitability, invest less in innovation, which will naturally limit their growth opportunities. Similarly, family ownership may be more prevalent in low productivity sectors within a country, or more prevalent in less developed capital markets (e.g., where asymmetric information is pervasive and thus more difficult to solve), which would restrict their access to external financing and ability to expand. In other words we need to tease out the impact of the family blockholder's control motivations from other factors that may lead to observational equivalence issues.

It is notoriously difficult to empirically disentangle the control motivation effect from the other factors that affect growth. One would need an exogenous shock to control motivations that does not affect any other factor to establish the link. The only option available to investigate the link of interest is through a structural estimation, allowing us a full spectrum of the counterfactual analysis. Thus, in the second part of the analysis, we estimate a structural model of control and financing decisions to explain the differential growth of family-owned firms compared to non-family owned firms in our sample. Our objective is to infer the significance of each friction described above in determining the financing decisions and growth of family firms. Since each friction calls for different policy measures, quantifying and decomposing their impact on equilibrium outcomes is crucial to guide policy.

We start by proposing a theoretical model, where an entrepreneur (*founder*) is endowed with a risky investment project, which we refer to as her firm. The founder has an initial capital invested in the firm, and raises additional funding in a competitive capital market. She can issue debt and/or equity, in a framework with personal and corporate taxation, bankruptcy costs, asymmetric information, agency issues, and control benefits. The model has only two periods (an initial stage in which the firm is set up and a later stage when its profits realize), so it captures a static notion of growth: the firm's growth is the additional capital the founder raises through external financing (i.e., the issuance of debt and equity). The information asymmetry relates to the quality of the investment, since the founder is privately informed about the distribution of the project's return. The agency issue arises because the founder can exert effort to make the firm more profitable, but her effort is unobservable to investors. Thus, the founder tends to naturally exert too little effort compared to the first-best outcome.

Control rights increase with cash-flow rights: the larger the fraction of the equity cash-flow that goes to the founder, the higher the degree to which she controls the firm. The founder then has to give up some of her control if new shareholders enter the firm. Control has two types of values in our model. First, a higher share of cash flow motivates the founder to exert more effort, moving her choice of effort closer to its socially optimal level. We refer to the sensitivity of the founder's effort to her share of the equity cash-flow as the *social value* of control. Second, the founder enjoys a non-monetary value from controlling the firm, which we refer to as the *private value* of control.

The model generates predictions on how each friction affects the financing decisions of the founder and, as a result, the growth of the firm. The predictions mirror our initial discussion of the different channels. The founder chooses to raise little capital if this is not very productive in the firm's production technology and/or the firm is not profitable. Asymmetric information increases the cost of external financing, especially for equity – similar to the pecking order theory of Myers and Majluf (1984), the pricing of equity is more sensitive to information asymmetry. This increased cost induces the founder to raise low debt and even lower equity.

Both types of control values make the founder reluctant to dilute her control of the firm by issuing equity. Since too much debt is expensive – due to the bankruptcy costs – this reluctance to issue equity distorts the founder's financing decisions and limits her ability to raise capital. The founder's private benefit of control is not priced in by potential outside shareholders, which dissuades the founder from issuing equity. The founder and outside shareholders agree instead on the pricing of the social value of control. However, they anticipate that transferring control from the founder to outside shareholders would reduce this value (since effort would be lower).

The parameters describing the firm's production technology, its profitability, the degree of adverse selection, and both social and private values of control represent unknowns in the structural model. We estimate the model using GMM, which picks the parameter estimates that minimize the distance between relevant moments from actual data and the corresponding moments generated by the model. Under the conditions discussed below, minimizing the distance between model-generated and real-world moments yields consistent estimates of the unknown parameters.

Each friction has a different effect on the moments generated by the model. This allows us to identify and separate them in the data. If the main friction is low profitability or capital productivity, we expect to see unprofitable and unproductive firms in the data. If the problem is asymmetric information, we should see good (bad) firms systematically receiving too much (little) external funding, since these two types of firms are pooled together by investors. A high social value of control leads to highly profitable firms with concentrated ownership. Private benefits of control also lead to concentrated ownership, but have no direct effect on measures of performance.

The structural approach helps to overcome three main empirical challenges. First, the estimation of deep parameters of the economic environment – such as the private and social values of control and the degree of asymmetric information, requires a structural model. Second, while reduced-form techniques allows us to sign the effect of each friction on firms' growth, evaluating their magnitudes also requires a model. Finally, the model allows us to perform counterfactual experiments and quantify the effects on total surplus.

The solutions of the model depend on the initial endowment of the founder. We use the book value of equity in the year a firm appears in our sample as a proxy for its founder's endowment. We then group firms according to their endowment and estimate the model for each group of firms. We begin by fitting the model to the family firms in the median endowment group. The resulting estimates offer the following set of insights.

First, low capital productivity or profitability are unable to explain the lack of family firms' growth in our sample. We use the estimated model to conduct counterfactual analysis. In a scenario where control has neither private nor social value, and there is no information asymmetry, firms grow 3.86 times more than in the estimated model, the founder's share of the equity goes from 100% to 41.68%, and firm value is 3.56 times larger. We also estimate the model on the typical dispersed, non-family firm. The estimates of the technology parameters are very similar to those for the typical family firm. This finding indicates that these two types of firms are not inherently different in terms of fundamentals. Therefore, our analysis suggests that their size gap is due to the different degree of frictions they face (i.e., control and agency issues, and adverse selection).

Second, our estimates reflect a relatively small social value of control: the founder's effort to improve the profitability of the firm accounts for less than 1% of its equity value. This is in line with the mixed reduced-form evidence on the effect of family control on firm performance (e.g., Bennedsen et al. 2007; Belenzon et al. 2017). The presence of social value of control does not change the founder's financing decisions – growth and capital structure are essentially the same in a scenario in which we set the social value of control to zero. The model thus rejects the hypothesis that concentrated ownership and limited growth represent a socially desirable outcome. Since family control does not significantly improve performance, the founder's reluctance (or inability) to issue equity and grow the firm generates a deadweight loss for the economy.

Third, the model supports the presence of both large private benefits of control and information asymmetry. The average firm in our sample behaves as if its founder receives a private benefit from (fully) controlling the firm that amounts to 25.6% of the equity value. In comparison, Albuquerque and Schroth (2010) find an average block premium of 19.6% using data on actual block trades of US companies, and Nicodano and Sembenelli (2004) find an average premium of 27% using data on Italian firms. In a counterfactual scenario where control has no private value, the firm grows 1.54 times more than in the estimated model and the founder holds 57% of the equity (and issues 1.30 times more debt). The increase in equity financing reduces leverage, which in turn makes the firm *safer*: leverage is approximately 10% lower than in the estimated model, and the firm is 11% less likely to go bankrupt. This result has an important implication: family control not only reduces firms' growth, but also makes them riskier in equilibrium by inducing highly levered capital structures.

Information asymmetry has the largest impact on growth among the frictions we consider. The ex-ante value of the average family firm (which has a book value of 334 thousand Euro) in the baseline model is 65% lower compared to a scenario with symmetric information. This loss of value is due to the reduced access to external financing: in the scenario with symmetric information, the firm grows 3.37 times more than in the estimated model (the founder holds 52% of the equity and issues 3.12 times more debt). By contrast, Liu (2019) estimates that the value of the average biotech startup in the US (which has a book value of 222 million US dollars) is 24% lower due to asymmetric information. Perhaps not surprisingly, our results indicate that adverse selection is much more severe for smaller firms, which make up the majority of businesses around the world.

The relative impact of control benefits and asymmetric information on growth is linked to their differential effect on debt. The founder's control benefits do not directly affect the pricing of external financing, so the firm can still issue debt at a fair price when such control benefits are the only friction. Information asymmetry instead increases the cost of *both* equity and debt, ultimately leading to more severe under-funding. Interestingly, we find a similar degree of asymmetric information when we estimate the model on the sample of dispersed, non-family firms. So even though family and non-family firms have similar fundamentals and face a similar degree of adverse selection, family firms grow substantially less due to larger private benefits of control. However, when we switch off the control benefit for the average family firm, the counterfactual growth is similar to the observed growth of the average non-family firm with dispersed ownership. The model thus indicates that the typical founder of a family firm puts a substantially higher value on control than the typical blockholder present in a non-family firm. We find that this difference explains most of the size gap between family and non-family firms.

**Related literature.** Our paper contributes to a growing literature on family firms (for a review, see Villalonga and Amit 2020). The existing literature has mostly focused on documenting and explaining the prevalence and persistence of family firms. However, it has overlooked an important aspect of family firms: they tend to be smaller than non-family firms. In this paper, we explore how family control affects firms' growth by influencing their financing decisions: we develop and estimate a model in which the growth and financing of family firms are jointly determined in equilibrium. The model is flexible enough to include a rich set of frictions, estimate their contribution in explaining the patterns observed in the data, and thus quantify the impact of family control on firms' growth. The model can be used to analyze the implications for welfare and policy.

Despite the broad academic interest in family firms and their importance for the aggregate gross domestic product (GDP), there is a dearth of research on how family control influences firms' growth. Pellegrino and Zingales (2017) argue that the familism in the selection of Italian firms' management has significantly contributed to their inability to take advantage of the ICT revolution and to the observed decline of Italy's total factor productivity in the last 25 years. Morck et al. (2007) find that countries in which inherited wealth accounts for a large fraction of GDP have slower growth than similarly developed countries in which entrepreneurs' self-made wealth is large compared to GDP. Finally, Bertrand and Schoar (2006) document a negative correlation between measures of family values and GDP per capita.

Similarly, only a few papers connect family control to financing decisions. Ellul (2008) shows that family blockholders are associated with higher leverage, especially in countries with higher investor protection (consistently with the private benefits of control channel). Chen et al. (2014) find that the differences in debt maturity and leverage ratios between family and non-family firms are consistent with a higher expropriation of minority shareholders by family firms. Since leverage and ownership structure are *both* endogenously determined in equilibrium (as the outcome of optimal financing decisions), the reduced-form evidence in these papers suffers from an endogeneity problem. The structural approach helps to overcome the endogeneity problem, since it provides a framework to interpret the observed choices of leverage and ownership as the joint outcome of profit-maximizing behavior, and estimate how such choices depend on the economic environment.

The idea that the control benefits of large shareholders may influence firm policies is well-established in the literature. The presence of a large shareholder may have a positive impact on firm value (due to increased monitoring [Admati et al. 1994; DeMarzo and Urošević 2006] or higher reputational incentives [Belenzon et al. 2017]) but also create distortions in their decisions (e.g., in financing and investment decisions [Harris and Raviv 1988; Ellul et al. 2010], and the selection of management [Bennedsen et al. 2007]). The existing papers typically consider positive and negative effects in isolation, while we include both in the same model. This allows us to estimate the overall impact of the most common large shareholder, i.e., a firm's founding family, on multiple dimensions of its performance, such as profitability, growth, and financial risk.

# 2 Data and preliminary evidence

We conduct our empirical analysis on a large panel of European firms. We use data from the Orbis database by the Bureau van Dijk on France, Germany, Italy, and Spain between 2010 and 2017. We collect data from two different Orbis datasets, *Financial Variables* and *Shareholder Identity*. The first dataset contains information about firms' fundamentals. We gather annual data on standard measures of profitability, capital structure, and size. These measures include sales, profits and losses, return-on-assets (ROA), return-on-equity (ROE), short- and long-term debt, tangible, and total assets. The second dataset contains information about firms' ownership structure. We gather information about the largest shareholder's type, identity, block size, if the largest shareholder is also the firm manager, and if the firm is publicly listed or private. Table 1 describes the variables we use in the analysis.

We merge the two datasets using the unique Orbis firm identifier, and we drop firms that do not appear in both datasets. We apply the standard filters to the data: we exclude financial and utility firms, and firms for which the book value of assets is either missing or negative. To reduce the potential impact of outliers in the data, we winsorize the dataset at the 1% level. Our final sample includes 5,860,218 firm-year observations and 1,307,400 unique firms. Next, we describe the descriptive statistics of the data we use in the empirical analysis.

## 2.1 Descriptive Statistics

Table 1 describes the summary statistics for the firms' fundamentals variables. The average size of the firm, that we measure as the book value of the total assets, is slightly lower than 1 million of euro. On average, around 20% of a firm's assets are tangible. The firm size distribution is highly skewed: the median value of the assets is around half of its mean. We use the value of the total assets to scale the total turnover of the firm and its operating profits. Firms display an average sales-to-assets ratio above 1, generate income from their production roughly equal to 4.5% of their assets value, and returns on assets and equity roughly equal to 4.5% and 16%, respectively. We measure firms' growth as the ratio between the book value of total assets and the firm initial endowment, which is calculated as the product between the initial book value of equity and the ownership share of the largest shareholder. The average value of this ratio is 27, though this value is likely driven by a sub-sample of high-growth firms, since the median ratio is only 4.294. The firms in our sample are substantially levered: more than half of their total assets is financed with debt. We compute the firm leverage as the ratio between the book value of debt (the sum of the current liabilities and the long-term debt) and the book value of assets.

[Insert here Table 1]

We summarize the firms' ownership structure in Figure 2. Only a tiny fraction (0.01%) of them is publicly listed, and family firms are predominant in the sample (83.50%). Ownership is generally highly concentrated: (a) in more than 30% of the firms, the largest shareholder owns the entire company; (b) in more than half of the sample, the block size of the largest shareholder is above 50%; and (c) in only 18% of the sample, the stake of the largest shareholder is less than 50%. Finally, the largest shareholder is also the firm's manager in more than 58% of the firms.

[Insert here Figure 2]

Table 2 describes the differences in firms' fundamentals across sub-samples. Family firms are substantially smaller than non-family firms and grow much less than family firms over time. The ratio between the last and the first observed book value of assets is approximately 76.65 in non-family firms but only 16.70 in family firms. Family and non-family firms are very similar in production, profitability, and leverage measures despite this large difference in size and growth. A similar difference in size and growth occurs between concentrated and widely-dispersed firms: the firms with concentrated ownership are significantly smaller than those with dispersed ownership. In this case, however, differences also emerge in production, profitability, and capital structure: firms with concentrated ownership exhibit higher operating income, higher return-on-assets and return-on-equity, and higher leverage. Similarly, firms in which the largest shareholder also runs the company are smaller, grow less, have higher ROA and ROE, and have higher leverage than those in which the largest shareholder is not the manager.

[Insert here Table 2]

### 2.2 Preliminary evidence

This section presents several stylized facts and suggestive evidence that family control affects firms' performance, financing decisions, and growth. The evidence presented here motivates the theoretical framework that we develop and analyze in Section 3.

We investigate how common measures of performance, risk, capital structure, and growth correlate with a firm's type and ownership concentration. For this purpose, we use a simple OLS regression analysis on our panel data. Across all regressions, we employ the same set of covariates. We use dummy variables for family firms, concentrated and fully owned firms, and firms whose manager is related to the controlling family. We also include the fraction of shares owned by the largest shareholder and interaction terms between the dummy variables. Finally, we include country-year fixed effects and control for the log-value of assets and the proportion of the tangible assets, which is standard in the literature. We describe our results below.

First, family firms are associated with better performance as measured by ROA (Table 3). Ownership concentration is associated with higher performance as well: a firm's ROA positively correlates with the stake of its largest shareholder. Firms managed by their largest shareholder are also associated with higher profitability. These results are robust to alternative performance measures, such as ROE and operating income (tables available upon request).

[Insert here Table 3]

Second, we show that family and concentrated firms are associated with higher leverage. A firm's leverage also positively correlates with the stake of its largest shareholder (Table 4). Interestingly, the regression coefficient on the family firms' dummy turns negative when we control for firms who are managed by their largest shareholder. This result suggests that family management is likely to drive the positive relationship between family firms and leverage in the data.

[Insert here Table 4]

Despite their apparent preference for leverage, family firms and firms managed by their largest shareholder seem to be relatively safe: they have lower variance of ROA and lower frequency of losses over time (Tables 5 and 6, respectively). In contrast, ownership concentration is associated with a higher level of performance variability and a larger frequency of operating losses.

[Insert here Tables 5, 6]

Finally, family firms display a lower rate of growth of their sales compared to non-family firms, even after controlling for ownership structure and concentration between ownership and management.

[Insert here Table 7]

# 3 Theoretical framework

Our model features a firm and a competitive capital market. All agents in the model are rational and risk neutral. We first present the details of the model, and then define the equilibrium. We conclude this section with a discussion of the main assumptions of the model.

## 3.1 Model setup

The model consists of two periods, $t \in \{0, 1\}$ and two types of agents: an entrepreneur/founder ($\mathcal{F}$) and investors in a competitive capital market. $\mathcal{F}$ is endowed with a risky investment project, and she has an initial capital $E_{\mathcal{F}}$ invested in the project. We refer to $\mathcal{F}$'s project as her firm.

**Firm technology.** At time $t = 1$, the firm generates operating profits in the amount of

$$\pi \equiv \theta z k^{\gamma}. \tag{1}$$

The capital invested in the firm is $k$ and the productivity of $k$ in the firm's production technology is $\gamma \in (0, 1)$. The random variable $z = \lambda e + \epsilon$ captures the firm's profitability, where $e \in [0, \infty)$ is an hidden action/effort that $\mathcal{F}$ takes at time $t = 1$ to increase $z$, $\lambda$ is the sensitivity of $z$ to the founder's effort, and $\epsilon \sim \mathcal{N}(\mu, \sigma^2)$ captures a random component of $z$. $\mathcal{F}$ incurs a private cost $C(e)$ from exerting effort, with $C' \geqslant 0$, $C'' > 0$, $C'(0) = 0$, and $C'(\infty) = \infty$.

The random variable $\theta \in \{0, 1\}$ captures the type of the founder. Since the firm's profits increase with the realized value of $\theta$, we refer to the type $\theta = 1$ as the *good* type and to the type $\theta = 0$ as the *bad* type. The realization of $\theta$ is $\mathcal{F}$'s private information. Investors' prior beliefs about $\theta$ are given by $\Pr(\theta = 1) = p \in (0, 1]$ and $\Pr(\theta = 0) = 1 - p$.

**Growth and control.** At time $t = 0$, $\mathcal{F}$ can raise additional funds to invest in the firm by issuing debt and/or equity. If $\mathcal{F}$ wants to raise an amount $D$ in debt, she promises to pay an amount $FV$ at time $t = 1$ to debtholders. If she wants to raise an amount $E_O$ in equity, $\mathcal{F}$ promises to give a fraction $1 - \alpha$ of the equity cash flow at time $t = 1$ to shareholders. The values of $FV$ and $\alpha$ are such that both debtholders and shareholders break even in expectation (more on this shortly). The total capital invested in the firm is thus $k \equiv E_{\mathcal{F}} + E_O + D$. We refer to the ratio between the initial capital endowed to $\mathcal{F}$ and $k$ as the firm's growth $g$, where $g \equiv \frac{k}{E_{\mathcal{F}}}$.

Control has both a *social* and a *private* value in our framework. $\mathcal{F}$ extracts a private benefit from controlling the firm. We let $B(\alpha, v)$ denote the monetary equivalent of this private benefit, where $B$ is an increasing function of both its arguments and satisfies $B(\alpha, 0) = B(0, v) = 0$. The assumptions on the shape of $B(\alpha, v)$ embody two main premises of the model. First, control rights increase with cash-flow rights, so that $\mathcal{F}$'s control of the firm increases with her share of the equity cash flow $\alpha$. Second, the benefit of control increases with the market value of equity $v$, so that controlling a more valuable firm gives $\mathcal{F}$ a higher utility. Since effort is neither contractible nor observable, the higher is $\alpha$, the closer is $\mathcal{F}$'s choice of $e$ to its first-best level. This second channel captures the social value of control. Since effort is more sensitive to $\alpha$ when $\lambda$ increases, $\lambda$ parametrizes the social value of control in our model.

**Capital markets.** If the firm defaults on its debt obligation, that is, if $\pi < FV$, debtholders collect the physical assets and cash in the firm for an amount $\pi\chi$, where $\chi < 1$ and $(1 - \chi)\,\pi$ captures the cost of bankruptcy. The risk-free asset earns a pre-tax rate of return $r_f$, and the tax rate on interest income at the personal level is $\tau_i$. Investors thus use $\beta = [1 + r_f(1 - \tau_i)]^{-1}$ as discount rate. The interest rate $r$ such that $FV = (1 + r)D$ is pinned down by the debtholders' zero-profit condition:

$$\Pr(\pi > FV)\,[1 + r(1 - \tau_i)]D + \Pr(0 < \pi \leqslant FV)\,\chi E[\pi \mid 0 < \pi \leqslant FV] = D\beta^{-1}. \tag{2}$$

Investors do not observe $\mathcal{F}$'s realized type. However, $\mathcal{F}$'s capital structure decisions may convey information about her type, so investors incorporate this information when forming their beliefs about $\theta$. The probability distribution for $\pi$ in Eqn. (2) is thus conditional on the investors' *posterior* beliefs about $\theta$ after they have observed $\mathcal{F}$'s choice of $D$ and $E_{\mathcal{O}}$. Investors do not observe $\mathcal{F}$'s choice of effort either; we let $\overline{e}_\theta$ denote their conjecture about a type-$\theta$ founder's effort. The probability distribution in Eqn. (2) is thus also conditional on the conjecture $\overline{\mathbf{e}} \equiv (\overline{e}_0, \overline{e}_1)$.

If the firm does not default, an amount $\pi - FV - T_c$ is distributed to shareholders, where $T_c$ denotes corporate taxes. Following Hennessy and Whited (2007), loss limitations rules are modeled as kinks in the tax schedule. At time $t = 1$, the realized net income of the firm is $(1-\tau_c)(\pi - rD) - D$. We assume that $T_c = \max\{\pi - FV, 0\}$ if $(1 - \tau_c)(\pi - rD) - D \leqslant 0$, where $\tau_c$ denotes the corporate tax rate when income is positive. Otherwise, we have $T_c = \tau_c(\pi - rD)$.

At time $t = 0$, the investors' expectation of the total discounted equity cash-flow is:

$$v \equiv \beta(1 - \tau_i)\Pr(\pi > \underline{\pi})\,\{[E[\pi \mid \pi > \underline{\pi}] - rD]\,(1 - \tau_c) - D\}, \tag{3}$$

where $\underline{\pi} \equiv D[(1 - \tau_c)^{-1} + r]$ is the value of $\pi$ above which the firm's net income is positive. Like before, the probability distribution for $\pi$ in Eqn. (3) is conditional on the investors' posterior beliefs about $\theta$ and their conjectures $\overline{\mathbf{e}}$. Shareholders break even in expectation if $E_{\mathcal{O}} = (1 - \alpha)v$, which implies $\alpha = 1 - \frac{E_{\mathcal{O}}}{v}$. Since $v$ describes the discounted expected value of the equity cash-flow from the perspective of outside investors, it also represents the market value of equity.

**Founder's problem.** Let $v_\theta$ denote the expected discounted value of the equity cash flow from the perspective of a founder of type $\theta$. The expression for $v_\theta$ is equivalent to the expression for $v$ in Eqn. (3) evaluated at the realized value of $\theta$ and the true level of effort $e$. For given posterior beliefs about $\theta$ as a function of the capital structure decisions, conjectures $\overline{\mathbf{e}}$, and a realized type $\theta$, $\mathcal{F}$ faces the following optimization program:

$$\max_{\{E_{\mathcal{O}},D,e\}} u(\theta) \equiv \alpha v_\theta + B(\alpha, v) - C(e), \tag{4}$$

subject to equations (1) to (3), $\alpha = 1 - \frac{E_{\mathcal{O}}}{v}$, $E_{\mathcal{O}} > 0$ only if $E_{\mathcal{O}} \geqslant (1-\alpha)v$, and $E_{\mathcal{O}} = 0$ otherwise.

Figure 1 provides a timeline of the main events in the model. We use Perfect Bayesian Equilibrium (PBE) as the equilibrium concept.

| $\mathbf{t = 1}$ | $\mathbf{t = 2}$ |
|---|---|
| 1. $\mathcal{F}$ privately learns its type $\theta$;<br>2. $\mathcal{F}$ publicly chooses $\{D, E_{\mathcal{O}}\}$;<br>3. $\mathcal{F}$ privately chooses $e$. | 1. Firm profit $\pi$ realizes;<br>2. $\mathcal{F}$ pays investors. |

**Figure 1:** Timeline of the model.

### 3.2 Equilibrium analysis

This section characterizes the equilibrium of the game. We begin with describing $\mathcal{F}$'s choice of effort for a given capital structure $\{D, E_{\mathcal{O}}\}$. We then use the properties of the equilibrium effort to characterize the equilibrium choice of capital structure.

**Effort choice.** For given capital structure $\{D, E_{\mathcal{O}}\}$, investors' beliefs about $\theta$, and conjecture $\overline{\mathrm{e}}$ about effort, a founder of type $\theta$ chooses a level of effort that satisfies the following equation:

$$\alpha \frac{\partial v_\theta}{\partial e} - C'(e) = 0, \tag{5}$$

subject to equations (1) to (3), and $\alpha = 1 - \frac{E_{\mathcal{O}}}{v}$.

The market value of equity $v$ and $\mathcal{F}$'s share of the equity cash-flow $\alpha$ only depend on effort through the investors' conjecture $\overline{\mathrm{e}}$. $\mathcal{F}$ takes this conjecture as given when choosing her effort. It follows that the private value of control $B(\alpha, v)$ does not enter the first-order condition in Eqn. (5), even though it is part of $\mathcal{F}$'s objective function in Program (4).

The equilibrium effort solves Eqn. (5) when the conjecture $\overline{\mathrm{e}}$ is consistent with the play of the game. The following lemma describes the equilibrium effort choices.

**Lemma 1 (Effort choices)** *For a given capital structure $\{D, E_{\mathcal{O}}\}$ and investors' beliefs about $\theta$, an equilibrium of the effort game always exists, and there may be more than one. In equilibrium, we have:*

1. *A bad founder exerts no effort. A good founder exerts a positive level of effort $e^*$ for any $\lambda > 0$, where $e^*$ is such that Eqn. (5) holds at $\theta = 1$ and $\overline{\mathbf{e}} = (0, e^*)$.*
2. *The investors' conjectures are consistent with the equilibrium play, i.e., $\overline{\mathbf{e}} = (0, e^*)$.*
3. *When multiple equilibria occur, all agents have a (weakly) higher payoff in the equilibrium where $e^*$ is the largest.*

The solution to Eqn. (5) depends on the realized type $\theta$, so each type of $\mathcal{F}$ chooses a different value of effort in equilibrium. When $\mathcal{F}$ is a bad type ($\theta = 0$), we have $\pi = 0$ for any $e \in [0, \infty)$ (i.e., $\frac{\partial v_0}{\partial e} = 0$). This type has thus no incentive to exert effort and always chooses $e = 0$. Investors anticipate that a bad type exerts zero effort, so we have $\overline{e}_0 = 0$ in equilibrium.

When $\mathcal{F}$ is a good type ($\theta = 1$), $\frac{\partial v_\theta}{\partial e}$ is positive and is directly proportional to $\lambda$, since the firm's profitability is $z = \lambda e + \epsilon$. A good $\mathcal{F}$ thus chooses a positive level of effort $e^* > 0$ for any $\lambda > 0$. The expressions for $\alpha$ and $\frac{\partial v_1}{\partial e}$ depend on the investors' conjecture $\overline{\mathbf{e}}$. So the value of $e^*$ is the solution to the fixed-point problem in Eqn. (5) when this conjecture is consistent, i.e., when $\overline{\mathbf{e}} = (0, e^*)$.

Eqn. (5) may admit multiple solutions, so we may have multiple equilibria of the effort game, each with a different value of $e^*$. When $e^*$ increases, the market value of equity $v$ goes up. The increase in $v$ leads to a higher share of cash-flow (since $\alpha$ increases with $v$) and more private benefit of control (since both $v$ and $\alpha$ increase) for both types of $\mathcal{F}$. Investors are competitive and always break-even in equilibrium, so they are indifferent across equilibria. When multiple equilibria arise, the one with the largest $e^*$ is thus the Pareto-dominant equilibrium, since it is strictly preferred by both types of $\mathcal{F}$ and weakly preferred by outside investors.[1]

[1]Switching from an equilibrium with low $e^*$ to one with high $e^*$ only affects $\mathcal{F}$ through the change in the investors' conjecture, since $\mathcal{F}$ chooses $e$ optimally for any given conjecture $\overline{\mathbf{e}}$.

**Financing decision.** $\mathcal{F}$'s financing decisions may convey information about her type to investors, so the choice of capital structure represents a signaling game. The following lemma describes an important property of this signaling game.

**Lemma 2 (Financing decisions)** *A bad founder and a good founder choose the same capital structure (i.e., identical values of $D$ and $E_{\mathcal{O}}$) in any equilibrium of the game.*

If investors learn that $\mathcal{F}$ is a bad type ($\theta = 0$), they are not willing to provide funding to the firm (since $\pi = 0$ when $\theta = 0$), so we have $v_1 = v = 0$. A bad $\mathcal{F}$ thus receives a payoff of $0$ in any equilibrium in which investors learn $\theta$ from observing her choice of $\{D, E_{\mathcal{O}}\}$ (*separating equilibria*). A bad type receives instead a positive payoff (through the private benefit $B(\alpha, v)$) whenever investors believe she is a good type with positive probability. A bad $\mathcal{F}$ then has an incentive to deviate and mimic the choice of capital structure of a good type in any candidate separating equilibrium. It follows that the two types of $\mathcal{F}$ must choose the same capital structure in equilibrium, so that investors do not learn any information about $\theta$ (*pooling equilibria*).

The characterization of the equilibrium depend on investors' off-equilibrium path beliefs (i.e., their beliefs about $\theta$ after they observe a capital structure that is different from the equilibrium choice). Such beliefs are arbitrary in a PBE. Depending on the parameters of the model, one may then be able to sustain a given strategy profile $\{D', E'_{\mathcal{O}}\}$ as equilibrium by assuming that investors believe $\theta = 0$ whenever they observe a capital structure different than $\{D', E'_{\mathcal{O}}\}$.

The arbitrarity of off-equilibrium beliefs and the possibility of multiple solutions for the effort equation (Eqn. 5) lead to the possibility of multiple equilibria. We follow the existing literature (e.g., Ueda 2004; Hennessy et al. 2010; Bouvard 2014) and focus on the equilibrium that maximizes the expected payoff of the most profitable type (i.e., type $\theta = 1$). We let a triple $\{D, E_{\mathcal{O}}, e\}$ denote the strategy profile of each type of founder. The following proposition describes the strategy profiles and investors' beliefs in the equilibrium that is preferred by a good type of $\mathcal{F}$.

**Proposition 1** *An equilibrium that maximizes the expected payoff of the most profitable type of founder ($\theta = 1$) always exists and is unique. In this equilibrium, we have:*

1. *A good type of founder ($\theta = 1$) chooses the strategy profile $\{D^{eqm}, E_{\mathcal{O}}^{eqm}, e^{eqm} > 0\}$ that solves Program (4) when $\theta = 1$, investors maintain their prior beliefs about $\theta$, i.e., $\Pr(\theta = G) = p \in (0,1)$ and $\Pr(\theta = B) = 1 - p$, for any observed capital structure $\{D, E_{\mathcal{O}}\}$, and where $e^{eqm}$ is the largest value of $e$ that solves Eqn. (5) when $\theta = 1$ and $\bar{\mathbf{e}} = (0, e)$.*

2. *A bad type of founder ($\theta = 0$) chooses the strategy profile $\{D^{eqm}, E_{\mathcal{O}}^{eqm}, 0\}$.*

3. *Investors maintain their prior beliefs about $\theta$ if they observe a capital structure $\{D^{eqm}, E_{\mathcal{O}}^{eqm}\}$; otherwise (i.e., off-the-equilibrium path), they believe the founder is a bad type. The investors' conjectures about effort are consistent with the equilibrium play, i.e., $\bar{\mathbf{e}} = (0, e^{eqm})$.*

The equilibrium capital structure in Proposition 1 satisfies the following first-order conditions:

$$\alpha \frac{\partial v_1}{\partial E_{\mathcal{O}}} + \underbrace{\frac{\partial \alpha}{\partial E_{\mathcal{O}}} v_1}_{\text{Cash-flow dilution}} + \underbrace{\frac{\partial B}{\partial \alpha}\frac{\partial \alpha}{\partial E_{\mathcal{O}}}}_{\text{Control dilution}} + \underbrace{\frac{\partial B}{\partial v}\frac{\partial v}{\partial E_{\mathcal{O}}}}_{\text{Empire building}} \leqslant 0; \tag{6}$$

$$\alpha \frac{\partial v_1}{\partial D} + \underbrace{\frac{\partial \alpha}{\partial D} v_1}_{\text{Cash-flow dilution}} + \underbrace{\frac{\partial B}{\partial \alpha}\frac{\partial \alpha}{\partial D}}_{\text{Control dilution}} + \underbrace{\frac{\partial B}{\partial v}\frac{\partial v}{\partial D}}_{\text{Empire building}} \leqslant 0, \tag{7}$$

where $\alpha = 1 - \frac{E_{\mathcal{O}}}{v}$, and we have $E_{\mathcal{O}} = 0$ and $D = 0$ if equations (6) and (7) hold strict, respectively.

The choice of capital structure of a good $\mathcal{F}$ is driven by four different considerations, each reflecting one of the terms in equations (6) and (7). The first two terms in both equations capture the effect of increasing each type of funding on the founder's expected cash-flow. Increasing $E_{\mathcal{O}}$ has both a direct and an indirect effect on $\mathcal{F}$'s cash-flow. The term $\alpha \frac{\partial v_1}{\partial E_{\mathcal{O}}}$ captures the direct effect of $E_{\mathcal{O}}$ on the expected cash-flow to equity: the capital invested in the firm and, as a consequence, the firm's profits and equity cash-flow increase with $E_{\mathcal{O}}$. The indirect effect describes instead the dilution of $\mathcal{F}$'s cash-flow rights: when $\mathcal{F}$ issues new equity, her fraction $\alpha$ of the equity cash-flow diminishes, since some of this cash-flow is promised to the new shareholders.

Debt has also both direct and indirect effects on $\mathcal{F}$'s cash-flow. If the equity cash-flow increases with $D$ (i.e., if $\frac{\partial v_1}{\partial D}$ is positive) and the firm issues more debt, investing becomes more attractive for outside shareholders. $\mathcal{F}$ can then sell shares at a more favorable price, and the dilution due to the outside equity $E_{\mathcal{O}}$ decreases with $D$. If $\frac{\partial v_1}{\partial D}$ is negative, the opposite logic applies.

The third term in equation (6) captures the dilution of $\mathcal{F}$'s control that comes with new equity issuance: since control rights increase with cash-flow rights (i.e $\frac{\partial B}{\partial \alpha} > 0$), $\mathcal{F}$ loses some of her control of the firm (and, thus, some of her private benefits) when $E_{\mathcal{O}}$ increases. By the same logic as before, debt also has an effect on control benefits: $D$ affects the price at which $\mathcal{F}$ can sell new shares, and so the dilution of control associated with any given level of outside equity $E_{\mathcal{O}}$.

Finally, since $\mathcal{F}$ enjoys a larger benefit from controlling a more valuable firm, the private value of control introduces also an empire *building motive* for $\mathcal{F}$. If the value of the firm's equity increases with $E_{\mathcal{O}}$, then $\mathcal{F}$ has an additional incentive to increase $E_{\mathcal{O}}$, since she can control a more valuable firm by issuing more equity. Of course, there is a tension between empire building and empire building: when $E_{\mathcal{O}}$ increases $\mathcal{F}$ also dilutes her control of the firm, so the overall effect on $B(\alpha, v)$ is ambiguous. A similar logic applies to an increase in $D$.

# 4 Structural estimation

In this section, we estimate the model described in Section 3 using observed data on firms' financing decisions and performance. The model estimates will allow us to decompose and quantify the impact of each model friction on the growth of the family firms in our sample.

## 4.1 Target Parameters and functional forms

The parameters that identify the main model frictions (i.e., the private and social values of control, and the degree of asymmetric information) and the firm's technology represent unknowns in the structural models. We estimate these parameters using a Generalized Method of Moments (GMM) estimator, which minimizes the distance between model-generated moments and their empirical counterparts computed in the data. If the number of moments is at least equal to the number of unknown parameters, the model is identified, and the GMM yields consistent estimates of the model parameters.

In order to estimate the model, we need to make functional form assumptions for the private benefit of control and the effort cost. For the private benefit, we assume $B(\alpha, v) = b\alpha^2 v$. This functional form embodies two main assumptions. First, $\mathcal{F}$'s private benefit of control increases with the market value of equity $v$. This feature captures the idea that controlling a more valuable firm gives $\mathcal{F}$ a higher utility. It also allows us to express the parameter $b$ that governs the private benefit of control as a percentage of equity value, as is typical in the literature (e.g., Albuquerque and Schroth, 2010). Second, $B(\alpha, v)$ is a convex (quadratic) function of $\alpha$, so that a small stake in the firm gives $\mathcal{F}$ a negligible degree of control, but her control increases steeply with her stake in the firm. For the cost of effort, we assume a quadratic cost function $C(e) = E_{\mathcal{F}}\frac{1}{2}e^2$, where $C(e)$ increases with $E_{\mathcal{F}}$ to capture the idea that running a larger firm is more costly for $\mathcal{F}$.

We target the six parameters that describe the following economic features: the capital productivity ($\gamma$), the mean ($\mu$) and variance ($\sigma$) of the profitability shock; the founder's private benefits of control ($b$); the investors' prior beliefs about the distribution of project types ($p$); and the marginal return of the founder's effort on the firm profitability ($\lambda$). We denote the set of unknown parameters by $\mathbf{\Theta}$; we have:

$$\mathbf{\Theta} = \{\gamma, \mu, \sigma, b, p, \lambda\}. \tag{8}$$

### 4.2 Moments selection

The selection of moments is a key step in estimating a structural model. We select the moments generated by the model that are most sensitive to the structural parameters and are thus informative about the unknown parameters. These moments can also be easily computed on the data and are common in previous empirical studies on corporate policy.

We use firms' ROE and ROA to capture their performance. Since we interpret time-series data through the lens of a static model, we need to slightly adjust the model implied moments to make them consistent with those in the data. We subtract the capital invested in the firm ($k$) from the measures of return on investment, since the model assumes that $k$ is depleted when the project pays out. The two corresponding model-implied moments are as follows:

$$ROE = \frac{E[\pi] - rD - k}{E_{\mathcal{F}} + E_{\mathcal{O}}}; \quad ROA = \frac{E[\pi] - rD - k}{k}. \tag{9}$$

The expectations in equation (9) are conditional on the prior distribution of project types, so we have $E[\pi] = pk^{\gamma}E[z]$ where $z \sim \mathcal{N}(\mu + \lambda e^{eqm}, \sigma^2)$.

We also use the probabilities that the firm generates a negative operating income and that it ends up with negative earnings after paying the interests on debt:

$$\Pr[\pi \leqslant 0] = 1 - p + p\Pr[z < 0]; \quad \Pr[\pi \leqslant rD] = 1 - p + p\Pr[z < rD]. \tag{10}$$

We then select the variance of the sales-to-assets ratio, which is particularly informative about the variance of the profitability shock. The corresponding model-implied moment is the following:

$$\mathrm{Var}[\frac{\pi}{k}] = k^{2(\gamma-1)}[p(\sigma^2 + E[z]^2) - p^2(E[z])^2]. \tag{11}$$

Finally, we gather information on firms' leverage and the ratio between their book value of assets and endowment (the product between the initial book value of equity and the ownership share of the largest shareholder). To be consistent with the model, we consider the first observed data in the sample at the firm level. Both the model-implied leverage and growth, defined respectively as $D/k$ and $k/E_{\mathcal{F}}$, are the outcome of the optimal financing decisions of the founder at time $t = 0$. When taking the model to the data, we thus implicitly assume that the actual data and corresponding moments result from the profit-maximizing behavior of the firm's founder (or largest shareholder) for a given set of parameter values.

We denote by $M_n(\mathbf{\Theta})$ the set of $n$ moment conditions implied by the model, which depend on the vector of unknown parameters $\mathbf{\Theta}$, and we denote by $\mathbf{m_n}$ the vector that includes the $n$ empirical counterparts. The GMM estimator searches for the value of $\mathbf{\Theta}$ that minimizes the following quadratic form:

$$Q(\mathbf{\Theta}) = (\mathbf{m_n} - M_n(\mathbf{\Theta}))' W_n (\mathbf{m_n} - M_n(\mathbf{\Theta})). \tag{12}$$

where $W_n$ is a symmetric weighting matrix of size $n$. In a first-step, we use the identity matrix as the weighting matrix.[2] Since we have six target parameters to estimate and $n$=7, we obtain an over-identified model by one degree of freedom.

[2]Guvenen (2009) shows that a minimum distance estimator that weighs moments with an identity matrix is asymptotically consistent and normal.

### 4.3 Identification and strategy

Each friction has a different effect on the moments generated by the model. This allows us to identify and separate them in the data. If the main friction is low profitability ($\mu$) or capital productivity ($\gamma$), we expect to see unprofitable and unproductive firms in the data, with little use of external financing (since low $\mu$ and low $\gamma$ reduce the founder's incentives to raise capital).

If the main issues is the degree of asymmetric information (i.e., a low $p$), we should see good (bad) firms systematically receiving too much (little) external funding, since these two types of firms are pooled together by investors. Asymmetric information also create a preference for debt financing, since the pricing of equity is more sensitive to adverse selection.

A high social value of control leads to highly profitable firms with concentrated ownership. Private benefits of control also lead to concentrated ownership, but have no direct effect on measures of performance. Notice that while asymmetric information reduces the level of debt good firms can raise (since they are undervalued by debt-holders), control benefits do not.

The key implication for identifying the model parameters is that while each friction limits firms' growth, it also has differential effects on the other observable variables. So we can use the observed financing decisions and firms' performance to estimate our model.

Another important prediction of the model is that the ownership structure is irrelevant for the founder in the absence of control motives and adverse selection. In this case, the optimal financing decisions revolve only around an optimal capital and a target leverage ratio, as she is indifferent between internal and external equity. The critical implication is that the initial size of the firm, and in particular the founder's endowment, affects the financing decisions of the founder when frictions are in place. Consequently, we need to control for the initial endowment of the firm when estimating the model. We do so by splitting the sample into deciles according to the initial endowment of the firm, where we define the firm-specific initial endowment as the difference between the book value of the assets and debt at the first observed data. Our approach is analogous to the estimation strategy of Hennessy and Whited (2007), who split their sample by size and find large differences in terms of cost of external funds between small and large firms.

In addition, we further split the sample according to three different ownership structures (fully owned, concentrated, and dispersed) and two types of management (family management, external management). As a result, we form clusters of homogeneous firms by size, ownership structure, and management type, and we estimate the vector of unknown parameters at the cluster level: we compute the sample moments at the cluster level and we assume that firms within a cluster share the same set of model parameters.

# 5 Estimation Results

We present our main estimation results in Table 8. These results are obtained from estimating the model on the median family firm (i.e., the fifth decile of initial endowment) with concentrated ownership and whose manager is related to the founding family. Estimates for the entire set of clusters of initial endowments are described in the Appendix.

We report the model parameter estimates, a breakdown of the model fit, and a set of model-generated economic quantities implied by the parameter estimates.

[Insert here Table 8]

## 5.1 Model fit

We match particularly well the growth observed in the data: the model-implied ratio between the overall capital raised by the founder and the initial endowment is 4.891, which is very close to the average ratio computed in the data. The model fits also well the performance measures. The ROA and ROE implied by the parameter estimates (0.0582 and 0.2840, respectively) are in line with those observed in the data (0.0602 and 0.2648, respectively). Moreover, the model-implied variance of the sales-to-capital ratio is similar to the within-cluster variance of the total sales scaled by the book value of the assets.

We tend to overestimate the firm leverage. Our model estimates yield an optimal leverage equal to roughly 0.79, while the observed average leverage is around 0.67. As a consequence, we also tend to overestimate the probability of operating loss (17.99%) and probability of default

(26.35%), which are both higher compared to the observed frequency of operating losses (9.17%) and negative earnings (19.62%).

### 5.2 Parameter estimates and implications

Our estimates of $\mu$ and $\gamma$ imply that the firm generates expected operating income roughly equal to 471 euro per 100 euro of capital invested. The elasticity of the expected income with respect to capital ($E\left[\frac{\partial \pi}{\partial k}\right] = \mu g k^{g-1}$) is equal to 4.17. The point estimate of $\sigma$ corresponds to a standard deviation of the operating income equal to 349 euro per 100 euro invested, which implies an expected income of 1.39 per unit of variability of the profitability shock.

The founder enjoys private benefits from controlling the firm that are equivalent to 25.61% of the market value of equity. This means that the founder values the firm approximately one quarter more than the market because of control benefits. This number is in line with Albuquerque and Schroth (2010), who find that controlling blocks of shares are traded with an average premium of 19.62%, and with Nicodano and Sembenelli (2004), who document that the average per-share price in the block in Italy is 27.4% higher than the post-transaction market price. Our estimate of control motives is sizeable: the control premium accounts for roughly 33 thousand euros out of an initial endowment of approximately 64 thousand.

We find evidence of substantial asymmetric information between the founder and outside investors. The point estimate of $p$ indicates that outside investors value a firm with a good project 10.14% less than its true equity value. This measure of under-pricing is analogous to the empirical evidence about IPO under-pricing documented by Banerjee et al. (2011) for continental European countries. The estimated deadweight loss of asymmetric information is remarkable. The optimal financing decisions by the founder under asymmetric information lead to a firm value of around 30% of the firm value one would obtain in a market with symmetric information.

We do not find evidence of a significant contribution of the founder to the firm performance. The social value of control, defined as the increase in profitability due to the founder's effort, accounts for only 0.8% of firm value.

# 6 Counterfactual analysis

The purpose of our counterfactual analyses is two-fold. First, we want to disentangle the effect of each friction on the growth and financing decisions of the firm. We do so by ruling out one friction at a time from the estimated model, and computing firms' growth and capital structure in each scenario. This also allows us to quantify the contribution of each friction to the limited growth of the firm. Second, we use the estimated model to test the policy implications of our results.

We present our results in Table 9, in which we compare the counterfactual financing decisions and growth in each scenario with those implied by the parameter estimates (i.e., *Baseline*).

[Insert here Table 9]

When we switch off control benefits (i.e., when we set $b$=0 in the estimated model and compute the new equilibrium outcomes), the founder is willing to raise external equity through equity issuance. So she dilutes her ownership stake from 100% (in the baseline) to 57.6% (in the model with $b = 0$). When the founder raises external equity, she raises more debt, since the larger equity works as collateral and lowers the interest rate on debt. As a result, the firm grows 1.54 times more than in the baseline. The firm is less levered overall (due to the increase in equity financing) and less risky: the probability of going bankrupt drops from 26.32% (in the baseline) to 23.73%. Therefore, family control not only reduces firms' growth, but also makes them riskier in equilibrium by inducing highly levered capital structures.

The effect of information asymmetry on growth is the largest among the frictions. The adverse selection strongly reduces the ability of the founder to obtain external financing, *both* debt and equity. In the scenario with symmetric information (i.e., $p = 1$), the founder holds 52% of the equity, issues 3.12 times more debt, and the firm grows 3.37 times more than in the baseline. The differential effect of control benefits and asymmetric information on growth is linked to their differential effect on debt. Control benefits do not directly affect the pricing of the firm value so that the firm can raise debt at a fair price when control motives are the only friction.

The firm's capital structure and growth do not change significantly when the founder's effort has no effect on the firm's profitability (i.e., when we set $\lambda = 0$). An important implication is that the model leads to reject the hypothesis that concentrated ownership and limited growth represent a socially desirable outcome, since family control does not seem to significantly improve firm value.

Finally, we test the impact of separating cash-flow rights and control rights (e.g., using dual-class shares). We set $B(\alpha, v) = bv$ in the estimated model and compute the new equilibrium outcomes so that the founder enjoys private benefits of control *even if* she dilutes her stake in the firm. In this scenario, the founder chooses to hold only 14.53% of the equity. Compared to the scenario of zero control benefits, the founder now raises relatively more equity than debt. The firm is then substantially less levered (0.389) and is 30% less likely to go bankrupt (i.e., the default probability drops from 26.32% to 20.23%).

# 7 Conclusion

In this paper we investigate whether firm blockholders' control motivations limit firm growth through their influence on financing choices. Theoretical work has already shown that debt and equity have different effects on firm control. We build on this existing work and explore how these financing choices driven by control motivations end up impacting negatively on firm growth. To do so, we use family ownership as the laboratory for our investigation.

We start by proposing a theoretical model, where an entrepreneur (founder) is endowed with a risky investment project and has control rights. Control has two types of values: first, a higher share of cash flow motivates the founder to exert more effort, moving her choice of effort closer to its socially optimal level (social value of control); second, the founder enjoys a non-monetary value from controlling the firm (private value of control). The founder has to give up some of her control if new shareholders enter the firm. Both types of control values make the founder reluctant to dilute her control of the firm by issuing equity. Since too much debt is expensive – due to the bankruptcy costs – this reluctance to issue equity distorts the founder's financing decisions and limits her ability to raise capital and finance growth.

We estimate the model using data from a large sample of firms, mostly private ones, operating in France, Germany, Italy and Spain. The structural model allows us to disentangle control motivations from the other frictions of importance. We find that in a scenario where control has neither private nor social value, and there is no information asymmetry, firms grow 3.86 times more than in the estimated model, the founder's share of the equity goes from 100% to 41.68%, and firm value is 3.56 times larger. Importantly, family ownership has a negative impact on firm growth because of the private value attached to control: in a counterfactual scenario where control has no private value, the firm grows 1.54 times more than in the estimated model.

Family control also makes the firm riskier in equilibrium by inducing higher leverage. We rule out the capital productivity and profitability hypotheses as potential explanations. Overall, our results are consistent with the view that since family control does not significantly improve performance, the founder's reluctance to issue equity to keep control generates a deadweight loss for the economy

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# A Proofs

## A.1 Proof of Lemma 1

When $\theta = 0$, we have $\pi = 0$ for any $e \in [0, \infty)$, so that $\frac{\partial v_0}{\partial e} = 0$. This type has thus no incentive to exert effort and always chooses $e = 0$. Investors anticipate that a bad type exerts zero effort, so we have $\bar{e}_0 = 0$ in equilibrium. When $\theta = 1$, $\frac{\partial v_\theta}{\partial e}$ is positive and is directly proportional to $\lambda$, since the firm's profitability is $z = \lambda e + \epsilon$. At $e = 0$, we have $\frac{\partial v_\theta}{\partial e} > C'(0) = 0$. It follows that $e = 0$ cannot satisfy Eqn. (5) and, thus, we must have $e > 0$ in equilibrium when $\mathcal{F}$ is a good type.

Since $C'(\infty) = \infty$ and $\frac{\partial v_\theta}{\partial e}$ is finite for any value of $e \in [0, \infty)$, we have instead $\frac{\partial v_\theta}{\partial e} < C'(\infty)$ when $e = \infty$. Since both $\frac{\partial v_\theta}{\partial e}$ an $C'(e)$ are continuous function of $e$, and given that we have $\frac{\partial v_\theta}{\partial e} > C'(e)$ at $e = 0$ and $\frac{\partial v_\theta}{\partial e} < C'(e)$ and $e = \infty$, there exists a value of $e'$ such that $\frac{\partial v_\theta}{\partial e} = C'(e')$ by the Intermediate Value Theorem. Therefore, an equilibrium value of effort $e^*$ always exists.

Since Eqn. (5) may admit multiple solutions, we may have multiple equilibria of the effort game. The direct effect of switching across equilibria is zero for $\mathcal{F}$, since we have $\frac{\partial u_1}{\partial e} = 0$ by the optimality condition in Eqn. (5). The indirect effect reflects the change in $\mathcal{F}$'s payoff due to the change in the investors' conjecture $\bar{e}_1$. We have $\frac{\partial v}{\partial \bar{e}_1}$ and, thus, $\frac{\partial u_1}{\partial \bar{e}_1} > 0$. It follows that the expected payoff of both types of $\mathcal{F}$ is higher in the equilibrium with the largest $e^*$.

## A.2 Proof of Lemma 2

If investors learn that $\theta = 0$, they are not willing to provide funding to the firm (since $\pi = 0$ when $\theta = 0$), so we have $v_1 = v = 0$. A bad $\mathcal{F}$ thus receives a payoff of $0$ in any equilibrium in which investors learn $\theta$ from observing her choice of $\{D, E_{\mathcal{O}}\}$. A bad type receives instead a positive payoff (through the private benefit $B(\alpha, v)$) whenever investors believe she is a good type with positive probability. A bad $\mathcal{F}$ then has an incentive to deviate and mimic the choice of capital structure of a good type in any candidate separating equilibrium. It follows that the two types of $\mathcal{F}$ must choose the same capital structure in equilibrium, so that investors do not learn any information about $\theta$. Therefore, we can restrict our attention to pooling equilibria.

## A.3 Proof of Proposition 1

The derivative of the firm's profits with respect to the capital $k$ is $\frac{\partial \pi}{\partial k} = k^{\gamma-1}E[\theta z]$. Since $\gamma < 1$, we have $\lim_{k\to\infty} \frac{\partial \pi}{\partial k} = 0$. Without loss of generality, we can thus restrict our attention to attention to a compact set of capital choices $k \in (0, \overline{k}]$, where $\overline{k} < \infty$ (see Hennessy and Whited 2007).

The capital invested in the firm is $k = E_{\mathcal{F}} + E_{\mathcal{O}} + D$, so the founder chooses a capital structure $\{D, E_{\mathcal{O}}\}$ such that $k \in (E_{\mathcal{F}}, \overline{k}]$. Since the set of capital choices is compact, and $\pi$ is a continuous function of $k$, there always exists a solution to Program (4) by the Extreme value theorem, for any investors' beliefs about $\theta$ and conjectures about effort $\overline{\mathbf{e}}$.

Since $\{D^{eqm}, E_{\mathcal{O}}^{eqm}\}$ solves Program (4) when $\theta = 1$, $\overline{e}_1$ is evaluated at the largest equilibrium value $e^*$ and investors maintain their prior beliefs about $\theta$ for any given choice of $\{D, E_{\mathcal{O}}\}$, the triple $\{D^{eqm}, E_{\mathcal{O}}^{eqm}, e^{eqm} > 0\}$ is unique and is the preferred equilibrium for a good type of $\mathcal{F}$.

Finally, the investors' off-equilibrium path belief that $\theta = 0$ whenever they observe a choice of capital structure different than $\{D^{eqm}, E_{\mathcal{O}}^{eqm}\}$ is sufficient to sustain the equilibrium strategies described in Proposition 1.

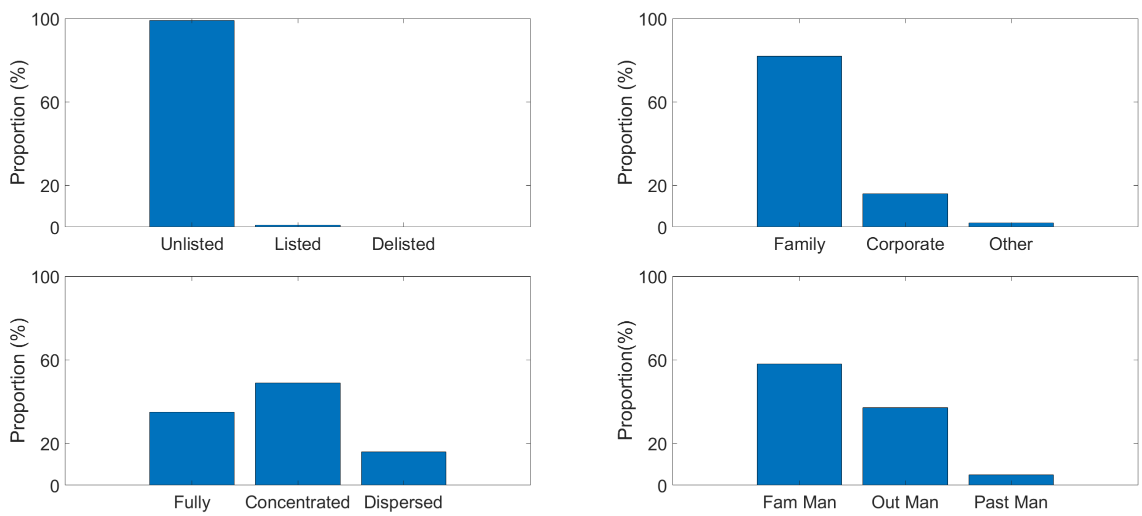


**Figure 2:** The figure shows the proportion of firms belonging to the sub-samples based on the following criteria: Current listing status of the firm: *Listed*, if the firm is publicly listed on an official stock exchange, *Delisted*, if the firm was publicly listed on an official stock exchange in the past, and *Unlisted* otherwise (Top-left panel); Largest shareholder's type: *Family*, if the largest shareholder is either an individual or a family; *Corporate*, if the largest shareholder is a company, and *Other* otherwise (Top-right panel); Largest shareholder's ownership stake: *Fully*, if the size of largest shareholder's ownership stake is 100%, *Concentrated*, if the size of largest shareholder's ownership stake is larger than 50% and smaller than 100%, and *Dispersed*, if the size of largest shareholder's ownership stake is smaller than 50% (Bottom-left panel); Identity of firm manager: *Fam Man*, if the largest shareholder is also the manager of the company, *Out Man*, if the largest shareholder has never been the manager of the company, and *Past man* if the largest shareholder was the manager of the company in the past (Bottom-right panel).

**Table 1: Summary Statistics : Full Sample**

The table reports summary statistics on the final sample of data described in Section 2. Data are from Orbis by the Bureau van Dijk and cover the period 2010-2017. We report statistics about the following variables: *Total Assets*, the book value of the total assets; *Tangible Assets*, the ratio between the book value of the tangible assets and the book value of the total assets; *Sales*, the ratio between the total amount of the company sales and the book value of the total assets; *Profits*, the ratio between the operating income and the book value of the total assets; *ROA*, the Return on Assets computed using the firm profits & losses before taxes; *ROE*, the Return on Equity (ROE) computed using the firm profits & losses before taxes; *Leverage*, the ratio between the book value of debt and the book value of the assets, where the book value of the debt is the sum of the current liabilities and the long-term debt; *Growth (Sales)*, the annual growth rate of the company sales computed as the log difference between two subsequent annual observations of the total amount of company sales; *Growth (Size)*, the ratio between the initial book value of total assets and the firm initial endowment, defined as the product between the initial book value of equity and the ownership share of the largest shareholder. We report the mean and standard deviation, the 10-th, 50-th, and 90-th percentiles. $N$ is the number of firm-year observations. Data are on annual basis.

| | Mean | St. Dev. | p10 | Median | p90 | N |
|---|---|---|---|---|---|---|
| Total Assets | 948957 | 1062778 | 85667 | 572917 | 2341529 | 5857901 |
| Tangible Assets | 0.215 | 0.268 | 0 | 0.093 | 0.673 | 5857901 |
| Sales | 1.250 | 1.454 | 0.017 | 1.023 | 2.623 | 5857901 |
| Profits | 0.045 | 0.085 | -0.031 | 0.027 | 0.159 | 5857901 |
| ROA | 4.465 | 8.541 | -3.140 | 2.670 | 15.890 | 5857901 |
| ROE | 15.896 | 30.439 | -13.550 | 11.040 | 56.550 | 5857901 |
| Leverage | 0.544 | 0.276 | 0.125 | 0.579 | 0.888 | 5599433 |
| Growth (Sales) | 0.028 | 0.652 | -0.366 | 0.003 | 0.436 | 4122883 |
| Growth (Size) | 27.050 | 4343 | 1.499 | 4.294 | 20.479 | 1232583 |

**Table 2: The Average Firm: Sub-Samples**
The table reports summary statistics on sub-samples of data described in Section 2. Data are from Orbis by the Bureau van Dijk and cover the period 2010-2017. We group the firms using the following criteria: (i) *Size*, the book value of the total assets; (ii) *Status*, the current listing status of the firm; (iii) *Type*, the largest shareholder's type identified by the Orbis dataset; (iv) *Ownership*, the size of the largest shareholder's ownership stake; (v) *Management*, the identity of the firm manager. For each group, we classify the firms, respectively, using the following sub-samples: (i) quartiles of total assets; (ii) *Listed*, if the firm is publicly listed on an official stock exchange, and *Unlisted* otherwise; (ii) *Family Firms*, if the largest shareholder is either an individual or a family, and *Non-Family* firms otherwise; *Fully*, if the size of largest shareholder's ownership stake is 100%, *Concentrated*, if the size of largest shareholder's ownership stake is larger than 50% and smaller than 100%, and *Dispersed*, if the size of largest shareholder's ownership stake is smaller than 50%; *Family Manager* if the largest shareholder is either an individual or a family and is also the manager of the company, and *Non-Family Manager* otherwise. We report the average value of the variables. Variables are described in Table 1. *Proportion* is the number of firms belonging to each sub-sample divided by the total number of firms in the final sample. Data are on annual basis.

| | Total Assets | Tangible Assets | Sales | Profits | ROA | ROE | Leverage | Growth (Sales) | Growth (Size) | Proportion |
|---|---|---|---|---|---|---|---|---|---|---|
| **Size Class** | | | | | | | | | | |
| 0 - 25pct | 211522 | 0.156 | 1.414 | 0.021 | 0.039 | 0.141 | 0.511 | 0.054 | 15.16 | 0.25 |
| 25 - 50pct | 561012 | 0.215 | 1.309 | 0.031 | 0.047 | 0.174 | 0.565 | 0.028 | 19.09 | 0.25 |
| 50 - 75pct | 1293752 | 0.246 | 1.165 | 0.029 | 0.043 | 0.158 | 0.554 | 0.016 | 34.85 | 0.25 |
| 75 - 100pct | 9569540 | 0.242 | 1.015 | 0.029 | 0.043 | 0.150 | 0.535 | 0.018 | 46.82 | 0.25 |
| **Status** | | | | | | | | | | |
| Unlisted | 949004 | 0.214 | 1.249 | 0.028 | 0.045 | 0.159 | 0.544 | 0.028 | 27.05 | 99.99 |
| Listed | 2659013 | 0.067 | 1.129 | 0.035 | 0.039 | 0.121 | 0.482 | 0.079 | 12.93 | 0.01 |
| **Type** | | | | | | | | | | |
| Family | 880136 | 0.220 | 1.244 | 0.045 | 0.045 | 0.161 | 0.579 | 0.027 | 16.70 | 83.50 |
| Non-Family | 1298364 | 0.185 | 1.276 | 0.045 | 0.045 | 0.149 | 0.575 | 0.030 | 76.65 | 16.50 |
| **Ownership** | | | | | | | | | | |
| Fully | 867592 | 0.217 | 1.361 | 0.032 | 0.047 | 0.172 | 0.571 | 0.037 | 14.22 | 30.38 |
| Concentrated | 981476 | 0.207 | 1.236 | 0.028 | 0.045 | 0.161 | 0.542 | 0.026 | 19.92 | 51.58 |
| Dispersed | 1126436 | 0.233 | 1.098 | 0.024 | 0.039 | 0.132 | 0.508 | 0.016 | 73.92 | 18.05 |
| **Management** | | | | | | | | | | |
| Family Manager | 882745 | 0.215 | 1.284 | 0.046 | 0.046 | 0.171 | 0.555 | 0.032 | 15.54 | 58.02 |
| External Manager | 1040475 | 0.214 | 1.201 | 0.042 | 0.042 | 0.142 | 0.529 | 0.022 | 42.46 | 41.98 |

**Table 3: Preliminary Evidence: Profitability**
The table reports results from OLS regression using data described in Section 2. Data are from Orbis by the Bureau van Dijk and cover the period 2010-2017. The dependent variable is the Return on Assets (ROA) computed using the firm profits & losses before taxes. The independent variables are: *Family*, a dummy variable equal to 1 if the largest shareholder is either an individual or a family, and zero otherwise; *Share*, the percentage of outstanding shares held by the largest shareholder; *Fully*, a dummy variable equal to 1 if the size of the largest shareholder's ownership stake is 100%, and zero otherwise; *Concentrated*, a dummy variable equal to 1 if the size of the largest shareholder's ownership stake is larger than 50% and smaller than 100%, and zero otherwise; *Family Manager*, a dummy variable equal to 1 if the largest shareholder is either an individual or a family and is also the manager of the company, and zero otherwise. We also consider interaction variables. We control for the book value of the total assets and the book value of the tangible assets. All the regressions include country and year-fixed effects. $N$ is the total number of firm-year observations. We report in parentheses standard errors and ***,**,* over the regression coefficients denote statistical significance at the 0.1%, 1%, and 5% significance levels, respectively. Data are on annual basis.

| | Return on Assets | | | | | | |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| **Family** | 0.621*** | 0.752*** | | 0.729*** | 0.738*** | | 0.086*** |
| | (0.010) | (0.010) | | (0.009) | (0.010) | | (0.011) |
| **Share** | | 1.050*** | 0.347*** | | | | |
| | | (0.013) | (0.015) | | | | |
| **Family*Share** | | | 0.008*** | | | | |
| | | | (0.000) | | | | |
| **Fully** | | | | 0.591*** | 0.902*** | 0.276*** | |
| | | | | (0.008) | (0.011) | (0.015) | |
| **Concentrated** | | | | | 0.419** | -0.137** | |
| | | | | | (0.009) | (0.016) | |
| **Family*Fully** | | | | | | 0.707*** | |
| | | | | | | (0.015) | |
| **Family*Conc** | | | | | | 0.627** | |
| | | | | | | (0.014) | |
| **Family Manager** | | | | | | | 0.776*** |
| | | | | | | | (0.008) |
| **(log)-Asset** | Y | Y | Y | Y | Y | Y | Y |
| **Tangibility** | Y | Y | Y | Y | Y | Y | Y |
| **Country** | Y | Y | Y | Y | Y | Y | Y |
| **Year** | Y | Y | Y | Y | Y | Y | Y |
| **Constant** | Y | Y | Y | Y | Y | Y | Y |
| **R2** | 0.033 | 0.038 | 0.038 | 0.038 | 0.039 | 0.039 | 0.034 |
| **N** | 5,860,218 | 5,860,218 | 5,860,218 | 5,860,218 | 5,860,218 | 5,860,218 | 5,860,218 |

**Table 4: Preliminary Evidence: Leverage**

The table reports results from OLS regression using data described in Section 2. Data are from Orbis by the Bureau van Dijk and cover the period 2010-2017. The dependent variable is the book leverage computed as the ratio between the book value of debt and the book value of the assets. The book value of the debt is the sum of the current liabilities and the long-term debt. The independent variables are: *Family*, a dummy variable equal to 1 if the largest shareholder is either an individual or a family, and zero otherwise; *Share*, the percentage of outstanding shares held by the largest shareholder; *Fully*, a dummy variable equal to 1 if the size of the largest shareholder's ownership stake is 100%, and zero otherwise; *Concentrated*, a dummy variable equal to 1 if the size of the largest shareholder's ownership stake is larger than 50% and smaller than 100%, and zero otherwise; *Family Manager*, a dummy variable equal to 1 if the largest shareholder is either an individual or a family and is also the manager of the company, and zero otherwise. We also consider interaction variables. We control for the book value of the total assets and the book value of the tangible assets. All the regressions include country and year-fixed effects. *N* is the total number of firm-year observations. We report in parentheses standard errors and ***,**,* over the regression coefficients denote statistical significance at the 0.1%, 1%, and 5% significance levels, respectively. Data are on annual basis.

| | **Leverage** | | | | | | |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| **Family** | 0.014*** | 0.023*** | | 0.020*** | 0.021*** | | -0.006*** |
| | (0.000) | (0.000) | | (0.000) | (0.000) | | (0.000) |
| **Share** | | 0.076*** | 0.048*** | | | | |
| | | (0.001) | (0.001) | | | | |
| **Family*Share** | | | 0.034*** | | | | |
| | | | (0.000) | | | | |
| **Fully** | | | | 0.035*** | 0.063*** | 0.025*** | |
| | | | | (0.000) | (0.000) | (0.001) | |
| **Concentrated** | | | | | 0.037** | 0.030** | |
| | | | | | (0.001) | (0.001) | |
| **Family*Fully** | | | | | | 0.046*** | |
| | | | | | | (0.000) | |
| **Family*Conc** | | | | | | 0.008** | |
| | | | | | | (0.001) | |
| **Family Manager** | | | | | | | 0.028*** |
| | | | | | | | (0.000) |
| **(log)-Asset** | Y | Y | Y | Y | Y | Y | Y |
| **Tangibility** | Y | Y | Y | Y | Y | Y | Y |
| **Country** | Y | Y | Y | Y | Y | Y | Y |
| **Year** | Y | Y | Y | Y | Y | Y | Y |
| **Constant** | Y | Y | Y | Y | Y | Y | Y |
| **R2** | 0.027 | 0.033 | 0.031 | 0.031 | 0.032 | 0.033 | 0.029 |
| **N** | 5,601,703 | 5,601,703 | 5,601,703 | 5,601,703 | 5,601,703 | 5,601,703 | 5,601,703 |

**Table 5: Preliminary Evidence: Risk (Variance)**
The table reports results from cross-sectional OLS regression using data described in Section 2. Data are from Orbis by the Bureau van Dijk and cover the period 2010-2017. The dependent variable is the firm-specific variance of the Return on Assets (ROA) computed using the firm profits & losses before taxes. The book value of the debt is the sum of the current liabilities and the long-term debt. The independent variables are: *Family*, a dummy variable equal to 1 if the largest shareholder is either an individual or a family, and zero otherwise; *Share*, the percentage of outstanding shares held by the largest shareholder; *Fully*, a dummy variable equal to 1 if the size of the largest shareholder's ownership stake is 100%, and zero otherwise; *Concentrated*, a dummy variable equal to 1 if the size of the largest shareholder's ownership stake is larger than 50% and smaller than 100%, and zero otherwise; *Family Manager*, a dummy variable equal to 1 if the largest shareholder is either an individual or a family and is also the manager of the company, and zero otherwise. We also consider interaction variables. We control for the book value of the total assets and the book value of the tangible assets. All the regressions include country and year-fixed effects. *N* is the total number of firm-year observations. We report in parentheses standard errors and ***,**,* over the regression coefficients denote statistical significance at the 0.1%, 1%, and 5% significance levels, respectively. Data are on annual basis.

| | ROA Variance | | | | | | |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| **Family** | -0.169*** | -0.147*** | | -0.151*** | -0.151*** | | -0.293*** |
| | (0.011) | (0.010) | | (0.011) | (0.011) | | (0.013) |
| **Share** | | 0.200*** | 0.383*** | | | | |
| | | 0.015 | 0.017 | | | | |
| **Family*Share** | | | -0.002*** | | | | |
| | | | (0.000) | | | | |
| **Fully** | | | | 0.011*** | 0.141*** | 0.435*** | |
| | | | | (0.009) | (0.012) | (0.017) | |
| **Concentrated** | | | | | 0.347*** | 0.054*** | |
| | | | | | (0.011) | (0.018) | |
| **Family*Fully** | | | | | | -0.373** | |
| | | | | | | (0.013) | |
| **Family*Conc** | | | | | | -0.021** | |
| | | | | | | (0.013) | |
| **Family Manager** | | | | | | | 0.177 |
| | | | | | | | (0.009) |
| **(log)-Asset** | Y | Y | Y | Y | Y | Y | Y |
| **Tangibility** | Y | Y | Y | Y | Y | Y | Y |
| **Country** | Y | Y | Y | Y | Y | Y | Y |
| **Year** | Y | Y | Y | Y | Y | Y | Y |
| **Constant** | Y | Y | Y | Y | Y | Y | Y |
| **R2** | 0.032 | 0.033 | 0.033 | 0.033 | 0.033 | 0.033 | 0.033 |
| **N** | 1,073,111 | 5,860,218 | 5,860,218 | 5,860,218 | 5,860,218 | 5,860,218 | 5,860,218 |

**Table 6: Preliminary Evidence: Risk (Loss Probability)**
The table reports results from cross-sectional OLS regression using data described in Section 2. Data are from Orbis by the Bureau van Dijk and cover the period 2010-2017. The dependent variable is the firm-specific relative frequency of negative profits (i.e., losses) observed over the sample time-series. The independent variables are: *Family*, a dummy variable equal to 1 if the largest shareholder is either an individual or a family, and zero otherwise; *Share*, the percentage of outstanding shares held by the largest shareholder; *Fully*, a dummy variable equal to 1 if the size of the largest shareholder's ownership stake is 100%, and zero otherwise; *Concentrated*, a dummy variable equal to 1 if the size of the largest shareholder's ownership stake is larger than 50% and smaller than 100%, and zero otherwise; *Family Manager*, a dummy variable equal to 1 if the largest shareholder is either an individual or a family and is also the manager of the company, and zero otherwise. We also consider interaction variables. We control for the book value of the total assets and the book value of the tangible assets. All the regressions include country and year-fixed effects. $N$ is the total number of firm-year observations. We report in parentheses standard errors and ***,**,* over the regression coefficients denote statistical significance at the 0.1%, 1%, and 5% significance levels, respectively. Data are on annual basis.

| | **Pr(Loss)** | | | | | | |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| **Family** | -0.239*** | -0.189*** | | -0.252*** | -0.253*** | | -0.142*** |
| | (0.002) | (0.002) | | (0.001) | (0.002) | | (0.002) |
| **Share** | | -0.262*** | 0.065*** | | | | |
| | | (0.001) | (0.002) | | | | |
| **Family*Share** | | | -0.003*** | | | | |
| | | | (0.000) | | | | |
| **Fully** | | | | -0.066*** | -0.166*** | 0.065** | |
| | | | | (0.001) | (0.002) | (0.002) | |
| **Concentrated** | | | | | -0.135*** | 0.078** | |
| | | | | | (0.002) | (0.003) | |
| **Family*Fully** | | | | | | -0.266*** | |
| | | | | | | (0.002) | |
| **Family*Conc** | | | | | | -0.243*** | |
| | | | | | | (0.002) | |
| **Family Manager** | | | | | | | -0.143*** |
| | | | | | | | (0.003) |
| **(log)-Asset** | Y | Y | Y | Y | Y | Y | Y |
| **Tangibility** | Y | Y | Y | Y | Y | Y | Y |
| **Country** | Y | Y | Y | Y | Y | Y | Y |
| **Year** | Y | Y | Y | Y | Y | Y | Y |
| **Constant** | Y | Y | Y | Y | Y | Y | Y |
| **R2** | 0.033 | 0.033 | 0.033 | 0.033 | 0.033 | 0.033 | 0.033 |
| **N** | 5,836,853 | 5,860,218 | 5,860,218 | 5,860,218 | 5,860,218 | 5,860,218 | 5,860,218 |

**Table 7: Preliminary Evidence: Growth (Sales)**
The table reports results from OLS regression using data described in Section 2. Data are from Orbis by the Bureau van Dijk and cover the period 2010-2017. The dependent variable is the annual growth rate of the company sales computed as the log difference between two subsequent annual observations of the total amount of company sales. The independent variables are: *Family*, a dummy variable equal to 1 if the largest shareholder is either an individual or a family, and zero otherwise; *Share*, the percentage of outstanding shares held by the largest shareholder; *Fully*, a dummy variable equal to 1 if the size of the largest shareholder's ownership stake is 100%, and zero otherwise; *Concentrated*, a dummy variable equal to 1 if the size of the largest shareholder's ownership stake is larger than 50% and smaller than 100%, and zero otherwise; *Family Manager*, a dummy variable equal to 1 if the largest shareholder is either an individual or a family and is also the manager of the company, and zero otherwise. We also consider interaction variables. We control for the book value of the total assets and the book value of the tangible assets. All the regressions include country and year-fixed effects. $N$ is the total number of firm-year observations. We report in parentheses standard errors and ***,**,* over the regression coefficients denote statistical significance at the 0.1%, 1%, and 5% significance levels, respectively. Data are on annual basis.

| | Sales Growth | | | | | | |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| **Family** | -0.045*** | -0.045*** | | -0.045*** | -0.045*** | | -0.055*** |
| | (0.001) | (0.001) | | (0.001) | (0.001) | | (0.001) |
| **Share** | | 0.001 | 0.046** | | | | |
| | | (0.001) | (0.001) | | | | |
| **Family*Share** | | | -0.001*** | | | | |
| | | | (0.000) | | | | |
| **Fully** | | | | -0.004*** | -0.002*** | 0.042** | |
| | | | | (0.001) | (0.001) | (0.001) | |
| **Concentrated** | | | | | -0.008*** | 0.034** | |
| | | | | | (0.001) | (0.001) | |
| **Family*Fully** | | | | | | -0.049*** | |
| | | | | | | (0.001) | |
| **Family*Conc** | | | | | | -0.046*** | |
| | | | | | | (0.002) | |
| **Family Manager** | | | | | | | 0.013 |
| | | | | | | | (0.001) |
| **(log)-Asset** | Y | Y | Y | Y | Y | Y | Y |
| **Tangibility** | Y | Y | Y | Y | Y | Y | Y |
| **Country** | Y | Y | Y | Y | Y | Y | Y |
| **Year** | Y | Y | Y | Y | Y | Y | Y |
| **Constant** | Y | Y | Y | Y | Y | Y | Y |
| **R2** | 0.033 | 0.033 | 0.033 | 0.033 | 0.033 | 0.033 | 0.033 |
| **N** | 4,124,801 | 4,124,801 | 4,124,801 | 4,124,801 | 4,124,801 | 4,124,801 | 4,124,801 |

**Table 8: Estimation Results: Median Firm**

The table reports results from the model estimation using data described in Section 2. Data are from Orbis by the Bureau van Dijk and cover the period 2010-2017. We split the firms into deciles based on initial size. For each decile, we estimate the model by minimizing the (weighted) distance between model-generated moments and corresponding data moments using a (over-identified) GMM estimator. The model-generated moments and corresponding data moments moments are described in Section 4.2. We report here the estimation results for the fifth size decile of firms with both concentrated ownership structure and concentration between ownership and management: the point estimates of the model parameters described in Section 4.1 with standard errors within parentheses; the model-generated moments obtained using the point estimates of the model parameters and the corresponding data moments, and the root mean squared error (RMSE) as overall fit of the model; a set of model-implied economic quantities computed using the point estimates of the model parameters: the *Control Premium* ($b\alpha^2 v_\theta$, the nominal value attributed to the control of the firm by the founder expressed in Euro), the *Deadweight Loss* ($\frac{v_\theta|p=p}{v_\theta|p=1}$, the ratio between the equity value under asymmetric information and the equity value under symmetric information), the *Social Value* of control ($\frac{v_\theta|\lambda=\lambda}{v_\theta|\lambda=0}$, the surplus in the equity value generated by the founder's effort compared to the value of the equity when the founder does not exert effort to run the firm). Data are on annual basis.

| Parameter Estimates | | Moments | Model | Data | Economic Implications | |
|---|---|---|---|---|---|---|
| $\gamma$ | 0.884<br>(0.004) | ROA | 0.0582 | 0.0602 | Control Premium | 33,017 |
| $\sigma$ | 5.960<br>(0.515) | ROE | 0.2840 | 0.2648 | Deadweight Loss | 69.31% |
| $\mu$ | 8.048<br>(0.604) | Sales Variance | 1.4079 | 1.3487 | Social Value | 1.0081 |
| $b$ | 0.256<br>(0.132) | Pr(Loss) | 0.1799 | 0.0917 | | |
| $p$ | 0.899<br>(0.039) | Pr(Def) | 0.2635 | 0.1962 | | |
| $\lambda$ | 0.320<br>(0.057) | Size Growth | 4.891 | 4.888 | | |
| | | Leverage | 0.7959 | 0.6757 | | |
| | | RMSE | 0.1753 | | | |

**Table 9: Counterfactual Analysis : Median Firm**
The table reports results from the counterfactual exercises using the model estimation results presented in Section 5.2. In this exercise, we compute a set of model-implied quantities in different scenarios: the *Baseline*, that is the complete model described in Section 3.1 using the parameter estimates reported in Table 8; the *Zero control benefits*, where we assume that the founder does not extract control benefits from the control of the firm ($b$=0); the *Symmetric Information*, where we assume that outside investors observe the firm type ($p$=1); the *Zero social value*, where the founder does not exert effort to run the firm ($\lambda$=0); the *All Above*, in which we set $b$=0, $p$=1, and $\lambda$=0; the *Separation between cash-flow and control rights*, in which we allow the founder to enjoy control benefits regardless her ownership share. In each scenario, we let the founder make optimal financing decisions and then compute the size growth, the ownership share of the founder, the amount of external equity and debt raised by the founder, the leverage and probability that the firm generates negative earnings. We also determine the value of the firm in each scenario.

| | Growth | Ownership | External Equity | Debt | Leverage | Pr(Def) | Firm Value |
|---|---|---|---|---|---|---|---|
| Baseline | 4.885 | 100% | 0 | 264,163 | 0.795 | 26.32% | 407,630 |
| b = 0 | 7.539 | 57.60% | 99,482 | 345,082 | 0.673 | 23.73% | 606,189 |
| p = 1 | 16.469 | 51.26% | 227,840 | 823,799 | 0.736 | 14.51% | 1,291,249 |
| $\lambda$ = 0 | 4.885 | 100% | 0 | 264,163 | 0.795 | 26.44% | 405,065 |
| All Above | 18.864 | 41.63% | 331,323 | 883,169 | 0.688 | 13.83% | 1,450,777 |
| $B(\alpha, v) = bv_\theta$ | 14.742 | 14.58% | 543,478 | 390,751 | 0.389 | 20.23% | 1,098,334 |

**Table 10: Estimation Results: Deciles**

The table reports results from the model estimation using data described in Section 2. Data are from Orbis by the Bureau van Dijk and cover the period 2010-2017. We split the firms into deciles based on initial size. For each decile, we estimate the model by minimizing the (weighted) distance between model-generated moments and corresponding data moments using a (over-identified) GMM estimator. The model-generated moments and corresponding data moments moments are described in Section 4.2. We report here the point estimates of the model parameters described in Section 4.1 for firms with both concentrated ownership structure and concentration between ownership and management (*Conc*) and for firms with widely dispersed ownership (*Disp*). For each decile, We also report the root mean squared error (RMSE) as overall fit of the model. Data are on annual basis.

| | $\gamma$ | | $\sigma$ | | $\mu$ | | $b$ | | $p$ | | $\lambda$ | | $RMSE$ | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Conc | Disp | Conc | Disp | Conc | Disp | Conc | Disp | Conc | Disp | Conc | Disp | Conc | Disp |
| Decile | | | | | | | | | | | | | | |
| 3 | 0.87 | 0.86 | 7.09 | 8.52 | 8.23 | 8.16 | 0.09 | | 0.91 | 0.94 | 0.38 | | 0.11 | 0.11 |
| 4 | 0.89 | 0.89 | 5.91 | 5.70 | 7.25 | 7.38 | 0.19 | | 0.91 | 0.87 | 0.50 | | 0.16 | 0.09 |
| 5 | 0.88 | 0.89 | 5.96 | 5.45 | 8.05 | 7.76 | 0.26 | | 0.90 | 0.84 | 0.32 | | 0.18 | 0.13 |
| 6 | 0.89 | 0.89 | 5.64 | 5.09 | 7.80 | 8.31 | 0.20 | | 0.85 | 0.79 | 0.61 | | 0.29 | 0.17 |
| 7 | 0.90 | 0.89 | 5.79 | 5.80 | 6.98 | 7.26 | 0.20 | | 0.89 | 0.91 | 0.52 | | 0.43 | 0.24 |
| 8 | 0.90 | 0.91 | 5.77 | 3.58 | 6.91 | 6.44 | 0.20 | | 0.90 | 0.82 | 0.49 | | 0.57 | 0.24 |