Control Motivations and Firm Growth*

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Abstract

This paper investigates how the control motivations of large shareholders affect firm growth through their influence on financing decisions. We use family blockholding as our laboratory since these blockholders have strong preferences to keep a tight grip on firm control. Using data on a large panel of European private firms, we estimate a structural model of firm control, financing decisions, and managerial effort in a setting with corporate taxation, costly bankruptcy, adverse selection, and agency issues to explain why firms with a control-motivated blockholder grow less compared to firms without such type of shareholders. The structural model allows us to disentangle control motivations from other frictions of importance. Our estimates indicate that family blockholders' reluctance to issue equity and dilute control explains 66% of the growth differential between firms with control-motivated blockholders and those without in our sample.

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

JEL Classification: G31, G32, L25, L26

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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 of Luxottica), *Corriere della Sera*, December 2021

"... too much debt, too little capital, too small, too many relatives at the head of the company."

Maurizio Ricci (journalist at *La Repubblica*), *Riparte l'Italia*, June 2020

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, however, 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 the control motivations of large shareholders – that may arise from the private value these shareholders attach to their ownership position – limit firm growth through their influence on financing decisions.

Existing theoretical work has shown that debt and equity have different effects on firm control (Harris and Raviv 1988; Israel 1991; Stulz 1988), so that the control motivations of large shareholders create distortions in firms' financing decisions. We build on this work and explore how such distortions to financing choices impact firm growth. Our objective is to estimate the impact of control motivations on firm growth, after controlling for other firm-level characteristics that may differ between firms with different degrees of control motivations and that may influence growth.

As the laboratory for our investigation, we use family ownership as a proxy for blockholders with control motivations. We do so for two reasons. First, empirical literature shows that 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 stronger preference of founders to keep control within the family – rather than employing a professional outside manager – when faced with a succession decision (Bennedsen et al. 2007). In other words, family blockholders, especially founders, may receive utility from passing firm control to their children. 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). Given the preeminent position of family firms in many countries, their growth is likely to have broader implications for economy-wide outcomes. Family control has been found to influence 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; Franks et al. 2012). However, there is no systematic evidence regarding the impact of family control on the important dimension of firm growth.

Our source of data is the Orbis database by Bureau Van Dijk, which provides information about corporate shareholders and several economic and financial indicators on a large panel of European firms. We construct a balanced, matched sample of family and non-family firms from France, Germany, Italy, Spain, and the UK. We use approximately 33 thousand unique private firms and 300 thousand firm-year observations. We begin our analysis by showing that family firms grow less and their growth is less sensitive to economic fundamentals compared to non-family firms, despite family firms having have higher returns on capital and lower risk. The reduced form estimates also 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.

This difference in growth between family and non-family firms can be driven by a number of disparate factors. Our hypothesis is that the desire of the founding family to retain control introduces distortions in the firm's financing decisions and, as a result, limit its growth. However, family firms may be associated with other characteristics that curb their growth. For example, family-owned firms may suffer from low capital productivity, low profitability, and invest less in innovation. These characteristics would naturally limit their growth opportunities and, eventually, their growth in the long-term. Similarly, family ownership may be more prevalent in countries with 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. Stated differently, we need to tease out the impact of the family blockholder's control motivations from other factors that may lead to observational equivalence issues.

Disentangling the effect of control motivations from other factors that may affect firm growth is challenging. To establish the link in a reduced-form estimation, one needs an exogenous shock to control motivations that does not affect any other factor of importance. The other option is to conduct a structural estimation, which allows the full spectrum of counterfactual analysis. 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 ones 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 is crucial to guide policy.

In the model, 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 asymmetric information, agency issues, and control benefits. The model has an initial stage in which the firm is set up, and a later stage when its profits realize. As such, it captures a static notion of growth, which relates to the additional capital the founder raises by issuing debt and equity. The founder is privately informed about the distribution of the project's return, so there is information asymmetry with outside investors. The agency issue arises because the founder can exert effort to make the firm more profitable, but her effort is unobservable to investors.

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 and issue equity. Since too much debt is expensive – due to 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, but they also anticipate that transferring control from the founder to outside shareholders would reduce such value (since effort would then 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, which allows us to identify and separate them in the data. 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 allow 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.

We begin with estimating the model on family and non-family firms. The starkest difference in the estimates relates to the private value of control: the typical family firm behaves as if its founder receives a private benefit from controlling the firm that amounts to around 11% of its equity value. We find no evidence of such value in non-family firms. By comparison, Albuquerque and Schroth (2010) estimate a structural model of control premium using observed block trades of US companies. They find that, on average, the controlling shareholder extracts private benefits equal to 10% of the market value of its stake. Our results are also in line with the average control benefits estimated by Dyck and Zingales (2004) across continental European countries (around 13%).

The second largest difference is in the estimates of the recovery rate: the recovery rate is around 48% in non-family firms and only about 6% in family firms. This suggests that family firms are associated with less efficient bankruptcy procedures. The effort of the controlling shareholder is slightly more productive in family firms. Yet, even for these firms, it only amounts to a negligible fraction of firm profitability (0.2%). So, overall, we find little evidence of the social value of control in our structural estimations. The other parameter estimates are similar across family and non-family firms. Family firms face slightly less adverse selection, but their profitability is slightly lower and more volatile, and capital is marginally more productive in non-family firms.

Next, we show that the differences in control motivations alone explain 66% of the observed growth differential between family and non-family firms. In a counterfactual scenario where the founder does not receive any private benefit from control, the typical family firm raises 72% more capital as in the estimated model: The founder dilutes her control and issues equity; the increase in equity works as collateral, which allows the firm to raise more debt and further boosts its growth. Even if debt is higher, the firm is still less levered overall compared to the estimated model, and thus safer. The remaining 42% of the growth differential between family and non-family firms is explained by the differences in fundamentals described above. Overall, our estimates suggest that control-motivated shareholders limit firm growth, without significantly improving performance.

Contributions. Our paper contributes to a large literature on the impact of ownership on firm outcomes. The idea that the control benefits of such 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 it may 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.

We also contribute to a growing literature on family firms (for a review, see Villalonga and Amit 2020). 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. We try to fill this gap and explore how family control affects firms' growth by influencing their financing decisions.

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, the reduced-form evidence in these papers suffers from an endogeneity problem. The structural approach in our paper 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 optimal financing decisions, and estimate how such choices depend on the economic environment.

2 Data and suggestive evidence

This section describes the data we use in our empirical analyses. We begin by describing how we constructed our dataset and its descriptive statistics. We then present suggestive evidence that family firms have stronger preferences for control, and that family ownership impacts firm growth and other firm outcomes. The evidence presented in this section motivates the structural estimation exercise we conduct in the remainder of the paper.

2.1 Sample construction

We conduct our empirical analysis on a panel of European private firms. We collect information about firms located in France, Germany, Italy, Spain, and the UK, between 2003 and 2020, from the Orbis database by Bureau Van Dijk. We gather data about the country and sector a firm operates in, its year of incorporation, balance sheet, and income statement, and construct traditional measures of firms' profitability, capital structure, and growth. We apply the following filters to our initial sample. We exclude financial and utility firms, and firms with a year of incorporation prior to 2003, and only consider firms with at least six years of consecutive, non-missing data. The filtering procedure yields a sample of 182,258 unique firms and 1,494,077 firm-year observations.

We collect information about the five largest shareholders of each company, specifically their identity, block size, and type (i.e., whether a shareholder is an individual, a corporation, or another type of legal entity). Orbis provides information about the identity of the direct shareholders of a company and the ultimate-ownership type of each direct shareholder, since some shareholders may own stakes in a company indirectly through separate legal entities that they control.[1] Data on direct shareholders are generally available over the entire life span of each company, while information about ultimate ownership is only reported for the latest available date. We aggregate the stakes of the direct shareholders of a company who are individuals with the same surname, to capture instances where the family ownership is distributed among multiple family members.

We identify as *family firms* the firms for which, at the year of incorporation, the largest direct

[1]For example, if company B owns a stake in company A, and company B is controlled by an individual C, B is classified as a direct shareholder of company A with ultimate-ownership type 'One or more named individuals or families'.

shareholder (or group of shareholders with the same surname) (i) is classified by Orbis as 'One or more named individuals or families' and (ii) holds more than 50% of the company's share.

We identify as *non-family firms* the firms for which (a) the previous two conditions are not jointly satisfied and (b) the largest shareholder's ultimate-ownership type at the latest available date is not classified as 'One or more named individuals or families.' Condition (b) helps reduce the likelihood of identifying as non-family a firm that, at the year of incorporation, is controlled by an individual or a family through a separate legal entity: since family control is very persistent over time, firms that are not controlled by a family at the most current date are also less likely to be controlled by a family at the year of incorporation. Our qualitative results continue to hold if we remove condition (b) from our classification of non-family firms. The non-family firms in our sample are then either controlled by a legal entity (e.g., another corporation or an institutional investor) that holds more than 50% of the company's equity, or their ownership is split among a group of individuals with different surnames or a combination of individuals and legal entities. We refer to this second type of non-family firms as *widely-held*.

We remove from the sample the firms for which we do not have information about the entire ownership structure at the year of incorporation – that is, firms for which the stakes of the top five direct shareholders do not sum up to 100%. This procedure yields a panel of 139,584 unique firms and 1,131,717 firm-year observations. Table 1 describes the composition of our sample. Family ownership is predominant: 87.35% of the firms in the sample is controlled by a family at the year of incorporation. The prevalence of family ownership is common across countries and is most pronounced in small firms: 92.50% of the smallest 1,000 firms (evaluated at the year of incorporation) is a family firm. The proportion of family firms drops to 59% for firms with an initial size larger than 1 million Euro and 13.50% for the largest 1,000 firms. Tables 2 and 3 describe how ownership evolves over the observation period (more on this in the next section).

Since family ownership is over-represented in our full sample, our regression analyses are conducted on a balanced sample of family and non-family firms. We build this sample by matching each family firm with the most similar non-family firm across four characteristics: initial size, country, year of incorporation, and sector. We use a propensity score matching with a one-to-one nearest neighborhood approach. We exclude firms with an initial size smaller than 10,000 Euro and firms reporting size growth in a year above 1,000%, to reduce measurement errors in the data. Our sample selection strategy yields a final sample of 21,434 unique firms (i.e., 10,717 family firms and 10,717 non-family firms) and 178,083 firm-year observations. Finally, to reduce the potential impact of outliers, we winsorize the dataset at the 1% level. Table 4 describes the composition (Panel A) and summary statistics (Panel B) for our balanced sample.

2.2 Suggestive evidence

This section presents the suggestive evidence that motivates our theoretical framework and structural estimation. First, we provide evidence that family ownership is more persistent over time, which is consistent with our assumption that family blockholders have stronger preferences for control. We then provide evidence that control-motivated shareholders (as proxied by family ownership) are associated with lower firm growth and a stronger preference for debt financing.

2.2.1 Control motivations in family firms

Ownership is generally very concentrated in private firms: in our full sample, at they year of incorporation, the average stake of the largest shareholder is approximately 90% considering all firms, 95% for family firms, and 82% for non-family firms (Table 2). Ownership is significantly more persistent in family firms than non-family firms: we observe a change in the controlling shareholder between the year of incorporation ($t = 0$) and the latest available date ($t = T$) in only 15.62% of family firms, compared to 38.68% of non-family firms. The largest shareholder of the company is the same individual at both $t = 0$ and $t = T$ in 80.10% of the firms, and a different individual with the same surname in 4.40% of the firms (Table 3, Panel A).

The typical acquirer of a family firm is another family: in about two-thirds of the cases in which we observe a *control change*, that is, when neither the original controlling shareholder nor an individual with the same surname holds more than 50% of the company's equity at $t = T$, the controlling shareholder at $t = T$ is another family. When we focus on family firms with an initial size larger than 1 million Euro, the typical acquirer is instead a corporation, and the proportion of firms acquired by funds increases significantly. At the sector level, family ownership is prevalent in the agriculture and trade sectors and less diffuse in the health care and high-tech industries (Table 3, Panel B). The high-tech sector is the most dynamic in terms of control changes: we observe a change in the controlling shareholder in more than 40% of family firms, and the fraction of corporations and institutional investors acquiring family firms is substantially larger in this sector.

We obtain similar results when we move to our balanced sample of family and non-family firms. Table 5 shows that, after controlling for a number of firm characteristics (including firm size, age, and the sector they operate in), family firms are significantly less likely to experience a change in the controlling shareholder over the sample period. Interestingly, Figure 2 shows that: (a) family firms seem to grow less than non-family firms; (b) within the set of family firms, those that experienced a control change between $t = 0$ and $t = T$ have a more pronounced growth and those for which control is passed on to a different individual within the same family grow the least. We further analyze these patterns further in the next section.

2.2.2 Control motivations and firm growth

We explore the effect of family control on common measures of growth, capital structure, profitability, and risk. For this purpose, we use a simple regression analysis on our panel data. We use a dummy variable for family firms and let this dummy variable interact with key covariates of interest. We include country, year, sector, and cohort fixed effects, and a set of standard time-varying controls to absorb other firm-specific characteristics. We describe our results below.

Family firms grow less compared to non-family firms (Table 6). The negative effect of family ownership on firm growth is stronger when we include fixed effects and a firm's initial size as controls. Family firms are also less sensitive to the growth of the sector they operate in – i.e., the lagged value of the growth in the industry sales, computed as the average growth rate of sales across firms within a given industry. While sector growth has generally a positive effect on firm-level growth, this effect is lower in family firms compared to non-family firms.

After including fixed effects and controls, family firms are also more levered than non-family firms (Table 7). Leverage is typically lower after the sector grows, but this effect is diminished in family firms compared to non-family firm.[2] This observation is consistent with family firms having a stronger preference to finance their growth through leverage rather than by increasing their equity. Finally, family firms are associated with better performance, as measured by ROA, and less risk, as captured by a smaller probability of incurring operating losses (Table 8).

Overall, the reduced-form estimates indicate that family control is associated with lower growth, higher profitability, and a stronger preference for debt financing. Several different *features* of family firms may help explain this characterization. The typical family firm may have higher performance because it operates at a smaller size, at which capital is more productive (due to decreasing marginal returns). Its limited growth may then be the outcome of an efficient allocation of resources: if this firm were to raise more capital and expand, it would become less efficient and unprofitable. Alternatively, the typical family firm may be profitable even at a larger scale, but also less transparent than the typical non-family firm: this would limit its ability to raise funds, and lead to inefficiently low growth. Finally, the control motivations of the founder may distort the firm's financing decisions and limit its growth. The founder may be reluctant to raise external financing (especially equity) because either (a) she wants to leave the firm to her heirs or (b) she believes that the outside investors would interfere with the optimal running of the firm.

The features described above relate to deep parameters of the economic environment, like the firm's production technology, the transparency of financial markets, the efficiency of bankruptcy procedures, and the founder's preferences. These parameters are notoriously hard to estimate through reduced-form methods. The structural estimation in the remainder of the paper helps us to quantify these parameters, and evaluate the impact of each friction on firm growth.

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.

[2] The definition of leverage in Table 7 does not consider the portion of debt payable within one year. This is to rule out a firm's working capital from our measure of the firm's reliance on debt financing vs. equity financing.

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, λ 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 project. Since the firm's profits increase with the realized value of θ, we refer to the type $\theta = 1$ as the *good* type and to the type $\theta = 0$ as the *bad* type. The realization of θ is $\mathcal{F}$'s private information, so we refer to θ as the founder's type. Investors' prior beliefs about θ 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 α 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 non-monetary, 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 α. Second, the benefit of control increases with the market value of equity v (more on this shortly), so that controlling a more valuable firm gives $\mathcal{F}$ a higher utility. Since effort is neither contractible nor observable, the higher is α, 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 α when λ increases, λ 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 τ_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:

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

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 θ. The probability distribution for π in Eqn. (2) is thus conditional on the investors' *posterior* beliefs about θ 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 $\bar{e}_\theta$ denote their conjecture about a type-θ founder's effort. The probability distribution in Eqn. (2) is thus also conditional on the conjecture $\bar{\mathbf{e}} \equiv (\bar{e}_0, \bar{e}_1)$.

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 $t = 1$, if $\pi - FV - (\pi - rD - k)\tau_c > 0$, where τ_c denotes the corporate tax rate when income is positive, then we have $T_c = \max\{(\pi - rD - k)\tau_c, 0\}$.[3] Otherwise, we have $T_c = \max\{\pi - FV, 0\}$. At time $t = 0$, we can then write the investors' expectation of the

[3]Note that the firm fully depreciates its capital at $t = 1$, since the model assumes that capital is depleted when the project pays out.

total discounted equity cash-flow as follows:

$$v \equiv \beta(1-\tau_i)\Pr(\pi > \underline{\pi})\,\mathbb{E}\left[\pi - FV - T_c \mid \pi > \underline{\pi}\right], \tag{3}$$

where $\underline{\pi}$ is the value of π above which the firm's net income is positive. Like before, the probability distribution for π in Eqn. (3) is conditional on the investors' posterior beliefs about θ and their conjectures $\bar{\mathbf{e}}$. 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_θ denote the expected discounted value of the equity cash flow from the perspective of a founder of type θ. The expression for v_θ is equivalent to the expression for v in Eqn. (3) evaluated at the realized value of θ and the true level of effort e. For given posterior beliefs about θ as a function of the capital structure decisions, conjectures $\bar{\mathbf{e}}$, and a realized type θ, $\mathcal{F}$ 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.

t = 1

1. $\mathcal{F}$ privately learns its type θ;
2. $\mathcal{F}$ publicly chooses $\{D, E_{\mathcal{O}}\}$;
3. $\mathcal{F}$ privately chooses e.

t = 2

1. Firm profit π realizes;
2. $\mathcal{F}$ pays investors.

Figure 1: Timeline of the model.

3.2 Equilibrium analysis

This section characterizes the equilibrium of the model. 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 choice of capital structure.

Effort choice. For given capital structure $\{D, E_{\mathcal{O}}\}$, investors' beliefs about θ, and conjecture $\overline{\mathbf{e}}$ about effort, a founder of type θ 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 α only depend on effort through the investors' conjecture $\overline{\mathbf{e}}$. $\mathcal{F}$ 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 $\overline{\mathbf{e}}$ 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 θ, 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 θ, 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 $\bar{e}_0 = 0$ in equilibrium.

When $\mathcal{F}$ is a good type ($\theta = 1$), $\frac{\partial v_\theta}{\partial e}$ is positive and is directly proportional to λ, 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 α and $\frac{\partial v_1}{\partial e}$ depend on the investors' conjecture $\bar{\mathbf{e}}$. So the value of e^* is the solution to the fixed-point problem in Eqn. (5) when this conjecture is consistent, i.e., when $\bar{\mathbf{e}} = (0, e^*)$.

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 α increases with v) and more private benefit of control (since both v and α 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.[4]

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 $v_1 = v = 0$ and $D = 0$. A bad $\mathcal{F}$ thus receives a payoff of 0 in any equilibrium in which investors learn θ 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

[4]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 $\bar{\mathbf{e}}$.

in equilibrium, so that investors do not learn any information about θ (*pooling equilibria*).

The investors' prior beliefs about the project's return has a particularly simple interpretation in a pooling equilibrium: $1-p$ is the fraction of negative NPV projects that receive financing (even if they should not) in equilibrium, as they are pooled with positive NPV projects. In other words, $1-p$ is the mass of bad firms that the investors are unable to screen out of the capital market.

The characterization of the equilibrium depend on investors' off-equilibrium path beliefs (i.e., their beliefs about θ 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; Liu 2019) 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 θ, 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 $\overline{\mathbf{e}} = (0, e)$.*

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 θ 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., $\overline{\mathbf{e}} = (0, e^{eqm})$.*

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 α 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 market value of 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 control dilution 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 describe how we estimate the model described in Section 3 using observed data on firms' financing decisions and performance. The model estimates will then allow us to decompose and quantify the impact of each model friction on firm growth.

4.1 Preliminaries

The parameters of the model that identify the main model frictions and the firm's technology represent unknowns in the structural model. 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. The number of moments we use is equal to the number of unknown parameters we aim to estimate, so 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 firm with a higher equity value gives $\mathcal{F}$ a higher utility.[5] Second, $B(\alpha, v)$ is a convex (quadratic) function of α, so that a small stake in the firm gives $\mathcal{F}$ a negligible degree of control, but her control increases steeply with α. For the cost of effort, we assume a quadratic function $C(e) = k^{\gamma}\frac{1}{2}e^2$, where $C(e)$ being proportional to k^{γ} captures the idea that running a larger firm is more costly for $\mathcal{F}$.[6]

We target the seven parameters that describe the following economic features: the capital productivity (γ), the mean (μ) and variance (σ) of the profitability shock; the founder's private benefits of control (b); the prior distribution of project types (p); the marginal return of the founder's

[5]This assumption is typical in the literature on control benefits (see, e.g., Albuquerque and Schroth, 2010)

[6]The assumption that $C(e)$ is proportional to k^{γ} is such that the equilibrium level of effort is less sensitive to the value of k, so that the estimated value of λ is less sensitive to the founder's initial endowment $E_{\mathcal{F}}$. This makes it easier to compare the estimates for λ across groups of firms with different initial size.

effort on the firm profitability (λ), and the recovery rate in case of bankruptcy (χ). We denote the set of unknown parameters by $\mathbf{\Theta}$; we have:

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

4.2 Moments selection

We select the moments generated by the model that are most sensitive to (and thus most informative about) the structural parameters. These moments can also be easily computed on the data and are common in previous empirical studies on corporate policy.

We use ROA and the return on the initial investment (i.e., the founder's endowment $E_{\mathcal{F}}$), which we refer to as ROI, to capture firm performance.[7] To approximate the founder's endowment $E_{\mathcal{F}}$ in the data, we consider the book value of equity at the year of incorporation. 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. The model assumes that k is depleted when the project pays out, so we subtract the capital invested in the firm (k) from the measures of return on investment. The two corresponding model-implied moments are:

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

The expectations in Eqn. (9) are conditional on the prior distribution of project types, so we have $\mathbb{E}[\pi] = pk^{\gamma}\mathbb{E}[z]$ where $z \sim \mathcal{N}(\mu + \lambda e^{eqm}, \sigma^2)$. In the data, we use the ratio between net income before taxes and total assets for the ROA and the ratio between net income before taxes and the book value of equity at the year of incorporation for the ROI.

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

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

As sample counterparts of the probabilities described in Eqn. (10), we consider the observed

[7]We use ROI instead of the return on equity ROE because, for the latter, both the numerator and the denominator change with $E_{\mathcal{O}}$, which is a choice variable in the model. This makes ROE less sensitive to the model parameters.

frequency of operating losses for $\Pr[\pi \leqslant 0]$ and the frequency of negative income after interests for $\Pr[\pi \leqslant rD]$: we create dummy variables for both operating losses and negative income, and then compute the average of these variables across firm-year observations in the sample.[8]

The curvature of the firm's production function is shaped by the capital productivity parameter γ, which captures the sensitivity of income to capital. In the model, γ is equal to the first-order derivative of $\ln(\pi)$ with respect to $\ln(k)$. We can then capture this sensitivity by regressing the (log)-operating profits on the (log)-total assets, controlling for cohort, year, and country fixed effects. We estimate a simple OLS regression after clustering firms using sectors and quintiles of the initial size. We then use the regression beta as the empirical counterpart of the model income-to-capital sensitivity. This approach of including regression coefficients as moments in the estimation strategy of a structural model is similar to Hennessy and Whited (2007).

In the model, leverage is D/k and firm growth is $g = k/E_{\mathcal{F}}$. Both D/k and g are outcomes of the founder's optimal decisions 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 founder (or largest shareholder) for a given set of parameter values. The empirical counterpart for leverage is the total debt ratio, and the counterpart for growth is the ratio between the total assets at the latest available date and the book value of equity at the year of incorporation.

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:

$$Q(\mathbf{\Theta}) = (\mathbf{m_n} - M_n(\mathbf{\Theta}))' W_n (\mathbf{m_n} - M_n(\mathbf{\Theta})). \tag{11}$$

where W_n is the optimal weighting matrix obtained using the influence functions approach detailed in Bazdresch et al. (2018). Since we have seven target parameters and seven moments (i.e., $n = 7$), we obtain an exactly identified model.

[8] The dummy variable for operating loss (negative income) is equal to 1 if a firm reports an operating loss (a negative income) in a given year, and zero otherwise.

4.3 Estimation strategy

Identification. 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 (μ) or capital productivity (γ), we expect to see unprofitable and unproductive firms, with little use of external financing (since low μ and low γ reduce the founder's incentives to raise capital).

In the model, $1-p$ captures the fraction of firms that have negative NPV projects but still receive financing in equilibrium (as they are pooled together with good firms). This parameter influences the aggregate probability of default and operating losses, which both decrease with p. Asymmetric information also (a) limits the access to external financing of good firms, curbing their ability to grow, and (b) it creates a preference for debt financing (since the pricing of equity is more sensitive to adverse selection). All else equal, a preference for debt financing increases firm leverage.

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 a good type of founder can raise (since the good type is undervalued by debt-holders), control benefits do not. Finally, a higher recovery rate χ reduces the price of debt for the company. So a higher χ tends to increase access to capital (and thus growth) and leverage, similar to lower asymmetric information. Unlike asymmetric information, however, χ does not directly affect firm performance.

In Appendix C, we describe how the model-implied moments respond to changes in the parameters to be estimated, starting from a specific set of initial parameter values (i.e., the estimated set of parameters Θ). Overall, the key to identifying the model parameters is that while each friction limits firm growth, it also has differential effects on other observables. So we can use the observed financing decisions and firm performance to estimate the parameters of the model.

Sample selection. We estimate the model on the subsample of high-tech firms with initial endowment above the median. There are two main reasons for this choice, which we discuss below.

First, our matched sample of family and non-family firms is not balanced across sectors. Some sectors are more common than others, and the moments are significantly different across sectors in the data. So there is a concern that the heterogeneity across sectors might bias our results. To alleviate this concern, we estimate the model only on the firms in the high-tech sector. These firms generally display higher growth rates and more instances of control change. Both these features help to identify our main frictions in the data, in particular in distinguishing between control motivations (i.e., the founder gives up on growth to keep control of the firm) versus low capital productivity and limited access to the capital market (where the founder has either no growth opportunities or no access to outside investors, which would also explain limited growth).

Second, the model predicts that the firm ownership structure is irrelevant for the founder *only* in the absence of control motives and adverse selection. In this case, the optimal financing decisions revolve around an optimal capital and a target leverage ratio (similar to the traditional trade-off theories of capital structure), as she is indifferent between internal and external equity. When control motives and adverse selection stand, however, the founder's initial endowment affects her financing decisions. As a consequence, we need to control for the initial endowment of the firm when estimating the model. We do so by splitting our sample into two according to the initial endowment of the firm. Our approach is analogous to the estimation strategy of Hennessy and Whited (2007), who split their sample in small and large firms.

5 Estimation results and implications

In this section, we discuss the results of our structural estimation. We begin with presenting the parameter estimates, and then describe the implications for equilibrium outcomes.

5.1 Parameter estimates

We estimate the model both on the typical family and non-family firms in our structural estimation sample (i.e., high-tech firms with initial endowment above the median). The model estimates for the typical family (non-family) firm are in Table 10 (Table 11).

Estimation results. We first describe our estimation results for the subsample of family firms.

Our estimates of μ and γ imply that the typical family firm generates an expected operating income roughly equal to 119 Euro per 100 Euro of capital invested, since the elasticity of expected income to capital ($\mathbb{E}\left[\frac{\partial \pi}{\partial k}\right] = \mu\gamma k^{\gamma-1}$) is equal to 1.19. The point estimate of σ corresponds to a standard deviation of the operating income equal to 388 Euro per 100 Euro invested, which implies an expected income of 0.72 per unit of variability of the profitability shock ($\mathbb{E}[\pi]/\sqrt{\text{Var}[\pi]}$).

The founder's private benefit of control (b) is equivalent to 10.91% of the equity value. This means that the founder values the firm approximately 11% more than the market because of control benefits. This is similar to the structural estimates in Albuquerque and Schroth (2010), which find that, on average, the private benefits of controlling shareholders amount to 10% of the market value of their equity stakes. Our results are also in line with the average control benefits estimated by Dyck and Zingales (2004) across continental European countries (around 13%).

By contrast, our estimates of the social value of control (that is, the sensitivity of the firm's profitability to the founder's effort λ and the implied equilibrium value of effort e^*) are relatively small: λe^* accounts for only 0.2% of the firm's expected profitability $\mathbb{E}[z]$ in the estimated model. This implies that the founder's control of the firm has a negligible direct effect on its performance.

We find evidence of a small degree of asymmetric information between the founder and outside investors, but also significant liquidation losses. The recovery rate is only about 6% of the residual cash flow of the firm. This finding is consistent with those in Kermani and Ma (2023), who estimate similar recovery rate estimates for relatively small firms with a high fraction of intangible assets.

When we estimate the model on the sample of non-family firms, we obtain very similar values of γ and μ to those estimated for family firms. The elasticity of the expected income with respect to capital is equal to 1.33, which is close to the value we obtain for family firms. This result indicates that the returns on capital for the typical family and non-family firms are similar, so the limited growth of family firms is likely driven by other factors. Non-family firms appear to be less risky: our estimate for σ is substantially smaller than the one for family firms. We find a very similar degree of asymmetric information, but a substantially higher recovery rate. This may imply that family firms are associated with less efficient bankruptcy procedures or a higher fraction of intangibles. Most importantly, we find much smaller values of control: both social and private values of control are nearly equal to zero for non-family firms. The model thus indicates that the typical founder of a family firm puts a substantially higher value on control than the typical blockholder in a non-family firm.

Model fit. The estimated model matches well the growth observed in the data: the ratio between the total capital invested in the firm and the initial endowment of the founder is 2.42 in the estimated model and 2.33 in the data. The ROA and ROI in the estimated model (0.03 and 0.07, respectively) are in line with those observed in the data (0.04 and 0.13, respectively). The estimated model matches particularly well both the observed capital structure of the typical family firm and the sensitivity of net income to capital. In fact, the ratio between debt and capital in the model (0.40) is very close to the ratio between total debt and total assets obtained from the actual data (0.38). Moreover, the slope of the relationship between operating profits and total assets computed in the data (0.90) aligns with the first-order derivative of net income with respect to capital (0.89).

The model matches well also the probability of default: the probability that the firm generates profits which are not sufficient to afford the cost of debt is 0.29 in the baseline model estimation while the frequency of negative income is 0.23 in the data. However, the model tends to overestimate the probability of incurring in operating losses. The probability that the firm generates negative profits (0.24) is higher than the frequency of operating losses computed in the data (0.17). Finally, the model estimated on the sample of non-family firms matches particularly well the observed data on performance, capital structure, and size growth, while it tends to slightly underestimate the probability of operating losses.

5.2 Counterfactual analyses

The purpose of this section 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 the founder's choices and firm outcomes in each scenario. Second, we use the estimated model to test the policy implications of our results. Table 13 describes our results. Next, we describe how we compute each counterfactual and discuss our results.

To simulate a scenario where control has no private value, we set $b = 0$ in the estimated model, and compute the new equilibrium outcomes. In this case, the founder dilutes substantially her stake in the company by raising outside equity: the fraction of shares held by the founder drops to 51.22%. The increase in equity also helps the founder raise more debt: all else equal, the increase in equity reduces the probability of bankruptcy, so it makes it easier for the founder to raise additional debt, which further spurs growth. Overall, the firm grows more, but it is also less levered and safer (both leverage and default probability drop when control motivations are absent).

The increase in growth compared to the baseline model is substantial: the firm is 43% larger ($\frac{k}{E_{\mathcal{F}}}$ is 3.559 in the model with $b = 0$ and 2.422 in the estimated model). Most importantly, this increase in growth makes up for 66% of the growth differential we observe between the typical family and non-family firms in the respective estimated models. So control motivations alone explain 66% of the growth differential between family and non-family firms in our sample.

Next, we consider a counterfactual where we fix the founder's effort to the level of the estimated model ($e = e^*$), so that the founder's stake does not affect the firm profitability. Consistent with our estimate for λ being small, the effects on both financing decisions and size growth are limited.

Finally, we simulate a scenario with symmetric information. We set $p = 1$ in the estimated model, which captures a setting where the outside investors are informed about firms' projects and screen out those with negative NPV. The firm issues both more debt and equity: the founder reduces her stake to 66.62%, and leverage drops to 0.39. The differential size growth is 13% compared to the baseline case. When we also remove control motivations, the differences are significantly stronger: the founder's block drops to 49% and the firm grows around 50% more than in the baseline case (size growth is 3.787) and substantially reduces leverage (from 0.41 to 0.34).

6 Conclusion

In this paper, we have used data on a large panel of European firms to investigate whether the control motivations of large shareholders affect firm growth through their influence on financing decisions. We use family blockholding as our laboratory since these blockholders have strong preferences to keep a tight 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 smaller growth of family-owned firms compared to non-family-owned firms in our sample. The structural model allows us to disentangle control motivations from the other frictions of importance. We find that family blockholders (a) significantly limit firm growth as they are reluctant to issue equity and dilute their control and (b) increase firm risk by inducing higher leverage. Since family control has a relatively small positive effect on firm performance, our results are consistent with the view that the control motivations of family blockholders generate a deadweight loss for the economy.

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Appendices

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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 λ, 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 θ 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 θ. 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 $k \in (0, \bar{k}]$, where $\bar{k} < \infty$ (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 $k \in (E_\mathcal{F}, \bar{k}]$. Since the set of capital choices is compact, and π is a continuous function of k, there always exists a solution to Program (4) by the Extreme value theorem, for any investors' beliefs about θ and conjectures about effort $\bar{\text{e}}$.

Since $\{D^{eqm}, E_{\mathcal{O}}^{eqm}\}$ solves Program (4) when $\theta = 1$, $\bar{e}_1$ is evaluated at the largest equilibrium value e^* and investors maintain their prior beliefs about θ 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.

B Tables

B.1 Suggestive evidence

Table 1: Blockholder Type
The table reports the percentage of firms in the original (non-matched) sample held by different types of blockholder, at the year of incorporation. We classify firms as *Family* and *Non-Family* following the criteria described in Section 2.1. Next, within the *Non-Family* group, we further classify firms as *Corporate*, if a corporation holds more than 50% of the shares; *Funds*, if the largest shareholder holds more than 50% of the shares and is either a private equity fund, a venture capital, a mutual fund, a pension fund, or a financial company; *Widely-Held*, if the largest shareholder holds at most 50% of the shares. We also report data for each country, for the largest (*Top*) and the smallest (*Bottom*) 1,000 firms after sorting on the initial size, and for the firms with initial size larger than 1 million of Euro (*Large*). Data are from Orbis by the Bureau van Dijk and cover the period 2003-2020. Data are on annual basis.

Type	Total	France	Germany	Italy	Spain	UK	Top	Bottom	Large
Family	87.35	75.05	75.50	83.72	87.82	94.66	13.50	92.50	59.00
Non-Family	12.65	24.95	24.50	16.28	12.18	5.34	86.50	7.50	41.00
– Corporate	8.53	18.75	18.46	8.65	10.57	3.75	71.20	6.00	32.31
– Funds	0.98	2.31	1.21	1.28	0.84	0.65	8.00	1.00	3.19
– Widely-Held	2.80	2.96	3.76	6.16	0.35	0.80	1.50	0.10	3.93
Num of firms	139,584	3,339	21,435	40,117	15,324	59,369	1,000	1,000	31,656

Table 2: Ownership Data
The table reports the average proportion of shares held by the largest shareholder in the original (non-matched) sample. Based on the blockholder type, we classify firms as *Family* and *Non-Family* following the criteria described in Section 2.1. Next, within the *Non-Family* group, we further classify firms as *Corporate*, if a corporation holds more than 50% of the shares; *Funds*, if the largest shareholder holds more than 50% of the shares and is either a private equity funds, a venture capital, a mutual fund, a pension fund, or a financial company; *Widely-Held*, if the largest shareholder holds at most 50% of the shares. We report the average proportion of shares held by the largest shareholder at the year of incorporation (*Stake 0*), the average proportion of shares held by the largest shareholder at the latest available date (*Stake T*), the percentage of firms in which we observe a change in the largest shareholder between the year of incorporation and latest available date (*Control Change* (%)), the Herfindhal Index computed at the year of incorporation (HH_0) and at the latest available date (HH_T) using the stake held by the top five firm shareholders, and the average growth computed as the firm-level ratio between the size at the latest available date and the size the year of incorporation. We winsorize here growth at the 5% level. Data are from Orbis by the Bureau van Dijk and cover the period 2003-2020. Data are on annual basis.

Type	Stake 0	Stake T	Control Change (%)	HH_0	HH_T
All firms	89.28	67.75	22.32	0.91	0.63
Family	95.61	77.87	15.50	0.93	0.66
Non-Family	82.03	52.25	38.68	0.74	0.44
– Corporate	92.90	57.40	37.52	0.89	0.53
– Funds	93.14	42.83	52.85	0.90	0.40
– Widely-Held	44.60	34.62	37.81	0.21	0.17
Large	92.57	69.02	29.95	0.88	0.61
Large Family	94.92	75.34	19.26	0.91	0.68

Table 3: Blockholder Change

The table reports the percentage of *Family* firms in the original (non-matched) sample on the basis of the change in the largest shareholder between the year of incorporation and the latest available date. We consider the following cases: *No Change*, if the largest shareholder at the latest available date is equal to the largest shareholder at the year of incorporation; *Within Family*, if the largest shareholder at the latest available date has the same surname as the largest shareholder at the year of incorporation; *Other Family*, if the largest shareholder at the latest available date is different from the largest shareholder at the year of incorporation and is either an individual or a family holding more than 50% of the shares; *Corporate*, if the largest shareholder at the latest available date is a corporation holding more than 50% of the shares; *Funds*, if the largest shareholder at the latest available date holds more than 50% of the shares and is either a private equity funds, a venture capital, a mutual fund, a pension fund, or a financial company; *Widely-Held*, if the largest shareholder holds at most 50% of the shares. The Control Change data in Table 1 is the sum of the last four cases, thus excluding the *Within Family* control change. We also report data for each country, for the largest (*Top*) and the smallest (*Bottom*) 1,000 firms after sorting on the initial size, and for the firms with initial size larger than 1 million of Euro (*Large*). We report results for *All firms* in the sample, for each type of firm-blockholder, for *Large* firms, and for *Large* Family firms. In panel B, we report the data on large firms for each sector by using the Orbis industry classification (BvD Sectors). The sectors are the following: *Agriculture*, *Construction*, *Business Services*, *Trade* (Wholesale and Retail), *Leisure*, *Property Services*, *Health Care*, *High-Tech*. The High-tech sector includes Computer Software and Hardware, Biotechnology, Communications. In Panel B, we also report the percentage of *Family Firms* in each sector. Data are from Orbis by the Bureau van Dijk and cover the period 2003-2020. Data are on annual basis.

Panel A

Type	Total	Large	France	Germany	Italy	Spain	UK
No Change	80.10	68.08	82.75	72.66	75.83	88.85	82.64
Within Family	4.40	8.91	2.11	7.91	5.90	0.58	3.47
Other Family	9.84	7.97	4.80	7.08	11.65	12.44	9.46
Corporate	3.86	11,77	7.74	6.78	3.76	4.95	2.53
Funds	0.36	1.53	2.11	0.33	0.29	0.52	0.32
Widely-Held	1.20	1.73	0.49	0.72	2.37	0.29	0.81

Panel B

Type	Agric	Constr	Bus Svs	Trade	Leisure	Prop Svs	Health	High-Tech
Family Firm	57.40	52.88	48.48	55.26	52.53	53.04	29.67	39.25
No Change	73.64	66.58	67.20	64.05	69.20	72.49	57.97	52.54
Within Family	6.76	8.83	10.30	8.47	7.59	11.32	6.52	6.21
Other Family	10.92	8.27	6.90	9.50	7.36	4.87	10.87	10.73
Corporate	8.08	9.96	11.91	15.08	14.48	8.94	21.74	27.12
Funds	0.60	3.38	1.51	1.14	0.69	1.19	0.72	2.26
Widely-Held	0.48	3.01	2.17	1.76	0.69	1.19	2.17	1.13
Num of Firms	187	532	1,058	968	435	1,007	138	177

Table 4: Descriptive Statistics
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 2003-2020. In Panel A, we report the sample composition using different group classifications, such as: *Country*, the legal residence country of the firm; *Country*, the year of incorporation; *Type*, the type of the controlling shareholder of the company; *Ownership*, the degree of ownership concentration, that we define *Fully*, if the size of the largest shareholder's ownership stake is 100%, *Partially*, if the size of the largest shareholder's ownership stake is larger than 50% and smaller than 100%, *Widely*, if the size of the largest shareholder's ownership stake is larger smaller than 50%. In Panel B, we report statistics about the following variables: *Total Assets*, the book value of the firm's total assets; *Initial Size*, the firm's total assets at the year of incorporation. *Size Growth*, the ratio between the firm's total assets and the initial book value of total assets; *Growth rate*, the annual growth rate of the firm's total assets, computed as the log difference between two subsequent annual observations of the firm's total assets; *Tangibility*, the ratio between the book value of the tangible assets 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 computed using the firm profits & losses before taxes; *Debt Ratio*, 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; *Debt Ratio (> 1Y)*, the ratio between the book value of debt, net of the current liabilities payable within one year, and the book value of the assets. We report the mean and standard deviation, the 10-th, 50-th, and 90-th percentiles. *N* is the number of firm-year observations. In Panel C, we report the average of the variables described above across sub-samples including only family and non-family firms, respectively. In Panel D, we report the average firm size growth across different types of controlling shareholders. Data are on annual basis.

Panel A. Sample Composition (%)

Country	France	Germany	Italy	Spain	UK
	3.45	30.59	43.11	8.03	14.81
Type	Family	Corporate	Funds	Widely-Held	Other
	50.00	33.02	3.84	11.96	1.18
Control Change	Family	Corporate	Funds	Widely-Held	All Firms
	20.03	35.27	51.17	35.31	31.10

Panel B. Summary Statistics

	Mean	St. Dev.	p10	Median	p90	N
Total Assets	2,633,640	5,132,928	68,726	740,270	7,017,032	172,399
Initial Size	3,247,794	9,875,594	47,332	534,653	51,216,230	174,526
Size Growth	3.34	5.19	0.57	1.59	7.54	148,718
Growth Rate	0.07	0.42	-0.26	0.03	0.49	151,161
Tangibility	0.21	0.28	0	0.08	0.72	156,138
ROA	0.04	0.14	-0.08	0.02	0.20	108,764
ROE	0.20	0.62	-0.25	0.18	0.87	97,930
Debt Ratio	0.60	0.36	0.10	0.64	0.97	147,092
Debt Ratio (> 1Y)	0.15	0.27	0	0	0.61	150,527

Panel C. Family vs Non-Family firms

	Total Assets	Initial Size	Size Growth	Growth Rate	Tang	ROA	ROE	Debt Ratio	Debt Ratio (> 1Y)
Non-Family	3,223,408	4,401,101	5.66	0.09	0.18	0.03	0.17	0.62	0.14
Family	2,070,364	2,122,764	3.29	0.06	0.24	0.05	0.23	0.60	0.17

Table 5: Family Ownership & Control Change

The table reports results from the Probit regression using data described in Section 2. Data are from Orbis by the Bureau van Dijk and cover the period 2003-2020. The dependent variable is the dummy variable *Control Change*, that is equal to 1 if there is a change in the largest shareholder between the year of incorporation and the latest available date, at the firm-level, and zero otherwise. The main independent variable is the dummy variable *Family*, that is equal to 1 if the firm is classified as a Family firm following the definition provided in Section 2.1, and zero otherwise. Additional independent variables are the following: *Age*, the firm age measured in years; *Initial Size*, the (log)-total assets at the year of incorporation; *UK*, a dummy variable equal to 1 if the firm is located in the UK, and zero otherwise. In columns (1) to (5), we use all firms included in the balanced matched sample described in Section 2.1. In column (6), we use only Large Firms (i.e., firms with initial size larger than 1 million euros). In column (7), we use only the largest 1,000 firms in the sample in terms of initial size. In columns (5) to (6), we also control for industry 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.

	Control Change						
			All Firms			Large Firms	Top 1,000
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Family	-0.502***	-0.501***	-0.464***	-0.465***	-0.465***	-0.447***	-0.448***
	(0.019)	(0.019)	(0.022)	(0.022)	(0.022)	(0.057)	(0.072)
Age		0.022**	0.019*	0.025**	0.024**	0.031	0.013
		(0.007)	(0.008)	(0.008)	(0.008)	(0.021)	(0.026)
Initial Size			0.032***	0.029***	0.031***	0.030	0.012
			(0.005)	(0.005)	(0.005)	(0.034)	(0.048)
UK				0.329***	0.339***	0.524***	0.483***
				(0.043)	(0.060)	(0.117)	(0.142)
Industry					Y	Y	Y
R2	0.029	0.029	0.028	0.031	0.035	0.067	0.080
N	19,686	19,686	15,858	15,858	15,858	2,420	1,590

Table 6: Firm Growth
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 2003-2020. The dependent variable is the annual growth rate of the firm's total assets, computed as the log difference between two subsequent annual observations of the firm's total assets. The independent variables are: *Family*, a dummy variable equal to 1 if the firm is classified as a Family firm following the definition provided in Section 2.1, and zero otherwise; *Sector Sales Growth (SSG)*, the past, industry-specific growth rate of sales, computed as the one-year lagged average growth rate of sales across firms within a given sector; *Family*SSG*, the interaction variable between the *Family* dummy and *SSG*; *Initial Size*, the firm's total assets at the year of incorporation. As additional control variables, we also include country, industry, cohort, and year-fixed effects. *Observations* 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.

	Growth Rate								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Family	-0.044***	-0.042***	-0.083***	-0.044***	-0.041***	-0.082***	-0.026***	-0.023***	-0.064***
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)
Sector Sales Growth (SSG)				0.194***	0.042**	0.036**	0.264***	0.113***	0.104***
				(0.005)	(0.018)	(0.018)	(0.014)	(0.021)	(0.021)
Family*SSG							-0.140***	-0.142***	-0.134***
							(0.020)	(0.020)	(0.020)
Initial Size			-0.053***			-0.053***			-0.053***
			(0.001)			(0.001)			(0.001)
Country		Y	Y		Y	Y		Y	Y
Industry		Y	Y		Y	Y		Y	Y
Year		Y	Y		Y	Y		Y	Y
Cohort			Y			Y			Y
R-squared	0.001	0.015	0.049	0.002	0.016	0.049	0.002	0.016	0.049
Observations	254,611	254,611	254,611	254,611	250,955	250,955	250,955	250,955	250,955

Table 7: Capital Structure
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 2003-2020. The dependent variable is the book leverage computed as the ratio between the book value of debt, net of the current liabilities payable within one year, and the book value of the assets. The independent variables are: *Family*, a dummy variable equal to 1 if the firm is classified as a Family firm following the definition provided in Section 2.1, and zero otherwise; *Sector Sales Growth (SSG)*, the past, industry-specific growth rate of sales, computed as the one-year lagged average growth rate of sales across firms within a given sector; *(log)-Assets*, the log of the firm's total assets; *Tangibility*, the ratio between tangible and total assets; *ROA* (Return on Assets), computed by dividing the firm profits & losses before taxes by the firm's total assets. As additional control variables, we also include country, industry, cohort, and year-fixed effects. *Observations* 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)	(8)
Family	-0.001	0.002***	0.007***	0.014***	-0.006***	-0.001	-0.001	0.009***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Sector Sales Growth (SSG)					0.019***	-0.012**	-0.012**	-0.008*
					(0.004)	(0.005)	(0.005)	(0.005)
Family*SSG					0.027***	0.031***	0.030***	0.029***
					(0.006)	(0.006)	(0.006)	(0.005)
ROA				-0.084***				-0.084***
				(0.002)				(0.002)
(log)-Assets				0.013***				0.013***
				(0.001)				(0.001)
Tangibility				0.141***				0.141***
				(0.002)				(0.001)
Country		Y	Y	Y		Y	Y	Y
Industry		Y	Y	Y		Y	Y	Y
Year		Y	Y	Y		Y	Y	Y
Cohort			Y	Y			Y	Y
R-squared	0.000	0.212	0.214	0.234	0.001	0.185	0.186	0.219
Observations	152,318	152,318	152,318	152,318	152,318	152,318	152,318	152,318

Table 8: Performance & Risk

The table reports results from OLS and Probit regression using data described in Section 2. Data are from Orbis by the Bureau van Dijk and cover the period 2003-2020. In columns (1) to (4), the dependent variable is the Return on Assets (ROA) computed by dividing the firm profits & losses before taxes by the firm's total assets. In columns (5) to (8), the dependent variable is a dummy variable equal to 1 if the firm reports losses in a year. In columns (1) to (4), we perform an OLS regression. In columns (5) to (8), we estimate a Probit model. The independent variables are: *Family*, a dummy variable equal to 1 if the firm is classified as a Family firm following the definition provided in Section 2.1, and zero otherwise; *Sales Growth*, the firm-specific sales growth rate; *(log)-Assets*, the log of the firm's total assets; *Tangibility*, the ratio between tangible and total assets; *Initial Size*, the firm's total assets at the year of incorporation. As additional control variables, we also include country, industry, cohort, and year-fixed effects. *Observations* 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 (OLS)				**Loss** (Probit)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Family	0.024***	0.024***	0.020***	0.024***	-0.253***	-0.271***	-0.272***	-0.353***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.008)	(0.008)	(0.009)	(0.009)
Sales Growth				Y				Y
Log-Assets				Y				Y
Tangibility				Y				Y
Initial Size			Y	Y			Y	Y
Country		Y	Y	Y		Y	Y	Y
Industry		Y	Y	Y		Y	Y	Y
Year		Y	Y	Y		Y	Y	Y
Cohort			Y	Y			Y	Y
R-squared	0.006	0.029	0.029	0.033	0.013	0.043	0.047	0.043
Observations	103,470	103,470	103,470	103,470	103,470	103,470	103,470	103,470

Table 9: Family and Growth: Diff-in-diff

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 2003-2020. The dependent variable is the annual growth rate of the firm's total assets, computed as the log difference between two subsequent annual observations of the firm's total assets. The independent variables are: *Family*, a dummy variable equal to 1 if the firm is classified as a Family firm following the definition provided in Section 2.1, and zero otherwise; *Post-Shock*, a dummy variable equal to 1 for the years after the industry *shock*, where we refer to industry shock as the maximum sector-specific annual growth rate reported across the years in the sample. We compute the sector-specific annual growth rate as the one-year lagged average growth rate of sales across firms within a given sector; *Family*Post*, the interaction variable between the *Family* dummy and *Post-Shock*; *Initial Size*, the firm's total assets at the year of incorporation. As additional control variables, we also include country, industry, cohort, and year-fixed effects. *Observations* 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.

	Growth Rate								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Post-Shock	0.021***	0.022**	0.022***	0.021***	0.022**	0.022***	0.025***	0.025***	0.031***
	(0.004)	(0.007)	(0.007)	(0.004)	(0.007)	(0.007)	(0.006)	(0.007)	(0.007)
Family				-0.005*	-0.008***	-0.042***	0.004	-0.001	-0.022*
				(0.002)	(0.002)	(0.002)	(0.009)	(0.009)	(0.009)
Family*Post							-0.009	-0.008	-0.021*
							(0.009)	(0.009)	(0.009)
Initial Size			Y			Y			Y
Country		Y	Y		Y	Y		Y	Y
Industry		Y	Y		Y	Y		Y	Y
Year		Y	Y		Y	Y		Y	Y
Cohort			Y			Y			Y
R2	0.001	0.045	0.071	0.001	0.045	0.072	0.001	0.045	0.072
Observations	159,669	159,669	159,669	159,669	159,669	159,669	159,669	159,669	159,669

B.2 Structural estimation

Table 10: Estimation Results: Family Firm
The table reports results from the model estimation using the data described in Section 2. Data are from Orbis by the Bureau van Dijk and cover the period 2003-2020. We estimate the model by minimizing the (weighted) distance between model-generated moments and corresponding data moments using a 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 typical large *family* firm (with initial book value of equity above the median). In particular, we report the following quantities: 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 empirical moments computed in the data; a set of model-implied economic quantities computed using the point estimates of the model parameters – the *Control Premium* ($b\alpha^2$), the *Deadweight Loss* (the percentage reduction in firm value due to the presence of asymmetric information, i.e., $\frac{\mathbb{E}[f|_{p=1}]-\mathbb{E}[f|_{p=\overline{p}}]}{\mathbb{E}[f|_{p=1}]}$), the *Social Value* of control (the percentage of firm value that is due to the founder's effort, i.e., $\frac{\mathbb{E}[f|_{\lambda=\overline{\lambda}}]-\mathbb{E}[f|_{\lambda=0}]}{\mathbb{E}[f|_{\lambda=\overline{\lambda}}]}$). We compute standard errors following the approach of Bazdresch et al. (2018) and using a grid of 30 points in a neighborhood of 0.1% around the point estimate.

Structural Parameters

Parameter	γ	σ	μ	b	p	λ	ξ
	0.894	8.550	6.182	0.109	0.993	0.199	0.053
	(0.009)	(4.295)	(4.014)	(0.044)	(0.028)	(0.161)	(0.459)

Model Fit

Moment	Leverage	Growth	OLS	ROA	P(Loss)	P(Def)	ROI
Model	0.40	2.42	0.89	0.03	0.24	0.29	0.07
Sample	0.38	2.33	0.90	0.04	0.17	0.23	0.13

Economic Implications

Control Premium	6.00%
Social Value	4.33%
Deadweight Loss	10.81%

Table 11: Estimation Results: Non-Family Firm

The table reports results from the model estimation using the data described in Section 2. Data are from Orbis by the Bureau van Dijk and cover the period 2003-2020. We estimate the model by minimizing the (weighted) distance between model-generated moments and corresponding data moments using a 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 typical large *non-family* firm (with initial book value of equity above the median). In particular, we report the following quantities: 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 empirical moments computed in the data; a set of model-implied economic quantities computed using the point estimates of the model parameters – the *Control Premium* ($b\alpha^2$), the *Deadweight Loss* (the percentage reduction in firm value due to the presence of asymmetric information, i.e., $\frac{\mathbb{E}[f|_{p=1}]-\mathbb{E}[f|_{p=\overline{p}}]}{\mathbb{E}[f|_{p=1}]}$), the *Social Value* of control (the percentage of firm value that is due to the founder's effort, i.e., $\frac{\mathbb{E}[f|_{\lambda=\overline{\lambda}}]-\mathbb{E}[f|_{\lambda=0}]}{\mathbb{E}[f|_{\lambda=\overline{\lambda}}]}$). We compute standard errors following the approach of Bazdresch et al. (2018) and using a grid of 30 points in a neighborhood of 0.1% around the point estimate.

Structural Parameters

Parameter	γ	σ	μ	b	p	λ	ξ
	0.899	6.088	6.537	0.014	0.987	0.067	0.487
	(0.006)	(4.289)	(2.449)	(0.691)	(0.317)	(0.199)	(0.684)

Model Fit

Moment	Leverage	Growth	OLS	ROA	P(Loss)	P(Def)	ROI
Model	0.55	4.11	0.89	0.06	0.15	0.21	0.13
Sample	0.55	4.21	0.89	0.05	0.20	0.21	0.16

Economic Implications

Control Premium	0.84%
Social Value	0.21%
Deadweight Loss	13.30%

Table 12: Counterfactual Analysis: Family Firm
The table reports results from the counterfactual exercises using the model estimation results presented in Section 5.1. In this exercise, we compute a set of model-implied quantities in different scenarios: the *Baseline*, that is the model described in Section 3.1 using the parameter estimates reported in Table 10; the *No control benefits*, where we assume that the founder does not extract control benefits from controlling the firm ($b = 0$); the *Symmetric Information*, where we assume that outside investors can screen out bad projects ($p = 1$); the *No social value*, where the founder's effort does not depend on her stake of the firm ($e = e^*$); combinations of previous scenarios. In each scenario, we let the founder make optimal financing and effort choices, and report the corresponding equilibrium outcomes. Specifically, we report the following quantities: *Size Growth*, the ratio between capital and initial endowment ($k/E_{\mathcal{F}}$); *Final Stake*, the fraction of shares held by the founder after the choice of $\{D, E_{\mathcal{O}}\}$ (α in th model); *Outside Equity*, the amount of external equity raised by the founder through shares issuance ($E_{\mathcal{O}}$); *Debt*, the amount of debt raised by the founder through external financing (D); *Leverage*, the ratio between debt and capital (D/k); *Pr(Def)*, the probability that the firm is not able to comply with its debt obligations at T ($\Pr[\pi \leqslant rD]$); *Firm Value*, the sum of the market values of equity and debt.

	Size Growth	Final Stake	Outside Equity	Debt	Leverage	Pr(Def)	Firm Value
Baseline	2.422	74.15%	397,191€	842,355€	0.41	29.65%	2,386,559€
$b = 0$	3.559	51.22%	1,101,477€	1,029,152€	0.34	28.15%	3,298,795€
$e = e^*$	2.375	77.26%	332,871	811,764€	0.41	29.23%	2,283,329€
$(b = 0, e = e^*)$	3.506	51.71%	1,074,460	1,011,520€	0.34	28.13%	3,248,739€
$p = 1$	2.828	66.62%	583,284€	930,119€	0.39	28.50%	2,675,775€
$(p = 1, b = 0)$	3.787	49.00%	1,225,067 €	1,095,284€	0.34	27.68%	3,495,550€

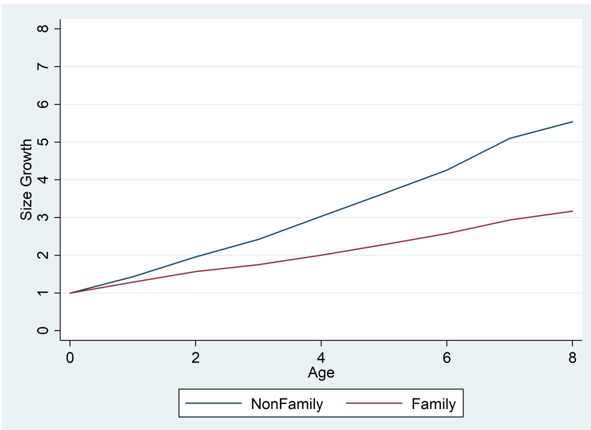
Table 13: Counterfactual Analysis: Non-Family Firm
The table reports results from the counterfactual exercises using the model estimation results presented in Section 5.1. In this exercise, we compute a set of model-implied quantities in different scenarios: the *Baseline*, that is the model described in Section 3.1 using the parameter estimates reported in Table 11; the *No control benefits*, where we assume that the founder does not extract control benefits from controlling the firm ($b = 0$); the *Symmetric Information*, where we assume that outside investors can screen out bad projects ($p = 1$); the *No social value*, where the founder's effort does not depend on her stake of the firm ($e = e^*$); combinations of previous scenarios. In each scenario, we let the founder make optimal financing and effort choices, and report the corresponding equilibrium outcomes. Specifically, we report the following quantities: *Size Growth*, the ratio between capital and initial endowment ($k/E_{\mathcal{F}}$); *Final Stake*, the fraction of shares held by the founder after the choice of $\{D, E_{\mathcal{O}}\}$ (α in th model); *Outside Equity*, the amount of external equity raised by the founder through shares issuance ($E_{\mathcal{O}}$); *Debt*, the amount of debt raised by the founder through external financing (D); *Leverage*, the ratio between debt and capital (D/k); *Pr(Def)*, the probability that the firm is not able to comply with its debt obligations at T ($\Pr[\pi \leqslant rD]$); *Firm Value*, the sum of the market values of equity and debt.

	Size Growth	Final Stake	Outside Equity	Debt	Leverage	Pr(Def)	Firm Value
Baseline	4.106	63.67%	1,047,425€	2,922,751€	0.56	21.09%	5,751,818€
$b = 0$	4.234	61.20%	1,163,883€	2,972,369€	0.55	20.94%	6,011,795€
$(b = 0, e = e^*)$	4.234	61.20%	1,163,883€	2,972,369€	0.55	20.94%	6,011,795€
$b = 0$	4.105	63.67%	1,047,425€	2,922,750€	0.56	21.09%	5,751,818€
$p = 1$	4.775	57.19%	1,439,266€	3,388,508€	0.55	19.82%	6,750,201€
$(p = 1, b = 0)$	4.899	55.35%	1,551,117 €	3,435,499€	0.55	19.70%	6,909,296€

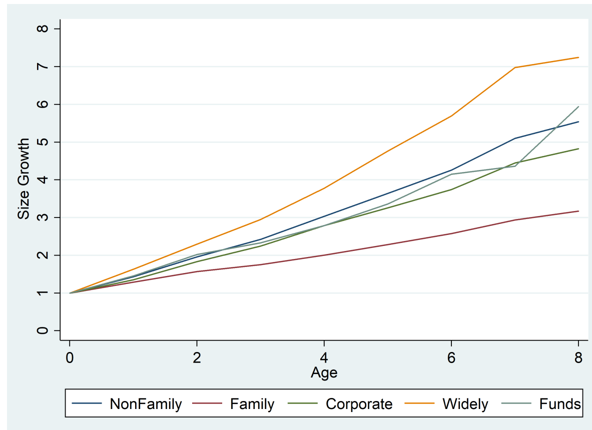
C Figures

Figure 2: The figure shows the firm size growth over the life cycle. For each year in the sample, we compute size growth as the ratio between current size (Total Assets) and initial size (i.e., Total Assets at the year of incorporation), at the firm-level. We compute age as the difference between the current year and the year of incorporation. Then, for each age, we report the average size growth across (i) *Family* and *Non-Family* firms (Top Panel), (ii) types of firm-blockholder at the year of incorporation (Mid Panel), and (iii) cases of change of control in Family firms (Bottom panel). The definition of Family and Non-family firms is provided in Section 2.1. Details about blockholder types and cases of change of control are provided in Table 1 and 3, respectively. Data are from Orbis by the Bureau van Dijk and cover the period 2003-2020.

(a) Family vs. non-family



(b) Types of blockholders



(c) Control change

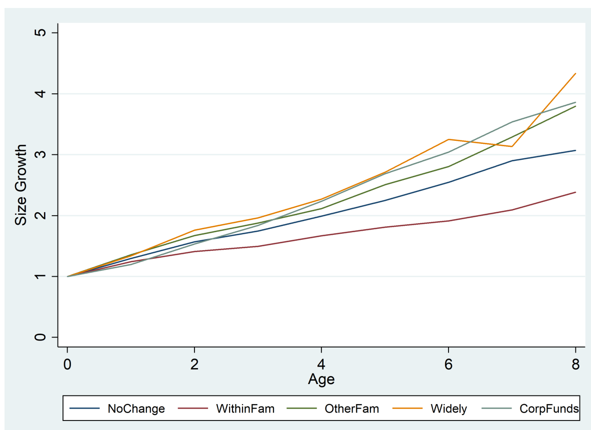
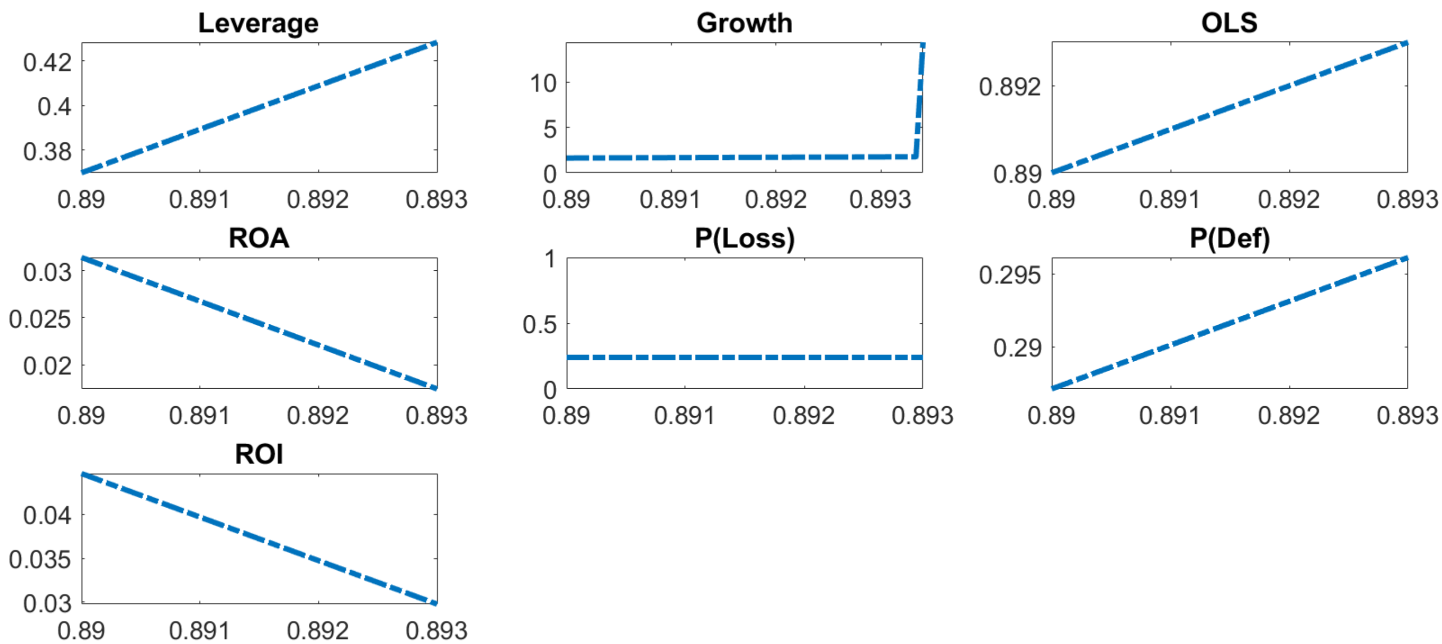
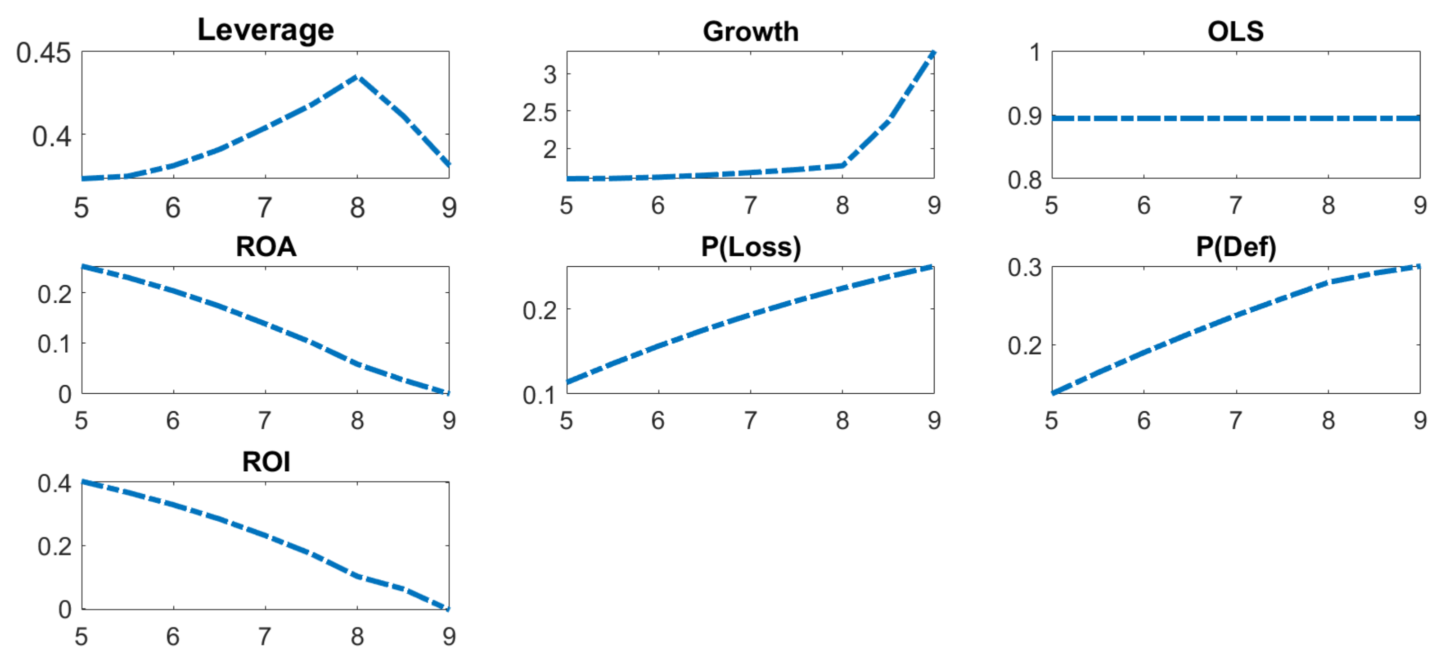


Figure 3: The figure reports the model-generated moments for the median family firm obtained using for each model parameter a grid of 20 points around the point estimate reported in Table 10. The model-generated moments and corresponding data moments are described in Section 4.2.

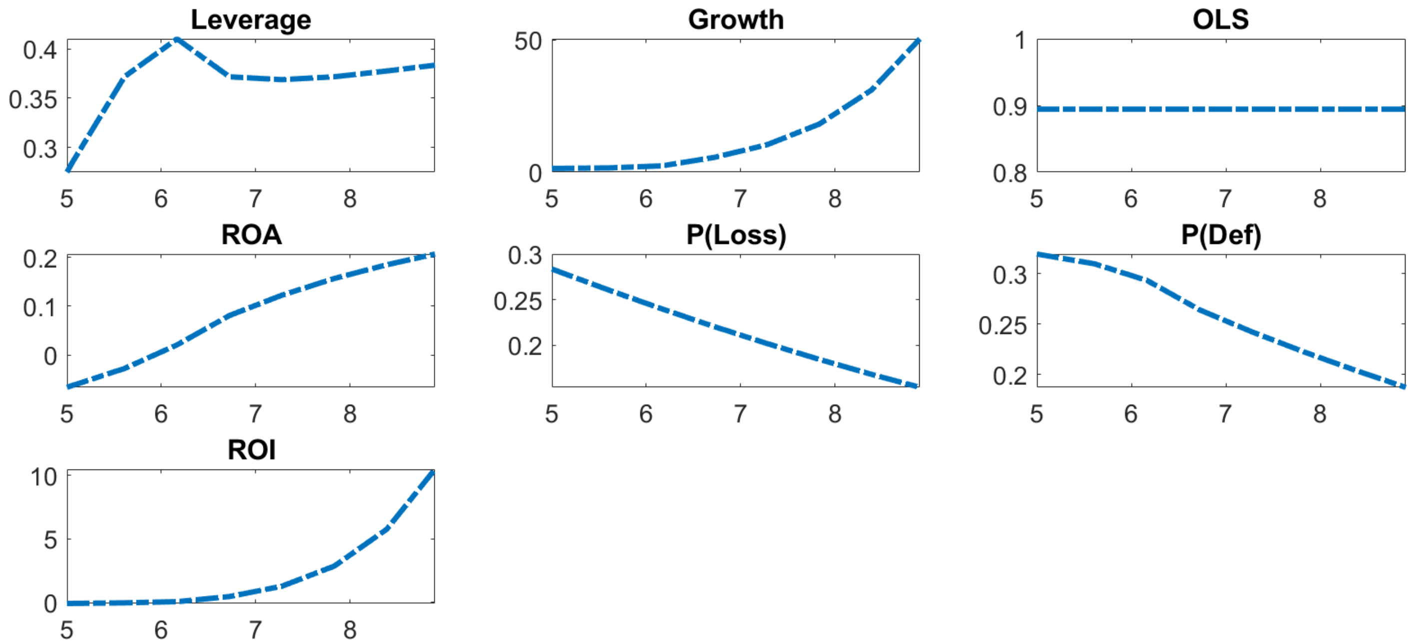
Moment Sensitivity: γ



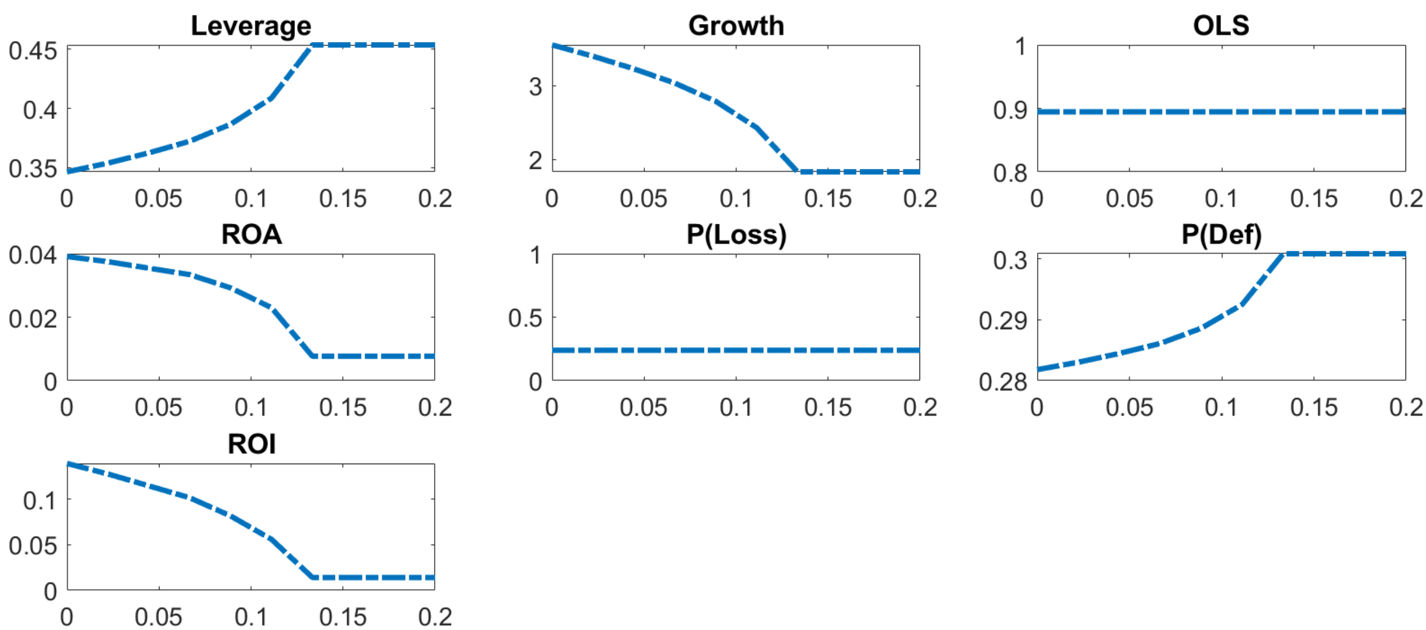
Moment Sensitivity: σ



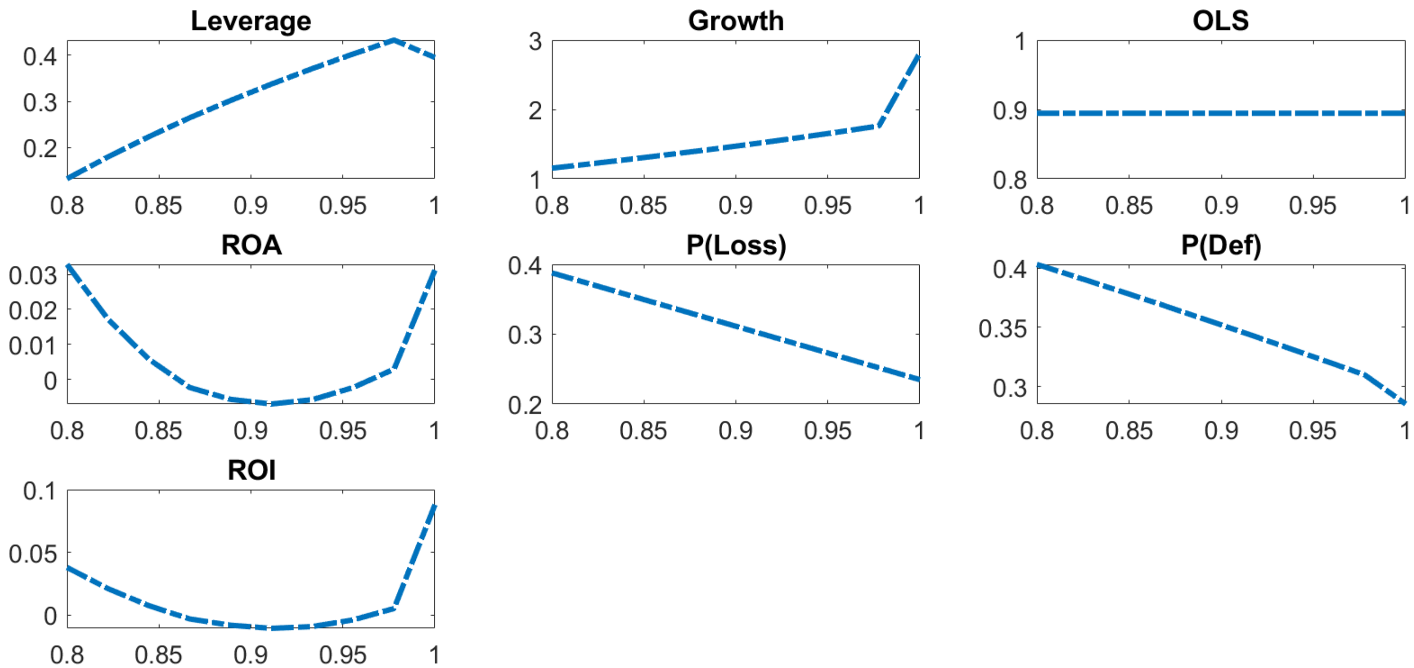
Moment Sensitivity: μ



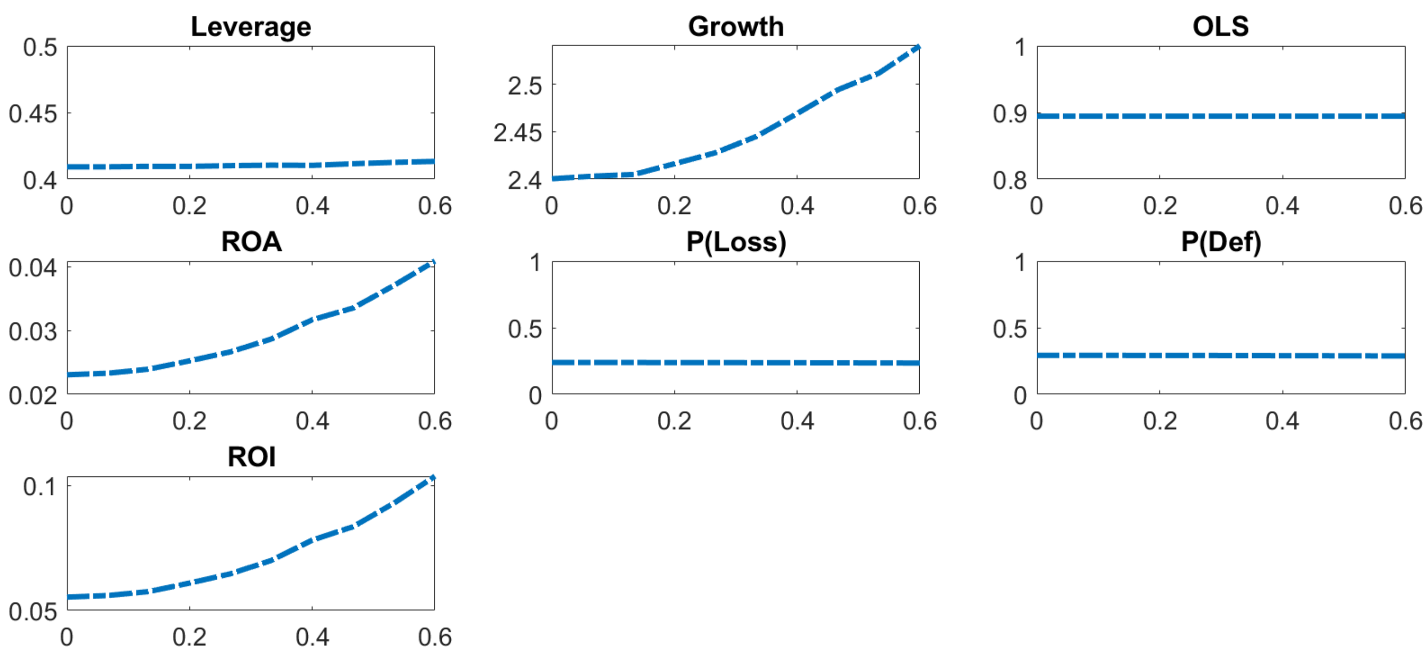
Moment Sensitivity: b



Moment Sensitivity: p



Moment Sensitivity: λ



Moment Sensitivity: χ