Too much at stake? Entrepreneurial Wealth Concentration and Firm Performance*

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Abstract

Using detailed Danish registry data, we study how entrepreneurial wealth concentration—the share of an entrepreneur's wealth invested in the firm—affects performance. We exploit the *marital divorce of a minority shareholder* as an exogenous source of variation in the majority shareholder's concentration. Divorce generates a negative income shock that induces the minority shareholder to sell their stake to the majority shareholder, increasing concentration independently of firm fundamentals. Consistent with the hypothesis that higher concentration induces more conservative risk-taking, we find that following a minority shareholder's divorce, both the mean and variance of firm performance—measured by ROE, sales, and employment—as well as the probability of default, decline. Counterfactual calculations suggest that the growth costs of entrepreneurial wealth concentration are substantial.

Keywords: Entrepreneurship, diversification, idiosyncratic risk, firm performance.

JEL Codes: D23, G32, L25, L26, O16

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1 Introduction

We study the effects of entrepreneurs' wealth concentration on business performance. We define entrepreneurial wealth concentration as the value of the stock holding in the business over the total value of the entrepreneur's wealth. When entrepreneurs allocate a significant portion of their total wealth to their business, they become vulnerable to the associated idiosyncratic risk. This affects their entrepreneurial choices. In particular, when facing projects with different risk/return profiles, undiversified entrepreneurs might shift the firm strategy toward low-risk/low-return projects to reduce exposure to idiosyncratic risk, thus reducing overall growth.

Quantifying the effects of wealth concentration is important. In fact, there is evidence that private equity owners - and particularly entrepreneurs - tend to hold a large share of personal wealth in the firm they own (Moskowitz and Vissing-Jørgensen, 2002). Moreover, owners of family firms tend to forgo the benefits of diversification to maintain control of the firm and enjoy private benefits of control (Burkart, Panunzi, and Shleifer, 2003). Finally, private equity accounts for a large share of total equity globally. All this suggests that the cost of entrepreneurial under-diversification may be large. But how large? This is the question we contribute to answer in this paper.

To frame our empirical analysis, we formalize the role of under-diversification in a simple Sharpe–Markowitz model of entrepreneurial choices (Markowitz, 1952; Sharpe, 1964). Entrepreneurs select their firms' risk–return profiles along a concave frontier and allocate their wealth between the firm and a risk-free asset. When they are free to choose the optimal share of wealth to invest in the firm, they select a risk-return combination that maximizes their portfolio's Sharpe ratio. By contrast, when they are forced to hold a larger stake than optimal, they adjust the firm's risk–return combination downward—moving to a safer, lower-return point on the frontier. This distortion lowers their overall utility and reduces firm's performance.

Despite its theoretical importance, there is no causal evidence on the effects of under-diversification, largely because identifying them is difficult. Both ownership structure and the entrepreneur's wealth concentration in the firm are endogenous choices, and simple correlations are easily contaminated by reverse causality. For example, high-growth firms tend to attract outside investors, which allows entrepreneurs to dilute their stake—generating a negative relationship between expected returns and ownership concentration that simply

reflects heterogeneity in growth opportunities.

To overcome these challenges, we exploit the marital separation (hereafter, "divorce") of a *minority shareholder* as a quasi-random shock to the likelihood that the majority shareholder acquires the minority shareholder's shares, thereby increasing her wealth concentration in the firm. When a household experiences a divorce, the two spouses lose the family economies of scale in household expenditures, resulting in a standard of living for each separated member that is lower than when they were married. Although it varies by sex, family characteristics, and the public safety net, the effect of divorce on the living standards of the members of the couple is estimated to be sizeable (Bratberg and Tjøtta, 2008; Bonnet, Bertrand, and Solaz, 2021). In Denmark, from which our data are sourced, the loss is substantial: Hussain and Knagas (2009) document that divorce reduces disposable income by roughly 30% for women and 24% for men. This drop in income can prompt the minority shareholder to liquidate her position in the firm. The majority shareholder is typically the natural buyer. This reflects a desire to avoid the uncertainty associated with an unknown external investor entering the firm or with another minority shareholder increasing their influence and potentially threatening control. In addition, incumbent shareholders have an informational advantage in assessing the value of the firm, making transactions between existing shareholders easier vis-à-vis those involving external investors. We assume that, conditional on the number of shareholders and their age, the divorce of one of the minority shareholders is orthogonal to firm characteristics and, in particular, to expected firm outcomes.

An important property of our approach is that the shock we use does not affect the overall wealth of the entrepreneur. Instead, it just induces a change in the composition of the majority shareholder's wealth from other personal wealth (financial assets, housing wealth, etc.) to own-business wealth. Shocks to total wealth, such as lottery wins or changes in the prices of real estate, can also alter shareholder concentration in the firm but would likely violate the exclusion restriction, as total wealth may have a direct effect on the chosen risk–return profile. This feature is particularly important under DARA (Decreasing Absolute Risk Aversion) preferences, which are standard in economic applications. Under DARA preferences, the majority shareholder's total wealth directly affects risk preferences, making it difficult to disentangle changes in firm strategy driven by wealth concentration from those driven by shifts in risk tolerance. Moreover, the majority shareholder may invest the additional wealth directly in the firm, affecting performance through this channel. Our shock affects entrepreneurial concentration without changing the overall wealth of the entrepreneur.

Our identification strategy requires that the departure of the minority shareholder affects firm performance only through the increase in the majority shareholder's ownership concentration. While this is motivated by the fact that the majority shareholder typically determines the firm's strategy, minority shareholders may still affect performance through direct managerial contributions or other inputs. We address this concern by exploiting variation in the likely contribution of minority shareholders and show no evidence consistent with a direct effect (details below).

We implement our identification strategy by combining an array of administrative registry data at Statistics Denmark for the years 2006 to 2017. We use the population of Danish individuals and limited liability companies, including firm ownership and accounting information. Following the literature, we estimate the value of the private firms by computing the book-to-market value for listed companies and apply these multiples to private firms (Bach, Calvet, and Sodini, 2020). Statistics Denmark directly supplies information on the market value of all other components of an individual's wealth. We use other administrative data from tax authorities to obtain information on other components of wealth and income, as well as information on marital status from the social security system. Using register information on divorces, we identify limited liability companies (firms, hereafter) in which a minority shareholder undergoes a divorce. In our period of analysis, we observe 1,036 firms (for 10,067 firm-year observations) experiencing a minority shareholder's divorce, accounting for 5% of firms with more than one shareholder.[1] We then check if, following the divorce of a minority shareholder, the majority shareholder's wealth concentration (defined as the value of the firm stake relative to total wealth) increases and if the firm's risk/return combination is affected by this change. We measure firm returns using the level of ROE (defined as net income divided by the book value of equity). We capture risk through the time-series variability of ROE, changes across its distribution, and firm default, the latter measured using administrative data on bankruptcy and liquidation. We study changes in firm strategy using firm-level data on turnover, employment, assets, debt and equity. To analyze how majority shareholders acquire minority stakes and how this affects their portfolio choices, we use individual-level data on housing values, debt, bank deposits, and financial investments.

To estimate the effect of minority-shareholder divorce on firm ROE and the other variables of interest, we use a staggered difference-in-differences design in which the event is the minority shareholder's divorce. To address the negative-weight problem that can arise with

[1] As we use minority-shareholder divorce as an instrument, firms must be observed at least once with a minority shareholder.

staggered and heterogeneous treatment effects, we rely on the methodology of Callaway and Sant'Anna (2021). To maximize comparability between treated and control units, we use not-yet-treated units as controls. We estimate both event studies, which allow us to test for the absence of pre-trends, and average treatment effects (ATEs). To study return variability, we first compute the standard deviation of returns before and after divorce and estimate a two-way fixed-effects model with divorce as the treatment variable. We then examine how divorce affects the distribution of returns by estimating quantile regressions across the ROE distribution. Finally, we analyze whether divorce affects the probability of firm default using a cross-sectional specification, which requires introducing never-treated units as controls.

We begin by showing that our instrument performs well. Following the divorce of a minority shareholder, the number of firm's shareholders falls by 0.27 on average over the post-event period and by about 0.60 after five years. This is consistent with divorce absorbing financial resources and prompting the minority shareholder to sell their stake. The majority shareholder's equity share rises on average by roughly 5 percentage points after the event and by more than 10 percentage points after five years—an increase equal to about 20 percent of their average equity share (0.53). Over the same period, the total value of their stake in the firm rises by about 20 percentage points, indicating that they buy out the minority shareholder's stake. Consequently, their wealth concentration grows by about 7 percentage points over five years—a large effect, given that concentration is bounded between zero and one and averages 35 percent. In all cases, the event-study estimates reveal no evidence of pre-trends. This evidence shows that the instrument is both exogenous and highly relevant.

We next examine how increases in ownership concentration affect firm returns. Event-study estimates reveal no pre-trend in ROE but a sharp and persistent decline after the minority shareholder's divorce: treated firms experience a drop of roughly 10–15 percentage points within four to five years, relative to an average ROE of 26 percent. The magnitude and timing of the effect are highly consistent across specifications, including those with an extensive set of firm and shareholder controls. Overall, the evidence shows that higher ownership concentration leads entrepreneurs to adopt strategies that reduce average returns.

A potential threat to our identification strategy is that minority shareholders may directly affect firm performance by providing valuable human capital and influencing the chosen risk–return profile through their preferences.[2] In that case, their exit—rather than the in-

[2]An additional effect of the increase in the majority shareholder's stake is that they have more "skin in the game". This mechanism operates in the opposite direction of our risk-aversion hypothesis, as it predicts greater effort by the majority shareholder (Holmstrom and Tirole, 1997).

duced increase in ownership concentration—could mechanically affect ROE, thereby violating the exclusion restriction. To address this concern, we re-estimate our baseline specification on subsamples that should differ in the extent of the minority shareholder's potential influence. First, we restrict the sample to firms in which the minority shareholder was a "passive shareholder", i.e., they held neither board nor executive positions prior to the divorce event, thereby ruling out direct managerial or advisory channels. In addition, we show that the effect does not vary with the human capital of the divorcing minority shareholder. Second, we focus on firms in which the majority shareholder already held more than 50% of the voting rights before the divorce, implying that control rights and decision-making authority were unaffected by the minority shareholder's exit. We then partition the sample by minority shareholders' educational attainment — distinguishing those with at most a high school diploma from those with post-secondary education — and find that the estimated effect of the increase in ownership concentration is virtually identical across the two groups. Finally, we consider the subsample of firms with at least three shareholders at the time of divorce, ensuring that minority shareholder monitoring remains in place, finding no difference with the overall results. This evidence runs against the hypothesis that the baseline results are driven by the direct involvement of minority shareholders and supports the validity of the exclusion restriction.

Next, we examine the effects on firm risk. The variability of returns—measured by the standard deviation of ROE—declines by approximately 0.09 in the post-divorce period, relative to a sample mean of 0.42. Lower variability does not necessarily imply lower risk, given the drop in mean returns. If the leftward shift dominates the variance reduction, pre-divorce returns may first-order stochastically dominate post-divorce ones. We address this issue in two ways. First, we perform quantile regression analysis. We find that after a minority shareholder's divorce, firms perform better at the lower end of the ROE distribution. Specifically, the 10^{th} percentile for these firms is 5% higher than that of yet-to-be-treated firms, compared to an overall mean return of -10% at that percentile. Things are opposite at the 90^{th} percentile. This result is extremely robust to changes in the sample and estimation technique. This rules out the possibility that, after treatment, firms do uniformly worse over the whole distribution of return on equity. Second, we look at the extensive margin of risk, that is, at the default probability. In fact, from the main shareholder's perspective, the most disruptive outcome is firm failure, and our theory predicts that when becoming more exposed entrepreneurs should reduce risk and thus default rates. And this is what we find. In our preferred specification, firms that experience the divorce of a minority shareholder have

a default probability over the entire observation period that is 4% lower than other firms. This compares to an overall default rate of 16%. In this case too, we show that the results are robust to changes in the estimation technique, time periods and definition of default. In summary, a minority shareholder's divorce increases the majority shareholder's wealth concentration, leading to safer strategies. This lowers the firm's risk-return profile: average ROE and dispersion decline, the lower ROE percentile rises while the upper one falls, and the default probability decreases.

We conjecture that strategies that imply lower risk and lower returns generally imply a reduction in the firm's growth prospects, for example, cutting risky but promising investments. We therefore repeat the same analysis for sales, employment, and assets. Following the divorce, firms settle on a path of substantially lower and less volatile growth along all three dimensions. No evidence of pre-trend emerges, again supporting our identification assumption. The effects are substantial.

Entrepreneurs who choose to mitigate risk by scaling down their operations are likely to forego investment opportunities, thereby lowering their investment requirements. Consistently, we find that after the divorce the debt level drops by more than 10 percentage points over 5 years. Since equity is unaffected, the firm leverage also drops by more than 5 percentage points after 5 years. Given that leverage is a major determinant of corporate risk and equity returns variability (Myers, 1977), a reduction in leverage further supports the hypothesis that the firm becomes less risky. We conclude that an increase in wealth concentration significantly reduces the risk-return combination chosen by the entrepreneur.

Finally, we study the effect of minority shareholder divorce on the majority shareholder's portfolio. Consistent with the properties of our instrument —which shifts wealth allocation toward the firm but does not affect total wealth— we find that the majority shareholder's total wealth remains unchanged following the minority shareholder's divorce. Instead, the funds used to acquire the minority stake are sourced from the majority shareholder's housing wealth, which declines after the divorce by an amount comparable to the value of the newly acquired shares. In addition, the majority shareholder's bank deposits increase indicating a rise in precautionary savings consistent with the majority shareholder offsetting the higher risk exposure associated with greater concentration in the firm.

To evaluate the aggregate impact of high concentration, we conduct a counterfactual exercise. We consider all firms with more than one shareholder and cap the majority shareholder's stake at 51%, modifying their wealth concentration accordingly. We then recompute coun-

terfactual average ROE, employment and sales under the reduced concentration. We find that the unweighted average ROE of limited liability companies in the economy increases by 2.5 percentage points, from 18% to 20.5%, and that employment increases by 2.4 log points and sales by 1.7 log points. When weighting firms by equity, the resulting increase in aggregate ROE amounts to 7 p.p. The effect is substantially larger when restricting the sample to firms in which the majority shareholder holds more than 51%, that is, those "treated" by the experiment. Overall, we conclude that reducing majority-shareholder concentration has substantial economy-wide effects.

There is limited evidence on the effects of lack of entrepreneurial diversification on firm performance. Faccio, Marchica, and Mura (2011) show that firms with more diversified owners, defined in terms of business ownership only (i.e., without information on other wealth components),[3] undertake more risky investments than those owned by un-diversified shareholders. Other papers proxy lack of diversification with family ownership (Anderson, Duru, and Reeb, 2012; Michelacci and Schivardi, 2013), reaching similar conclusions.[4] Bena, Ellul, Pagano, and Rutigliano (2025) show that entrepreneurs with more diversified portfolio of firms offer more wage and employment insurance to their employees. Compared with these papers, we provide causal evidence on the effects of business risk exposure exploiting an exogenous shock to concentration.

A large literature on financial frictions emphasizes the importance borrowing constraints, based on the idea that own wealth is needed to secure external finance (Holmstrom and Tirole, 1997). We focus on a less studied aspect–equity frictions—that is, limits to entrepreneurs' ability to diversify firm-specific risk. Two recent macro papers evaluate the relative importance of debt and equity frictions (Peter, 2025; Boar, Gorea, and Midrigan, 2025). In these models, equity market frictions constrain diversification, leading risk-averse entrepreneurs to scale down firm operations to limit their exposure to the firm risk. Both find that eliminating equity frictions would have a substantially larger impact on aggregate output than eliminating debt frictions. This is because, while entrepreneurs can eventually relax borrowing constraints as wealth accumulates, risk exposure declines only slowly with wealth and remains significant even at very high wealth levels. We contribute to this nascent

[3] Faccio et al. (2011) compute diversification using information on business ownership in the Amadeus database, which reports information on shareholders of European private and public firms.

[4] The literature on family firms suggests that they tend to exhibit lower managerial quality (Bennedsen, Nielsen, Pérez-González, and Wolfenzon, 2007; Bloom and Van Reenen, 2007). We stress that, even controlling for skills, family ownership might deliver a worse performance because of the high concentration that maintaining control entails.

literature by offering causal micro-level evidence on the role of limited entrepreneurial diversification in shaping firm performance. Remarkably, despite substantial methodological differences, their quantitative findings are consistent with the magnitudes implied by our counterfactual exercises.

The rest of the paper is organized as follows. Section 2 presents the simple model of entrepreneurial choices under exposure to the firm's risk. Section 3 outlines the identification strategy and empirical design, while Section 4 describes the data. Section 5 documents the increase in wealth concentration following a minority shareholder's divorce and the resulting reduction in returns, while Section 6 focuses on the associated reduction in firm risk. Section 7 examines the mechanisms driving these shifts. Section 9 performs the counterfactual exercise and Section 10 concludes.

2 A simple Sharpe–Markowitz model of entrepreneurship

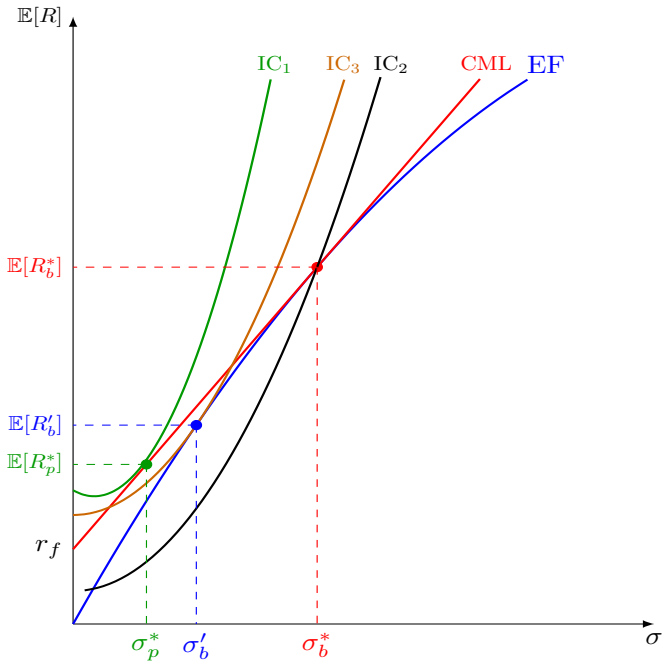
In this section, we propose a very simple model of entrepreneurial risk-return choices with risk averse entrepreneurs based on the Markowitz–Sharpe mean–variance approach to portfolio choice to formally illustrate the mechanism that we test in the data.

An entrepreneur operates a firm that requires a fixed start-up equity investment E. For expositional simplicity, and without loss of generality, we assume that the entrepreneur's initial wealth is exactly equal to E, so that external finance is not strictly required to start the firm. A firm is represented by a technology characterized by a concave risk–return combination, with risk measured by the standard deviation of the expected return:

$$\mathbb{E}[R_b] = a_1\sigma_b - a_2\sigma_b^2, \qquad a_1 > 0,\ a_2 > 0, \tag{1}$$

where $\mathbb{E}[R_b]$ and σ_b denote, respectively, the expected return and the risk of the business b. The technology defines the upper envelope of the feasible combinations of expected return and risk. We assume a concave risk–return relationship, whereby attaining higher expected returns entails progressively increasing marginal exposure to risk. This is the same set up as the efficient frontier model of portfolio choice of Markowitz (1952). We follow Markowitz's terminology and call the risk-return schedule the *efficient frontier* (EF). The entrepreneur chooses their preferred point on this frontier. The efficient frontier is represented by the blue line in Figure 1.

Figure 1: The effect of divorce on the firm's risk–return combination



Note: The figure illustrates the efficient frontier (EF, blue curve), the capital market line (CML, blue straight line), and the entrepreneur's indifference curves under different ownership structures.

In addition to investing in the firm, the entrepreneur can allocate wealth to a risk-free asset yielding return r_f. As shown by Sharpe (1964), the highest attainable risk–return combinations lie along the straight line that passes through $(0, r_f)$ and is tangent to the efficient frontier. This line is the *capital market line* (CML), represented by the red line in Figure 1. It captures the expected risk–return trade-off of a portfolio that combines the risk-free asset with the firm's equity and takes the following form:

$$\mathbb{E}[R_p] = r_f + s^* \sigma_p = r_f + \left(a_1 - 2\sqrt{a_2 r_f}\right)\sigma_p, \tag{2}$$

where the subscript p denotes the portfolio.

Portfolios on the capital market line dominate all other feasible portfolios. As a consequence, the entrepreneur chooses the business risk-return combination at the point of tangency between the efficient frontier (EF) and the capital market line itself. It is immediate to verify that the firm's risk–return combination at this point is:

$$\mathbb{E}[R_b^*] = a_1 \sqrt{\frac{r_f}{a_2}} - r_f. \tag{3a}$$

$$\sigma_b^* = \sqrt{\frac{r_f}{a_2}} \tag{3b}$$

Along the capital market line the Sharpe ratio is $S^* = \frac{\mathbb{E}[R_p^*]-r_f}{\sigma^*} = a_1 - 2\sqrt{a_2 r_f}$.

The entrepreneur has mean–variance preferences:

$$U = \mathbb{E}[R_p] - \frac{A}{2}\sigma_p^2, \qquad A > 0, \tag{4}$$

where A is the coefficient of absolute risk aversion. The optimal portfolio corresponds to the point of tangency between the capital market line and the highest attainable indifference curve, depicted by the green line in Figure 1. The share of wealth α invested in the firm at this portfolio is:

$$\alpha^* = \frac{a_1 - 2\sqrt{a_2 r_f}}{A}\sqrt{\frac{a_2}{r_f}}.$$

Accordingly, at start-up the entrepreneur invests $\alpha^* E$ in the firm and $(1-\alpha^*)E$ in the risk-free asset. The remaining $(1-\alpha^*)E$ required to start the firm is contributed by another investor, denoted the *minority shareholder*. In what follows, we define the share of the entrepreneur's wealth invested in the firm α as *entrepreneurial concentration*. In this case with complete diversification opportunities, the entrepreneurial concentration is α^*. At this optimal point, the firm's risk-return combination is $\{\mathbb{E}[R_b^*], \sigma_b^*\}$ but the entrepreneur's portfolio risk-return combination is $\{\mathbb{E}[R_p^*], \sigma_p^*\}$ as depicted in Figure 1.[5] By reducing the exposition to the firm, the entrepreneur chooses a relatively high risk-return business strategy, and then diversify away part of the risk away by reducing the equity share and maximizes their expected utility along the EC_1 indifference curve.

Suppose now that the minority shareholder must liquidate their equity stake, and the majority shareholder is forced to acquire it. The entrepreneur then invests all their wealth in the firm, increasing its entrepreneurial concentration to 1. In this case, the portfolio's risk-return combination coincides with that of the firm, represented by the red point in Figure 1. Because the previously chosen portfolio on the capital market line was strictly preferred to any other feasible portfolio, investing all wealth in the firm entails a lower utility, illustrated by the lower indifference curve (IC_2) in Figure 1 passing through the red dot.

At this new position, the firm's risk–return combination initially chosen by the diversified entrepreneur is no longer optimal. Without access to the capital market line, the entrepreneur chooses the point on the efficient frontier that is tangent to the highest attainable indifference curve. This new optimal risk-return combination corresponds to the blue dot in Figure 1, with corresponding risk and return combination

[5] Formally, the values are $\sigma_p^* = \frac{a_1 - 2\sqrt{a_2 r_f}}{A}$ and $\mathbb{E}[R_p^*] = r_f + \frac{\left(a_1\sqrt{r_f} - 2\sqrt{a_2}\, r_f\right)^2}{A\, r_f}$.

$$\mathbb{E}[R_b'] = \frac{a_1^2(a_2 + A)}{(2a_2 + A)^2}. \tag{5a}$$

$$\sigma_b' = \frac{a_1}{2a_2 + A} \tag{5b}$$

It is immediate to show that $\{\mathbb{E}[R_b'] < \mathbb{E}[R_b^*], \sigma_b' < \sigma_b^*\}$. The associated indifference curve (the orange curve IC_3 in Figure 1) lies above that corresponding IC_2, but below the one achieved before the entrepreneur was forced to buy out the minority shareholder (IC_1). Hence, the entrepreneur is strictly worse off.

The utility loss stems from two sources. First, at the new firm's risk–return combination, the entrepreneur would attain higher utility if they could move vertically upward to the capital market line. Second, and more importantly, the loss of diversification forces the entrepreneur to reduce risk at the cost of lower expected returns. The trade-off between risk and return is therefore less favorable on the efficient frontier than on the capital market line. Indeed, it is immediate to show that the Sharpe ratio is strictly higher when the entrepreneur can optimally choose the degree of concentration (i.e., the share invested in the firm) and thus operate along the capital market line.

This simple model illustrates the core mechanism that we are going to investigate empirically: entrepreneurs with a large exposure to the firm risk choose an entrepreneurial strategy which delivers lower risk at the cost of lower expected returns. Firms of highly concentrated entrepreneurs take up too little risk compared to those of a well diversified entrepreneur.

3 Identification and empirical design

We aim to evaluate the effect of the majority shareholder's wealth concentration in firm j on the risk-return profile of the firm. The idea is that more concentrated owners are more risk-averse and tend to adopt a more conservative business strategy. Specifically, we are interested in the effect of concentration on the firm return and risk profile. We measure concentration as the ratio between the value of firm j times the profit share of the majority shareholder and the majority shareholder's total wealth.[6] Of course, we cannot simply relate returns and risk to concentration, as concentration itself is a choice variable. Furthermore, performance can have feedback effects on diversification. For example, a firm with better prospects might

[6]The detailed definitions of these variables can be found in Section Variables Definition.

attract more external capital, allowing the entrepreneur to diversify its portfolio. One needs exogenous variability in the concentration. This is what we discuss next.

3.1 Identification

Finding sources of as good as random variation in the concentration of majority ownership is challenging. One approach would be to exploit shocks to the majority shareholder's total wealth, such as lottery wins, changes in real estate prices, or shocks to the firm's value. However, variation of this type likely violates the exclusion restriction. There are channels through which changes in the majority shareholder's wealth may affect firm performance. Most directly, the majority shareholder may invest additional wealth in the firm. Moreover, if the majority shareholder's utility exhibits decreasing absolute risk aversion, wealth shocks also alter risk preferences.

Our approach is to look for an event that shifts the majority shareholder's wealth allocation between that invested in the firm and in other assets, keeping the overall majority shareholder's wealth fixed. We focus on a shock that directly impacts a *minority shareholder* and indirectly pushes the majority shareholder to increase their stake in the firm: the divorce of a minority shareholder. When a household undergoes a divorce, it loses the family economies of scale in expenditures, and the combined standard of living of the separated members becomes lower than when they were married.[7] Divorce increases the likelihood that the affected shareholder wants to sell their share to cover the liquidity needs. The majority shareholder might buy the minority shareholder's stake to avoid the uncertainty entailed by an external investor entering the company or the risk of losing control if another minority shareholder buys. In doing so, their wealth concentration in the firm rises, heightening their exposure to its risk. To manage this increased exposure, they can choose safer strategies.

We now discuss the assumptions underlying our identification strategy (See Appendix A for a formal discussion).

1) **The divorce of a minority shareholder being as good as random.** We assume that the probability of a firm experiencing the divorce of a minority shareholder depends

[7] Estimates of the effect of divorce on the living standards of couple members vary depending on gender, family characteristics, and the public safety net (Bratberg and Tjøtta, 2008; Bonnet et al., 2021). Nevertheless, these effects are significant even in a country with an extensive welfare system like Denmark. According to Hussain and Knagas (2009), divorce leads to an average income reduction of around 30% for women and 24% for men.

structurally on the number of shareholders, the shareholders' age structure (which can be approximated by the majority shareholder's age), and a random factor. By conditioning for the number of shareholders and the majority shareholder's age, we exploit the as good as random variation that leads to a divorce event among one of the firm's minority shareholders. Given the controls, the divorce of a minority shareholder satisfies the absence of selection into the treatment: no firm characteristics predict the divorce of a minority shareholder. By claiming that the instrument for the divorce of a minority shareholder is exogenous, we rule out the possibility that the firm's expected outcome can influence the minority shareholder's divorce probability.

2) **The first stage mechanism.** The divorce of a minority shareholder increases the likelihood that the majority shareholder will buy the shares of that minority shareholder. Divorce is costly because the household loses economies of scale within the family. It entails a negative wealth and income shock to the minority shareholder, leading some minority shareholders to sell their stake in the firm to finance the divorce. At the same time, the majority shareholder might want to avoid new minority shareholders. In addition, the shares of non-listed firms are highly illiquid due to information asymmetries regarding the firm's valuation, making them difficult to sell to individuals who are not already shareholders of the firm. As a result, the divorce of a minority shareholder increases the probability that the majority shareholder will increase their stake in the firm.

3) **The Exclusion Restriction.** We assume that there is no direct effect of the divorce of a minority shareholder on the firm's risk–return profile. This assumption is based on the fact that minority shareholders do not influence the firm's risk–return decisions because they hold minority stakes. Potential violations of this assumption arise if minority shareholders affect firm outcomes through their human capital, their influence on the firm's risk–return choices, or their monitoring role. We address these threats to our exclusion restriction through a set of exercises that show our results are robust in subsamples in which a contribution of the minority shareholder to firm management or to the determination of the risk–return profile can be excluded.

3.2 Empirical model

We estimate the effect of the shock to concentration using Diff-in-Diff and event study estimators. These estimators compare changes in an outcome variable pre-post event for treated units with changes of the same variable over the same period for units that have not

(yet) undergone treatment. Our treatment occurs in different periods for different units. A growing body of established literature highlights significant estimation challenges associated with Diff-in-Diff models with staggered treatment timing. In particular, if the treatment effect is heterogeneous, standard two-way fixed effects estimators can be severely biased due to the "negative weights" problem. The literature has proposed various estimators that address this problem (see, for example, De Chaisemartin and D'Haultfoeuille, 2020; Goodman-Bacon, 2021; Borusyak and Jaravel, 2024; Athey and Imbens, 2022; Callaway and Sant'Anna, 2021; Sun and Abraham, 2021).

We use the Difference-in-Difference event study design with staggered adoption proposed by Callaway and Sant'Anna (2021). This approach avoids the issue of negative weights. We use not-yet-treated firms as controls for treated firms, avoiding the need to select a control group of never-treated firms and maximizing comparability between treatment and control groups. We argue that our setting satisfies the assumptions needed to consistently estimate the effects of the treatment: irreversibility of the treatment, random sampling, limited treatment anticipation, and conditional parallel trends based on "Not-Yet-Treated" groups. Divorce is very rarely reversed. We assume that neither the majority shareholder nor the firm's expected outcomes influence the probability of a minority shareholder's divorce. We also assume parallel trends between groups experiencing the divorce of a minority shareholder at time t and groups that are "not-yet-treated" at time $t + k$, conditional on controls.

Callaway and Sant'Anna (2021) propose to first estimate the treatment effects separately for each cohort (i.e., firms undergoing treatment in the same year) and year post treatment and then aggregate these cohort-time estimates to obtain aggregate estimators. We estimate $\theta_{es}(e)$ by aggregating all group-time average treatment effects corresponding to event time e into a single event-study parameter. As the preferred summary measure of the treatment effect, we use θ_w^O, computed as the average of the overall effect for each individual cohort. We experiment with different aggregation methods, finding that the results are robust. [8]

To assess risk, we use the variability of the performance. In this case, we need multiple periods to measure variability. This variable is therefore not suitable for event studies analysis. Consider a performance measure r_{jt}. We define firm risk as the firm level variability over time of such performance. A more variable performance implies a less stable cash flow for the entrepreneur. Moreover, a highly variable performance is more likely to lead the firm to

[8] $\theta_{es}(e)$ and θ_w^O correspond, respectively, to the Stata output of `estat event` and the `estat all`–average treatment effect on treated.

financial distress. We measure variability as the standard deviation of returns, calculated separately for the pre- and post-divorce periods:

$$\text{sd(r)}_{jPRE} = \sqrt{\frac{1}{(n_{jPRE}-1)} \sum_{t=T_j^{Min}}^{T_j-1} (r_{jt} - \bar{r}_{jPRE})^2} \tag{6}$$

$$\text{sd(r)}_{jPOST} = \sqrt{\frac{1}{(n_{jPOST}-1)} \sum_{t=T_j}^{T_j^{Max}} (r_{jt} - \bar{r}_{jPOST})^2} \tag{7}$$

where T_j is the year of the divorce of a minority shareholder of firm j, n_{jPRE} (n_{jPOST}) is the number of periods for which firm j is observed pre (post) divorce, T_j^{Min} (T_j^{Max}) is the first (last) year in which firm j is observed, $\bar{r}_{jPRE}$ ($\bar{r}_{jPOST}$) is the average performance pre-divorce (post-divorce). For each firm, therefore, we have two measures of risk, one pre- and another post-divorce.

To analyze the effect of the divorce of a minority shareholder on firm variability, we run a two-way fixed effect linear regression of the following form:

$$\text{sd(r)}_{j\tau} = \beta \mathbb{1}_{\{\tau=POST\}} + \gamma_j + \theta \times C_j + \epsilon_{j\tau} \tag{8}$$

where $\tau = \{PRE, POST\}$, $\mathbb{1}_{\{\tau=POST\}}$ is an indicator function for the post-divorce period, γ_j are firm fixed effects, and C_j represents fixed controls added in specifications where we do not control for firm fixed effects. A reduction in firm risk after the divorce implies that $\beta < 0$.

4 The data

In this section, we describe the data sources, illustrate the variables' construction, and supply descriptive statistics for the key variables.

4.1 Data Sources & Sample Construction

We use Danish registry data from 2006 to 2017. Specifically, we exploit data on balance sheet information, firm ownership structure, households' full wealth holdings, and individual household divorce history. Each variable is recorded annually. We define shareholders at the household level, aggregating all shares owned by household members. Therefore, the divorce of a minority shareholder means that the divorce has occurred in a household that owns a

minority share in the firm. The majority shareholder is the household that holds the relative majority of the company's voting shares.

We construct shareholdings using the data from Experian, a private data provider, augmented with data from the Central Business Register, supervised by the Ministry of Industry, Business and Financial Affairs. Firms can be owned either directly by individuals or indirectly through other firms. In cases of firm ownership, we trace the ownership hierarchy to assign control rights to individual owners. At each step, we identify the controlling shareholder of firm j_1 as the entity holding the majority of its shares and attribute to that shareholder the shares of other firms owned by j_1. This process is repeated until only individual owners remain. For cases in which we cannot trace back the firm's majority shareholder to an individual owner, we drop the firm from the sample. In addition to the ownership share, we also compute the profit shares, obtained by multiplying ownership shares along the ownership chain. For example, if individual i owns 70% of firm j_1 which owns 40% of firm j_2, individual i owns 28% of j_2's profits.

The criteria for a firm in the Danish firm register to be included in our data are: 1) the firm is either a closely held company, a limited liability company, or a partnership; 2) the firm has been observed at least once with 1 employee and positive turnover; and 3) the firm has been observed in the data more than twice. These inclusion criteria are necessary to exclude sole proprietorship, unincorporated businesses, or legal entities created for fiscal purposes only.

For our analysis, we focus on the subset og firms that (i) have more than one shareholder for at least one year, (ii) experience the divorce of a minority shareholder, and (iii) remain in the sample throughout the entire period. The last restriction is necessary because, by construction, a firm can exit only *after* the divorce of the minority shareholder. Absent this restriction, exits would be observed only among treated firms, since we use not-yet-treated firms as controls. Because firms typically under-perform in the years preceding exit, this would mechanically bias the estimates toward finding a decline in performance among treated firms. Exit is analyzed in a separate set of regressions, in which the sample also includes never-treated units, allowing exit to occur independently of treatment. We explain in detail the construction of this second sample in Section 6.3 describing the exit results. Additionally, we drop firms in which the divorced minority shareholder held 50 percent or more of the equity at the time of divorce. This excludes cases with two shareholders each owning exactly 50 percent, as well as cases in which a shareholder classified as a minority in

terms of voting rights is, in fact, the absolute majority in terms of equity. This restriction ensures that there is no ambiguity in identifying the majority shareholder.

4.2 Variables Definition

In this section we describe the variables we construct to carry out our analysis.

Value of the firm Our sample comprises unlisted firms. We obtain a measure of the market value of the firm by applying a multiple evaluation. Specifically, the value of the firm is computed as follows:

$$\text{Value}_{jt} = \text{Equity}_{jt} \times \text{PB}_{s,t} \tag{9}$$

where Equity_{jt} is the book value of equity of firm j at time t, and $\text{PB}_{s,t}$ is the price-to-book value multiple for sector s to which firm j belongs in period t. The multiple is obtained as the ratio between the sum of the market capitalization of listed companies in Denmark belonging to sector s in period t, and the sum of their shareholders' equity at book value. Details on the market multiples method used can be found in Appendix B.

Household's total wealth. Total Wealth gross of total debt is defined as the sum of bank deposits, stocks, bonds, estimated housing value, and the value of ownership of private businesses.[9] For each business j, the value of the business is $\text{Share}_{ijt} * \text{Value}_{jt}$, where Share_{ijt} is the share of business j owned by household i. Net Total Wealth is defined as Total Wealth net of mortgages, bank loans, and other loans.

Wealth share concentration. We define Wealth share concentration as the share of household i's wealth due to the ownership of firm j:

$$\text{Conc}_{ijt} = \frac{\text{Share}_{ijt} * \text{Value}_{jt}}{\text{Total Wealth}_{it}} = \frac{\text{Share}_{ijt} * \text{Value}_{jt}}{\text{Share}_{ijt} * \text{Value}_{jt} + \text{Other Wealth}_{it}}, \tag{10}$$

where Share_{ijt} is the profit share of the household i in firm j at time t, Value_{jt} is the value of firm j at time t and Other Wealth_{it} is the entrepreneur's wealth different from the wealth deriving from the ownership of the firm. We use gross wealth as our preferred measure of wealth, calculated without subtracting household debt. In fact, net wealth (obtained by subtracting household debt) has a negative left tail, making the measure of concentration meaningless.[10]

[9] Since the tax evaluation of the house in the Danish archives is approximately 60% of the real value, we impute the market value of the house based on property trades.

[10] The reason is that housing values tend to be underestimated, while mortgages on housing are precisely reported, leading to an underestimation of wealth when household debt is taken into account. Indeed, the

4.3 Descriptive Statistics

As discussed in subsection 4.1, we restrict the sample to firms that are observed at least once with more than one shareholder, experience the divorce of a minority shareholder during the observation period, survive until the end of the observation period, and satisfy our inclusion criteria.[11] Our final sample is composed of 1,036 firms (around 5% of the total) and 10,067 firm-year observations. Descriptive statistics for this sample (hereafter *Main Sample*) are displayed in Table 1. Unsurprisingly, firms in the *Main Sample* are on average larger than firms in the set of firms observed at least once with more than one shareholder. Indeed, the probability of a minority shareholder divorce increases with the number of shareholders. The average number of shareholders for firms in the *Main Sample* is 2.9. The median firm has approximately 11.5 employees (8.5 in the overall sample), is 10 years old, has 383,000 in equity, almost 1 million in assets, and turnover of 1,5 million.[12]

We present descriptive statistics for the majority shareholders in Table 2. When we use information at the individual level (rather than at the household level), such as age, we refer to the first family member listed in the data. In the data, the first family member is male 75% of the time. The average age is 51. The majority shareholder's firm equity share ranges between 25% (10th p) and 90% (90th p), with a mean of 51%. While majority shareholders are defined based on voting shares, half of our sample consists of absolute majority shareholders in terms of equity shares, as the median majority shareholder holds 50% of the firm's equity. We exclude firms in which the divorcing minority shareholder held 50% or more of the equity at the time of divorce.

In Table 3, we report descriptive statistics for divorcing minority shareholder households.[13] On average, they hold one-fourth of the firm's equity and voting shares. Importantly, the value of their stake in the firm relative to their total wealth (Part./Wealth) and income (Part./Income) is substantial, averaging 22% and 630%, respectively. This implies that liquidating their stake can relax the liquidity constraints arising as a consequence of divorce.

1st percentile of the distribution of wealth net of all debt is negative.

[11] Danish firms observed at least once with more than one shareholder during the period 2006–2017 number 20,519, corresponding to 145,578 firm-year observations. Appendix Table C1 presents descriptive statistics for the universe of these firms.

[12] All percentiles are computed as averages around the percentile, in compliance with Statistics Denmark's confidentiality regulations. All values displayed in the tables are computed from 2015 Danish crowns converted into dollars at the average 2015 exchange rate (1 USD = 6.74 DKK).

[13] Age is measured as the age of the first family member, who is male in 77% of cases.

Table 1: Descriptive Statistics: Firms in the estimation sample

	Mean	Median	10 p.	90 p.	Obs.
Emp.	25	11.5	2	52.5	9,979
Age	13	10	2	29	10,067
# Shareholders	2.9	3	1	4.3	10,067
Equity	8,026	383	54	2,833	10,067
Assets	11,246	960	190	6,930	10,067
Net Profits	1,295	72	-32	537	10,064
Turnover	3,353	1,513	160	7,983	10,067
Value	10,934	605	72	4,510	10,067
ROE	0.27	0.20	-0.11	0.78	9,864
Debt	3,398	543	75	3,798	9,887
Leverage	0.57	0.59	0.22	0.87	9,887
	Firm Level Standard Deviation:				
ROE	0.42	0.21	0.05	1.04	874
ROE res.	0.30	0.20	0.06	0.72	880
log(Turnover)	0.30	0.21	0.07	0.70	853
log(Emp.)	0.23	0.18	0.03	0.49	871
log(Assets))	0.35	0.26	0.07	0.80	9874
	Pre-Treament:				
ROE	0.29	0.22	-0.11	0.80	3,953
St.Dev(ROE)	0.36	0.24	0.07	0.84	439
St.Dev(ROE re.)	0.35	0.24	0.08	0.84	439

The Table reports descriptive statistics for firms included in the estimation, that is, those for which there is a divorce in the minority shareholder household. Values are in thousand dollars evaluated at the average 2015 exchange rate (1 dollar for 6.74 Danish Krone). All percentiles are computed as averages around the percentile, in compliance with Statistics Denmark's confidentiality regulations. Value are in thousands.

5 Results: First stage and returns

In this section, we present the results on the effects of the minority shareholder's divorce on the majority shareholder's ownership concentration (first stage) and on firm performance, as measured by return on equity (ROE). We start by showing that the divorce of a minority shareholder increases the majority shareholder's equity share and concentration. Next, we analyze the evolution of firm performance in terms of returns and risk pre- post-divorce of a minority shareholder.

Table 2: Descriptive Statistics: Majority Shareholder in the estimation sample

	Mean	Median	10 p.	90 p.	Obs.
Age	51	49	36	67	9,851
Equity Shares	0.51	0.50	0.25	0.90	10,067
Voting Shares	0.55	0.53	0.25	0.93	10,067
Conc.	0.35	0.27	0.03	0.80	9,851
Conc. D.	0.48	0.41	.03	0.99	9,908
Total Wealth	6,484	1,245	380	5,474	9,851
Total Wealth D	5,919	826	97	4,510	9,908
Income	158	133	70	249	9,979

Values are in thousands Dollars. They were originally computed in 2015 Danish Crown. Average 2015 Dollar to DKK exchange rate: 1 dollar for 6.74 Danish Krone. Debt to Cap. reads as debt to debt plus equity ratio, Shares reads Equity Shares, Mkt. V. to Wealth reads Firm Market value to majority shareholder wealth ratio. All percentiles are computed as averages around the percentile, in compliance with Statistics Denmark's confidentiality regulations. The letter D stands for net of debt and Mkt. Val. to Wealth reads as firm market value to wealth ratio.

Table 3: Descriptive Statistics at time of Divorce: Divorcing Minority Shareholders

	Mean	Median	10 p.	90 p.	Obs.
Age	43	43	32	56	1,036
Equity Shares	0.27	0.25	0.10	0.47	1,036
Voting Shares	0.26	0.25	.11	0.40	1,036
Stake/Wealth	0.22	0.14	0.01	0.55	1,036
Stake/Income	6.3	.72	.07	5.3	1,036

Part./Wealth reads as the value of the minority shareholder's stake divided by the minority shareholder's total wealth, and Part./Income as the value of the stake divided by their total annual household income. All percentiles are computed as averages around the percentile, in compliance with Statistics Denmark's confidentiality regulations. The letter D stands for net of debt and Mkt. Val. to Wealth reads as firm market value to wealth ratio.

5.1 The first stage: Minority shareholders' divorce as a shock to concentration

In this section, we determine if the evidence supports the economic mechanism illustrated in Section 3.1 discussing identification. We hypothesize that a divorce pushes the minority shareholder to liquidate their share to cover the costs of the separation. The majority shareholder is the most likely acquirer, both to avoid undesired shareholders and because the shareholders are equally informed about the company's value, and more informed than potential outsiders. When a minority shareholder divorces, we should observe, on average, a decrease in the number of shareholders, an increase in the majority shareholder's equity share, an increase in the value of their stake in the firm, and an increase in their wealth

concentration in the firm.

Figure 2 tests this hypotheses. Panel (a) reports the event study coefficients obtained applying the Callaway and Sant'Anna (2021) estimation method ($\theta(e)$ illustrated above, where e is the distance from the divorce in terms of years) for the number of shareholders. We find that the number of shareholders gradually decreases after the divorce, reaching almost -0.60 after 5 years. The estimates are significantly different from zero already 2 years after the divorce, and remain always significant despite the increase in the standard errors, due to the smaller number of data points available for periods further away from the divorce date.[14]

Panel (b) plots the equity share of the majority shareholder. The share increases monotonically after the divorce, reaching an average value of 10% higher after five years. The increase is the mirror image of the decrease in the number of shareholders shown in panel (a), consistent with the idea that the majority shareholder liquidates the minority shareholder buying their shares. Importantly, we find no evidence of any pre-trend: the difference between treated and controls is small before the divorce.

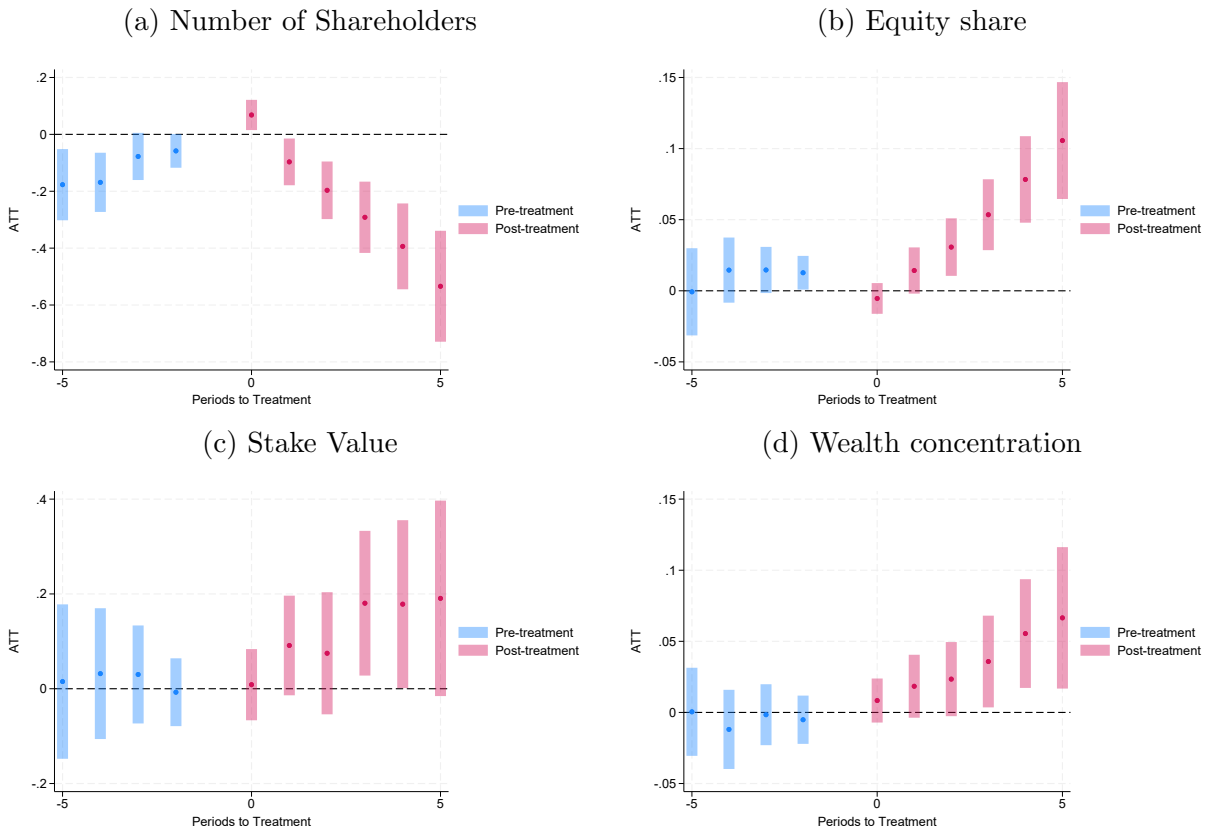
A potential concern is that the minority shareholder's shares are acquired directly by the firm through a share buyback, rather than by the majority shareholder personally. In this case, the majority shareholder's equity stake would increase mechanically — as a result of the reduction in total shares outstanding — without any increase in the value of their stake. Panel (c) addresses this concern directly by reporting the total value of the majority shareholder's stake in the firm. Consistent with the interpretation that it is the majority shareholder who personally buys out the minority, the value of their stake increases by approximately 20% over five years following the divorce, again with no evidence of a pre-trend.

Panel (d) shows that the wealth concentration of the majority shareholder increases substantially after the divorce—by more than 5% by the end of the period. This represents a sizable change relative to an average wealth concentration of 35% and a median of 27% (see Table 2). In line with the evidence on equity shares, we find no statistically significant difference in pre-divorce trends, supporting the parallel-trend assumption.[15]

[14] We find a small, positive trend in the pre-event period. This is because by construction a firm has more than one shareholder in the year of the divorce so that we capture some firms going from one to more than one shareholder in the previous years. In Appendix C.2, Figure C1(b) shows the effect of the divorce of a minority shareholder on the number of shareholders for the subset of firms that have at least two shareholders in the first year of observation: there is no pre-trend.

[15] The figure uses gross wealth concentration, that is, without subtracting debt. Appendix C.2 Figure C1 depicts the evolution of concentration net of debt, revealing a similar post-divorce increase.

Figure 2: Firm Number of Shareholders, Majority Shareholder's Equity Share, Value of and Wealth Concentration



Note: The figure plots event-study coefficients using the Callaway and Sant'Anna (2021) estimator for the effect of the divorce of a minority shareholder on different outcomes. We control for the number of shareholders and the age of the majority shareholder, both measured in the year prior to the divorce. Panel (a) reports the effect on the number of firm shareholders, Panel (b) on the majority shareholder's equity shares in the firm, Panel (c) on the log of the value of majority shareholder's firm stake and Panel (d) on the majority shareholder's wealth concentration in the firm.

Table 4 reports the estimated ATE coefficients, which capture the average effect of the treatment over the post-divorce period. As discussed above, we rely on Callaway and Sant'Anna (2021)'s estimator, θ^{O}_{sel}, computed as the average of the overall effects across cohorts. The estimated coefficients are all highly statistically significant. Consistent with the dynamic patterns shown in Figure 2, where the treatment effects gradually unfold over time, the ATEs are substantially smaller than the effects measured at the end of the observation window.

Overall, we conclude that the divorce of a minority shareholder provides a valid source of exogenous variation in the majority shareholder's ownership concentration. There is no evidence of differential pre-treatment trends, while the relevance condition is clearly met, given the economically and statistically significant increase in concentration following the

Table 4: First Stage ATE

	[1] # of Shareholders	[2] Equity Shares	[3] log(Stake Value)	[4] Wealth Conc.
ATT	-0.27***	0.052***	0.12*	0.043***
	(0.054)	(0.012)	(.066)	(0.014)
N	7,629	7,629	7,396	7,562

Note: The table reports the ATT using the Callaway and Sant'Anna (2021) estimator for the effect of the divorce of a minority shareholder on different outcomes. Controls include the number of shareholders and the age of the majority shareholder, both measured in the year prior to the divorce. Column [1] displays the results for the number of firm shareholders, Column [2] for the majority shareholder's equity share in the firm, Column [3] for the majority shareholder's wealth concentration in the firm, and Column [4] for the majority shareholder's wealth concentration in the firm computed net of debt. Standard errors clustered at the firm level are reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

divorce.

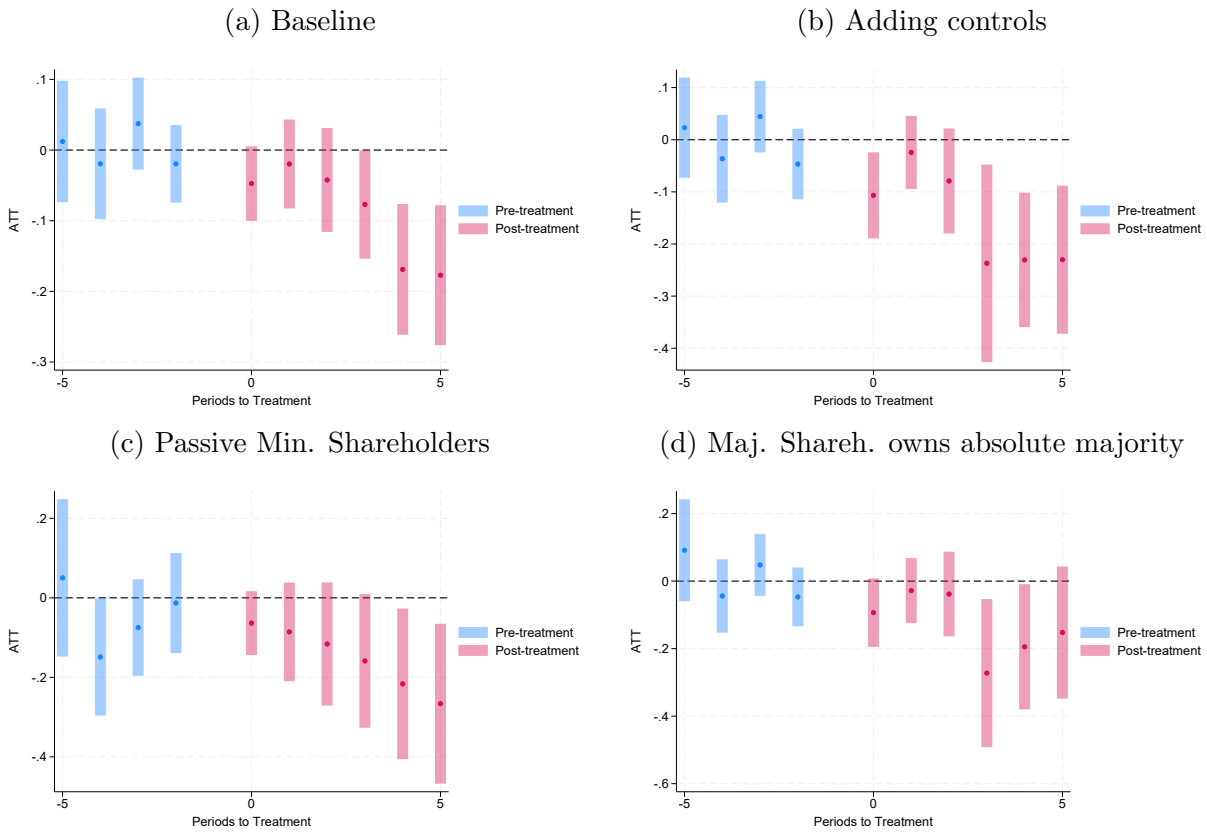
5.2 Effects on performance

Next, we analyze the effects of ownership concentration on firm performance, measured by average returns. Figure 3 plots the event-study coefficients tracing the evolution of ROE before and after the divorce. Panel (a) includes the standard controls—the number of shareholders and the age of the majority shareholder, both measured in the year preceding the divorce. Consistent with our identification strategy, there is no evidence of pre-treatment trends: treated and control firms display parallel trajectories prior to the divorce. Following the divorce, ROE declines sharply among treated firms, with the effect becoming statistically significant three years after the event. Estimates remain relatively stable thereafter, although their precision decreases as the sample size diminishes with time since divorce. Four to five years after the divorce, the estimated decline in ROE reaches approximately -15%, a substantial drop considering that the average ROE over the sample period is 27% (see Table 1).

In Panel (b), we augment the specification with an extended set of controls capturing majority shareholder, divorce stake, and firm characteristics measured in the year prior to the divorce. Specifically, we include the majority shareholder's wealth, wealth concentration, equity share in the firm, a dummy for holding an absolute majority, the value of the divorce-

related shares in the firm, the firm's market value relative to the majority shareholder's wealth, firm leverage, and total assets. The estimated negative effect on ROE becomes slightly larger, while the results remain qualitatively unchanged, confirming the robustness of the baseline specification.

Figure 3: Event studies for ROE



Note: The figure plots event-study coefficients using the Callaway and Sant'Anna (2021) estimator for the effect of the divorce of a minority shareholder on firm ROE. We control for the number of shareholders and the age of the majority shareholder, both measured in the year prior to the divorce. Panel (a) plots the results for the full sample. Panel (b) plots the results for the specification in Panel (a) for the sample of firms in which the divorcing shareholder was never the firm CEO and had never been on the firm's board prior to the divorce. Panel (c) plots the results from the specification in Panel (a), augmented with controls for characteristics of the majority shareholder, divorce stake, and the firm in the year prior to the divorce. These controls include the majority shareholder's wealth, wealth concentration, equity share in the firm, a dummy for whether she owns an absolute majority, the value of the divorce shares in the firm, the market value relative to the majority shareholder's wealth, firm leverage, and total assets. Panel (d) plots the results for the specification in Panel (c) for the sample of firms in which the majority shareholder held an absolute majority of firm shares prior to the divorce of the minority shareholder. Standard errors are clustered at the firm level.

We report the ATE in Table 5. ROE is 10 percentage points lower on average in the post-period in the basic specification (Column 1), and 13 percentage points lower when adding controls for firm and majority shareholder characteristics (Column 2). In both cases,

the estimates are significant at the 1% level. This confirms that ROE drops substantially following the divorce of a minority shareholder.

Table 5: Average treatment effect for ROE

	[1]	[2]	[3]	[4]
Sample:	Full	Full	Pass. Min.	MS> 51%
ATT	-0.10^{***}	-0.13^{***}	-0.15^{**}	-0.11^{**}
	(.034)	(.039)	(.064)	(.046)
N. Obs.	7,386	7,284	2,161	3,838
Controls	NO	YES	NO	YES

Note: The table reports the ATT, using the Callaway and Sant'Anna (2021) estimator, for the effect of the divorce of a minority shareholder on firm ROE. Controls include the number of shareholders and the age of the majority shareholder, both measured in the year prior to the divorce. Column [1] displays the results for the full sample. Column [2] displays the results for the specification in Column [1] for the sample of firms in which the divorcing shareholder was never the firm CEO and had never been on the firm's board prior to the divorce. Column [3] displays the results for the specification in Column [1], augmented with controls for characteristics of the majority shareholder, divorce stake, and the firm in the year prior to the divorce. These controls include the majority shareholder's wealth, wealth concentration, equity share in the firm, a dummy for whether she owns an absolute majority, the value of the divorce shares in the firm, the market value relative to the majority shareholder's wealth, firm leverage, and total assets. Column [4] displays the results for the specification in Column [3] for the sample of firms in which the majority shareholder held the absolute majority of firm shares prior to the divorce of the minority shareholder. Standard errors clustered at the firm level in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5.3 Validating the Exclusion Restriction

A key concern relates to the validity of the exclusion restriction. One might argue that the minority shareholder directly affects firm performance, so that their exit may influence outcomes independently of the induced increase in ownership concentration of the majority shareholder. Our simple model helps clarify this issue. We can formalize the loss of the minority shareholder's valuable contribution as a downward shift in the efficient frontier in Figure 1, namely as an increase in the parameter governing the concavity of the firm's risk-return combination, a_2 (see Equation 1), which worsens the risk-return tradeoff. Differentiating Equation (5a) with respect to a_2 yields

$$\frac{\partial \mathbb{E}[R_b']}{\partial a_2} = -\frac{a_1^2(2a_2 + 3A)}{(2a_2 + A)^3} < 0.$$

This expression implies that the loss of a valuable contribution to firm management lowers the entrepreneur's optimal return choice after the minority shareholder's departure. We build on this result by presenting evidence from subsamples that differ ex ante in the minority shareholder's likely contribution, and thus in the implied increase in a_2. If the decline in ROE were driven by the minority shareholder's direct contribution, its magnitude should vary systematically with the shareholder's expected contribution.

First, a direct effect of a minority shareholder on firm performance is most plausible when the shareholder serves on the board of directors or holds an executive position within the company. In such cases, the shareholder also acts as an administrator, and their departure could directly affect firm outcomes through the loss of managerial or governance capabilities rather than through changes in ownership structure. To check for this possibility, Panel (c) of Figure 3 reports the event study for the ROE excluding all firms in which the minority shareholder has served on the board of directors or held an executive position within the company at any time prior to the divorce. This reduces the number of observations employed in the estimation from 7,386 to 2,261. Owing to the limited number of observations within each group-time cell, we estimate this specification using the baseline set of controls (the number of shareholders and the age of the majority shareholder, both measured in the year prior to the minority shareholder's divorce).[16] We refer to this set of firms in the tables and figures as *Passive Min. Shareholders*. The results we obtain in this subsample are very similar to those of the overall sample: if anything, the magnitude is slightly larger in absolute value. Specifically, the average treatment effect is -0.15, significant at the 5% level, compared to -0.10 of the full sample (Table 5, columns 1 and 3).

Second, our definition of majority shareholder is based on relative majority, that is, it includes also majority shareholders with less than 51% of voting shares pre-divorce of the minority shareholder. In this case, attributing the choice of the firm strategy to the majority shareholder only might be questionable. In Panel (d) of Figure 3, we show the results for the sample of firms in which the majority shareholder held the absolute majority of firm voting shares pre-divorce. This reduces the number of observations used in the estimation from 7,284 to 3,838. The results are robust also to this modification. The average treatment effect is very similar to that of the overall sample (-0.11 significant at the 5% level, see Column 4 of Table 5,).

[16]Including the full set of controls yields similar average treatment effects in the pre-post specification, but for some periods the estimates loose precision.

Third, we examine heterogeneity across minority shareholders with different levels of human capital. We partition the sample by educational attainment, distinguishing between minority shareholders with at most a high school diploma and those with post-secondary education. On average, more educated shareholders should be better positioned to contribute to firm performance.[17] Under the human capital hypothesis, the exit of a shareholder from the high-education subsample should generate a larger negative effect on firm performance. Appendix Figure C2 presents the event-study estimates for ROE separately for the two subsamples. Contrary to this prediction, the performance decline is *larger* in the low-education subsample. To investigate this result further, Table C3 reports the average treatment effects for the first-stage outcomes and for ROE in each subsample. Column [1] shows that the number of shareholders declines more sharply in the low-education subsample, reflecting the greater propensity of less-educated minority shareholders to liquidate their stakes—consistent with their lower income and wealth levels (see Appendix Table C4). To account for this difference, we compute the "structural" coefficient relating ROE to ownership concentration, defined as the ratio of the reduced-form coefficient of the ROE regression (Column [4]) to the first-stage coefficient of the ownership concentration regression (Column [3]). Strikingly, this coefficient is virtually *identical* across the two subsamples. This finding provides further evidence that the decline in firm performance is driven by the change in the majority shareholder's concentration rather than by the loss of minority shareholders' human capital contributions.

Minority shareholders may play a monitoring role vis-à-vis the majority shareholder. To investigate this channel, we distinguish between firms with two shareholders and firms with more than two shareholders. When the minority stake is acquired in a two-shareholder firm, the majority shareholder becomes the sole owner. While this eliminates incentives to expropriate minority shareholders, it may increase the scope to extract rents from other stakeholders, such as creditors or suppliers. Appendix C, Section C.3, Figure C3 and Table C5 reports the results separately for these two subsamples. We do not find qualitative different effects in the two sample with respect to the full sample providing little support for the monitoring and tunneling channel.

This evidence presented in this section goes against the hypothesis that the decline in ROE is attributable to a reduced active contribution by the minority shareholder to the firm's performance. This provides strong support for the validity of our exclusion restriction—namely,

[17] Consistent with this conjecture, we document that shareholders with higher educational attainment earn higher labor income, as measured by earnings from employment spells outside the firm in which they hold equity.

that the decline in ROE observed in the main analysis is driven by the increase in the majority shareholder's wealth concentration, rather than by the exit of a minority shareholder. As a further argument supporting the exclusion restriction, in the next section we document the second key implication of our mechanism—namely, a reduction in risk-taking after the departure of the minority shareholder. While the idea that a shareholder can contribute to average performance is relatively uncontroversial, it is much less obvious why their departure should reduce the variability of returns and lower the probability of default.

6 Results: Risk

Having shown that firms settle on a lower returns profile after the shock to the main shareholder's concentration, we now study the effects on risk-taking. To measure risk, we consider the variability of returns, consistent with the mean-variance model presented above. We also analyze how the whole distribution of returns changes pre-post divorce of a minority shareholder. Finally, we look at arguably the most relevant measure of realized risk, that is, firm default.

6.1 Returns variability

We measure risk-taking with the within-firm, over-time variability of ROE. We use the standard deviation, computed separately for each firm before and after the divorce according to Equations (6) and (7). We limit the sample to firms observed for at least three years before and three years after the divorce to obtain a meaningful measure of variability. As discussed in Section 3.2, a pre-post divorce variability measure is unsuitable for an event study design, so we use the simple OLS estimator illustrated in Equation 8. Since we compare ROE variability measures before and after the divorce, a potential concern is that the results may capture changes in macroeconomic conditions between the earlier and later periods. Moreover, given the staggered event nature of our research design, the years over which we compute the pre-post variability change according to when the divorce occurred. To address this, in a second set of specifications, we use the residuals from a regression of ROE on year×sector fixed effects to compute the standard deviation, accounting therefore for any shock at year×sector level.

Column (1) of Panel A of Table 6 reports the result when using the standard deviation of ROE without controls. In column (2) we add controls, including an indicator variable for the year of the divorce, the age of the majority shareholder, the number of shareholders all

evaluated in the year prior to the divorce. In column (3), we add firm fixed effects. Results are very stable across specifications: the divorce of a minority shareholder decreases the ROE standard deviation by around 0.10, which compares to an overall ROE mean standard deviation of 0.42 and to a median standard deviation of 0.20 in the sample (Table 1, second panel).

In columns [4], [5], and [6], we repeat specifications [1], [2], and [3] using the residuals of a regression of ROE on year-time-sector fixed effects as the measure of ROE when computing the standard deviation. This accounts for differences in macroeconomic conditions that could influence the firm's ROE standard deviation due to the different periods in which the standard deviation is computed, arising from variations in the year of the divorce. Results are hardly affected.

In Panel (B) of Table 6 we replicate the analysis by limiting the sample to firms in which the majority shareholder held the absolute majority of firm shares prior to the divorce of the minority shareholder. In Panel (C) we show the results when restricting the analysis to the sample of firms in which the divorcing shareholder was a passive shareholder. Despite the substantial changes in samples size, results are qualitatively very similar. We conclude that the divorce of a minority shareholder is followed by a market decline in the variability of ROE.

It is interesting to determine how the Sharpe ratio changes following the changes in the mean and the standard deviation of ROE. Starting from Table 1, the mean ROE prior divorce is 0.29, and the standard deviation of ROE prior divorce is 0.36. Given that the drop in the average and in the standard deviation is similar, and equal to 0.10, the percentage reduction in ROE is substantially higher, so that the Sharp ratio deteriorates substantially. This alings with the prediction of the simple model of Section 2.

6.2 Overall distribution of returns

One issue with the dispersion analysis is that lower variability does not necessarily mean lower risk, taking into account the drop in the mean returns. The leftward shift in the distribution that lowers the mean may outweigh the reduction in variance, resulting in the pre-divorce return distribution first-order stochastically dominating the post-divorce one. To rule this out, we analyze more in detail the shape of the two distributions of returns.

Figure 4 plots the distribution of ROE before and after the divorce. Consistently with

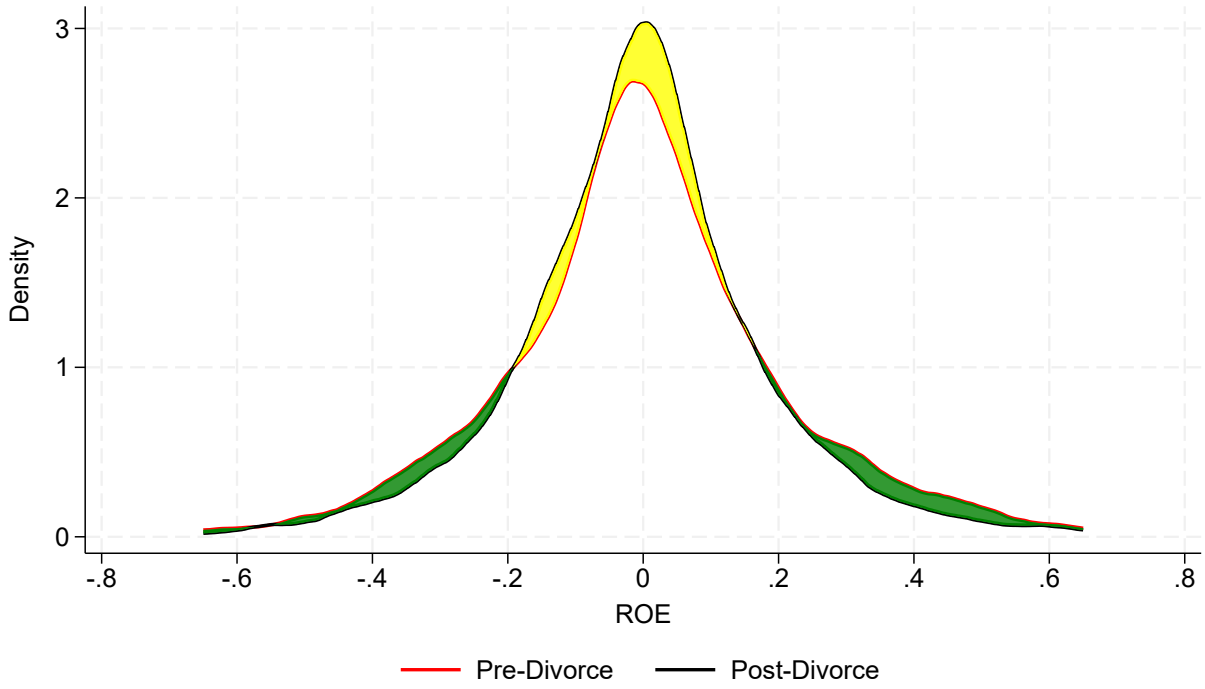
Table 6: Difference in the ROE Variability pre-post divorce

	[1]	[2]	[3]	[4]	[5]	[6]
	Panel A: All firms					
	SD(ROE)			SD(ROE Res)		
POST	-0.091***	-0.091***	-0.114***	-0.103***	-0.098***	-0.102***
	(0.019)	(0.019)	(0.019)	(0.017)	(0.017)	(0.017)
N. Obs.	794	767	794	880	848	880
	Panel B: Maj. shareholders own absolute majority					
	SD(ROE)			SD(ROE Res)		
POST	-0.087***	-0.079***	-0.12***	-0.070**	-0.058**	-0.079**
	(0.026)	(0.025)	(0.024)	(0.028)	(0.029)	(0.036)
N. Obs.	418	412	418	450	444	450
	Panel C: Passive Min. Shareholder Only					
	SD(ROE)			SD(ROE Res)		
POST	-0.109***	-0.102**	-0.138***	-0.088***	-0.075***	-0.088***
	(0.041)	(0.042)	(0.041)	(0.028)	(0.028)	(0.028)
N. Obs.	246	234	245	272	258	272
Controls:						
Age Maj. Shareh.		Y			Y	
# Shareholders		Y			Y	
Year of the Divorce		Y			Y	
Firm f.e.			Y			Y

Note: The table reports the OLS coefficient of the effect of divorce of a minority shareholder on the firm ROE standard deviation, estimated using equation $\text{sd(r)}_{j\tau} = \beta \text{POST} + \gamma_j + \theta \times C_j + \epsilon_{j\tau}$, where POST is a dummy equal to one when τ refers to the post divorce period. Column [1] reports the result for a pre-post specification without controls, in column [2] we add controls, including an indicator variable for the year of the divorce, the age of the majority shareholder, the number of shareholders, all evaluated in the year prior to the divorce. In column [3], we add firm fixed effects. In column [4], [5] and [6] we repeat specifications [1], [2], and [3] using the residuals of a regression of ROE on year-time-sector fixed effects as the measure of ROE. Panel A, displays the result for the full sample of firm, Panel B for the sample of firms in which the majority shareholder was holding the absolute majority of firm shares prior to the divorce of the minority shareholder, and Panel C for the sample of firms in which the divorcing shareholder was never the firm CEO and had never been on the firm's board prior to the divorce. Standard errors clustered at firm level in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

our identification strategy, we plot the residualized version of ROE, after regressing it on year×sector fixed effects and firm fixed effects. The red line represents the distribution of ROE prior to the divorce of a minority shareholder, while the black line represents the distribution after the divorce. The green and yellow area display the difference between the two distributions. Consistently with the regression results, the pre-divorce distribution is more dispersed. More importantly, the distribution exhibits greater mass in both the right and left tails. The increased right-tail mass suggests a higher likelihood of high returns, while the reduced left-tail mass supports the hypothesis that firms whose minority shareholders experienced a divorce become less risky, as they are less likely to generate extremely negative returns.

Figure 4: ROE Distribution Pre and Post Divorce



Note: The figure plots the univariate kernel density estimates, prior (red line) and post (black line) the divorce event, of the residuals of a regression of ROE on year×sector fixed effects, and on firm fixed effects. The green and yellow areas highlight the differences between the two densities.

While Figure 4 aligns with our hypothesis, it does not provide a means to quantify the magnitude or statistical significance of the effects. To address this, we conduct a quantile regression analysis. In recent years, research on the econometrics of Diff-in-Diff estimation has expanded significantly. However, the application of quantile regression within this framework remains an evolving area, with no consensus on the optimal estimator. To ensure the

robustness of our results, we estimate the quantiles using multiple estimation techniques.

We begin with a straightforward quantile estimator of the residualized ROE, obtained by regressing it, as before, on year × sector fixed effects and firm fixed effects. The resulting residuals are used as the dependent variable in a quantile regression with the dummy for post-divorce years as the explanatory variable. The coefficients from these quantile regressions correspond exactly to the difference in the densities displayed in Figure 4. We start with the 10^{th} percentile and estimate all ventiles up to the 90^{th} percentile.[18] The results of this estimation exercise are reported in Panel (a) of Figure 5. As expected, the quantile estimates confirm the patterns of Figure 4: the difference in ROE pre-post divorce is positive for lower quantiles and turns negative around the 60^{th} percentile. The estimated differences decrease smoothly and are statistically different from zero on both tails of the distribution. The size of the effect is 5% at the left tail and almost -10% at the right one. This compares with overall values of the 10^{th} and 90^{th} percentiles of ROE of -11% and 78% respectively (see Table 1). It indicates a significant reduction in negative outcomes and an even greater decline in positive ones, aligning with the idea that more exposed entrepreneurs adopt strategies with lower risk-return trade-offs.

To assess the robustness of these simple quantile regressions, we employ the method developed by Machado and Silva (2019) to directly incorporate fixed effects into quantile regressions. This approach allows firm fixed effects to influence the entire distribution of ROE, meaning that they can have a differential impact at each ventiles of the distribution. In particular, we first compute the residuals from a regression of ROE on the interaction of year and sector fixed effects, and then estimate on the residuals the following conditional quantile model:

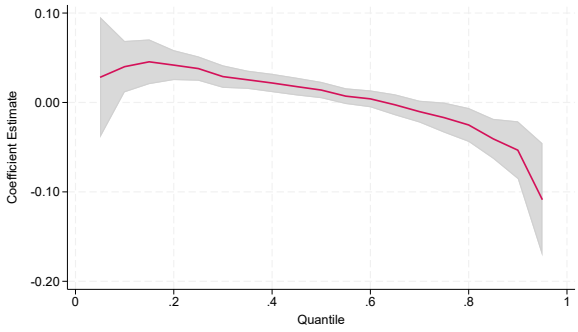
$$Q_{roe}(\tau|X_{jt}) = (\alpha_j + \delta_j * q(\tau)) + \mathrm{X}_{jt} * (\beta + \gamma * q(\tau)) \tag{11}$$

where τ is a quantile, $q(\tau) = F_u^{-1}(\tau)$, u an unobserved random variable with distribution F(u), $(\alpha_j + \delta_j * q(\tau))$ is the quantile-τ fixed effect for firm j, X_{jt} is a dummy variable for divorce of a minority shareholder. The results are reported in panel (b) of Figure 5, where we use a different graphical representation to distinguish this estimation technique from the previous one. The results are very similar both qualitative and quantitatively, with two slight differences. First, the effects at the lower quantiles are at the margin of statistical

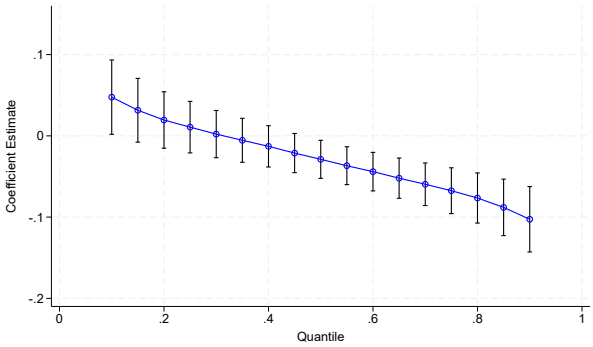
[18] Quantile regression methods of the family of Koenker and Bassett Jr (1978) are not well suited for estimating extreme quantiles, as large sample theory does not hold in the tails of the distribution (Chernozhukov, Fernández-Val, and Kaji, 2017).

Figure 5: Quantile regressions for ROE

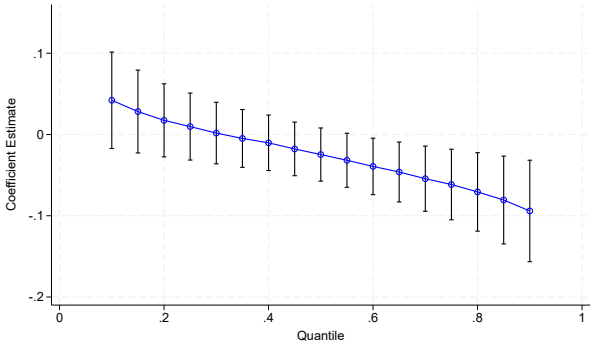
(a) Naive



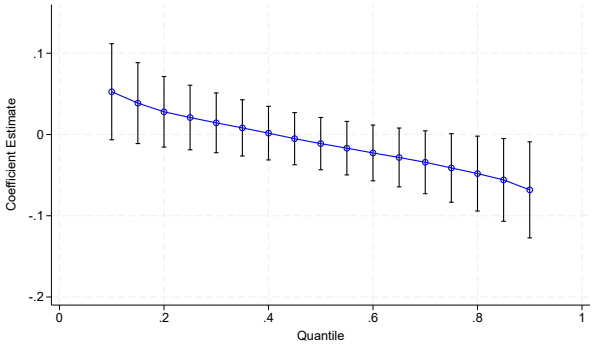
(b) Machado-Silva, All observations



(c) Machado-Silva, Passive shareholders only



(d) Machado-Silva, Absolute majority only



Note: The figure plots coefficient estimates by quantiles from quantile regressions of R.O.E. on the divorce event. Panel (a) plots the coefficient estimates for the quantile regression of the residuals from the regression of R.O.E. on the interaction of year and sector fixed effects and firm fixed effects on divorce. Panel (b) plots the coefficient estimates for the quantile regression of the residuals from a regression of R.O.E. on the interaction of year and sector fixed effects on divorce and firm fixed effects, using the Machado and Silva (2019) method. Panel (c) plots the results for the specification in Panel (b) for the sample of firms in which the divorcing shareholder was never the firm CEO and had never been on the firm's board prior to the divorce, and Panel (d) for the sample of firms in which the majority shareholder held the absolute majority of firm shares prior to the divorce of the minority shareholder. In panel (c), we trim the sample at the second percentile of ROE to increase precision; results trimmed at the first percentile are qualitatively similar but more imprecise.

significance at 5%. Second, the decrease is more linear compare to the previous figure, where it accelerates substantially at the upper quantiles: at the 90^{th} percentile, ROE of firms which underwent treatment is 10% lower than that of firms not yet treated.

Finally, Panel (c) shows the results for the subset of firms with divorced minority passive shareholders and panel (d) for firms where the majority shareholders held at least 51% of the voting shares prior to the divorce. In both cases, results are virtually identical to those base on the whole sample.

As a final check, we implement the Quantile Treatment Effect on the Treated (QTT) developed by Callaway and Li (2019). This estimator is closely aligned with the Diff-in-Diff event study design proposed by Callaway and Sant'Anna (2021) used as our preferred empirical model. This estimator is designed for a three-period framework only: two pre-treatment periods, in which all firms are untreated, and one post-treatment period, in which some firms are treated. We therefore construct all possible triplets in our observation period that include two years with no treated firms and one year in which part of the sample is treated, and we estimate the corresponding QTT for each triplet. Appendix C.7, Figure C6 plots the point estimates from each triplet for each decile of the ROE distribution. The estimates follow exactly the same pattern, positive for the left quantiles and turning progressively negative moving towards the right of the distribution.

6.3 Default probability

The quantile regressions certify that, *conditional on surviving*, firms become safer in terms of the return distribution post-divorce of the minority shareholder. However, from the main shareholder's perspective, the most critical risk is firm failure. Adopting safer strategies should also lead to safer outcomes at the extensive margin, reducing the probability of default. In this subsection we test this hypothesis. The default probability cannot be estimated using the not-yet-treated framework used thus far, as shareholders can divorce only in active firms: default would be observed only after treatment. For this analysis, therefore, we use non-treated firms as the control group. Specifically, the control group consists of all Danish firms with at least one minority shareholder and which did not experience a minority shareholder's divorce between 2006 and 2017. A firm is considered to have defaulted if it is recorded as bankrupt or undergoes either forced or voluntary liquidation during the observation period.[19] Firm default data are available through 2019.

The event study results show that the effects of a divorce emerge progressively over time. To assess changes in the default probability, we therefore need to observe firms for at least a few years after the divorce. This requires that a firm experiences a minority shareholder's divorce sufficiently early in our time frame. This requirement generates a trade-off between the number of treated firms and the length of the observation period available for detecting defaults. We display different thresholds for the latest year in which a firm can experience

[19] Including voluntary liquidations in the default definition is debatable, as they do not necessarily represent a negative outcome. It turns out that they constitute a minority shares of all liquidations, and excluding them does not affect the results.

the divorce of one of its minority shareholders in order to be included in the data. To ensure comparability between treated and controls, we only keep firms that were active in the year prior to the latest possible year of divorce, so as not to artificially inflate the survival rate of treated firms which, by construction, survive until the year of divorce. Then, we collapsed the data into one observation per firm, indicating whether the firm defaulted during the observation period, and run the following cross sectional OLS regression:

$$\text{Default}_j = \alpha + \beta \times \text{Divorce}_j + \theta_h \times \text{C}_j + \gamma_k \times \text{Z}_j + \epsilon_j \tag{12}$$

where Default_j is a dummy variable for a firm defaulting during the observation period, Divorce_j is a dummy variable for the divorce of a minority shareholder, and C_j is the vector of controls used in our identification strategy, namely the number of shareholders, the age of the majority shareholder. Z_j is a vector of firm characteristics, including firm sector, the year of establishment, the number of employees and firm leverage. Controls are evaluated at the first year a firm appears in the dataset.[20] Standard errors are clustered at the firm level.

Table 7 presents the results of estimating equation (12) using 2009, 2013, and 2017 as the latest year of divorce thresholds. Odd-numbered columns report OLS estimates, while even-numbered columns present probit estimates, with marginal effects reported to ensure direct comparability between the two methods. First, OLS and probit estimates are virtually identical. Second, the effect of divorce on the probability of default is negative and significant across all three specifications. Third, its magnitude decreases when more recent years are chosen as the latest possible year of divorce. This is exactly what we expect, as it takes time to adjust firm strategy, meaning differences are smaller immediately after the divorce and grow larger over time. Specifically, when the latest year of divorce is set to 2009, we have a ten-year window for observing defaults, whereas with 2017 as the latest year, we have only two years. Finally, the magnitude is substantial: in the sample where 2009 is the latest year of divorce, we find a 4% drop in the probability of default, representing a reduction of nearly one-fourth in the overall default probability (16%).[21]

We have experimented with different definitions of liquidation. One concern is that the legal registration of firm default may occur long after a firm has actually ceased economic

[20] In our previous analysis, we evaluated controls in the year prior to the divorce because we only used firm that eventually experienced the divorce of a minority shareholder. Here, since we include non-treated firms in the control group—which lack a date of divorce—controls for all firms are evaluated in the first year a firm appears in the sample.

[21] Average default probabilities for the *2013* and *2017* samples (columns (3) to (6) in Table 7) are, respectively, 10% and 4%.

Table 7: Effect of a Minority Shareholder's Divorce on a Firm's Probability of Default

	Default					
	Latest Year of Divorce					
	2009	2009	2013	2013	2017	2017
	OLS	Probit	OLS	Probit	OLS	Probit
	(1)	(2)	(3)	(4)	(5)	(6)
Divorce	-0.041**	-0.037*	-0.018*	-0.017	-0.015***	-0.015**
	(0.019)	(0.019)	(0.011)	(0.011)	(0.005)	(0.006)
N. Obs.	9,705	9,705	11,494	11,494	12775	12775

Note: The table reports the effect of a minority shareholder's divorce on the firm's probability of default. Years 2009, 2013, and 2017 represent the latest year in which a firm can experience the divorce of one of its minority shareholders in order to be included in the data. We only keep firms were active in the year prior to the latest possible year of divorce. Specifications (1), (3), and (5) are estimated using OLS, while specifications (2), (4), and (6) are estimated using a Probit estimator. The divorce coefficients shown in (2), (4), and (6) are average marginal effects. Controls common to all specifications include the age of the majority shareholder, the number of shareholders, the firm's sector, year of foundation, number of employees, and leverage. These controls are measured in the first year that a firm appears in the dataset. Standard errors, shown in parentheses, are clustered at the firm level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

activities. To address this issue, we define firm default as a firm being observed with zero employees in a given year up to the end of the observation period. Additionally, we consider defining default as the disappearance of a firm from the Danish Central Business Register (CVR). With this definition, default data are available until 2021, with the caveat that some of these exits could result from mergers and acquisitions. In both cases, the default measure is highly correlated with our preferred one. Appendix Table C6 and C7 reports the results with these alternative definitions, confirming their robustness.

Taking stock, the evidence presented in this section can be summarized as follows. The divorce of a minority shareholder forces the majority shareholder to increase their wealth concentration in the firm. This induces them to adopt safer strategies, positioning the firm on a lower risk-return combination: the average ROE and its dispersion decrease, the lower percentiles of the ROE distribution increase and the upper ones decrease, and the firm's default probability decreases.

We conclude by stressing that decline in performance volatility provides further evidence in support of the exclusion restriction. In contrast to average performance, there is no clear

mechanism through which the exit of a minority shareholder would be expected to directly reduce the variability of firm outcomes. If minority shareholders play any active role in the firm, standard considerations would instead suggest a stabilizing contribution—through monitoring, diversification of perspectives, or improved risk management—so that their departure should, if anything, be associated with higher rather than lower performance volatility. The observed reduction in risk therefore strengthens the interpretation that our estimates capture the effects of increased ownership concentration rather than the direct consequences of the minority shareholder's exit.

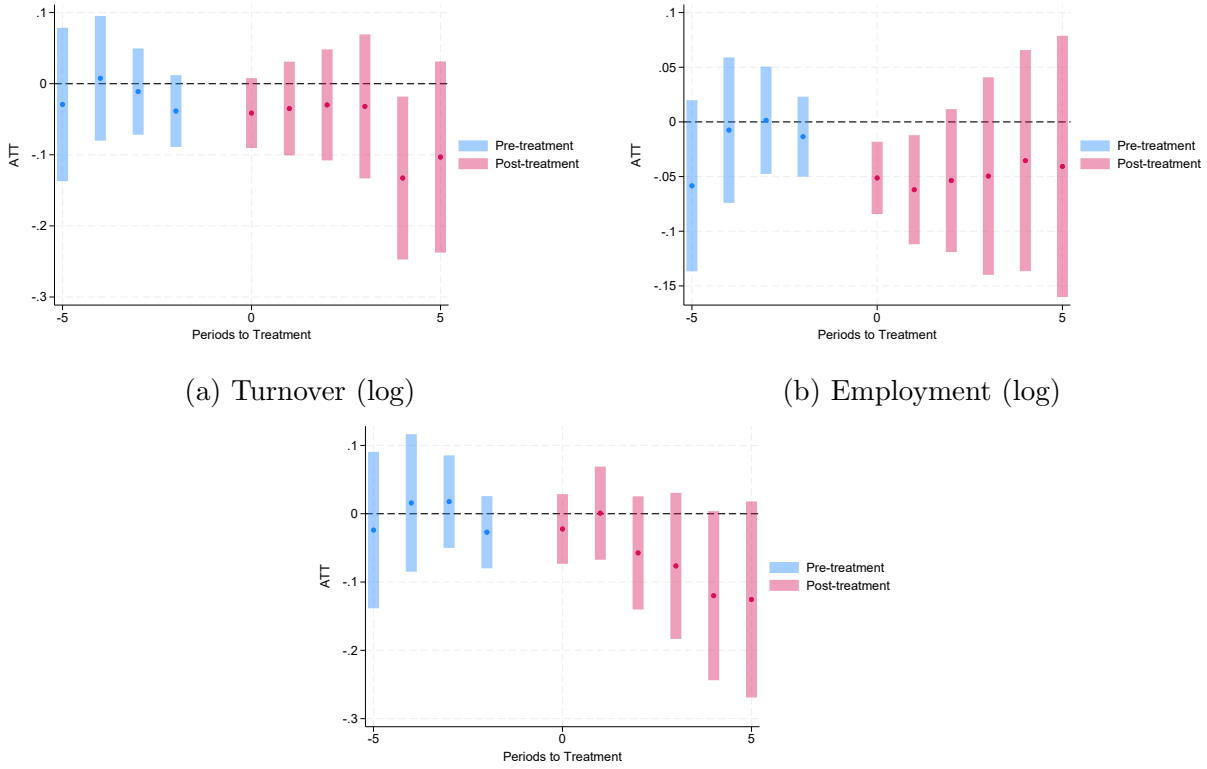
7 How does the entrepreneur move to a lower risk-return combination?

Our model in Appendix Section 2 assumes that entrepreneurs can freely choose any feasible risk-return combination. In practice, this requires changes in the firm's strategy, which we cannot directly observe. We conjecture that strategies that imply lower risk and lower returns are generally related to a reduction in the firm's growth prospects. Entrepreneurs will cut risky investment projects, which on average generate higher growth, but which also have a higher chance of failure. For example, exporting firms might downsize their plans to expand to new foreign markets or exit from the more difficult ones, and firms in technological sectors might cut their R&D expenditures. This implies that firms hit by the divorce of a minority shareholder should exhibit lower and less variable growth. This is what we test in this section.

We repeat the analysis carried out for ROE using turnover, employment, and assets as outcome variables. First, we replicate the event study of Figure 3 using the log of these three variables. We use the specification with the expanded set of controls (number of shareholders, the age of the majority shareholder, the majority shareholder's wealth, wealth concentration, equity share in the firm, a dummy for whether she owns an absolute majority, the value of the divorce shares in the firm, the market value relative to the majority shareholder's wealth, firm leverage, and total assets). The results, reported in Figure 6, support the reduced growth hypothesis. First, no evidence of any pre-trend emerges: for all three variables, differences between treated and controls are never significant before the divorce. After that, firms are hit by the divorce of a minority shareholder record substantially lower level in all outcome variables, compared to not yet treated firms. The effects are large, particularly in the years further away from the divorce. However, the estimates become less precise due to a lower

sample size, making point inference less reliable. The strong effects that we measure are consistent with the fact that most of our firms are SMEs, for which growth choices might have a discontinuous component. This is particularly true for employment: for example, for a firm with 5 employees and only using full time contracts, the smallest feasible workforce reduction is 20%.

Figure 6: Event studies for Turnover, Employment, and Assets



(a) Turnover (log)

(b) Employment (log)

(c) Assets (log)

Note: The figure plots event study coefficients using the Callaway and Sant'Anna (2021) estimator for the effect of the divorce of a minority shareholder on different outcomes. Controls include: the number of shareholders, the age of the majority shareholder, the majority shareholder's wealth, wealth concentration, equity share in the firm, a dummy for whether she owns an absolute majority, the value of the divorce shares in the firm, the market value relative to the majority shareholder's wealth, firm leverage, and total assets. All controls are evaluated the year prior to the divorce. Panel (a) plots the results for the effect on firm log(Turnover), Panel (b) for firm log(Employment), and Panel (c) for firm log(Assets). Standard errors are clustered at the firm level.

We compute and report the average treatment effects in Table 8. On average, firms hit by the divorce of a minority shareholder record lower turnover of about 7%, lower assets of almost 8%, and lower employment of more than 6%. The effects are significant and confirm a substantial change in firm growth after the divorce.

Table 8: Other Performance Measures: Average Treatment Effects

	[1] log(Turnover)	[2] log(Employment)	[3] log(Assets)
ATT	-0.069^{*}	-0.062^{*}	-0.077^{**}
	(.037)	(.032)	(.037)
N. Obs.	7,025	7,411	7,313
Add. Controls	YES	YES	YES

Note: The table reports the ATT, using the Callaway and Sant'Anna (2021) estimator, of the divorce of a minority shareholder on firm [1] log(Turnover), [2] log(Employment), [3] log(Assets), controls include the number of shareholders, the age of the majority shareholder, the majority shareholder's wealth, wealth concentration, equity share in the firm, a dummy for whether she owns an absolute majority, the value of the divorce shares in the firm, the market value relative to the majority shareholder's wealth, firm leverage, and total assets. All controls are evaluated the year prior to the divorce. Standard errors in parentheses are clustered at firm lvl.. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Next, we check if the lower growth goes together with a lower variability of the outcome variables, which, as before, we use as a proxy for risk. We compute the standard deviation of log turnover, employment, and asset for each firm pre- and post-divorce of the minority shareholder. We apply the same filters as we did for ROE. Specifically, only firms that are observed for at least three years both before and after the divorce. We residualize the outcome variables using year×sector fixed effects. Regressions are simple OLS.

Table 9, Panel A reports the results for turnover variability. Column 1 shows that the standard deviation decreases by 0.06 in the post-divorce period. Results are almost identical when we add the usual set of firm controls (Column 2) and firm fixed effects (Column 3). The estimates are always highly significant.

Panel B of Table 9 reports the results for employment and Panel C for Assets. Regarding employment, the standard deviation drops significantly in the post-divorce period for all specifications, while the decrease in variability is not statistically different from zero for assets. This supports the hypothesis that entrepreneurs opt for lower-risk, lower-return strategies that are less conducive to growth but help stabilize growth variability, thereby mitigating risk.

Entrepreneurs who choose to mitigate risk by scaling down their operations are likely to forego investment opportunities, thereby lowering their investment requirements. In line

Table 9: Diff-in-Diff estimates: Standard Deviation of Turnover, Employment, and Assets

	[1]	[2]	[3]
	Panel A: log(Turnover)		
Divorce	-0.053***	-0.054***	-0.043**
	(0.017)	(0.018)	(0.017)
N. obs.	855	824	855
	Panel B: log(Employment)		
Divorce	-0.041***	-0.045***	-0.040***
	(0.015)	(0.014)	(0.015)
N. obs.	880	848	880
	Panel C: log(Assets)		
Divorce	-0.009	-0.002	-0.008
	(0.019)	(0.020)	(0.019)
N. obs.	872	840	872
Controls:			
Age Maj. Shareh.		Y	
# Shareholders		Y	
Year of the Divorce		Y	
Firm f.e.			Y

Note: The table reports the OLS coefficient of the effect of divorce of a minority shareholder on the firm log(turnover) (Panel A), log(Employment) (Panel B), log(Assets) (Panel C), standard deviation. Column [1] reports the result for a pre-post specification without controls, in column [2] we add controls, including an indicator variable for the year of the divorce, the age of the majority shareholder, the number of shareholders, all evaluated in the year prior to the divorce. In column [3], we add firm fixed effects. All the outcome variables of interest are first regressed on year-time-sector fixed effects, and the residuals from these regressions are used to compute the standard deviations. Standard errors in parentheses are clustered at firm lvl. . * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

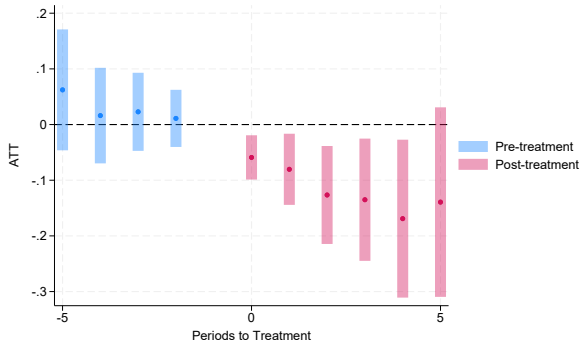
with this, we have demonstrated above that assets tend to decline following divorce. We now investigate whether a firm's financial structure changes following a divorce, analyzing the extent to which the reduction in assets is attributable to declines in debt and equity.

Building on the seminal work of Myers (1977), a large theoretical and empirical literature shows that the financial structure is a major determinant of corporate risk. In particular, highly levered firms are more at risk of financial distress and display a high sensitivity of equity returns to changes in operating performance. Reducing debt therefore reduces entrepreneurial risk.

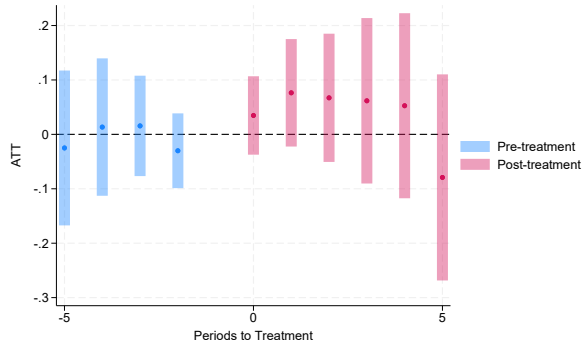
Panel (a) of Figure 7 plots the event study for the log of debt. We find that debt decreases progressively after the divorce. The reduction reaches more than 10 log points by the fifth year after the divorce. There is no evidence of any pre-trend: the debt trajectory diverges from that of controls only after the divorce.

Figure 7: Firm debt, equity and leverage

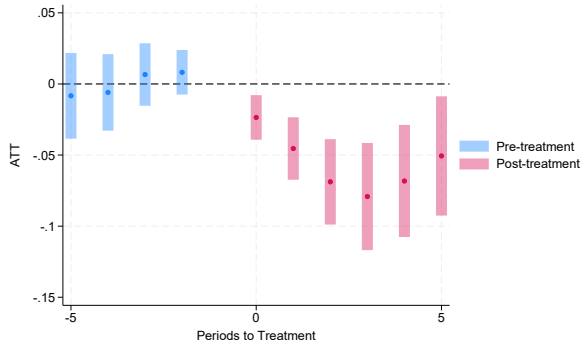
(a) Debt (log)



(b) Equity (log)



(c) Leverage



Note: The figure plots event study coefficients using the Callaway and Sant'Anna (2021) estimator. Controls include: the number of shareholders, the age of the majority shareholder, the majority shareholder's wealth, wealth concentration, equity share in the firm, a dummy for whether she owns an absolute majority, the value of the divorce shares in the firm, the market value relative to the majority shareholder's wealth, firm leverage, and total assets. All controls are evaluated the year prior to the divorce. Panel (a) plots the results for the effect on firm log(Debt), Panel (b) for firm log(Equity), and Panel (c) for firm leverage. Standard errors are clustered at the firm level.

Panel (b) of Figure 7 shows the evolution of equity. We find no evidence of any significant change in equity. This indicates that, after the minority shareholder's divorce, overall shareholders' financial involvement in the firm does not change: rather, as shown in Panel (b) of Figure 2, the main shareholder increases their equity stake. Given that debt decreases and equity remains stable, leverage, defined as debt over total assets goes down by approximately 5% after five years, as shown in Panel (c). Results are confirmed by the estimates of the average treatment effect, reported in Table 10.

Table 10: Average treatment effect for debt, equity and leverage

	[1] log(Firm Debt)	[2] log(Equity)	[3] Leverage
ATT	-0.12**	.041	-.053***
	(0.046)	(.054)	(.012)
N. obs.	7,269	7,363	7,475
Add. Controls	YES	YES	YES

Note: The table reports the ATT, using the Callaway and Sant'Anna (2021) estimator, of the divorce of a minority shareholder on firm [1] log(Debt), [2] leverage, [3] log(Equity). Controls include: the number of shareholders, the age of the majority shareholder, the majority shareholder's wealth, wealth concentration, equity share in the firm, a dummy for whether she owns an absolute majority, the value of the divorce shares in the firm, the market value relative to the majority shareholder's wealth, firm leverage, and total assets. All controls are evaluated the year prior to the divorce. Standard errors in parentheses are clustered at firm lvl.. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Overall, the evidence indicates that entrepreneurs reduce their risk exposure by decreasing the firm's growth prospects. This goes together with a reduction in debt and leverage, which contributes to mitigating the risk of financial distress and reduces the variability of equity returns.

8 Effect on the Majority Shareholders Portfolio Composition

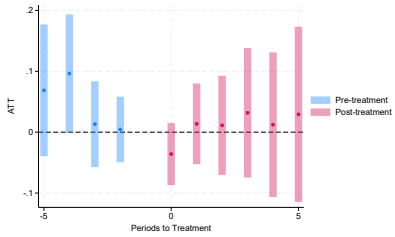
In this section, we show the effect of the minority shareholder's divorce and the subsequent acquisition of the minority's shares by the majority shareholder on the majority shareholder's portfolio composition — that is, how the majority shareholder finances the acquisition and adjusts their precautionary savings accordingly.

In Panel (a) of Figure 8, we plot the effect of the minority shareholder's divorce on the log wealth of the majority shareholder. There is no effect on total wealth, in line with our identifying assumption that the divorce shifts the allocation of wealth toward the firm but does not affect total wealth.[22]

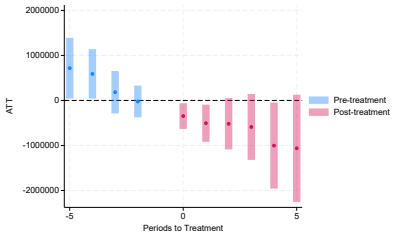
Following the acquisition of the divorced minority shareholder's shares, the value of the majority shareholder 's stake in the firm increases by around than 20% after five years, and on average by 12% in the post-treatment period (Column [2] of Table 4). The average value of the majority shareholder's stake in the firm is around 850,000 USD, thus the average increase amounts to 102,000 USD.

Figure 8: Majority shareholder's Portfolio

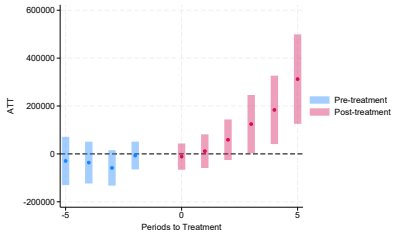
(a) log(Wealth)



(b) Housing Value



(c) Bank Deposits



Note: The figure plots event study coefficients using the Callaway and Sant'Anna (2021) estimator. Controls include: the number of shareholders, the age of the majority shareholder, the majority shareholder's wealth, wealth concentration, equity share in the firm, a dummy for whether she owns an absolute majority, the value of the divorce shares in the firm, the market value relative to the majority shareholder's wealth, firm leverage, and total assets. For the exercise on log wealth, we use the following subset of controls (to avoid variables that are collinear with the dependent variable): the number of shareholders, the age of the majority shareholder, their equity share in the firm, a dummy for whether they hold an absolute majority, the value of the stake of the divorcing shareholder in the firm, and firm leverage. All controls are evaluated the year prior to the divorce. Panel (a) plots the results for the majority shareholder's weatlh,Panel (b) plots the results for the majority shareholder's Housing Value and Panel (c) for majority shareholder 's Bank Deposits. Standard errors are clustered at the firm level.

The majority shareholder's household portfolio in our sample is composed of 50% housing,

[22]In this section, in line with the rest of the paper, we use gross total wealth. Results are unchanged when using wealth net of debt (Appendix C.5, Table C9).

41% private equity, 6% bank deposits, 2% stocks, and 1% bonds. In Panel (b) of Figure 8, we plot the effect of the minority shareholder's divorce on the value of the housing owned by the majority shareholder. Housing, being the largest component of household wealth, can be used to finance the acquisition of the minority shareholder's shares. We thus examine the effect of the minority shareholder's divorce on the value of the majority shareholder 's housing. To perform this exercise, we restrict the sample to majority shareholders with strictly positive housing value (91% of the sample). Following the acquisition of the divorced minority shareholder's shares, the value of the majority shareholder 's housing decreases by around 150,000 USD after five years (1,000,000 Danish kroner in the figure) and, on average, by almost 100,000 USD (-645,445 Danish kroner) in the post-treatment period (Column [2] of Table 11). Because the estimation is performed in levels rather than logs—so as to capture households that sell their entire estate—it is more sensitive to outliers, and an apparent pre-trend emerges in the earliest period in Panel (b) of Figure 8. When trimming the sample at the 5th percentile of housing value, the pre-trend disappears while results remain unaffected (Panel (c) of Figure C4).[23] The increase in the majority shareholder 's firm stake value after the divorce is paralleled by a corresponding decrease in housing value, supporting the idea that the majority shareholder sells part of her estate to finance the acquisition of the minority shareholder's shares.

In Appendix C.5, Figure C4, Panels (a) and (b) we show the effect of the divorce of minority shareholder on the majority shareholder 's debt composition. As a consequence of the majority shareholder household selling its housing, the majority shareholder 's mortgage value decreases by about 70,000 USD after five years (Figure C4, Panel (a) – -500,000 Danish kroner) and, on average, by 40,000 USD in the post-treatment period (Table C8, Column [1]- –260,000 Danish kroner), as mortgages are likely extinguished upon selling the housing. At the same time, the majority shareholder 's bank loans increase by 30,000 USD after five years (Figure C4, Panel (b) – 200,000 Danish kroner) and by almost 24,000 USD in the post-treatment period (Table C8, Column [2] – 160,000 Danish kroner). We interpret these findings as evidence that the majority shareholder extinguishes its mortgage as a consequence of selling its housing and receives a new loan from the bank to buy the minority shareholder's stake. Selling housing can be a lengthy process, which may partly explain why the acquisition of the minority shareholder's shares takes several years.

Finally, in Panel (c) of Figure 8, we plot the effect of the divorce on the majority shareholder

[23]Samples in the analysis are trimmed at the 1st percentile.

Table 11: Effect on majority shareholder Portfolio: Average Treatment Effects

	[1] log(Wealth)	[2] Housing Val.	[3] Bank Depo.
ATT	.002	$-645,445^{**}$	$124,173^{***}$
	(.04)	(284,468)	(39,095)
N. Obs.	7,253	6,452	7,240
Add. Controls	YES	YES	YES
β in US Dollars	-	-95,000 $	18,000 $

Note: The table reports the ATT, using the Callaway and Sant'Anna (2021) estimator, of the divorce of a minority shareholder on majority shareholder 's [1] log wealth of the majority shareholder, [2] housing value, and [3] value of bank deposits, controls include the number of shareholders, the age of the majority shareholder, the majority shareholder's wealth, wealth concentration, equity share in the firm, a dummy for whether she owns an absolute majority, the value of the divorce shares in the firm, the market value relative to the majority shareholder's wealth, firm leverage, and total assets. In [1], controls correspond to the subset described in footnote 8, chosen to avoid near collinearity. All controls are evaluated the year prior to the divorce. Standard errors in parentheses are clustered at firm lvl.. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

's amount of bank deposits. Five years after the divorce, bank deposits are almost 65,000 USD higher (Figure 8, Panel (c) – 300,000 Danish kroner) and about 20,000 USD higher in the post-treatment period (Table 11, Column [3] – 125,000 Danish kroner). The increase in bank deposits corresponds to approximately 11% of average annual household income in the sample. We interpret this finding as an increase in the majority shareholder 's precautionary savings to offset the higher firm-specific risk arising from the increased wealth concentration in the firm. Examining holdings of stocks and bonds to evaluate the effect of the divorce is not possible, as individuals in our sample hold such assets extremely infrequently.

9 How important is the lack of diversification for aggregate outcomes?

We now use the estimates obtained above to quantify the aggregate effects of the lack of diversification. To obtain the effect of a change in concentration on ROE we compute the ratio of the reduced form coefficient to the first stage coefficient, that is, the unit effect of the divorce on performance divided by the unit effect of the divorce on concentration. We then run the following counterfactual. We consider all firms that have more than one shareholder at any point in time and adjust the majority shareholder's stake to 51% in case it

is higher than 51%. We change the majority shareholder's wealth concentration accordingly. Compared to those with a single shareholder, these firms already exhibit an open ownership and may be more responsive to policies that encourage broader shareholding. Additionally, this adjustment ensures that the majority shareholder retains control, thereby minimizing any fundamental change to the firm's governance structure. For these firms, we compute the counterfactual ROE as:

$$\text{ROE counterfactual}_{jt} = \text{ROE}_{jt} + \frac{\beta_{roe}}{\beta_{conc}} * (\text{Counterfactual Conc}_{ijt} - \text{Conc}_{ijt})$$

where β_{roe} is the estimated effect of divorce on ROE in Table 5 Column (1), β_{conc} is the estimated effect of divorce on the majority shareholder wealth concentration in Table 4 Column (3), Conc_{ijt} is actual concentration as defined in equation (10) and

$$\text{Counterfactual Conc}_{ijt} = \text{Conc}_{ijt} * \mathbb{1}(\text{Share}_{ijt} \leq 0.51) + \frac{0.51 * \text{Value}_{jt}}{\text{Total Wealth}_{it}} * \mathbb{1}(\text{Share}_{ijt} > 0.51).$$

We then calculate the average across firms, actual and counterfactual. We find that, among firms with more than one shareholder, the majority shareholder's average wealth concentration in the firm decreases by 5 p.p., and that average ROE increases by 11 p.p. We repeat the same calculations for average turnover and employment, finding that average employment and sales both increase by 0.08 log points (from 2.11 to 2.19 and from 15.77 to 15.85, respectively), about 8 p.p. .To assess the effect at a more aggregate level, we consider the universe of Danish limited liability companies and add the firms with a sole shareholder, which are not affected by the policy. The average wealth concentration in the universe of Danish limited liability companies would decrease by almost 1.5 p.p., and average ROE, employment, and turnover would increase by around 2.5 p.p.

These average values weight all observations equally. To obtain the overall increase in ROE, we also compute weighted means, where ROE is weighted by firm equity in total equity. This amounts to computing the change in the overall ROE. In this case, the average ROE of firms with more than one shareholder increases by almost 17 p.p., and the average ROE of Danish limited liability companies increases by 7 p.p.

Of course, this exercise should be interpreted with caution, as it does not account for potential general-equilibrium effects arising from aggregate changes in ownership structure. For instance, stronger firm growth may affect the allocation of capital across firms with different productivity levels, as well as firm entry and exit decisions. Capturing these mechanisms

would require a fully specified structural model. Interestingly, a recent macroeconomic literature which accounts for these aspects reaches consistent conclusions. Specifically, Boar et al. (2025) evaluate output losses due to business risk entrepreneurial exposure using a heterogeneous-firm macro model calibrated to Spanish data. Despite the fundamentally different nature of their approach, they also find large aggregate effects of undiversified entrepreneurial risk. In particular, eliminating entrepreneurial risk exposure increases output by 15.4%, a magnitude comparable to our estimates, while eliminating debt constraints raises output by only 0.4%.[24]

10 Conclusions

Our study provides causal evidence on the impact of entrepreneurs' wealth concentration on firm outcomes. Using the divorce of a minority shareholder as an exogenous shock, we show that an increase in the majority shareholder's exposure leads to a shift toward lower risk-return strategies. Average return on equity and its variability decline markedly, the lower tail of the return on equity distribution loses probability mass and default probability decreases. These findings suggest that when more exposed to firm idiosyncratic risk entrepreneurs react adopting more conservative business strategies, prioritizing stability over growth. Consistently with this, firms whose controlling shareholder becomes more concentrated experience slower and less volatile growth in sales, employment, and assets, and a significant reduction in leverage.

Our results highlight the social inefficiencies of entrepreneurial under-diversification, as risk-averse behavior discourages high-growth, high-risk investments. In fact, the lower risk-return profile choice of more exposed entrepreneurs is socially inefficient as the idiosyncratic business risk that triggers it could be potentially diversified. Our findings imply that policies aimed at mitigating the negative effects of entrepreneurial under-diversification could enhance firm performance and economic growth. One approach is to expand access to financial instruments that allow entrepreneurs to mitigate their exposure to firm-specific risk, such as private equity secondary markets or insurance products tailored to business owners. Policymakers could also consider fostering venture capital and private equity markets, which provide alternative funding sources and reduce reliance on personal wealth. Finally, improving financial literacy

[24] Peter (2025) performs a similar exercise for four European countries, finding effects ranging from 1.7% in the Netherlands—where majority shareholders typically hold relatively small equity stakes—to 8.3% in Austria (Spain is not included in the sample). She similarly concludes that equity frictions represent a more important distortion for aggregate output than debt frictions.

programs for business owners may help them better manage risk while making growth-oriented investment decisions.

References

Anderson, R. C., A. Duru, and D. M. Reeb (2012). Investment policy in family controlled firms. *Journal of banking & finance 36*(6), 1744–1758.

Athey, S. and G. Imbens (2022). Design-based analysis in difference-in-differences settings with staggered adoption. *Journal of Econometrics 226*, 62–79.

Bach, L., L. E. Calvet, and P. Sodini (2020). Rich pickings? risk, return, and skill in household wealth. *American Economic Review 110*(9), 2703–2747.

Bena, J., A. Ellul, M. Pagano, and V. Rutigliano (2025). Entrepreneurs' diversification and labor income risk. Cepr DP20353.

Bennedsen, M., K. M. Nielsen, F. Pérez-González, and D. Wolfenzon (2007). Inside the family firm: The role of families in succession decisions and performance. *The Quarterly Journal of Economics 122*(2), 647–691.

Bloom, N. and J. Van Reenen (2007). Measuring and explaining management practices across firms and countries. *The quarterly journal of Economics 122*(4), 1351–1408.

Boar, C., D. Gorea, and V. Midrigan (2025). The aggregate costs of uninsurable business risk. *American Economic Review*. Forthcoming.

Bonnet, C., G. Bertrand, and A. Solaz (2021). The flip side of marital specialization: the gendered effect of divorce on living standards and labor supply. *Journal of Population Economics 34*, 515–573.

Borusyak, K. and X. Jaravel (2024). Revisiting event-study designs: Robust and efficient estimation. *Review of Economic Studies*. Forthcoming.

Bratberg, E. and S. Tjøtta (2008). Income effects of divorce in families with dependent children. *Journal of Population Economics 21*, 439–461.

Burkart, M., F. Panunzi, and A. Shleifer (2003). Family firms. *The journal of finance 58*(5), 2167–2201.

Callaway, B. and T. Li (2019). Quantile treatment effects in difference in differences models with panel data. *Quantitative Economics 10*(4), 1579–1618.

Callaway, B. and P. Sant'Anna (2021). Difference-in-differences with multiple timeperiods. *Journal of Econometrics 225*, 200–230.

Chernozhukov, V., I. Fernández-Val, and T. Kaji (2017). Extremal quantile regression. *Handbook of Quantile Regression*, 333–362.

De Chaisemartin, C. and X. D'Haultfoeuille (2020). Two-way fixed effects estimators with heterogeneous treatment effects. *American Economic Review 110*, 2964–2996.

Faccio, M., M.-T. Marchica, and R. Mura (2011). Large shareholder diversification and corporate risk-taking. *The Review of Financial Studies 24*(11), 3601–3641.

Goodman-Bacon, A. (2021). Difference-in-differences with variation in treatment timing. *Journal of Econometrics 225*, 254–277.

Holmstrom, B. and J. Tirole (1997). Financial intermediation, loanable funds, and the real sector. *the Quarterly Journal of economics 112*(3), 663–691.

Hussain, M. A. and O. Knagas (2009). New holes in the safety net? economic and social consquences of divorce in denmark. In H.-J. Andreß and D. Hummelsheim (Eds.), *When Marriage Ends*. Edward Elgar Publishing.

Koenker, R. and G. Bassett Jr (1978). Regression quantiles. *Econometrica: journal of the Econometric Society*, 33–50.

Machado, J. A. and J. S. Silva (2019). Quantiles via moments. *Journal of econometrics 213*(1), 145–173.

Markowitz, H. (1952). Portfolio selection. *Journal of Finance 7*(1), 77–91.

Michelacci, C. and F. Schivardi (2013). Does idiosyncratic business risk matter for growth? *Journal of the European Economic Association 11*(2), 343–368.

Moskowitz, T. J. and A. Vissing-Jørgensen (2002). The returns to entrepreneurial investment: A private equity premium puzzle? *American Economic Review 92*(4), 745–778.

Myers, S. C. (1977). Determinants of corporate borrowing. *Journal of financial economics 5*(2), 147–175.

Peter, A. (2025). Equity frictions and firm ownership. Mimeo, New York University.

Sharpe, W. F. (1964). Capital asset prices: A theory of market equilibrium under conditions of risk. *The journal of finance 19*(3), 425–442.

Sun, L. and S. Abraham (2021). Estimating dynamic treatment effects in event studies with heterogeneous treatment effects. *Journal of Econometrics 225*, 175–199.

Appendixes

A Instrument Formally

Let Divorce_{jt} be a dummy variable equal to 1 if a minority shareholder divorce occurred prior to time t, and 0 otherwise. Denote by τ the year of divorce of a minority shareholder; then $\text{Divorce}_{jt} = 1$ if $t > \tau$ and 0 otherwise. For firms that never experience a minority shareholder divorce, $\text{Divorce}_{jt} = 0$ for all t. Let numbershare_j denote the number of shareholders observed in the year prior to the divorce, and age_j the age of the majority shareholder in the year prior to the divorce.

Let y_{jt} denote a firm-level outcome, alternatively ROE_{jt} or $sdROE_{j\tau}$. Consider the following relationships:

$$y_{jt} = \alpha + \beta_y \, \text{Conc}_{ijt} + \gamma_1 \, \text{numbershare}_j + \gamma_2 \, \text{age}_j + \epsilon_{3jt} \tag{A.1}$$

$$\text{Conc}_{ijt} = \alpha + \beta_3 \, \text{Divorce}_{jt} + \gamma_1 \, \text{numbershare}_j + \gamma_2 \, \text{age}_j + \epsilon_{4jt} \tag{A.2}$$

We impose the following assumptions:

First stage: Conditional on the number of shareholders and the age of the majority shareholder, the divorce of a minority shareholder increases the share of household i's wealth due to the ownership of firm j:

$$E[\text{Divorce}_{jt} \times \text{Conc}_{ijt} \mid \text{numbershare}_j, \text{age}_j] \neq 0 \tag{A.3}$$

Exclusion restriction: The divorce of a minority shareholder does not have a direct effect on firm outcomes; it affects them solely through the increase in the majority shareholder's wealth concentration.

$$E[\text{Divorce}_{jt} \times \epsilon_{3jt} \mid \text{numbershare}_j, \text{age}_j] = 0 \tag{A.4}$$

Divorce is conditionally as good as random: Conditional on the number of shareholders and the age of the majority shareholder, the divorce of a minority shareholder is as good as random.

$$E[\text{Divorce}_{jt} \times \epsilon_{4jt} \mid \text{numbershare}_j, \text{age}_j] = 0 \tag{A.5}$$

Assumption (A.3) is testable and is evaluated empirically in Section 5.1, in light of the mechanism described in the mechanism section.

Assumption (A.4) requires that the divorce of a minority shareholder does not directly affect firm outcomes. Potential violations of this assumption arise if minority shareholders influence firm outcomes through their human capital, their impact on the firm's risk-return choices, or their monitoring role. We address these threats to our exclusion restriction through a set of exercises discussed in the exclusion restriction section.

Regarding (A.5), we assume that, conditional on the majority shareholder's age and the number of shareholders in the year prior to divorce, the probability that a firm experiences a minority shareholder divorce is as good as random. This is equivalent to assuming that the probability that a firm experiences the divorce of a minority shareholder depends structurally on a function of the majority shareholder's age (age_j) and the number of shareholders (numbershare_j), as well as on a random term.

$$\text{Divorce}_{jt} = \alpha_3 + \theta_1 \, \text{numbershare}_j + \theta_2 \, \text{age}_j + \epsilon_{5jt} \tag{A.6}$$

Thus, controlling for numbershare_j and age_j in (A.1) amounts to exploiting the residual variation ϵ_{5jt} in (A.6).

B Valuation using multiples

The valuation of unlisted firms using market multiples requires the definition of an appropriate set of comparable public companies for which a market price is available, and the aggregation of the firm-level multiples in the comparable set. We define comparability based on the sector of activity, and choose as aggregation rule the average multiple of listed companies in the sector. The market multiple we choose is the price-to-book value multiple (P/B) defined as:

$$PB_{s,t} = \frac{\sum_{i \in s} P_{i,t}}{\sum_{i \in s} SE_{i,t}} \tag{B.1}$$

where $PB_{s,t}$ is the multiple for sector s in period t, $P_{i,t}$ is the market capitalization of firm i belonging to sector s in period t, and $SE_{i,t}$ is the shareholders' equity of firm i belonging

to sector s in period t. This procedure is equivalent to taking a weighted average within sectors of the firm-level PB ratios using the shareholders' equity as a weight. After the PB multiples are computed for each sector, the value of a private company in sector s and period t is obtained as:

$$Value_{i,s,t} = PB_{s,t} SE_{i,s,t} \tag{B.2}$$

To estimate the multiples in Equation B.1, we use DataStream information for listed companies in Denmark, excluding firms whose end of fiscal year is not in December, and those with negative equity. The market prices are taken at the day in which the financial information is made available in DataStream. The data are trimmed yearly at the 95th percentile of the ratios distribution. DataStream classifies companies using the 4-digit U.S. Standard Industrial Classification (SIC) code system. The private companies in Danish archives are classified using the EU Nomenclature of Economic Activities (NACE) Rev. 2 system. We, therefore, map the two systems into a common 27-sector classification (Figure B1) to which we assign average price-to-earnings ratios as computed by Aswath Damodaran in 2019 for a sample of European firms[25]. Then, we restrict the number of industries to 10 by aggregating sectors with similar PE value, ending up with the classification shown in Figure B1. These 10 sectors are then used to compute PB ratios as in Equation B.1 and the value of private companies as in Equation B.2.

[25]File downloaded in December 2020 from
https : *//pages.stern.nyu.edu/ adamodar/New$_H$ome$_P$age/datacurrent.html*, at the section "Multiples", "PE Ratios, PEG Ratios and Expected Growth Rates by Industry Sector" – "Europe", file 1/20.

Figure B1: Classification of sectors of activity

Industry (27-sector classification)	Industry (10-sector class.)	PE Ratio (Europe)
Wholesale Trade	1	9.06
Real Estate		11.24
Agriculture, Forestry and Fishing		12.03
Petroleum Refining and Related Industries		12.12
Mining		12.37
Construction		12.58
Metal Industries		12.68
Finance and Insurance	2	12.91
Lumber and Wood Products, Except Furniture	3	13.03
Stone, Clay, Glass, and Concrete Products		14.18
Trade and Repair of Motor Vehicles		14.54
Hotels and Restaurant		14.94
Educational Services		17.39
Transportation, Communications	4	17.67
Paper, Printing and Publishing	5	17.74
Chemicals and Plastic Products	6	18.56
Electric, Gas and Sanitary Services	7	21.6
Transportation Equipment		22.2
Machinery, Electronic and Computer Equipment, Mesr/Anlyz/Cntrl Instrmnts and Repair Services		22.46
Private Household and Other Services	8	23.68
Health Services and Social Services		24.21
Food, Beverages and Tobacco		25.87
Retail Trade		25.91
Furniture and Fixtures and Miscellaneous Manufacturing Industries	9	30.29
Textile and Leather Products		32.48
Business Services	10	35.07

Note: The table shows the mapping from a 27-sector classification to a 10-sector one based on Aswath Damodaran's company ranking.

C Appendix: Additional tables and figures

C.1 Additional Descriptive Statistics

Table C1: Descriptive Statistics: Firms with more than one shareholder, 2006-2017

	Emp.	Age	Equi.	Ass.	Net Profit	Turnover
10p	2	1	27,226	106,341	-33,611	145,610
25p	3.5	3	75,022	257,340	4,143	403,216
50p	8.5	8	221,414	665,704	38,517	1,026,429
75p	19.5	16.5	590,481	1,721,068	133,120	2,626,112
90p	40	26.5	1,624,441	4,391,691	356,383	6,261,127
Mean	19	11	1,587,537	3,056,379	218,466	2,640,949

Values are in Dollars. They were originally computed in 2015 Danish Crown. Average 2015 Dollar to DKK exchange rate: 1 dollar for 6.74 Danish Krone. Emp. reads employees, Age reads firm age, Equi. reads equity, Ass. reads Assets, # Shareholders reads number of shareholders. All percentiles are computed as averages around the percentile, in compliance with Statistics Denmark's confidentiality regulations.

Table C2: Descriptive Statistics: Majority Shareholder Characteristics

	Conc.	Net Conc.	Shares
10p	0.02	0.03	0.25
25p	0.08	0.1	0.33
50p	0.22	0.33	0.5
75p	0.49	0.66	0.68
90p	0.79	0.92	1
Mean	.31	.38	.59

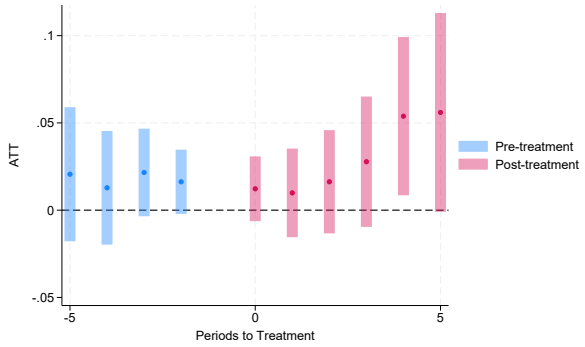
Value are in 2015 Danish Crown . Average 2015 Dollar to DKK exchange rate: 1 dollar for 6.74 Danish Krone. Conc. reads wealth concentration, Conc. reads wealth concentration net of mortgages, Shares reads Profit Shares, Mkt. V. to Wealth reads Firm Market value to majority shareholder wealth ratio . All percentiles are computed as averages around the percentile, in compliance with Statistics Denmark's confidentiality regulations.

C.2 Additional Figures: First Stage

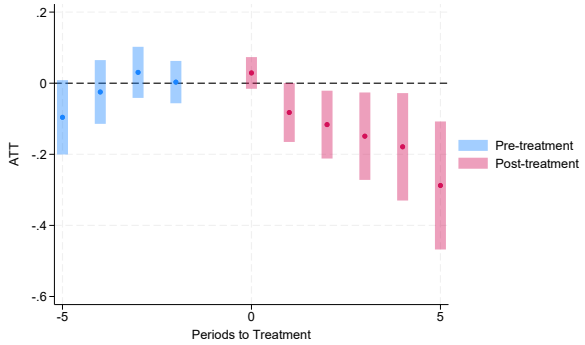
In Figure C1, Panel (a), we display the event-study coefficients for the effect of minority shareholder divorce on wealth concentration net of debt, as defined in Section 4.2. In Panel (b), we display the event-study coefficients for the effect of divorce on the number of shareholders, for the subset of firms that have at least two shareholders in the first year they are observed in the dataset.

Figure C1: App: Net Concentration and Number of Shareholder

(a) Wealth Concentration Net of Debt



(b) Number of Shareholders for Firms with at Least Two Shareholders in the First Year



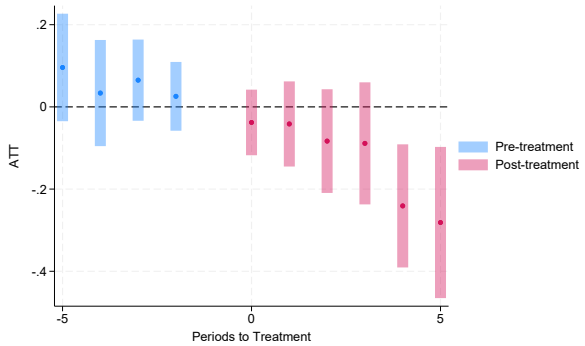
Note: *Note*: Figure (a) plots event-study coefficients for the effect of the divorce of a minority shareholder on the majority shareholder's concentration in the firm, computed net of debt, while Figure (b) plots the number of shareholders for the subset of firms with at least two shareholders in the first year of observation.

C.3 Appendix: Validating the Exclusion Restriction

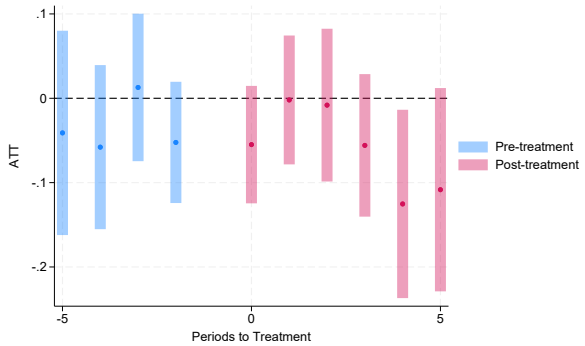
In this Appendix, we display additional tables and figures for the exclusion restriction section. In Figure C2, we show the event-study coefficients for the effect of minority shareholder divorce on ROE for the subset of firms in which the divorcing minority shareholder has a high school degree or less as their highest completed education (Panel (a)), and for the subset of firms in which the divorcing minority shareholder has an education level above high school (Panel (b)).

Figure C2: ROE: Low- and High-Productivity Divorcing Minority Shareholders

(a) High School or Less



(b) More than High School



Note: Figures plot event-study coefficients for the effect of the divorce of a minority shareholder on firm ROE. Panel (a) for firms in which the divorcing minority shareholder has a high school education or less, while Panel (b) reports results for those with more than a high school degree.

In Table C3, we report the ATE of minority shareholder divorce on the number of shareholders [1], the majority shareholder's equity share [2], wealth concentration [3], and firm ROE [4], for the sample of firms in which the divorcing minority shareholder is low educated (high school or less, upper panel) and high educated (more than high school, lower panel).

Table C3: Low- and High-Education Divorcing Minority Shareholders: ATE

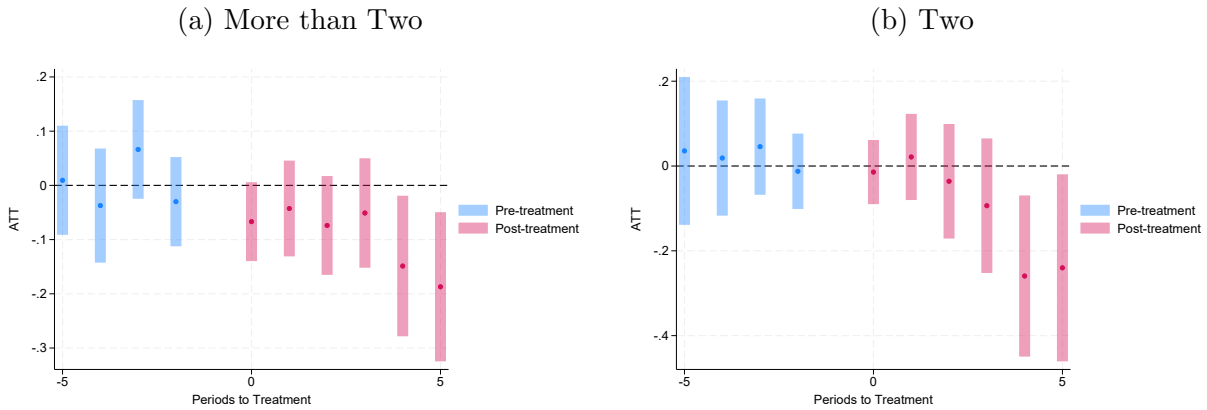
	[1] # of Shareholders	[2] Equity Shares	[3] Wealth Conc.	[4] ROE
		Panel A: High school or Less		
ATT	-0.36***	0.09***	0.06***	-0.15***
	(0.09)	(0.018)	(.024)	(0.05)
N	2,925	2,925	2,907	2,847
		Panel B: More than high school		
ATT	-0.23***	0.03**	.03*	-.07*
	(0.06)	(0.018)	(.018)	(.04)
N	4,662	4,662	4,614	4,497

Note: The table reports the ATT using the Callaway and Sant'Anna (2021) estimator for the effect of a minority shareholder's divorce on different outcomes. Controls include the number of shareholders and the age of the majority shareholder, both measured in the year prior to the divorce. Column [1] displays the results for the number of shareholders, column [2] for the majority shareholder's equity share, column [3] for the majority shareholder's wealth concentration in the firm, and column [4] for firm ROE. The upper panel reports results for firms in which the divorcing minority shareholder has a high school education or less, while the lower panel reports results for those with more than a high school education. Standard errors clustered at the firm level are reported in parentheses. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

In Table C4, we split the sample into two groups according to the education level of the divorcing minority shareholder. For each group, we report descriptive statistics for the characteristics of the first household member of the divorcing minority shareholder and of their household, as well as firm characteristics and the characteristics of the corresponding majority shareholder.

In Figure C3, we show the effect of divorce on firm ROE for the subset of firms that have more than two shareholders at the time of divorce (Panel (a)) and exactly two shareholders at the time of divorce (Panel (b)). In Table C5, we report the corresponding ATE.

Figure C3: ROE: Number of Shareholders at the Time of Divorce



Note: The figures plot event-study coefficients for the effect of a minority shareholder's divorce on firm ROE. Panel (a) reports results for firms with more than two shareholders at the time of divorce, while panel (b) reports results for firms with two shareholders.

C.4 Appendix: Alternative Definition of Default

In Table C6 and Table C7, we report the results of regressions 12 in which firm default is defined, respectively, as firm disappearance from Danish Business and as having zero employees.

Table C4: Descriptive Statistics: Low- and High-Productivity Divorcing Minority Shareholders

	First Household Member Characteristics	
	$\leq$ H.S.	$>$ H.S.
Mean:		
Age	43	43
Man	0.72	0.79
Year of Educ.	12.7	16.3
Wage	61,454	81,748
Household Characteristics		
Equity Share	0.27	0.26
Voting Share	0.26	0.26
Wealth	1,884,272	2,997,032
Income	117,374	136,251
Stake/Wealth	0.22	0.22
Stake/Income	8.0	5.4
Median:		
Wealth	675,359	738,645
Stake/Income	0.62	0.78
Firm Characteristics		
Mean:		
Age	11	11
Emp.	21	24
Equity	1,239,425	3,931,750
Leverage	0.59	0.57
Median:		
Emp.	11	11
Equity	296,396	366,66
Maj. Share Characteristics		
Mean:		
Equity Share	0.48	0.46
Voting Share	0.51	0.49
Conc.	0.32	0.33
Stake/Wealth	0.15	0.14
N. of Firms	394	637

The table reports descriptive statistics for samples split between low- and high-educated divorcing minority shareholders. It first reports descriptive statistics for the first household member, then for the household, the firm, and finally the majority shareholder. Values are in thousands of dollars, evaluated at the average 2015 exchange rate (1 dollar = 6.74 Danish kroner). All percentiles are computed as averages around the percentile, in compliance with Statistics Denmark's confidentiality regulations.

Table C5: Effect on Firm Roe by Number of Shareholders: ATE

	Shareholders at the time of Divorce	
	> 2	2
	ROE	ROE
ATT	$-.09^{**}$	$-.11^{*}$
	(.04)	(.057)
N. Obs. 4,540	2,298	
Add. Controls	YES	NO

Note: The figure plots event-study coefficients using the Callaway and Sant'Anna (2021) estimator for the effect of the divorce of a minority shareholder on firm ROE. We control for the number of shareholders and the age of the majority shareholder, both measured in the year prior to the divorce. Column [1] displays the results for the sample of firms with more than two shareholders at the time of divorce and uses the specification with additional controls from Table 5, column [2]. Column [2] displays the results for the sample of firms with two shareholders at the time of divorce and uses a more parsimonious set of controls (Table 5, column [1]) due to the smaller sample size. Standard errors in parentheses are clustered at firm lvl. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table C6: Effect of a Minority Shareholder's Divorce on a Firm's Probability of Default: Default as Disappearence from Danish Business register

	Default					
	Latest Year of Divorce					
	2009	2009	2013	2013	2017	2017
	OLS	Probit	OLS	Probit	OLS	Probit
	(1)	(2)	(3)	(4)	(5)	(6)
Divorce	-0.061^{***}	-0.058^{***}	-0.031^{**}	-0.029^{**}	-0.027^{***}	-0.028^{***}
	(0.021)	(0.021)	(0.012)	(0.013)	(0.007)	(0.007)
N	7,693	7,693	10,155	10,155	12,684	12,684

Note: The table reports the effect of a minority shareholder's divorce on the firm's probability of default. Years 2009, 2013, and 2017 represent the latest year in which a firm can experience the divorce of one of its minority shareholders in order to be included in the data. We only keep firms were active in the year prior to the latest possible year of divorce. Specifications (1), (3), and (5) are estimated using OLS, while specifications (2), (4), and (6) are estimated using a Probit estimator. The divorce coefficients shown in (2), (4), and (6) are average marginal effects. Controls common to all specifications include the age of the majority shareholder, the number of shareholders, the firm's sector, year of foundation, number of employees, and leverage. These controls are measured in the first year that a firm appears in the dataset. Standard errors, shown in parentheses, are clustered at the firm level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table C7: Effect of a Minority Shareholder's Divorce on a Firm's Probability of Default: 0 Employees

	Default			
	Latest Year of Divorce			
	2009	2009	2013	2013
	OLS	Probit	OLS	Probit
	(1)	(2)	(3)	(4)
Divorce	-0.067***	-0.066***	-0.042**	-0.041**
	(0.025)	(0.025)	(0.018)	(0.017)
N	7,828	7,828	10,360	10,360

Note: The table reports the effect of a minority shareholder's divorce on the firm's probability of default. Years 2009, 2013, and 2017 represent the latest year in which a firm can experience the divorce of one of its minority shareholders in order to be included in the data. We only keep firms were active in the year prior to the latest possible year of divorce. Specifications (1), (3), and (5) are estimated using OLS, while specifications (2), (4), and (6) are estimated using a Probit estimator. The divorce coefficients shown in (2), (4), and (6) are average marginal effects. Controls common to all specifications include the age of the majority shareholder, the number of shareholders, the firm's sector, year of foundation, number of employees, and leverage. These controls are measured in the first year that a firm appears in the dataset. Standard errors, shown in parentheses, are clustered at the firm level. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

C.5 Effect on the Majority Shareholders Portfolio Composition: Debt

In Figure C4, we show the effect of the minority shareholder's divorce on the majority shareholder 's mortgage value (Panel (a)) and bank loans (Panel (b)). When a house is sold, it is common for the outstanding mortgage to be repaid. Thus, the decline in mortgage value (Panel (a), Figure C4) provides additional evidence that the majority shareholder sells her housing. The pooled post-treatment effects are reported in Table C8, column [1].

Interestingly, as shown in Panel (b) of Figure C4, once the majority shareholder repays the mortgage when selling her property, she takes on new debt, arguably to finance the acquisition of the minority shareholder's stake. The pooled post-treatment effects are reported in Table C8, column [2].

Finally, in Panel (c) of Figure C4, we show the dynamics of housing value when trimming the dependent variable at the 5th percentile. This illustrates that the small pre-trend observed in Figure 8, Panel (b), is driven by extreme housing values that cannot be smoothed using logarithms, as we aim to capture cases in which the majority shareholder sells her entire property, bringing housing value to zero.

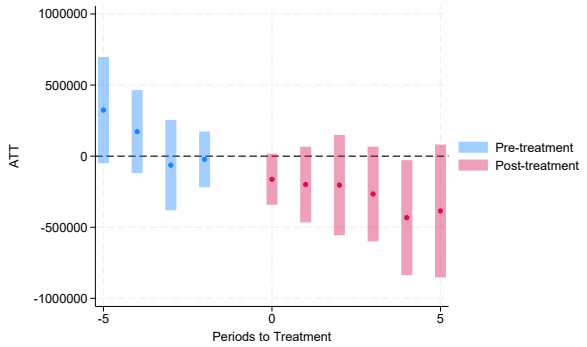
Table C8: Effect on majority shareholder Portfolio: Average Treatment Effects

	[1] Mortgage	[2] Bank Loan	[3] Housing Val.
ATT	$-259,382^{**}$	$157,745^{**}$	$-444,128^{**}$
	(126,623)	(68,552)	(185,580)
β in US Dollars	-38,483 $	23,405 $	65,894 $
N. Obs.	5,273	5,292	6,166

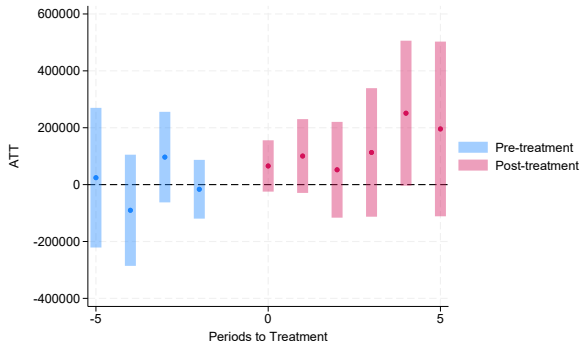
Note: The table reports the ATT, using the Callaway and Sant'Anna (2021) estimator, of the divorce of a minority shareholder on majority shareholder 's (i) log value of the firm stake, (ii) housing value, and (iii) value of bank deposits, controls include the number of shareholders, the age of the majority shareholder, the majority shareholder's wealth, wealth concentration, equity share in the firm, a dummy for whether she owns an absolute majority, the value of the divorce shares in the firm, the market value relative to the majority shareholder's wealth, firm leverage, and total assets. All controls are evaluated the year prior to the divorce. Standard errors in parentheses are clustered at firm lvl.. * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Figure C4: majority shareholder 's Value of Firm Participation, Housing and Deposit

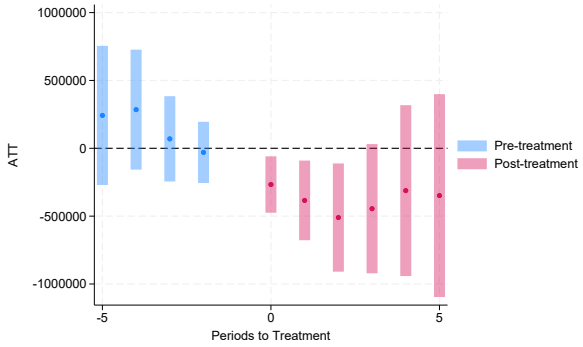
(a) majority shareholder 's Mortgage Value



(b) majority shareholder 's Bank Loan Value



(c) majority shareholder 's Housing Value



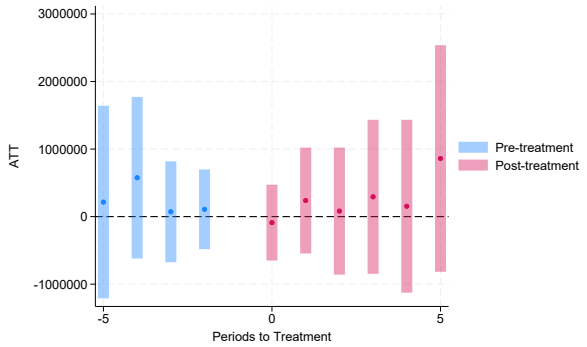
Note: The figure plots event study coefficients using the Callaway and Sant'Anna (2021) estimator. Controls include: the number of shareholders, the age of the majority shareholder, the majority shareholder's wealth, wealth concentration, equity share in the firm, a dummy for whether she owns an absolute majority, the value of the divorce shares in the firm, the market value relative to the majority shareholder's wealth, firm leverage, and total assets. All controls are evaluated the year prior to the divorce. Panel (a) plots the results for the effect on majority shareholder 's Mortgage Value, Panel (b) majority shareholder 's Bank Loan Value, Panel (c) majority shareholder 's housing value trimmed at 5 percent. Standard errors are clustered at the firm level.

C.6 Effect on the Majority Shareholders Portfolio Composition:: Net Total Wealth

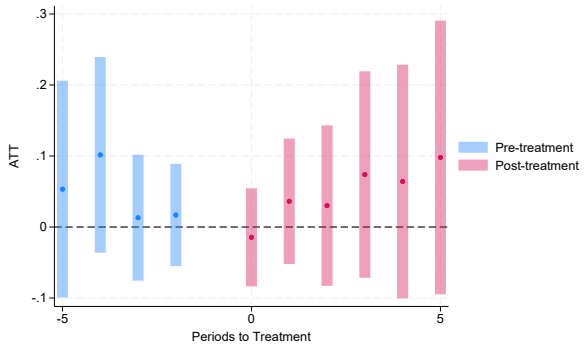
In this Appendix, we present the results for the effect of the divorce of a minority shareholder on the net wealth of the majority shareholder. We report results for both the level and the log of net wealth; since the log transformation excludes negative values of net wealth, we present both specifications. Results are unchanged. There is no effect of divorce on the majority shareholder's net wealth.

Figure C5: Majority shareholder's Wealth net of Debt

(a) Net Wealth



(b) log(Wealth)



Note: The figure plots event study coefficients using the Callaway and Sant'Anna (2021) estimator. Controls include: the number of shareholders, the age of the majority shareholder, their equity share in the firm, a dummy for whether they hold an absolute majority, the value of the stake of the divorcing shareholder in the firm, and firm leverage. All controls are evaluated the year prior to the divorce. Panel (a) plots the results for the majority shareholder 's wealth net of debt and Panel (b) for majority shareholder 's log of net wealth . Standard errors are clustered at the firm level.

Table C9: Effect on majority shareholder Wealth Net of Debt

	[1] Net Wealth	[2] log(Net Wealth)
ATT	247,877	0.0362
	(433,046)	(.051)
N. Obs.	6,446	6,70
Add. Controls	YES	YES

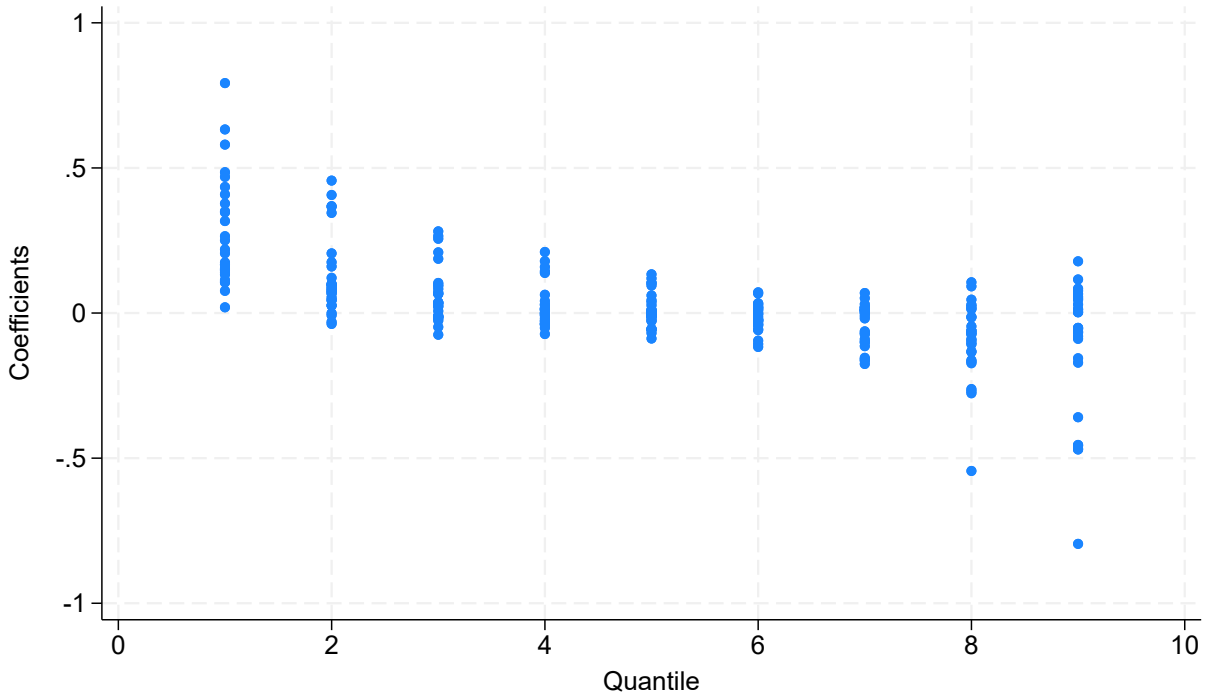
Note: The table reports the ATT, using the Callaway and Sant'Anna (2021) estimator, of the divorce of a minority shareholder on majority shareholder 's [1] net wealth and [2] log net wealth of the majority shareholder. Controls include: the number of shareholders, the age of the majority shareholder, their equity share in the firm, a dummy for whether they hold an absolute majority, the value of the stake of the divorcing shareholder in the firm, and firm leverage. All controls are evaluated the year prior to the divorce. Standard errors in parentheses are clustered at firm lvl..
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

C.7 Quantile Regression: Callaway et al.

In Figure C6 we show the results when implementing the Quantile Treatment Effect on the Treated (QTT) developed by Callaway and Li (2019). We construct all possible triplets in our observation period that include two years with no treated firms and one year in which part of the sample is treated, and we estimate the corresponding QTT for each triplet. Figure

C6 plots the point estimates from each triplet for each decile of the ROE distribution.

Figure C6: Quantile regressions for ROE: QTT Callaway et al.



Note: The figure plots all the event study coefficients by quantiles (from 1^{st} decile to the tenth), using the Callaway and Li (2019) quantile regression estimator, of all the possible triplets of two non treated period and one pontentially treated period available across the 2006-2017 time window. Controls include the number of shareholders, age of the majority shareholder, market value relative to the majority shareholder's wealth.