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"Ownership concentration and firm risk: The moderating role of mid-sized blockholders"

Silvia Rossetto, Nassima Selmane and Raffaele Staglianò

Toulouse School of Economics

Ownership Concentration and Firm Risk: The Moderating Role of Mid-Sized Blockholders*

Silvia Rossetto†

Toulouse School of Economics

Université Toulouse 1, TSM-R

Nassima Selmane‡

University of Groningen

Raffaele Staglianò§

Università degli Studi di Messina

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†silvia.rossetto@tse-fr.eu
‡n.selmane@rug.nl
§raffaele.stagliano@unime.it

Abstract

This study analyzes the relationship between mid-sized blockholders and firm risk. We show that ownership structure matters for firm risk, beyond the first largest blockholder. Firms with multiple blockholders take more risk than firms with just one blockholder, even when controlling for the stake of the largest blockholder. Consistent with the diversification argument, we find that firm risk increases by 22% when the number of blockholders increases from one to two. Our results are robust to controlling for blockholder type and firm characteristics. We carry out various robustness checks to tackle endogeneity issues. More generally, we provide evidence that firms' decisions are affected by mid-sized blockholders, and not merely the largest blockholder. This is in line with theoretical predictions.

JEL: G11, G30, G32, G34.

Keywords: Corporate Governance; Ownership Structure; Firm Risk; Blockholders; Volatility of Operating Performance.

1 Introduction

Firms across countries and sectors display a range of complex ownership structures that cannot be categorized as either widely held or controlled by one large investor. Previous studies such as Holderness (2009), Laeven and Levine (2008), and Edmans and Holderness (2017) and the OECD report of De La Cruz et al. (2019) document that the most common ownership structure is that with multiple large investors. In the United States, between 2009 and 2017, 69% of publicly listed firms had more than one blockholder (i.e., an investor with stake greater than 5%), 28% of firms had one blockholder, and only 3% of firms had no blockholders.[1] European firms show similar features, with more than 34% of them having at least two large investors and 12% having more than two large investors (see Laeven and Levine (2008)). The role of large shareholders has attracted the interest of academic researchers (see the reviews in Enriques and Volpin (2007) and Edmans and Holderness (2017)) as well as regulatory authorities (see, for example, the 2012 report published by the Autorité des Marchés Financiers, AMF (2012)) and the media (The Economist (1994), (2014)).

Empirical studies do not shed light on the role of mid-sized blockholders in firms' policies and in particular risk profiles. Existing studies linking ownership structure and firm risk focus on the role of the largest blockholder (John et al. (2008) and Faccio et al. (2011)). In this study, we examine the role of mid-sized blockholders and investigate whether and how the presence of blockholders, other than the largest one, plays a role in determining firm risk. We find that the number of blockholders is associated with firm risk, and that, in particular, the more dispersed the ownership structure is, the more risky the firm is.

The starting point for many studies on ownership structure is the belief that a large blockholder helps overcome the free-rider problem in monitoring a firm manager (Shleifer and Vishny (1986)). As a larger blockholder tends to be exposed to more firm risk, one would expect firms to take less risk, the larger the stake of the largest blockholder (Admati et al. (1994)). This relationship has been tested empirically. In a cross-country study, John et al. (2008) document a weak negative relationship between the largest blockholder's stake and firm risk. Faccio et al. (2011) carry out a similar analysis using European data, to find firm risk positively related to both the largest blockholder's stake and their degree of diversification.

The presence of a large shareholder triggers a conflict of interest between shareholders regarding risk choices: a large blockholder might prefer low-risk-return projects, whereas small shareholders might prefer high-risk-return projects. Mid-sized blockholders may create value by mitigating this conflict of interest. Dhillon and Rossetto (2015) show that when firms make investment decisions through shareholder vote and some small shareholders abstain from voting, mid-sized blockholders may emerge and become pivotal voters, and the largest shareholder may no longer determine risk choices. In such a setting, the larger the number of blockholders, the more is the firm risk.

Building on these findings, we carry out an empirical study to test whether mid-sized blockholders play a role in determining firm risk, and whether the power of the largest blockholder is the only dominant driver of firm risk choices. To test our hypothesis, we use data on ownership structure from US-listed firms from 2009 to 2017[2], defining as blockholder a shareholder with stake of at least 5%.

For firm risk, we mainly consider the volatility of operating performance computed over four-year overlapping periods, as in John et al. (2008) and Faccio et al. (2011). Alternatively, we use annual share price volatility and idiosyncratic risk.

Empirically, we first try to replicate the findings in the literature (John et al. (2008) and Faccio et al. (2011)) by determining whether exposure of the largest blockholder can predict the next-period firm risk. As in John et al. (2008), we find a weak negative relationship between exposure of the largest blockholder and firm risk. However, when we take into account multiple blockholders, we find that multi-blockholder firms take higher risk. This finding confirms the notion that ownership structure matters for risk-taking and that this relationship is more complex than previously thought. In particular, focusing on the largest blockholder alone is not sufficient.

We further examine the aspects of ownership structure affecting firm risk. The theoretical model proposed by Dhillon and Rossetto (2015) shows a positive relationship between the number of blockholders and firm risk. We directly test this prediction, and our analysis confirms this relationship. Hence, mid-sized blockholders appear to play a role in determining firm risk.

This finding is economically relevant. The average operating performance volatility of a firm with only one blockholder is around 3%. The addition of another blockholder increases the firm risk by 0.66%, indicating that when a firm moves from having one blockholder to having two blockholders, firm risk increases on average by 22% relative to its initial value.

The next step is to examine whether a portfolio argument is behind the relationship between ownership structure and risk. Portfolio theory predicts that if shareholders were perfectly diversified, specific risk would not matter, and there would be no relationship between risk and ownership structure (Markowitz (1952)). However, when shareholders are not well-diversified, a shareholder's stake will affect the firm's willingness to take risk. On average, the larger the number of blockholders, the smaller is the stake of the pivotal mid-sized blockholder. This relationship implies that shareholders having a smaller stake are less exposed to firm-specific risk and hence more willing to make investment decisions that increase firm risk. We then test whether the number of blockholders is positively related to a specific risk. Our results confirm the idea that blockholders who are in control hold a less diversified portfolio but affect firm policies, and this is reflected in share price specific risk.

Endogeneity concerns are common in this type of studies. To mitigate potential endogeneity problems related to omitted variables, we include in our baseline regression specification a number of control variables, as well as industry- and year-fixed effects. We consider two sets of firm-specific control variables, accounting and corporate governance controls. In the first group, we include firm age, size, sales growth, and asset tangibility, and in the second group, we add dummy variables to distinguish whether the largest blockholder is an individual, a corporation, a financial institution, or a government. We also consider two

CEO compensation variables (the delta and vega of CEO compensation). The inclusion of industry- and year-fixed effects helps us control for unobserved heterogeneity at the industry and year level.

Another concern is reverse causality. One could argue that greater firm risk may lead to greater dispersion of ownership. As previous studies have highlighted with regard to ownership structure, there are no valid instrumental variables to date that can resolve questions about the direction of causality (see Edmans and Holderness (2017) and Roberts and Whited (2013)). We therefore carry out three direct tests to exclude the following hypotheses: risk determines the number of blockholders, risk changes in anticipation of a change in number of blockholders, and the number of blockholders changes in anticipation of a change in risk.

First, we examine whether a change in ownership structure predicts a change in firm's operating risk. Our results confirm that ownership structure determines firm risk. Second, we test whether firm risk in year t predicts the number of blockholders in year $t + 1$. We find no significant relationship here. We can thus rule out that (i) a change in number of blockholders follows a change in risk, and that (ii) risk changes in anticipation of a change in ownership structure.

Per se, this evidence admits the possibility that ownership structure changes in anticipation of a change in risk. For this reason, we carry out a third analysis. We argue that shareholders of firms in regulated industries such as utilities and public transport have less room for maneuvering to affect risk. Hence, the relationship between number of blockholders and firm risk should be smaller or non-existent in a sub-sample of highly regulated firms. However, the relationship would still exist if the anticipation of a change in risk (due to external factors) determines a change in ownership structure. Our results confirm that the relationship between number of blockholders and risk is not significant for regulated firms.

To address potential problems related to the non-linear relationship with control variables, we check whether our results are robust when comparing firms with multiple blockholders to a (propensity score) matched sample of peer firms with only one blockholder. These tests suggest that ownership structure affects firm risk rather than vice versa.

To complete the picture of the relationship between ownership structure and firm risk, we consider alternative proxies both for ownership and risk measure. More specifically, we consider the Herfindahl index for ownership structure. This measure of ownership concentration is widely used, despite the disadvantage that it condenses the number of blockholders and the size of their stakes into one number, resulting in a loss of information. As an alternative measure for firm risk, we consider capital expenditure and research and development (R&D) expenditure. These robustness tests confirm that when there are multiple blockholders, it is not the largest blockholder, but rather the mid-sized blockholders who determine the firm's risk-taking decisions.

To our knowledge, this study provides the first empirical analysis of the relationship between mid-sized blockholders and firm risk. Existing studies analyze the relationship between ownership structure and firm performance, and reach contradictory conclusions. Cronqvist and Nilsson (2003) find a loss in efficiency when a wedge exists between cash flow rights and voting rights. Holderness (2009) aggregates the percentage of stock ownership for all blockholders and finds no difference in performance regardless of whether there is one or multiple blockholders. In Maury and Pajuste (2005) and Laeven and Levine (2008), the presence of a second blockholder increases firm value. In contrast, Konijn et al. (2011) find a negative relationship between ownership dispersion and firm value. In Donelli et al. (2013), the existence of a controlling blockholder is linked to a more stable ownership structure.

Our study contributes also to the literature on the role of mid-sized blockholders and shareholder activism in general. The literature has identified two ways through which smaller blockholders exercise their influence: voice (Bennedsen and Wolfenzon (2000), Dhillon and Rossetto (2015)) or exit (Admati and Pfleiderer (2009), Edmans and Manso (2011)).

The literature on "voice" traditionally refers to voting or persuasion. Through voting, smaller blockholders can affect the choice of board composition (Allen (2007)), and hence that of CEO. Karpoff et al. (1996) find that passing shareholder proposals that affect corporate governance does not imply a subsequent improvement in firm performance, whereas Cuñat et al. (2012) obtain a positive share price reaction when a firm passes a governance proposal by a small margin.

Persuasion is also a tool often used in practice. Activist investors rely on persuasion to influence corporate strategy (Brav et al. (2008), Gillan and Starks (2007) and the review of Denes et al. (2017)).[3]

Finally, a blockholder's threat to exit can discipline a CEO via its negative effect on share prices, and hence on any part of compensation linked to the latter. Examining this mechanism, Kim et al. (2018) and Mathers et al. (2020) show that blockholders coordinate on an eventual exit to affect firm choices.

The remainder of the paper is organized as follows. Section 2 presents the theoretical framework. Section 3 discusses the data sources. Section 4 reports the results of our analysis and robustness tests, and Section 5 concludes the paper.

2 Theoretical framework

Few theoretical models link ownership structure to firm risk. In the absence of frictions, investors hold a perfectly diversified portfolio, the firm ownership structure is dispersed, and all shareholders agree on the projects a firm should invest in (Fisher (1930), Markowitz (1952)). In the presence of agency problems, costly monitoring by shareholders can increase firm value, and dispersed ownership might not be optimal. While a shareholder with a small stake has little incentive to bear the monitoring costs, a blockholder might arise to overcome the free-rider problem associated with monitoring (Shleifer and Vishny (1986)).

Admati et al. (1994) show that the risk aversion and lack of diversification of a blockholder prompt her to choose low risk-return investments. This implies that when the largest blockholder is more exposed to a firm, firm risk would be lower. John et al. (2008) and Faccio et al. (2011) test this prediction empirically. John et al. (2008) find a weak negative relationship between the largest blockholder's share and risk, whereas Faccio et al. (2011) show that the degree of diversification of the largest blockholder has a positive effect on firm risk.

Dhillon and Rossetto (2015) show that the co-existence of a single large (poorly diversified) shareholder and many diversified shareholders creates an endogenous conflict of interest. The large shareholder prefers lower risk-return projects, but the dispersed shareholders prefer higher risk-return projects. When the firm's risk-return choices are determined by a majority vote and some dispersed shareholders abstain, mid-sized blockholders can arise and become pivotal by shifting the risk choice toward a middle-of-the-road outcome. Hence, these shareholders can mitigate the conflict of interest between the largest shareholder and minority shareholders.

This model suggests that the relationship between the largest blockholder's stake and risk would differ depending on whether the firm has multiple blockholders or only one blockholder. When only one blockholder is present, this investor determines the degree of firm's risk. Empirically, this implies that in firms with one blockholder, the stake of the blockholder is negatively related to firm risk.

In case of multiple blockholders, however, the share of the largest shareholder plays a more subtle role. If the largest blockholder has a larger stake, mid-sized blockholders together hold a larger stake to be pivotal. In turn, because on average mid-sized blockholders hold a larger stake, they are less diversified and hence prefer lower risk. Therefore, there is still a negative relationship between the largest blockholder and firm risk, but firms with multiple blockholders should take higher risk. Another important implication of the model is that when blockholders are present, the larger the number of blockholders, the more risk the firm would take. Formally, our first three hypotheses are stated as follows:

H1: The risk of firms with only one blockholder decreases with the blockholder's stake.

H2: For a given stake of the largest blockholder, firm risk is larger in the presence of *multiple blockholders.*

H3: Firm risk increases with the number of blockholders.

If firm choices are driven by a lack of blockholder diversification, idiosyncratic risk considerations should also play a role. Portfolio theory suggests that undiversified investors care about specific risk, while investors with more diversified portfolios care less about it. While there would be no relationship between firm-specific risk and ownership structure when ownership structure is dispersed, specific risk matters when there are blockholders who do not hold a perfectly diversified portfolio. Therefore, the larger the number of blockholders, the smaller is their exposure to specific risk, implying a positive relationship between number of blockholders and specific risk.[4]

H4: Firm-specific risk increases with the number of blockholders.

3 Data and descriptive statistics

Our primary source of data on the ownership structure of US-listed firms is Bureau van Dijk's (BvD) ORBIS database. This database includes detailed data on the percentage of voting rights of every shareholder with a known stake. Although this database is not error-free (see Kalemli-Ozcan et al. (2015)), it is among the most reliable publicly available databases.[5] We consider firms belonging to the S&P 1500 index over the period 2009−2018. We restrict our analysis to these data to avoid including the global financial crisis of 2007−2008.

We obtain ownership data for 1,852 US-listed firms between 2009 and 2018. Following the standard definition used by stock market regulators, we define a blockholder as a shareholder with a stake of more than 5%.[6] We exclude firms with no blockholders, because we are interested in the role of mid-sized blockholders in firm choices. For most of our analysis, we also exclude firms operating in regulated and public interest sectors (i.e., the financial sector, utilities, and public administration), because ownership structures and investment choices in these sectors are heavily influenced by regulation (e.g., Demsetz and Lehn (1985)).

We match the ORBIS data to Compustat (North America), Center for Research in Security Prices (CRSP), and Thomson Reuters Datastream to obtain information on earnings, market capitalization, other firm characteristics, and industry classification. After merging the different databases, we obtain our final sample of 8,700 firm-year observations (1,683 firms) over the period 2009−2018.

As the main measure of corporate risk-taking, following previous studies, we consider the volatility of operating performance (John et al. (2008) and Faccio et al. (2011)). We measure the volatility of operating performance, σROA, as the volatility of earnings before interest and taxes (EBIT) normalized by asset value over four-year overlapping periods following the data on ownership, multiplied by 100. When measuring risk using the volatility of operating performance, the sample period of ownership structure is from 2009 to 2014. We do not consider beyond 2014 because we need the following years' accounting data to compute firm risk. Our sample size thus reduces to 4,912 firm-year observations (1,334 firms).

In section 4.2.2, we consider the stock return volatility and idiosyncratic risk. These variables have the typical market data advantage of quickly aggregating new information. However, unlike our main variable, they could be driven by not only blockholders' decisions, but also market traders' decisions or in general particular market conditions. We compute share price volatility (*Volatility*) on the monthly returns over the year following the data on ownership multiplied by 100. Idiosyncratic risk (*Idiosyncratic Risk*) is measured as the standard deviation of the estimation residuals of the Capital Asset Pricing Model (CAPM). When share price volatility and idiosyncratic risk are used as proxies for firm risk, our sample period extends until 2018.

Finally, data on managerial compensation are obtained from Coles et al. (2006) and constitute an elaboration of Execucomp data using the Core and Guay (2002) methodology. As the intersection of this dataset with the ownership data is relatively small, we control for

CEO compensation in extra regressions.

In the robustness test section, we use alternative proxies of firm risk, such as the four-year average capital expenditures over assets (*CAPEX*) and four-year average R&D expenditures over assets (*R&D*). The idea is that firms seeking a higher risk/return are willing to invest a larger fraction of their revenue in new investments and/or R&D.

We also use various proxies of ownership structure. When examining the effect of the largest blockholder on firm risk, we consider the share held by the largest owner (*Largest Share in %*) and its dollar value (*Largest Share in $*). As suggested by Edmans and Holderness (2017), both these variables are relevant when addressing ownership structure issues. In particular, the dollar value of the largest blockholder's share reflects the shareholder's absolute exposure to firm risk. This is relevant in shaping the investor's attitude toward risk.

When focusing on the role of mid-sized blockholders, we use both the number of blockholders (*N BHs*) and its inverse (*1/N BHs*). The idea behind using the inverse of the number of blockholders is that the marginal contribution to firm risk by an extra blockholder decreases as the number of blockholders increases. This is in line with the findings of Dhillon and Rossetto (2015). Figure 1 shows the distribution of the number of observations per number of blockholders. As a robustness test, we also consider the Herfindahl index as a proxy for the severity of the conflict of interest between blockholders, *Herfindahl*.

We include several controls for firm characteristics. We consider *Age*, computed as the natural logarithm of the number of years (plus 1) since the firm was founded (or incorporated or since the firm's first appearance in CRSP database if the founding year is unavailable), and *Size*, measured as the value of total assets. We control for *Sales Growth*, measured as the annual growth rate of sales to capture the firm's recent performance. Good recent performance might encourage a firm to take more risk and/or attract more shareholders. We also control for *Leverage*, measured as the ratio of total liability divided by shareholder equity, and *Tangibility*, measured as the ratio of tangible over long-term assets (property, plant, and equipment) net of depreciation and amortization charges to sales.

We also consider a set of governance variables. As blockholder type might affect attitudes toward risk and investment choices (Dou et al. (2016) and Anantavrasilp et al. (2020)), we use dummy variables to describe the different types of largest blockholder. We set a dummy variable when the largest blockholder is a natural person, an insider, or a family (*D Individual 1*); a financial institution (*D Financial 1*); or a government (*D State 1*). The reference case (when all dummies are 0) is when the largest blockholder is a corporation.

Finally, Coles et al. (2006) and Panousi and Papanikolaou (2012) find that managerial compensation affects firm risk. For this reason, we control for the delta and vega of CEO compensation (respectively *CEO Delta* and *CEO Vega*). *CEO Delta* is defined as the dollar change in wealth associated with a 1% change in firm's stock price (in $000s), and measures the sensitivity of CEO wealth to a variation in the stock price. *CEO Vega*, defined as the dollar change in wealth associated with a 1% change in the standard deviation of firm's returns (in $000s), measures the sensitivity of CEO wealth to stock return volatility.

For a detailed description of the variables and their sources, see Appendix A.1.

The first part of Table 1 provides summary statistics of the whole sample. The number of observations of certain variables, notably σROA, are fewer due to the way in which they are computed. The firm's average operating performance volatility, σROA, in the final sample is 3.407%. On average, the annual share price volatility is 32.805%, and the idiosyncratic risk is about 1.857%. The average firm size, measured by total assets, is 8.133 billion US$.

[PLEASE INSERT TABLE 1 HERE]

About 73% of firms have more than one blockholder. Figure 1 shows that firms with multiple blockholders are a more common phenomenon than firms with single blockholder. On average, firms have four blockholders. The largest blockholder owns on average 12.66% of shares with a corresponding value of 1.08 billion US$. These numbers are fairly stable over time (Figures 2 and 3). Only 56% of firms have changed their number of blockholders over the sample period. About 24% of these firms moved from an ownership structure with multiple blockholders to one with a single blockholder, while 27% increased the number of blockholders from one to multiple blockholders. The second part of Table 1 reports summary statistics for next-period averages of firm risk and other characteristics for firms with multiple blockholders and firms with one blockholder. The results show that firms with multiple blockholders on average have more risk and are smaller than firms with only one blockholder. Similarly, Figures 4, 5, and 6 show how the average risk (measured as σROA, *Volatility*, and *Idiosyncratic Risk*) of firms with multiple blockholders is larger than that of firms with one blockholder over time. These results provide a first indication of a relationship between mid-sized blockholders and firm policy.

[PLEASE INSERT FIGURE 1 HERE]

[PLEASE INSERT FIGURE 2 HERE]

[PLEASE INSERT FIGURE 3 HERE]

[PLEASE INSERT FIGURE 4 HERE]

[PLEASE INSERT FIGURE 5 HERE]

[PLEASE INSERT FIGURE 6 HERE]

Figure 7 presents the types of largest blockholders depending on whether the firm has only one blockholder or multiple blockholders. Irrespective of the ownership structure, the most common type of largest blockholder is *Financial Institution*, that is, institutions such as banks, insurance companies, mutual funds, pension funds, and hedge funds. However, this is a more common phenomenon in firms with one blockholder. The second type of largest blockholder is *Corporate*. The third type of largest blockholder is *Individual*; this includes individuals, foundations and research institutes, families, employees, managers, and directors. This type of largest blockholder is more frequent in firms with multiple blockholders than in those with only one blockholder. Only a few firms with multiple blockholders are controlled by public authorities, states, and governments.

[PLEASE INSERT FIGURE 7 HERE]

4 Analysis and results

4.1 Largest blockholder and risk

In this section, we empirically test hypotheses *H1* and *H2*. We first consider the whole sample of firms with at least one blockholder and determine whether a relationship exists between the largest blockholder and firm risk. We then repeat the analysis using a dummy variable when firms have multiple blockholders and an interaction term with the largest blockholder's stake. These two variables together tell us how the relationship between the largest blockholder and firm risk changes when multiple blockholders are present.

The baseline Ordinary Least Squares (OLS) regression with the dummy variable and interaction term is as follows:

$$\sigma ROA_{i,(t,t+3)} = \alpha_0 + \alpha_1 Largest\ Share_{i,t-1} + \alpha_2 D\ Multi\ BH_{i,t-1} + \alpha_3 Largest\ Share_{i,t-1} * D\ Multi\ BH_{i,t-1} + \sum_n \alpha_n x_{n,i,t-1} + \text{Industry F.E.} + \text{Year F.E.} + \epsilon_{i,t} \quad (1)$$

Subscripts i and t refer to the observation of firm i at time t. The volatility of operating performance (σROA) is the proxy for firm risk. We measure the largest blockholder's exposure with two variables: the dollar value of the largest blockholder's stake, *Largest Share in \$*, and the fraction of total market capitalization it constitutes, *Largest Share in %*. As Edmans and Holderness (2017) noted, the dollar value matters as much as the percentage of a block of shares. In our setting, the value of the largest block is an indication of blockholder exposure to firm risk, while the percentage value measures a blockholder's capacity to affect firm strategy.[7] $x_{n,i,t}$ is the $n-th$ control variable, and $\epsilon_{i,t}$ is the error term. To limit endogeneity concerns in this analysis (and in all subsequent ones), the dependent variable, in this case, σROA, is one period ahead relative to the independent variables. We add industry-fixed effects to control for time-invariant industry characteristics and year-fixed effects. α_j are the parameters we want to estimate, with $j = \{0, 1, 2, 3, ..., n\}$.

Our estimations are reported in Table 2. In Columns (1) to (6), we use *Largest Share in $* as a proxy for the largest blockholder's risk exposure, and in Columns (7) to (12), we use *Largest Share in %*. As in John et al. (2008), the interpretation of results is not obvious when one does not consider the difference between single- and multi-blockholder firms: when considering the largest blockholder's absolute exposure in isolation, the relationship with risk is negative (Columns (1) to (3)), but changes in magnitude when one includes firms with multiple blockholders (Columns (4) to (6)). These results are consistent with Hypothesis 1. When examining the largest blockholder's percentage stake, the results of our estimations give less clear-cut results (Columns (7) to (12)). This may be because risk preferences are chiefly driven by absolute risk exposure. The argument supporting the importance of the percentage stake advanced above may have less importance because the power of determining decisions may differ greatly between a blockholder who is pivotal and one who is not. Whether a blockholder is pivotal depends on the overall shareholder structure, and the fraction of ownership may therefore be a very noisy proxy for influence (see Dhillon and Rossetto (2015)).

[PLEASE INSERT TABLE 2 HERE]

The presence of multiple blockholders has a significant impact on firm risk. The dummy for multiple blockholders has always a positive coefficient, indicating that firms with multiple blockholders are associated with higher risk. This result is consistent with Hypothesis 2.

The coefficients on dummy variable *D Financial 1* are negative and statistically significant, suggesting that firms controlled by financial institutions are less risky than those controlled by corporations.

This analysis highlights two important points. A clear difference exists between firms with one blockholder and firms with multiple blockholders, implying that a distinction should be made between these two sets of firms. This result agrees with the findings of Laeven and Levine (2008) that the effect of ownership structure on corporate valuation differs depending on whether firms have one, multiple, or no blockholders. Second, and more specifically, these findings contribute to the discussion initiated by John et al. (2008), Faccio et al. (2011), and Laeven and Levine (2009) on the largest blockholder's role in affecting firm risk. Our analysis shows that the greater the wealth exposure of the largest blockholder to firm risk, the lower is the firm risk. However, when multiple blockholders are present, firms have more risk.

4.2 Mid-sized blockholders and firm risk

In this section, we study in more detail how ownership structure affects firm risk.

4.2.1 Number of blockholders

Given the results of Dhillon and Rossetto (2015), we test whether a positive relationship exists between the number of blockholders and risk, that is, *Hypothesis 3.* The baseline model is as follows:

$$\sigma ROA_{i,(t,t+3)} = \alpha_0 + \alpha_1 Ownership_{i,t-1} + \sum_{n=2}^{N} \alpha_n x_{n,i,t-1} + \text{Industry F.E.} + \text{Year F.E.} + \epsilon_{i,t} \quad (2)$$

σROA is the proxy for firm risk and measured as the volatility of operating performance. For the explanatory variable $Ownership$, we use the number of blockholders and its inverse. Using the inverse of the number of blockholders is linked to the idea that the marginal contribution of one extra blockholder to firm risk decreases as the number of blockholders increases. From how the ownership variables *1/N BHs* and *N BHs* have been constructed, we expect the signs of the parameters to be opposite.

The results are presented in Table 3. In all specifications, the coefficients of variable *1/N BHs* are negative and statistically significant at the 1% level. Similarly, the coefficients of the number of blockholders, *N BHs*, are always positive and significant at the 1% level.

This supports the hypothesis of a positive relationship between the number of blockholders and firm risk (Hypothesis 3).

[PLEASE INSERT TABLE 3 HERE]

To confirm our findings, we break down the effect of each blockholder and measure the contribution of each extra blockholder to firm risk. We estimate a regression with a dummy variable depending on the number of blockholders, that is, a dummy variable for firms with one blockholder, a dummy for firms with 2 blockholders, and so on. More formally,

$$\sigma ROA_{i,(t,t+3)} = \alpha_0 + \sum_{m=2}^{5} \alpha_{1,m}(D|\ Block = m)_{i,t-1} + \alpha_{1,>5}(D|\ Block > 5)_{i,t-1} + \sum_{n=2}^{N} \alpha_n x_{n,i,t-1} + \text{Industry F.E.} + \text{Year F.E.} + \epsilon_{i,t} \quad (3)$$

The difference between the coefficients of the dummy variable gives us each additional blockholder's contribution to firm risk. The results are reported in Table 4.

[PLEASE INSERT TABLE 4 HERE]

The coefficients on each of the dummies are positive and increase in value as the number of blockholder increases. This result confirms that firms with multiple blockholders have more risk than those with one single blockholder, and that as the number of blockholders increases, the firm risk also increases. This is in line with the empirical implications of Dhillon and Rossetto (2015), where a larger number of blockholders is associated with higher firm risk; with the results in Table 2, where we consider only a dummy variable for multi-blockholders firms; and with the results in Table 3.

The effect is economically relevant. Firms with one blockholder have an average operating performance volatility of 3% (Table 1). When the firm moves from having one blockholder to having two blockholders, the operating risk on average increases by 0.66% (see the coefficients of $D|\ Block = 2$ in Table 4), which corresponds to a 22% increase. We thus provide evidence that risk is a concern for blockholders, and that mid-sized blockholders play a role in the determination of firm policy.

4.2.2 Share price volatility, idiosyncratic risk and number of blockholders

In this section, we examine the relationship between ownership structure and risk from the financial market point of view. We first check whether a link exists between number of blockholders and share price volatility. Columns (1) to (3) of Table 5 report the results and confirm that financial markets react to a change in number of blockholders: the share prices are on average more volatile when there are a higher number of blockholders.

[PLEASE INSERT TABLE 5 HERE]

To further test whether a diversification argument is behind the relationship between firm risk and ownership structure (*H4*), we estimate the same model used in the previous section, using idiosyncratic risk as the main dependent variable. To compute the idiosyncratic risk, we estimate the beta from the standard market model where the firm's daily returns are regressed on a CRSP-weighted market portfolio, using data for the calendar year following the annual ownership observation. The standard error of the residuals of the above market model is our variable, *Idiosyncratic Risk*. Again, our analysis includes industry- and year-fixed effects.

Columns (4) to (6) of Table 5 report the results. The coefficients of the inverse of number of blockholders are always negative and significant at the 1% level, implying that when the number of blockholders in a firm increases (decreases), the firm-specific risk subsequently increases (decreases). This result is consistent with Hypothesis 4. More specifically, it indicates that when one or a few large blockholders of a firm do not hold a perfectly diversified portfolio, specific risk is lower and a portfolio argument is behind the relationship between ownership structure and firm risk. This finding complements the findings of Panousi and Papanikolaou (2012). They examine the relationship between manager ownership and idiosyncratic risk, to find that when managers are more exposed to firm-specific risk, the firm's share price has a smaller exposure to idiosyncratic risk.

4.3 Robustness test

We conduct a series of robustness checks of our results: we carry out various tests to address endogeneity concerns, and propensity score matching, and consider alternative risk and ownership measures.

4.3.1 Endogeneity

In this section, we address issues related to endogeneity. One may be concerned about reverse causality, that is, firm risk is the cause of ownership structure, or that some unobservable variables drive both the firm risk and ownership structure. Given the absence of credible instrumental variables for blockholders of the ownership structure in general (see Edmans and Holderness (2017) for a discussion on this point), we carry out three different tests, which together address endogeneity concerns. The first test examines whether a change in ownership structure can predict a change in firm operating volatility. Second, we test whether firm risk can predict a change in ownership structure. Finally, we check whether ownership structure can predict risk in the regulated sectors, because shareholders in these sectors, by their nature, have less leeway in influencing firm risk.

Variation in ownership structure and risk

To reduce problems related to endogeneity, we examine whether a change in the number of blockholders can predict a change in firm operating risk. This analysis helps address both issues related to both causality and omitted variables. More formally,

$$\Delta\sigma ROA_{i,(t,t+3)} = \alpha_0 + \alpha_1 \Delta Ownership_{i,t} + \sum_{n=2}^{N} \alpha_n \Delta x_{n,i,t} + \text{Industry F.E.} + \text{Year F.E.} + \epsilon_{i,t} \tag{4}$$

Following the same logic used in the previous sections, we consider two variables for changes in ownership structure: the variation in number of blockholders ($\Delta NBHs$) and its logarithm ($\Delta LnNBHs$). Table 6 presents the coefficient estimations of model (4). The coefficients are significantly positive and agree with the results of previous sections. An increase in number of blockholders corresponds to a subsequent increase in firm operating risk.

[PLEASE INSERT TABLE 6 HERE]

Risk as predictor of ownership structure

We now test whether firm risk can predict a change in ownership structure. If there is an insignificant relationship, we can exclude two possibilities: (i) current changes in risk cause future changes in ownership, and (ii) firm risk changes in anticipation of a future change in ownership structure. We therefore carry out a regression taking as dependent variable the inverse of the number of blockholders and main independent variable the firm risk:

$$1/NBHs_{i,t} = \alpha_0 + \alpha_1 \sigma ROA_{i,(t-1,t-4)} + \sum_{n=2}^{N} \alpha_n x_{n,i,t-1} + \text{Industry F.E.} + \text{Year F.E.} + \epsilon_{i,t} \tag{5}$$

From Table 7, the coefficients of the volatility of both operating performance and share price are never significant. The coefficients are basically equal to 0 with a probability above 35%. As firm risk does not predict changes in ownership structure, reverse causality of the type mentioned above is unlikely to explain our results.

[PLEASE INSERT TABLE 7 HERE]

Firm risk and ownership structure in regulated sectors

From the previous analysis, we cannot rule out that ownership structure changes in anticipation of a change in firm risk. To exclude this possibility, we carry out a second test and the same analysis as in Section 4.2.1 but with the sub-sample of regulated industries. We define regulated firms as those belonging to Division E as categorized by the US Department of Labor, that is, firms operating in sectors such as transportation and utility industries. The idea is that, given their public interest, these firms are heavily regulated and monitored by governmental and local authorities. For this reason, it is more difficult for blockholders to influence risk in these firms compared to other firms. If ownership structure changes in anticipation of a change in risk, we can expect a significant relationship of the same magnitude as in the previous analysis. If, however, a change in ownership occurs due to a change in firm risk, we can expect a smaller or no relationship between ownership structure and risk in Division E firms.

Table 8 presents the estimation of model (2) using data on firms in Division E. The coefficients of *1/N BHs* are not statistically significant, indicating no relationship between ownership structure and firm risk for regulated firms. We can thus conclude that our results are not explained by changes in ownership structure in anticipation of a change in risk.

[PLEASE INSERT TABLE 8 HERE]

4.3.2 Propensity score matching

To further confirm the robustness of the relationship between ownership structure and firm risk, we carry out a propensity score matching analysis. We identify a control sample of multi-blockholder firms exhibiting minimal observable differences in their characteristics compared to firms having one blockholder. In this manner, we attempt to mimic the random assignment of subjects in treatment and control groups. More specifically, we first estimate a probit model where the binary dependent variable is either 1 or 0, depending on whether or not the firm has multiple blockholders. Explanatory variables are the same as those used in the previous sections. We then match each firm with multiple blockholders to the closest firms with only one blockholder.[8] Table 9 and Figure 8 show the results of the matching procedure. The two samples are very similar in characteristics: all explanatory variables display mean values that are almost indistinguishable. The absolute values of the standardized bias of the matched sample are always below 5%, indicating that matching reduces the initial unbalancing satisfactorily. Using the matched sample, we re-estimate the previous models to see whether a difference exists between multi- and single-blockholder firms. We do this using a dummy variable that takes the value of 1 if the firm has multiple blockholders (*D Multi BH*). Results are reported in Table 10. Given our matched sample, we examine the relationship between the risk in firms with one blockholder and multiple blockholders. Table 11 shows that firms with multiple blockholders have more risk than firms with one blockholder (see Columns (1) to (3)). We also find that number of blockholders has a positive impact on firm risk (see Columns (4) to (6) of Table 11). The rest of the coefficients remain very close to the baseline results shown in Section 4.2.

[PLEASE INSERT TABLE 9 HERE]

[PLEASE INSERT FIGURE 8 HERE]

[PLEASE INSERT TABLE 10 HERE]

[PLEASE INSERT TABLE 11 HERE]

4.3.3 Ownership concentration as proxy for ownership

A measure of ownership structure used in the literature is the Herfindahl index. It is a measure of concentration considering both the number of blockholders and their degree of inequality. There is no consensus in the literature computing the Herfindahl index for ownership dispersion.[9] We compute the Herfindahl index using all the information we have, that is, the share of all blockholders. Although the Herfindahl index might seem an appealing measure for ownership structure, its interpretation in this context is not straightforward. The index may yield the same number for firms with different numbers of blockholders. For example, a firm having two blockholders with 40% and 10% stake, respectively, has the same Herfindahl index of 0.11875 as a firm with three blockholders with stakes of 18%, 12%, and 10%, respectively. For this reason, we use this variable only as part of robustness checks.

We then regress the Herfindahl index on firm risk to explain the volatility of operating performance (σROA) using the same specification as in the previous sections.

Our findings confirm the conclusions of the previous sections. Table 12 shows that the ownership coefficient of the Herfindahl index is negative and significant at the 1% level. This result implies that the larger the ownership dispersion, the higher is the firm risk.

[PLEASE INSERT TABLE 12 HERE]

4.3.4 Other proxies for firm risk

We consider two alternative risk measures. The first is the four-year average capital expenditures normalized by asset value, *CAPEX*, which measures the investment of the firm. The idea is that a firm more prone to risk is ready to invest more. The second measure is the four-year average R&D expenditures normalized by asset value, *R&D*. The idea behind this variable is similar to the one used for capital expenditures. Firms willing to take more risk invest more in R&D.

As already noted in the literature, these variables often take the value of 0, but it is unclear whether this value is actually 0 or a missing observation. Koh and Reeb (2015) report that missing R&D information is often linked to the lack of innovation in a firm, which means that probably these 0 values are actually true accounting values. As we cannot be sure about these data and also do not want to ignore them, we use a dummy variable to highlight when the data on *CAPEX* and *R&D* are equal to 0. This approach has already been used in other studies such as Coles et al. (2006) and Cremers and Ferrell (2014). These dummy variables are defined as *CAPEX Missing* and *R&D Missing*. Table 13 shows that, consistently with our previous results, the larger the number of blockholders, the higher are the firm's subsequent CAPEX and R&D expenditures.

[PLEASE INSERT TABLE 13 HERE]

5 Conclusions

Existing empirical studies investigating the effect of ownership structure on firm risk-taking have focused on the role of the largest blockholder. Their main hypothesis is that the larger the stake of this blockholder, the greater is her risk exposure and hence lower the risk chosen by the firm. The literature has devoted little attention to the role of other large shareholders. We conduct direct tests and argue that a significant relationship exists between the number of blockholders and firm risk. We show that firm risk increases by 22% when the number blockholders increases from one to two.

Overall, we conclude that ownership structure, with all its complexity, has an effect on firm risk. This result implies that studies on the relationship between ownership structure and firm risk should not be limited to the distinction between firms with and without blockholders or to the relationship between the fraction of shares held by the largest blockholder and firm risk. Mid-sized blockholders are important and play an active role in firm policy.

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Table 1: Summary statistics

This table presents summary statistics of our firm risk measures and firm characteristics for all firms. σROA is the four-year volatility of the operating performance (ROA) multiplied by 100. ROA is the ratio of earnings before interests and taxes to total assets. $Volatility$ is the annual share price volatility multiplied by 100. *Idiosyncratic Risk* is measured as the standard deviation of the residuals from the estimation of the CAPM model multiplied by 100. *R&D* is the four-year average R&D expenditures over total assets. *CAPEX* is the four-year average capital expenditures over total assets. *Largest Share in %, $* measure the share of the largest blockholder in % and in billion US$, respectively. *N BHs* is the number of blockholders. *Age* is the natural logarithm of (1 + number of years since incorporation). *Size* is measured as total assets. *Tangibility* is the ratio of tangible, long-term assets net of depreciation and amortization to sales. *Leverage* is the ratio of total liabilities to shareholders' equity. *Sales Growth* is the growth rate of sales. *Herfindhal* is the ownership concentration measured as the Herfindahl index of the blockholders. *CEO Delta* is the dollar change in CEO's wealth associated with a 1% change in the firm's stock price (in $000s). *CEO Vega* is the dollar change in CEO wealth associated with a 1% change in the standard deviation of the firm's returns (in $000s). The table also shows for all relevant variables the average for firms with one blockholder and multiple blockholders. We test for differences in means for firms with multiple blockholders ($N > 1\ BH$) and one blockholder ($1\ BH$) using a t-test. ***, **, * denote the significance of difference at the 1%, 5%, and 10% levels, respectively. Detailed variable definitions appear in Appendix A.1.

VARIABLES	**Whole Sample**						**Mean Firms with**		***Difference***
							$1\ BH$	$N > 1\ BH$	
	N	Mean	Median	Std.Dev	Min	Max	(1)	(2)	(2) − (1)
σ ROA	4,912	3.407	1.950	6.095	0.017	143.550	3.009	3.442	0.433**
Volatility	8,700	32.805	29.348	16.602	6.101	304.058	31.372	32.902	1.530**
Idiosyncratic Risk	8,700	1.857	1.671	0.922	0.439	26.739	1.728	1.866	0.137***
R&D	4,912	0.030	0	0.062	0	0.621	0.022	0.031	0.009***
CAPEX	4,912	0.059	0.014	0.180	0	5.079	0.046	0.060	0.014
Largest Share in %	8,700	12.664	10.480	8.754	5	100	11.853	12.719	0.867
Largest Share in $ B	8,700	1.079	0.218	5.419	0.0003	187.401	2.146	1.007	−1.139***
N BHs	8,700	4.251	4	2.071	1	15	-	-	-
Age	8,700	3.604	3.555	0.824	0	5.384	3.587	3.605	−0.018
Size	8,700	8.133	1.782	29.332	0.010012	781.818	23.828	7.070	−16.758***
Tangibility	8,700	0.216	0.147	0.207	0	0.989	0.212	0.217	0.005
Leverage	8,700	0.759	0.390	14.074	−305.75	637.230	0.461	0.779	0.318
Sales Growth	8,700	0.089	0.054	0.540	−1	34.127	0.089	0.089	0.000
Herfindhal	8,700	0.341	0.269	0.214	0.0712477	1	-	-	-
CEO Delta	8,087	850.994	193.427	9667.189	0	486782	1931.575	779.477	−1152.098
CEO Vega	8,087	127.894	41.157	308.210	0	9495.541	262.192	119.006	−143.186***

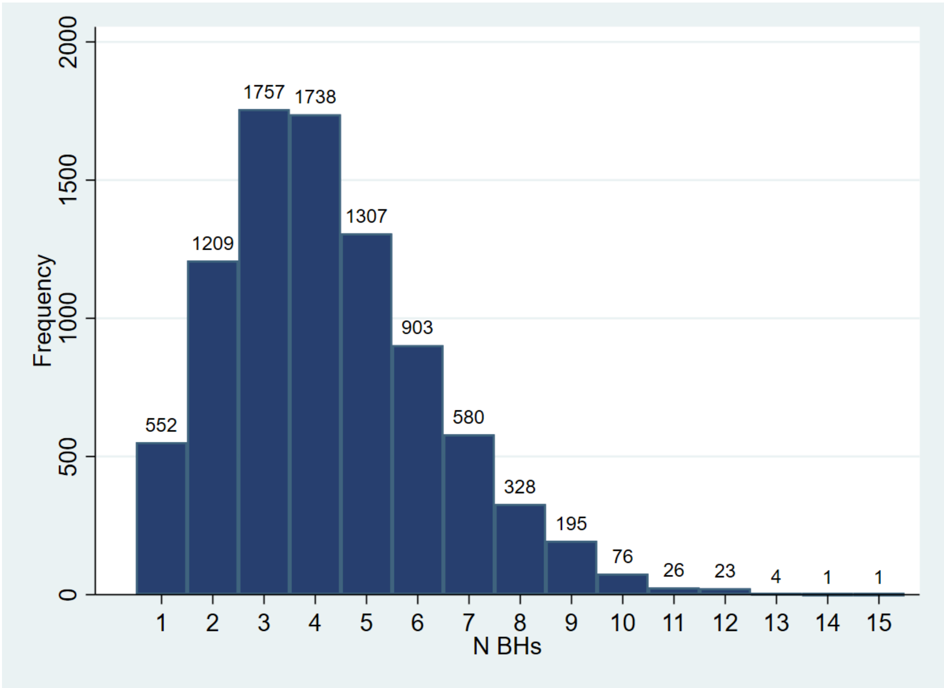


Figure 1: Sample distribution by the number of blockholders.

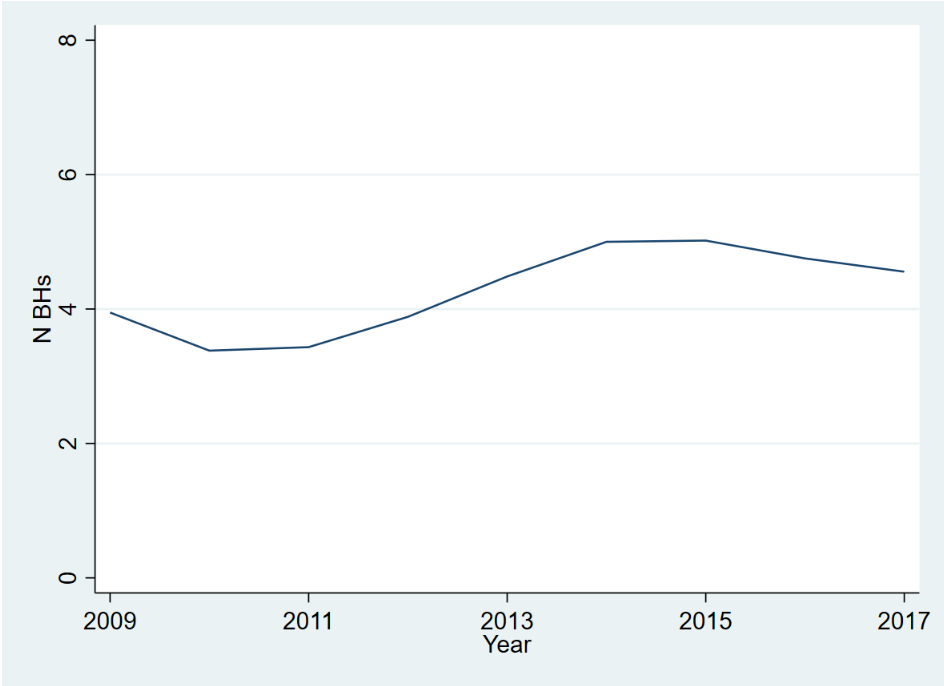


Figure 2: Evolution over time of the average number of blockholders.

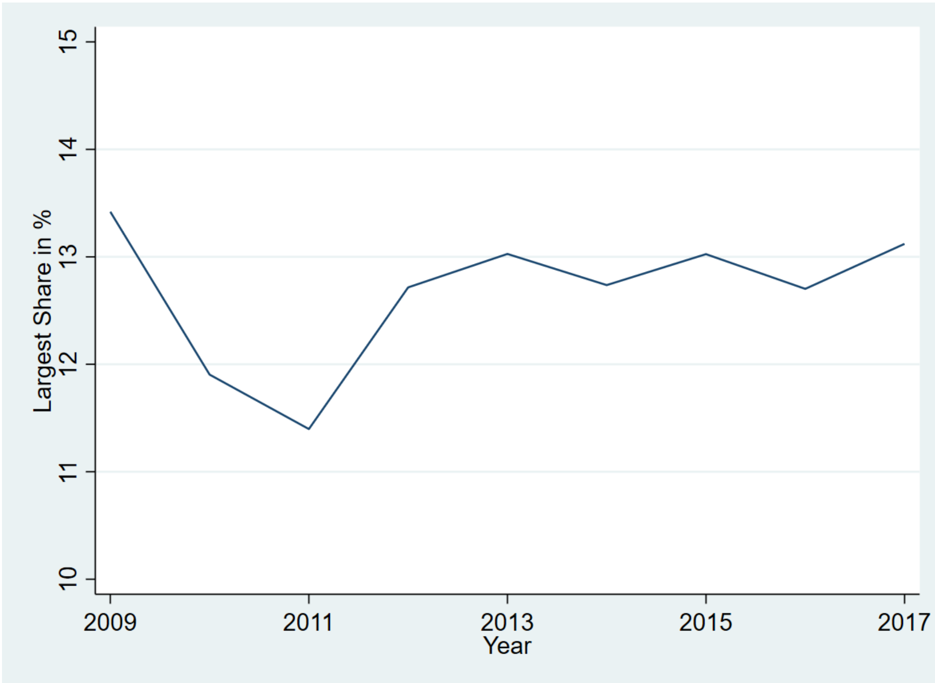


Figure 3: Evolution over time of the average largest shareholder share.

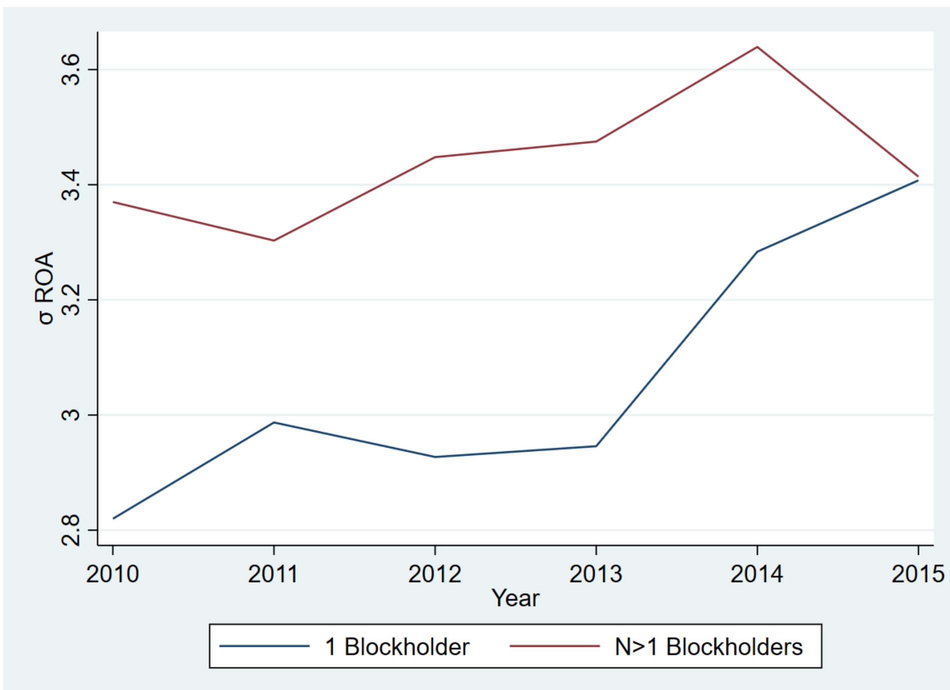


Figure 4: Evolution of firm risk over time for firms with one and multiple blockholders.

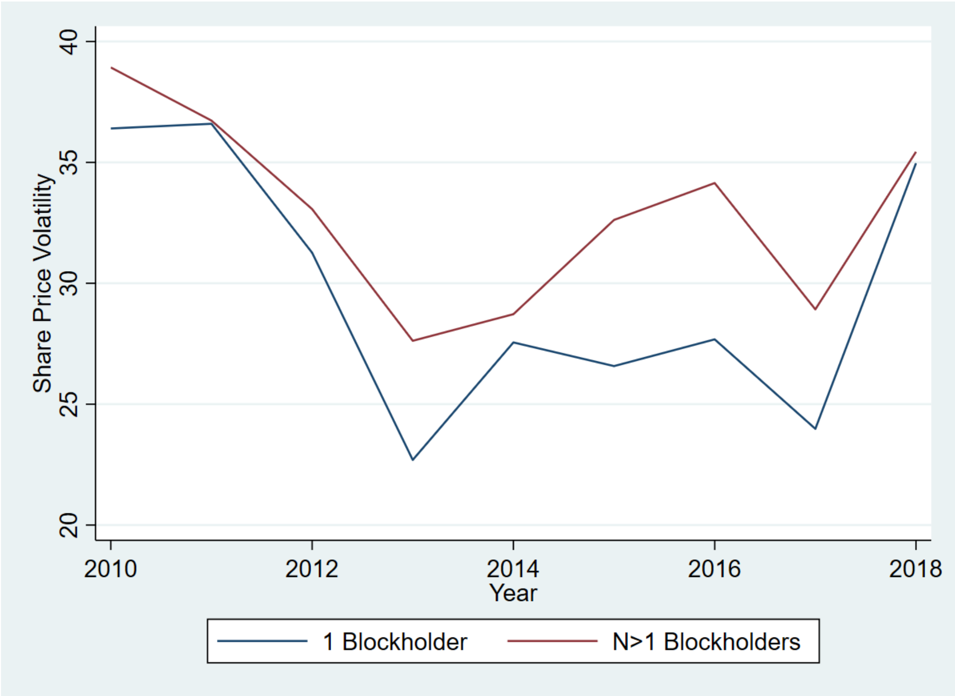


Figure 5: Evolution of share price volatility over time for firms with one and multiple blockholders.

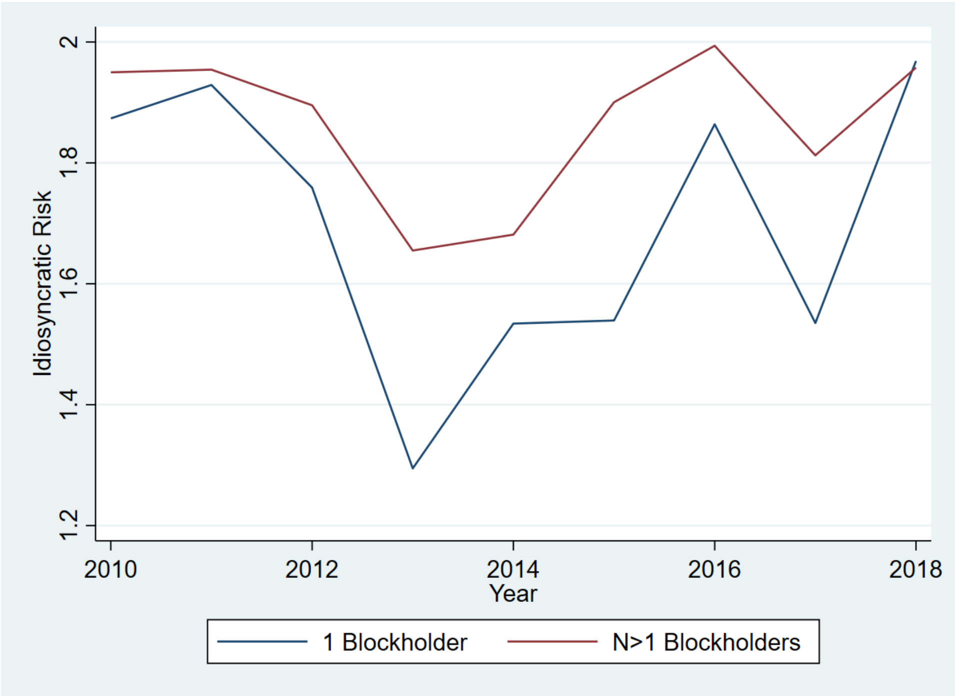


Figure 6: Evolution of idiosyncratic risk over time for firms with one and multiple blockholders.

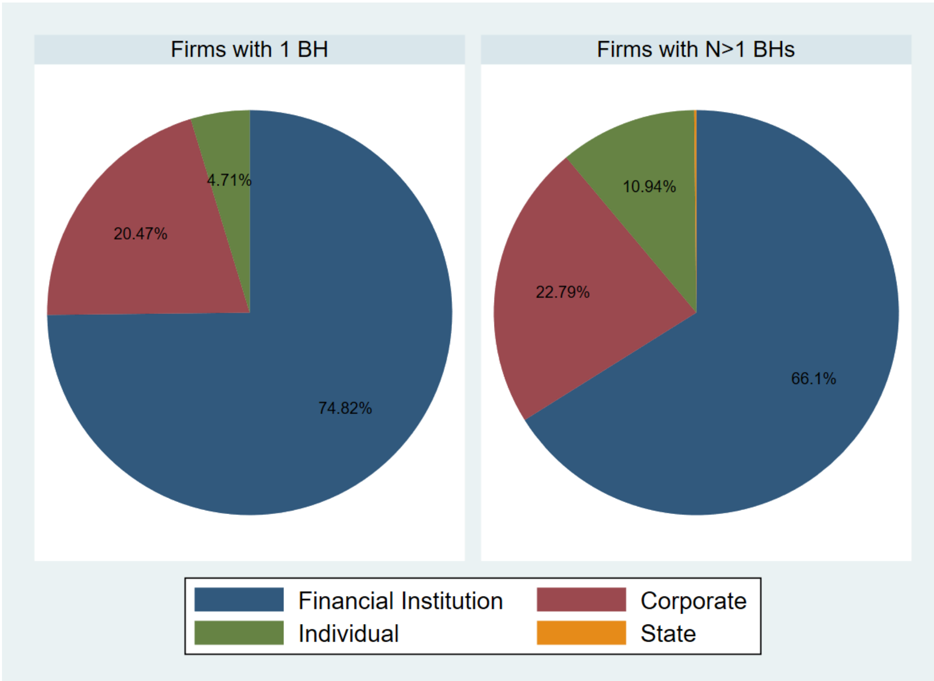


Figure 7: Largest blockholder type depending on whether the firm has one or multiple blockholders.

Table 2: Largest investor's exposure and firm risk

This table reports the estimated coefficients from OLS regressions of model (1). The dependent variable is σROA is the four-year volatility of the operating performance (ROA) multiplied by 100. ROA is the ratio of earnings before interests and taxes to total assets. Columns (1) to (6) present the estimates using the dollar value of the largest blockholder share (in billion US$), *Largest Share in $*, as the main independent variable. Columns (7) to (12) present the estimates using the fraction of the largest blockholder share, *Largest Share in %*, as the main independent variable. *D Multi BH* is a dummy variable coded 1 if the firm has more than one blockholder. *Age* is the natural logarithm of (1 + number of years since incorporation). *Size* is measured as total assets. *Tangibility* is the ratio of tangible, long-term assets net of depreciation and amortization to sales. *Leverage* is the ratio of total liabilities to shareholders' equity. *Sales Growth* is the growth rate of sales. *D Financial 1*, *D Individual 1*, and *D State 1* are dummy variables coded 1 when the largest blockholder is a *financial institution*, a *natural person*, or a *government*, respectively. *CEO Delta* is the dollar change in CEO's wealth associated with a 1% change in the firm's stock price (in $000s). *CEO Vega* is the dollar change in CEO wealth associated with a 1% change in the standard deviation of the firm's returns (in $000s). Industry-fixed effects and Year-fixed effects are included in all columns. Detailed variable definitions appear in Appendix A.1. Robust standard errors appear in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	σROA											
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Largest Share in $	-0.038***	-0.045***	-0.021**	-0.025**	-0.033***	-0.003						
	(0.012)	(0.013)	(0.009)	(0.010)	(0.011)	(0.025)						
Largest Share in $ x D Multi BH				-0.016	-0.014	-0.024						
				(0.015)	(0.016)	(0.025)						
Largest Share in %							0.020**	0.014	0.002	-0.002	-0.004	-0.017
							(0.009)	(0.009)	(0.010)	(0.019)	(0.019)	(0.032)
Largest Share in % x D Multi BH										0.023	0.020	0.019
										(0.022)	(0.021)	(0.033)
D Multi BH				0.900***	0.808***	0.832***				0.595	0.572	0.611
				(0.313)	(0.295)	(0.304)				(0.379)	(0.370)	(0.410)
Age	-0.684***	-0.592***	-0.538***	-0.690***	-0.599***	-0.545***	-0.670***	-0.584***	-0.536***	-0.679***	-0.593***	-0.548***
	(0.113)	(0.118)	(0.141)	(0.112)	(0.117)	(0.139)	(0.113)	(0.117)	(0.140)	(0.111)	(0.116)	(0.137)
Size	-0.008***	-0.007***	-0.006***	-0.007***	-0.006***	-0.005***	-0.011***	-0.011***	-0.008***	-0.009***	-0.009***	-0.006***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)
Tangibility		1.203	0.721		1.189	0.704		1.182	0.697		1.176	0.697
		(0.832)	(0.846)		(0.830)	(0.843)		(0.832)	(0.845)		(0.830)	(0.844)
Leverage		-0.000	0.000		-0.000	0.000		-0.000	0.000		-0.000	0.000
		(0.003)	(0.003)		(0.003)	(0.003)		(0.003)	(0.003)		(0.003)	(0.003)
Sales Growth		1.201***	1.180***		1.197***	1.174***		1.200***	1.179***		1.196***	1.173***
		(0.264)	(0.264)		(0.264)	(0.264)		(0.265)	(0.264)		(0.265)	(0.263)
D Individual 1		-0.059	-0.321		-0.071	-0.332		-0.199	-0.349		-0.214	-0.361
		(0.304)	(0.306)		(0.306)	(0.309)		(0.298)	(0.309)		(0.298)	(0.311)
D Financial 1		-0.520**	-0.578**		-0.485**	-0.547**		-0.461*	-0.565**		-0.428*	-0.540**
		(0.248)	(0.267)		(0.241)	(0.261)		(0.252)	(0.275)		(0.245)	(0.269)
D State 1		-0.280	-0.589		-0.304	-0.616		-0.324	-0.604		-0.350	-0.627
		(0.918)	(0.939)		(0.920)	(0.941)		(0.931)	(0.941)		(0.933)	(0.942)
CEO Delta			36.409***			35.226***			35.730***			34.684***
			(11.886)			(11.409)			(11.946)			(11.776)
CEO Vega			-1,895.939***			-1,826.667***			-1,951.018***			-1,870.414***
			(561.592)			(533.247)			(560.797)			(545.194)
Constant	34.929***	34.277***	36.159***	34.355***	33.753***	35.603***	34.641***	34.059***	36.157***	34.374***	33.767***	35.840***
	(9.470)	(9.275)	(9.656)	(9.323)	(9.146)	(9.523)	(9.467)	(9.303)	(9.697)	(9.368)	(9.208)	(9.648)
Industry FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES
Observations	4,912	4,912	4,616	4,912	4,912	4,616	4,912	4,912	4,616	4,912	4,912	4,616
Adjusted R-squared	0.196	0.205	0.224	0.197	0.206	0.225	0.196	0.205	0.224	0.197	0.205	0.225

Table 3: Number of blockholders and firm risk

This table reports the estimated coefficients from OLS regressions of model (2). The dependent variable is σROA is the four-year volatility of the operating performance (ROA) multiplied by 100. ROA is the ratio of earnings before interests and taxes to total assets. *N BH* is the number of blockholders. *1/N BH* is the inverse of the number of blockholders. *Age* is the natural logarithm of (1 + number of years since incorporation). *Size* is measured as total assets. *Tangibility* is the ratio of tangible, long-term assets net of depreciation and amortization to sales. *Leverage* is the ratio of total liabilities to shareholders' equity. *Sales Growth* is the growth rate of sales. *D Financial 1*, *D Individual 1*, and *D State 1* are dummy variables coded 1 when the largest blockholder is a *financial institution*, a *natural person*, or a *government*, respectively. *CEO Delta* is the dollar change in CEO's wealth associated with a 1% change in the firm's stock price (in $000s). *CEO Vega* is the dollar change in CEO wealth associated with a 1% change in the standard deviation of the firm's returns (in $000s). Industry-fixed effects and Year-fixed effects are included in all Columns. Detailed variable definitions appear in Appendix A.1. Robust standard errors appear in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	σROA					
	(1)	(2)	(3)	(4)	(5)	(6)
1/N BHs	-1.291***	-1.249***	-1.219***			
	(0.398)	(0.394)	(0.366)			
N BHs				0.126***	0.119***	0.128***
				(0.042)	(0.042)	(0.041)
Age	-0.677***	-0.602***	-0.538***	-0.660***	-0.585***	-0.520***
	(0.114)	(0.115)	(0.142)	(0.115)	(0.116)	(0.142)
Size	-0.009***	-0.008***	-0.006***	-0.009***	-0.009***	-0.006***
	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)
Tangibility		1.137	0.728		1.148	0.693
		(0.816)	(0.805)		(0.818)	(0.844)
Leverage		-0.000	0.000		-0.000	0.000
		(0.003)	(0.003)		(0.003)	(0.003)
Sales Growth		1.189***	1.163***		1.187***	1.169***
		(0.265)	(0.264)		(0.265)	(0.266)
D Individual 1			-0.371			-0.375
			(0.312)			(0.309)
D Financial 1			-0.529**			-0.560**
			(0.264)			(0.266)
D State 1			-0.506			-0.563
			(0.944)			(0.944)
CEO Delta			34.195***			34.113***
			(11.365)			(11.557)
CEO Vega			-1,826.471***			-1,826.683***
			(526.636)			(543.931)
Constant	35.630***	34.731***	36.876***	34.498***	33.639***	35.741***
	(9.574)	(9.331)	(9.698)	(9.406)	(9.168)	(9.608)
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	4,912	4,912	4,616	4,912	4,912	4,616
Adjusted R-squared	0.198	0.205	0.225	0.197	0.205	0.225

Table 4: Blockholders' contribution to firm risk

This table reports the estimated coefficients from OLS regressions of model (3). The dependent variable is σROA the four-year volatility of the operating performance (ROA) multiplied by 100. ROA is the ratio of earnings before interests and taxes to total assets. The main independent variables are dummy variables that capture the impact of firm blockholders existence on firm risk. $D|\ Block = m$ is a dummy variable equal to 1 if a firm has m blockholders. $D|\ Block > 5$ identifies firms with more than 5 blockholders. The case where firms have 1 blockholder is the reference category. *Age* is the natural logarithm of (1 + number of years since incorporation). *Size* is measured as total assets. *Tangibility* is the ratio of tangible, long-term assets net of depreciation and amortization to sales. *Leverage* is the ratio of total liabilities to shareholders' equity. *Sales Growth* is the growth rate of sales. *D Financial 1*, *D Individual 1*, and *D State 1* are dummy variables coded 1 when the largest blockholder is a *financial institution*, a *natural person*, or a *government*, respectively. *CEO Delta* is the dollar change in CEO's wealth associated with a 1% change in the firm's stock price (in \$000s). *CEO Vega* is the dollar change in CEO wealth associated with a 1% change in the standard deviation of the firm's returns (in \$000s). Industry-fixed effects and Year-fixed effects are included in all Columns. Detailed variable definitions appear in Appendix A.1. Robust standard errors appear in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES		σROA	
	(1)	(2)	(3)
$D\|\ Block = 2$	0.664*	0.597*	0.597*
	(0.361)	(0.349)	(0.358)
$D\|\ Block = 3$	0.738**	0.668**	0.640**
	(0.336)	(0.320)	(0.326)
$D\|\ Block = 4$	0.978***	0.914***	0.957***
	(0.355)	(0.339)	(0.340)
$D\|\ Block = 5$	0.986**	0.866**	0.853**
	(0.399)	(0.383)	(0.383)
$D\|\ Block > 5$	1.139***	1.035***	1.071***
	(0.340)	(0.327)	(0.325)
Age	-0.674***	-0.586***	-0.533***
	(0.112)	(0.118)	(0.139)
Size	-0.009***	-0.009***	-0.006***
	(0.002)	(0.002)	(0.001)
Tangibility		1.190	0.704
		(0.825)	(0.841)
Leverage		-0.000	0.000
		(0.003)	(0.003)
Sales Growth		1.192***	1.171***
		(0.265)	(0.265)
D Individual 1		-0.135	-0.372
		(0.312)	(0.312)
D Financial 1		-0.461*	-0.537**
		(0.239)	(0.260)
D State 1		-0.274	-0.583
		(0.921)	(0.941)
CEO Delta			33.738***
			(11.452)
CEO Vega			-1,804.928***
			(537.438)
Constant	34.340***	33.723***	35.606***
	(9.324)	(9.147)	(9.524)
Industry FE	YES	YES	YES
Year FE	YES	YES	YES
Observations	4,912	4,912	4,616
Adjusted R-squared	0.197	0.205	0.225

Table 5: Share price volatility and idiosyncratic risk vs the number of blockholders

This table reports the estimated coefficients from OLS regressions of model (2). Columns (1) to (3) present the estimates using *Volatility* as the dependent variable, and Columns (4) to (6) present the estimates using *Idiosyncratic Risk* as the dependent variable. *Volatility* is the annual volatility computed over monthly share price returns, multiplied by 100. *Idiosyncratic Risk* is measured as the standard deviation of the residuals from the estimation of the CAPM model multiplied by 100. *1/N BHs* is the inverse of the number of blockholders. *Age* is the natural logarithm of (1 + number of years since incorporation). *Size* is measured as total assets. *Tangibility* is the ratio of tangible, long-term assets net of depreciation and amortization to sales. *Leverage* is the ratio of total liabilities to shareholders' equity. *Sales Growth* is the growth rate of sales. *D Financial 1*, *D Individual 1*, and *D State 1* are dummy variables coded 1 when the largest blockholder is a *financial institution*, a *natural person*, or a *government*, respectively. *CEO Delta* is the dollar change in CEO's wealth associated with a 1% change in the firm's stock price (in $000s). *CEO Vega* is the dollar change in CEO wealth associated with a 1% change in the standard deviation of the firm's returns (in $000s). Industry-fixed effects and Year-fixed effects are included in all Columns. Detailed variable definitions appear in Appendix A.1. Robust standard errors appear in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	*Volatility*			*Idiosyncratic Risk*		
	(1)	(2)	(3)	(4)	(5)	(6)
1/N BHs	-4.099***	-3.860***	-2.298***	-0.237***	-0.223***	-0.132***
	(0.789)	(0.793)	(0.791)	(0.043)	(0.043)	(0.044)
Age	-2.666***	-2.661***	-2.590***	-0.214***	-0.212***	-0.211***
	(0.214)	(0.217)	(0.228)	(0.012)	(0.012)	(0.013)
Size	-0.075***	-0.074***	-0.053***	-0.005***	-0.005***	-0.003***
	(0.009)	(0.009)	(0.006)	(0.001)	(0.001)	(0.000)
Tangibility		6.442***	3.774***		0.280***	0.129*
		(1.400)	(1.455)		(0.074)	(0.076)
Leverage		0.010	0.017		0.001	0.001
		(0.018)	(0.019)		(0.001)	(0.001)
Sales Growth		0.673	1.534**		0.062*	0.106***
		(0.588)	(0.642)		(0.033)	(0.039)
D Individual 1		0.741	0.316		0.085**	0.053
		(0.613)	(0.655)		(0.034)	(0.036)
D Financial 1		-0.310	-0.597		-0.004	-0.018
		(0.416)	(0.420)		(0.022)	(0.022)
D State 1		2.753	2.315		0.329	0.282
		(3.178)	(3.041)		(0.275)	(0.269)
CEO Delta			158.536***			9.448***
			(32.325)			(2.081)
CEO Vega			-10,199.783***			-628.990***
			(1,291.499)			(77.536)
Constant	65.634***	62.186***	65.451***	3.614***	3.452***	3.640***
	(3.574)	(3.596)	(3.362)	(0.188)	(0.191)	(0.172)
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	8,700	8,700	8,087	8,700	8,700	8,087
Adjusted R-squared	0.165	0.168	0.198	0.161	0.164	0.200

Table 6: Changes in Number of blockholders and firm risk

This table reports the estimated coefficients from OLS regressions of model (4). The dependent variable is the change in the four-year volatility of operating performance, $\Delta\, \sigma ROA$. Δ *N BHs* is the one-year change in the number of blockholders. Δ *Ln N BHs* is the one-year change in the natural logarithm of the number of blockholders. Δ*Age* is the one-year change in the natural logarithm of (1 + number of years since incorporation). Δ*Size* is the one-year change in total assets. Δ*Tangibility* is the one-year change in the ratio of tangible, long-term assets net of depreciation and amortization to sales. Δ*Leverage* is the one-year change in the ratio of total liabilities to shareholders' equity. Δ*Sales Growth* is the one-year change in the growth rate of sales. Δ*D Financial 1*, Δ*D Individual 1*, and Δ*D State 1* are the one-year changes in dummy variables coded 1 when the largest blockholder is a *financial institution*, a *natural person*, or a *government*, respectively. Δ*CEO Delta* is the one-year change in the dollar change in CEO's wealth associated with a 1% change in the firm's stock price (in $000s). Δ*CEO Vega* is the one-year change in the dollar change in CEO wealth associated with a 1% change in the standard deviation of the firm's returns (in $000s). Industry-fixed effects and Year-fixed effects are included in all Columns. Detailed variable definitions appear in Appendix A.1. Robust standard errors appear in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	$\Delta \sigma ROA$					
	(1)	(2)	(3)	(4)	(5)	(6)
Δ Ln N BHs	0.281**	0.274**	0.183*			
	(0.131)	(0.128)	(0.103)			
Δ N BHs				0.073*	0.071*	0.045
				(0.038)	(0.037)	(0.028)
Δ Age	-1.267*	-1.349*	-2.372**	-1.251*	-1.333*	-2.369**
	(0.738)	(0.762)	(1.185)	(0.736)	(0.761)	(1.184)
Δ Size	0.012	0.017	0.015	0.012	0.017	0.015
	(0.017)	(0.021)	(0.023)	(0.017)	(0.021)	(0.023)
Δ Tangibility		6.744	8.303		6.731	8.304
		(5.432)	(5.627)		(5.435)	(5.629)
Δ Leverage		-0.002	-0.002		-0.002	-0.002
		(0.002)	(0.002)		(0.002)	(0.002)
Δ Sales Growth		-0.107	-0.115		-0.107	-0.114
		(0.219)	(0.223)		(0.220)	(0.223)
Δ D Individual 1			0.120			0.134
			(0.183)			(0.180)
Δ D Financial 1			0.150			0.148
			(0.112)			(0.113)
Δ D State 1			-0.496**			-0.508**
			(0.247)			(0.246)
Δ CEO Delta			1.920*			1.921*
			(1.117)			(1.114)
Δ CEO Vega			333.556			326.021
			(239.769)			(239.135)
Constant	0.394	0.461	6.653	0.409	0.476	6.636
	(7.797)	(7.801)	(5.943)	(7.796)	(7.798)	(5.911)
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	4,846	4,833	4,466	4,846	4,833	4,466
Adjusted R-squared	0.002	0.005	0.036	0.002	0.005	0.036

Table 7: Inverse relationship: firm risk vs. the number of blockholders

This table reports the estimated coefficients from OLS regressions of model (5). The dependent variable is *1/N BHs*, the inverse of the number of blockholders. σROA is measured as the four-year volatility of the operating performance (ROA) multiplied by 100. ROA is the ratio of earnings before interests and taxes to total assets. *Age* is the natural logarithm of (1 + number of years since incorporation). *Size* is measured as total assets. *Tangibility* is the ratio of tangible, long-term assets net of depreciation and amortization to sales. *Leverage* is the ratio of total liabilities to shareholders' equity. *Sales Growth* is the growth rate of sales. *D Financial 1*, *D Individual 1*, and *D State 1* are dummy variables coded 1 when the largest blockholder is a *financial institution*, a *natural person*, or a *government*, respectively. *CEO Delta* is the dollar change in CEO's wealth associated with a 1% change in the firm's stock price (in $000s). *CEO Vega* is the dollar change in CEO wealth associated with a 1% change in the standard deviation of the firm's returns (in $000s). Industry-fixed effects and Year-fixed effects are included in all Columns. Detailed variable definitions appear in Appendix A.1. Robust standard errors appear in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively. For σROA we add the probability that the coefficient is equal to zero in square brackets.

VARIABLES	*1/N BHs* (1)	(2)	(3)
σROA	-0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)
	[0.3510]	[0.4012]	[0.8609]
Age	0.012***	0.012***	0.009**
	(0.003)	(0.003)	(0.003)
Size	0.001***	0.001***	0.001***
	(0.000)	(0.000)	(0.000)
Tangibility		-0.028	-0.008
		(0.020)	(0.021)
Leverage		0.000	0.000
		(0.000)	(0.000)
Sales Growth		-0.004	-0.003
		(0.004)	(0.004)
D Individual 1		-0.027***	-0.029***
		(0.010)	(0.010)
D Financial 1		-0.006	-0.005
		(0.006)	(0.006)
D State 1		0.052	0.066
		(0.047)	(0.046)
CEO Delta			-0.693
			(0.772)
CEO Vega			90.991***
			(20.391)
Constant	0.275***	0.295***	0.244***
	(0.053)	(0.054)	(0.053)
Industry FE	YES	YES	YES
Year FE	YES	YES	YES
Observations	3,876	3,876	3,650
Adjusted R-squared	0.053	0.056	0.082

Table 8: Number of blockholders and risk in regulated sectors

This table reports the estimated coefficients from OLS regressions of mode (2) using data on regulated firms. The dependent variable is σROA is the four-year volatility of the operating performance (ROA) multiplied by 100. ROA is the ratio of earnings before interests and taxes to total assets. The main independent variable, *1/N BH*, is measured as the inverse of the number of blockholders. *Age* is the natural logarithm of (1 + number of years since incorporation). *Size* is measured as total assets. *Tangibility* is the ratio of tangible, long-term assets net of depreciation and amortization to sales. *Leverage* is the ratio of total liabilities to shareholders' equity. *Sales Growth* is the growth rate of sales. *D Financial 1*, *D Individual 1*, and *D State 1* are dummy variables coded 1 when the largest blockholder is a *financial institution*, a *natural person*, or a *government*, respectively. *CEO Delta* is the dollar change in CEO's wealth associated with a 1% change in the firm's stock price (in $000s). *CEO Vega* is the dollar change in CEO wealth associated with a 1% change in the standard deviation of the firm's returns (in $000s). Industry-fixed effects and Year-fixed effects are included in all Columns. Detailed variable definitions appear in Appendix A.1. Robust standard errors appear in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES		σROA	
	(1)	(2)	(3)
1/N BHs	-0.064	-0.331	-0.318
	(0.486)	(0.469)	(0.489)
Age	-0.364***	-0.246*	-0.250*
	(0.129)	(0.135)	(0.148)
Size	-0.003	-0.001	-0.000
	(0.002)	(0.002)	(0.002)
Tangibility		-1.408***	-1.351***
		(0.430)	(0.460)
Leverage		-0.014***	-0.015***
		(0.004)	(0.004)
Sales Growth		0.775	0.744
		(0.528)	(0.581)
D Individual 1		0.381	0.343
		(0.376)	(0.398)
D Financial 1		0.465**	0.469**
		(0.217)	(0.227)
D State 1		-0.880***	-1.218***
		(0.336)	(0.352)
CEO Delta			-11.361
			(17.484)
CEO Vega			-1,283.638***
			(265.369)
Constant	2.932***	3.405***	3.546***
	(0.766)	(0.745)	(0.792)
Industry FE	YES	YES	YES
Year FE	YES	YES	YES
Observations	363	363	340
Adjusted R-squared	0.076	0.111	0.137

Table 9: Propensity score matching diagnostics

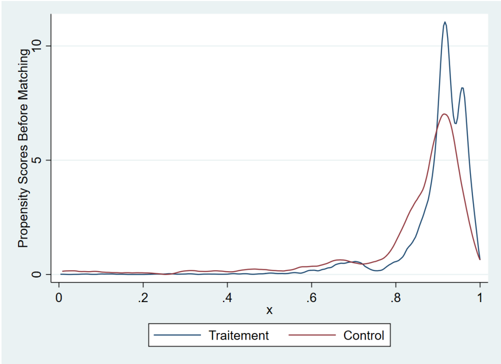
This table provides the mean values for all continuous variables for both the treated group (firms with multiple blockholders, $N > 1\,BH$) and the control group (firms with only one blockholder, $1\,BH$), % bias, % reduction in bias, and the t-tests for the equality of means in both the treated and control groups, both before and after matching. *Age* is the natural logarithm of (1 + number of years since incorporation). *Size* is measured as total assets. *Tangibility* is the ratio of tangible, long-term assets net of depreciation and amortization to sales. *Leverage* is the ratio of total liabilities to shareholders' equity. *Sales Growth* is the growth rate of sales. *CEO Delta* is the dollar change in CEO's wealth associated with a 1% change in the firm's stock price (in $000s). *CEO Vega* is the dollar change in CEO wealth associated with a 1% change in the standard deviation of the firm's returns (in $000s). Industry-fixed effects and Year-fixed effects are included in all Columns. Detailed variable definitions appear in Appendix A.1. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	Sample	Mean Firm with $N > 1\,BH$	Mean Firm with $1\,BH$	% bias	% reduction in bias	t-test % reduction in bias	t ($p > t$)	V(T)/ V(C)
Age	Unmatched	3.6109	3.6527	-4.9		-0.94	(0.347)	0.81*
	Matched	3.6109	3.6178	-0.8	83.6	-0.37	(0.711)	0.88*
Size	Unmatched	6.3954	27.429	-32.2		-11.79	(0.000)	0.05*
	Matched	6.3954	8.537	-3.3	89.8	-4.090	(0.000)	0.63*
Tangibility	Unmatched	0.2209	0.21967	0.2		0.04	(0.970)	1.06
	Matched	0.22009	0.21407	3	-1337.7	1.35	(0.176)	1.16*
Leverage	Unmatched	0.77619	0.74299	0.3		0.05	(0.963)	28.83*
	Matched	0.77619	0.63058	1.5	-338.6	0.67	(0.500)	37.40*
Sales Growth	Unmatched	0.09985	0.08325	4.2		0.62	((0.534)	4.76*
	Matched	0.09985	0.10782	-2	51.9	-0.92	(0.356)	5.46*
CEO Delta	Unmatched	0.00088	0.00222	-6.8		-1.93	(0.054)	0.18*
	Matched	0.00088	0.0012	-1.7	75.8	-1.20	(0.232)	0.65*
CEO Vega	Unmatched	0.00013	0.00027	-27.3		-7.12	(0.000)	0.24*
	Matched	0.00013	0.00014	-2.7	90	-1.94	(0.052)	0.95

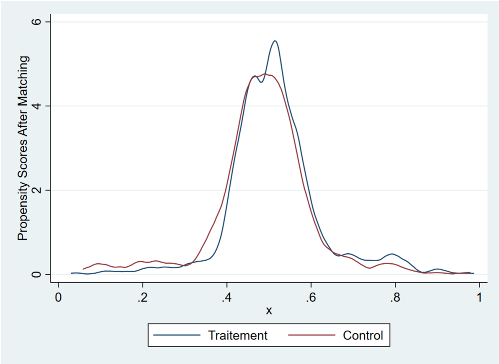
Table 10: Likelihood of multiple blockholders: Before and After Matching

This table reports the pre-match and post-match probit regression results. The dependent variable is *D Multi BH*, a dummy variable coded 1 if the firm has multiple blockholders. *Age* is the natural logarithm of (1 + number of years since incorporation). *Size* is measured as total assets. *Tangibility* is the ratio of tangible, long-term assets net of depreciation and amortization to sales. *Leverage* is the ratio of total liabilities to shareholders' equity. *Sales Growth* is the growth rate of sales. *CEO Delta* is the dollar change in CEO's wealth associated with a 1% change in the firm's stock price (in $000s). *CEO Vega* is the dollar change in CEO wealth associated with a 1% change in the standard deviation of the firm's returns (in $000s). Detailed variable definitions appear in Appendix A.1. Robust standard errors appear in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	*D Multi BH*	
	Before Matching	After Matching
Age	0.059	-0.057
	(0.037)	(0.056)
Size	-0.007***	-0.004**
	(0.001)	(0.002)
Tangibility	0.122	0.134
	(0.230)	(0.354)
Leverage	-0.000	0.001
	(0.001)	(0.002)
Sales Growth	0.061	-0.008
	(0.049)	(0.067)
CEO Delta	8.601**	1.572
	(3.340)	(3.734)
CEO Vega	-490.355***	-109.221
	(119.875)	(179.760)
Constant	0.259	0.234
	(0.318)	(0.437)
Industry FE	YES	YES
Year FE	YES	YES
Observations	4,397	4,360



(a) Pre-matching propensity score distribution



(b) Post-matching propensity score distribution

Figure 8: Pre- and post-matching propensity score distribution

Table 11: Number of blockholders and firm risk after matching

This table reports the estimated coefficients from OLS regressions of model (2) after matching. The dependent variable is σROA is the four-year volatility of the operating performance (ROA) multiplied by 100. ROA is the ratio of earnings before interests and taxes to total assets. *D Multi BH* is a dummy variable coded 1 if the firm has multiple blockholders. *1/N BHs* is the inverse of the number of blockholders. *Age* is the natural logarithm of (1 + number of years since incorporation). *Size* is measured as total assets. *Tangibility* is the ratio of tangible, long-term assets net of depreciation and amortization to sales. *Leverage* is the ratio of total liabilities to shareholders' equity. *Sales Growth* is the growth rate of sales. *D Financial 1*, *D Individual 1*, and *D State 1* are dummy variables coded 1 when the largest blockholder is a *financial institution*, a *natural person*, or a *government*, respectively. *CEO Delta* is the dollar change in CEO's wealth associated with a 1% change in the firm's stock price (in $000s). *CEO Vega* is the dollar change in CEO wealth associated with a 1% change in the standard deviation of the firm's returns (in $000s). Industry-fixed effects and Year-fixed effects are included in all Columns. Detailed variable definitions appear in Appendix A.1. Robust standard errors appear in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	σROA					
	(1)	(2)	(3)	(4)	(5)	(6)
D Multi BH	0.633***	0.638***	0.626***			
	(0.183)	(0.174)	(0.175)			
1/N BHs				-0.924***	-0.932***	-0.903***
				(0.250)	(0.236)	(0.235)
Age	-0.614***	-0.496***	-0.434***	-0.607***	-0.489***	-0.428***
	(0.128)	(0.129)	(0.141)	(0.128)	(0.129)	(0.142)
Size	-0.013***	-0.012***	-0.009***	-0.012***	-0.012***	-0.009***
	(0.003)	(0.003)	(0.002)	(0.003)	(0.003)	(0.002)
Tangibility		-0.994	-1.277		-1.008	-1.284
		(1.010)	(0.977)		(1.009)	(0.977)
Leverage		-0.001	-0.001		-0.001	-0.001
		(0.004)	(0.004)		(0.004)	(0.004)
Sales Growth		1.344***	1.307***		1.342***	1.306***
		(0.284)	(0.276)		(0.285)	(0.277)
D Individual 1		-0.296	-0.377		-0.308	-0.389
		(0.307)	(0.327)		(0.306)	(0.326)
D Financial 1		-0.169	-0.185		-0.167	-0.183
		(0.239)	(0.240)		(0.239)	(0.241)
D State 1		-0.754	-0.746		-0.727	-0.714
		(0.921)	(0.912)		(0.918)	(0.908)
CEO Delta			28.611**			28.263**
			(11.736)			(11.683)
CEO Vega			-1,610.319***			-1,579.692***
			(609.097)			(606.252)
Constant	30.753***	30.960***	31.557***	31.666***	31.885***	32.447***
	(9.089)	(9.074)	(9.117)	(9.138)	(9.109)	(9.152)
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	4,360	4,360	4,360	4,360	4,360	4,360
Adjusted R-squared	0.203	0.213	0.217	0.203	0.214	0.217

Table 12: Ownership concentration and firm risk

This table reports the estimated coefficients from OLS regressions of the modified model (2). The dependent variable is σROA measured as the four-year volatility of the operating performance (ROA) multiplied by 100. ROA is the ratio of earnings before interests and taxes to total assets. The main independent variable is *Herfindahl* measured as the Herfindahl index of blockholders, instead of 1/N BHs. *Age* is the natural logarithm of (1 + number of years since incorporation). *Size* is measured as total assets. *Tangibility* is the ratio of tangible, long-term assets net of depreciation and amortization to sales. *Leverage* is the ratio of total liabilities to shareholders' equity. *Sales Growth* is the growth rate of sales. *D Financial 1*, *D Individual 1*, and *D State 1* are dummy variables coded 1 when the largest blockholder is a *financial institution*, a *natural person*, or a *government*, respectively. *CEO Delta* is the dollar change in CEO's wealth associated with a 1% change in the firm's stock price (in $000s). *CEO Vega* is the dollar change in CEO wealth associated with a 1% change in the standard deviation of the firm's returns (in $000s). Industry-fixed effects and Year-fixed effects are included in all Columns. Detailed variable definitions appear in Appendix A.1. Robust standard errors appear in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES		σROA	
	(1)	(2)	(3)
Herfindahl	-1.224***	-1.150***	-1.184***
	(0.388)	(0.376)	(0.368)
Age	-0.680***	-0.590***	-0.537***
	(0.114)	(0.119)	(0.141)
Size	-0.009***	-0.009***	-0.006***
	(0.002)	(0.002)	(0.001)
Tangibility		1.178	0.688
		(0.829)	(0.842)
Leverage		-0.000	0.000
		(0.003)	(0.003)
Sales Growth		1.193***	1.172***
		(0.265)	(0.264)
D Individual 1		-0.104	-0.348
		(0.304)	(0.306)
D Financial 1		-0.478**	-0.554**
		(0.243)	(0.264)
D State 1		-0.250	-0.561
		(0.912)	(0.932)
CEO Delta			34.195***
			(11.468)
CEO Vega			-1,812.793***
			(532.482)
Constant	35.622***	34.922***	36.829***
	(9.574)	(9.373)	(9.741)
Industry FE	YES	YES	YES
Year FE	YES	YES	YES
Observations	4,912	4,912	4,616
Adjusted R-squared	0.198	0.206	0.225

Table 13: Number of blockholders and firm risk using other proxies.

This table reports the estimated coefficients from OLS regressions of model (2) using alternative proxy variables for firm risk. Columns (1) to (3) present the estimates using *CAPEX* as dependent variable. *CAPEX* is the four-year average capital expenditures over total assets. Columns (4) to (6) present the estimates using R&D as dependent variable. *R&D* is the four-year average R&D expenditures over total assets. *1/N BHs* is the inverse of the number of blockholders. *Age* is the natural logarithm of (1 + number of years since incorporation). *Size* is measured as total assets. *Tangibility* is the ratio of tangible, long-term assets net of depreciation and amortization to sales. *Leverage* is the ratio of total liabilities to shareholders' equity. *Sales Growth* is the growth rate of sales. *D Financial 1*, *D Individual 1*, and *D State 1* are dummy variables coded 1 when the largest blockholder is a *financial institution*, a *natural person*, or a *government*, respectively. *CEO Delta* is the dollar change in CEO's wealth associated with a 1% change in the firm's stock price (in $000s). *CEO Vega* is the dollar change in CEO wealth associated with a 1% change in the standard deviation of the firm's returns (in $000s). Industry-fixed effects and Year-fixed effects are included in all Columns. Detailed variable definitions appear in Appendix A.1. Robust standard errors appear in parentheses. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

VARIABLES	CAPEX			R&D		
	(1)	(2)	(3)	(4)	(5)	(6)
1/N BHs	-0.008	-0.006	-0.018*	-0.008**	-0.007*	-0.010**
	(0.016)	(0.016)	(0.011)	(0.004)	(0.004)	(0.004)
Age	-0.125***	-0.122***	-0.118***	-0.043***	-0.036***	-0.043***
	(0.020)	(0.018)	(0.018)	(0.004)	(0.004)	(0.004)
Size	-0.000***	-0.000***	-0.000***	-0.000**	-0.000**	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Tangibility		0.153***	0.143***		-0.080***	-0.081***
		(0.034)	(0.036)		(0.006)	(0.006)
Leverage		-0.000	-0.000		-0.000	-0.000
		(0.000)	(0.000)		(0.000)	(0.000)
Sales Growth		0.033	0.028		0.017***	0.017***
		(0.021)	(0.020)		(0.004)	(0.004)
D Individual 1		0.021***	0.021***		-0.004	-0.004
		(0.008)	(0.008)		(0.004)	(0.004)
D Financial 1		0.010	0.012*		-0.004**	-0.004**
		(0.007)	(0.006)		(0.002)	(0.002)
D State 1		0.122***	0.117***		-0.017	-0.019
		(0.042)	(0.042)		(0.013)	(0.014)
CEO Delta			0.853***			0.054
			(0.220)			(0.041)
CEO Vega			-53.150***			-2.889
			(9.001)			(2.088)
Missing Capex	0.147***	0.143***	0.101***			
	(0.027)	(0.026)	(0.017)			
Missing R&D				-0.003***	0.003**	0.003**
				(0.001)	(0.001)	(0.001)
Constant	0.244***	0.146***	0.171***	0.084***	0.123***	0.138***
	(0.033)	(0.023)	(0.023)	(0.009)	(0.009)	(0.010)
Industry FE	YES	YES	YES	YES	YES	YES
Year FE	YES	YES	YES	YES	YES	YES
Observations	4,912	4,912	4,616	4,912	4,912	4,616
Adjusted R-squared	0.081	0.099	0.105	0.239	0.279	0.296

A Appendix

Table A.1: **Variable definitions and data sources**

Variable	Definition	Source
Firm-risk		
σROA	Volatility of operating performance (ROA). It is measured as the standard deviation of the operating performance over four-year partially overlapping periods (2010−2013, 2011−2014, 2012−2015, 2013−2016, 2014−2017, 2015−2018) following the data on ownership multiplied by 100. ROA is the ratio of earnings before interest and taxes (EBIT) to total assets.	Compustat
Volatility	Yearly standard deviation of firm's monthly returns multiplied by 100.	CRSP
Idiosyncratic Risk	Standard deviation of the residuals of CAPM estimation multiplied by 100.	CRSP
R&D	Average R&D expenditure scaled by total assets of the subsequent four-year overlapping periods.	Compustat
CAPEX	Average capital expenditures scaled by total assets of the subsequent four-year overlapping periods.	Compustat
Firm ownership		
Largest Share in %	Percentage of voting rights of the largest blockholder.	ORBIS
Largest Share in $	Largest share in % * market capitalization in billion US$.	ORBIS & CRSP
N BHs	Number of blockholders. A blockholder is defined as a shareholder with at least 5% of voting rights.	ORBIS
1/N BHs	The inverse of $N\ BHs$.	ORBIS
D Multi BH	Dummy variable coded 1 if the firm has more than one blockholder and 0 if it has only one.	ORBIS
Δ Ln N BHs	One-year variation in the natural logarithm of the number of blockholders.	ORBIS
Δ N BHs	One-year variation in number of blockholders.	Orbis

Table A.1: **Variable definitions and data sources**

Variable	Definition	Source
D Financial 1	Dummy variable coded 1 when the largest blockholder is a financial institution and 0 otherwise.	ORBIS
D Individual 1	Dummy variable coded 1 when the largest blockholder is a natural person and 0 otherwise.	ORBIS
D State 1	Dummy variable coded 1 when the largest blockholder is a government and 0 otherwise.	ORBIS
Herfindahl	The Herfindhal index of the shareholder's stake. Shareholder's stake is based on the information on blockholders' stake.	ORBIS
Firm characteristics		
Age	Natural logarithm of 1 plus number of years since firm founding (or incorporation or year since the firm's first appearance in CRSP database if the founding year is unavailable)	Compustat & Datastream
Size	Total assets in billion US$.	Compustat
Tangibility	Ratio of tangible, long-term assets (property, plant, and equipment) net of depreciation and amortization charges to sales.	Compustat
Leverage	Total liabilities (long-term debt + short-term debt) divided by shareholders' equity.	Compustat
Sales Growth	Annual growth rate of sales.	Compustat
Missing R&D	A dummy variable coded 1 for missing R&D data and 0 otherwise.	Compustat
Missing Capex	A dummy variable coded 1 for missing Capex data and 0 otherwise.	Compustat
CEO-risk measures		

Table A.1: **Variable definitions and data sources**

Variable	Definition	Source
CEO Delta	Dollar change in wealth associated with a 1% change in firm's stock price (in $000s).	Coles, Daniel, and Naveen (2006)
CEO Vega	Dollar change in wealth associated with a 0.01 change in the standard deviation of firm's returns (in $000s).	Coles, Daniel, and Naveen (2006)

Notes

[1] Elaboration from the ORBIS database. This result agrees with the findings of Edmans and Holderness (2017).

[2]The sample period is restricted to 2009-2014 in some regressions due to data constraints. See Section 3 for further discussion.

[3]There is ample anecdotal evidence confirming this point. See, for example, Kolhatkar (2018), Abboud (2017), Reuters (2021), Lazard (2021), Insightia (2021), and Becht et al. (2017).

[4]This empirical hypothesis is not a direct implication of Dhillon and Rossetto (2015), but intuition suggests that this result might be obtained when setting the model in a general equilibrium framework.

[5]This database is widely used in studies of corporate control. See, for example, Franks et al. (2001), Chen et al. (2019), and Aminadav and Papaioannou (2020).

[6]The use of this threshold reflects the idea that shareholders *de facto* can affect firm policies only when they have a relevant stake.

[7]In unreported regressions, we control for the number of firms where the largest blockholder has a stake above 5%, as in Faccio et al. (2011). Results do not change qualitatively.

[8]We use Caliper matching, which allows us to avoid bad matches by imposing a tolerance on the maximum propensity score distance (Caliper) of 0.1 (Cochran and Rubin (2006)).

[9]Demsetz and Lehn (1985), Leech and Leahy (1991), and Goergen and Renneboog (2001) consider the stake of all blockholders. Other studies compute the index considering either the top two or top five largest shareholders (Laeven and Levine (2008) or Konijn et al. (2011)). John et al. (2008) consider only blockholders with voting right greater than 10%.