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Ownership Concentration and Firm Risk.

Evidence from the US *

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Abstract

This paper investigates empirically the link between mid-sized blockholders and firm risk. Controlling for potential endogeneity problems, we find that the presence of multiple blockholders positively affects firm risk. We also find that the stake of the largest blockholder reduces firm risk only when the firm has no other blockholders. Otherwise, the effect is insignificant. Overall our evidence is consistent with theories showing that firms' decisions are not determined by the largest shareholder alone and highlight the role of mid-sized blockholders. Findings are robust to various model specifications and controls.

JEL: G34, D72, D86

Keywords: Corporate governance, ownership structure, risk, blockholders.

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1 Introduction

Firms across countries and sectors display a range of complex ownership structures and often cannot be easily categorized as either widely held or controlled by one large investor. Ownership structures with more than one large investor are the most common type of ownership structure. In the United States, 74% of the publicly listed firms have more than one blockholder, with a blockholder defined as an investor with a stake greater than 5%. Only 18% have only one blockholder and 8% are widely held (see Table 1). European firms have similar features. More than 34% have at least two investors and 12% have more than two investors with a stake greater than 10% (Laeven and Levine (2008)).

The role of large shareholders has recently attracted the interest of not only academics (see the review of Enriques and Volpin (2007) and Edmans (forthcoming)) but also regulatory authorities (see for example the 2012 report of the Autorité des Marchés Financiers, AMF (2012)) and the media (Economist (1994) and Economist (2014)).

This paper analyses the relationship between ownership structure and firm risk. The studies linking ownership structure and firm risk have focused on the role of the largest blockholder (John, Litov, and Yeung (2008) and Faccio, Marchica, and Mura (2011)) or the role of management (Prendergast (2002)). This raises the question of the role, if any, of the other shareholders with a relevant stake. We investigate whether and how the presence of shareholders, other than the largest one, plays a role in determining a firm risk. Our overall conclusion is that the largest blockholder plays a significant role in determining a firm risk only when she is the only blockholder. When multiple large shareholders are present, this effect disappears. It is the number of blockholders and their stake which instead affect the firm risk. In particular, we find that the less dispersed the ownership structure is, the riskier a firm is.

The starting point for many studies on ownership structure is the idea that a large blockholder helps to overcome the free rider problem in monitoring a firm manager (Shleifer and Vishny (1986)). Since a larger blockholder tends to be more exposed to firm risk, one would expect such firms to take less risk, the larger is her participation (Admati, Pfleiderer, and Zechner (1994)). This relationship has been tested empirically. For example, John, Litov, and Yeung (2008) study firms from various

countries and found a weak negative relationship between stake of the largest blockholder and firm risk. Faccio, Marchica, and Mura (2011) carry out a similar analysis of European data and found that the more the largest blockholder is diversified, the riskier the firm will be.

The presence of a large shareholder triggers a conflict of interest among shareholders regarding risk choices: the large blockholder prefers low risk/return projects, while small shareholders prefer high risk/return projects. Mid-sized blockholders may have the incentive to emerge and mitigate this conflict of interest (see Dhillon and Rossetto (2014)).¹ Hence, when mid-sized blockholders emerge, the largest shareholder may no longer determine the risk choices, but rather the voting power of all shareholders has an impact. In such a setting, this often means that the higher the number of blockholders, the riskier the investments will be.

Building on these ideas, we carry out an empirical study to test whether mid-sized blockholders play a role in determining firm policies, as predicted by Dhillon and Rossetto (2014) or whether the power of the largest blockholder is the only driver of firm risk choices, as predicted by Admati, Pfleiderer, and Zechner (1994). Our study differs from those of John, Litov, and Yeung (2008) and Faccio, Marchica, and Mura (2011) in that these studies look at the impact of the largest blockholder on firm risk, whereas we look at the role of all blockholders and highlight the eventual role of mid-sized blockholders.

To test our hypothesis, we use data on ownership structure from Dlugosz, Fahlenbrach, Gompers, and Metrick (2006), who collected data on 1913 US listed firms over 6 years. This publicly available database contains data on stakes larger than 5%. As shown in this study, the advantage of this database compared with the Compact Disclosure database and similar databases is that it has been corrected for the mistakes and biases that tend to overstate the level of reported block ownership.² As in John, Litov, and Yeung (2008) and Faccio, Marchica, and Mura (2011) we measure firm risk by (daily) share price volatility computed annually. This is an obvious choice as this variable affects shareholders' portfolio volatility when undiversified. In addition, we also collected

¹Dhillon and Rossetto (2014) show that when firms take investment decisions through a shareholder vote and the small shareholders abstain from voting, mid-sized blockholders may emerge and become pivotal voters.

²This database has recently been used by, among others, Bharath, Jayaraman, and Nagar (2013) Brockman and Yan (2009), Konijn, Kräussl, and Lucas (2011), Cronqvist and Fahlenbrach (2009), Becker, Cronqvist, and Fahlenbrach (2011) and Liao (2015).

information on share prices and firm characteristics.

We carry out both a cross-sectional analysis and a fixed-effect panel regression. To address concerns related to simultaneous determination of risk and ownership structure, we use an instrumental variable that decoupled the exogenous variation in ownership structure. In the theoretical model of Dhillon and Rossetto (2014), sector characteristics determine ownership structure, which in turn determines firm-specific characteristics, such as volatility. Hence, we choose the sector average of the proxy of ownership structure as our instrumental variable.³

To address the potential issue of omitted variables, we both carry out a panel data analysis and introduce selected control variables that might affect volatility but would not be affected by it. We consider two sets of control variables. The first are accounting variables such as age, size, sales growth and tangibility. The second are corporate governance variables, namely a dummy variable if at least one blockholder is an insider and a dummy variable if the firm has an employee share ownership plan.

We first try to replicate the findings of the existing literature (John, Litov, and Yeung (2008) and Faccio, Marchica, and Mura (2011)) by looking at the relationship between the size of the largest blockholder's stake and firm risk. In line with these studies, we find a (weak) negative relationship between the size of the largest blockholder's stake and volatility. We then split the sample into one subsample of firms with only one blockholder and a second subsample with more than one blockholder. We show that the negative relationship between the size of the largest blockholder's stake and firm risk becomes stronger in the subsample with only one blockholder, but disappears when there are several blockholders. This confirms the notion that ownership structure matters for risk taking, but that the relationship is more complex than previously thought.

We follow up on these findings to see which aspects of ownership structure affect share price volatility. The theoretical model of Dhillon and Rossetto (2014) shows that the higher the number of blockholders, the larger the risk chosen by the firm will be. We compute the number of blockholders, with a blockholder defined as an investor with a stake larger than 5%. We then test this prediction.

³This approach has also been proposed in other studies: Lev and Sougiannis (1996), Laeven and Levine (2007), John, Litov, and Yeung (2008), Kale, Reis, and Venkateswaran (2009) and Faccio, Marchica, and Mura (2011) in corporate finance and Hasbrouck and Saar (2013) in market microstructure.

The data confirm the hypothesis that the number of blockholders positively affects share price volatility. Hence, share price volatility is a concern for shareholders (not only for firms with one blockholder) and mid-sized blockholders do play a role in determining a firm risk.

This result has economic relevance. When a firm has one blockholder, the arrival of another blockholder increases volatility between 5% and 6%. Thus, if you consider that a firm with one blockholder has on average a daily volatility of 3.1%, this implies that an extra blockholder will raise volatility to 4.3%.

In the third part of the paper, we investigate whether the voting power of the different blockholders would play a role in determining the share price volatility. In the model of Dhillon and Rossetto (2014), mid-sized blockholders arise to counterweight the power of the largest blockholder. To grasp the power tension among shareholders, we consider the ratio of the fraction of shares held by the second largest blockholder over the fraction held by the first one to be the explanatory variable of a firm risk. A high ratio thus implies that more voting power lies with the smallest shareholders. This statistic has the advantage that it considers the heterogeneity of the two largest shareholders and hence their voting power and risk exposure at the cost of disregarding the other shareholders. Alternatively, we also consider the ratio of the shares held by all shareholders but the largest one over the participation of the largest blockholder.

The results showed that when the voting power of mid-sized blockholders increases, firms take more risk. This result confirms the idea that when multiple blockholders are present, it is not the largest blockholder but rather the mid-sized blockholders who determine firm risk-taking decisions.

We also consider the Herfindahl index to measure ownership concentration. This is a widely used statistic to measure concentration. The advantage of this index is that it considers the participation of all shareholders and hence firms with no blockholders are also taken into account in the analysis. At the same time, however, this index does not necessarily differentiate between a firm with one large blockholder and many small shareholders and firms with multiple blockholders and few small shareholders.⁴ Hence, this statistic does not fully account for the potential conflicts of interest

⁴Given the construction of the index, we might find that firms with very different ownership structures have the same index. For example, a firm with only one blockholder with a 22.9% stake in the firm has the same Herfindahl index of 0.0525 as a firm with three blockholders, one with a 20%, one with a 10% and one with a 5% stake.

and power struggles among shareholders. Nevertheless, we find that the larger the ownership concentration is, the smaller the firm risk is.

Last, we examine whether the ownership structure would have a different effect when we distinguish between a firm systematic and idiosyncratic risk. If shareholders were perfectly diversified, specific risk would not matter and hence would not be affected by ownership structure. The effect of ownership structure on systematic risk is not so obvious as it is a risk that is priced on the market.

We found that the lower the number of blockholders, the smaller the firm idiosyncratic risk. This is in line with the idea that blockholders who are in control hold a less diversified portfolio and hence take their decision depending on the effect they might have on a risk that cannot be diversified away. At the same time, there is no relationship between systematic risk and ownership structure. This is consistent with the idea that, since systematic risk cannot be eliminated and is priced in the market, it does not change with ownership structure.

These results are consistent with Dhillon and Rossetto (2014), who argue that mid-sized blockholders can be pivotal in firm decisions.⁵

Previous empirical studies have focused on the differences between firms with at least one blockholder versus widely held firms. For example, some studies have looked at the relationship between the fraction of shares held by the largest blockholder and performance, dividend policy and capital structure (Himmelberg, Hubbard, and Palia (1999), de Miguel and Pindado (2001), Gugler and Yurtoglu (2003) among others). Xu and Malkiel (2003) found that the presence of institutional ownership is associated with higher risk. Other empirical studies have instead looked at the role of inside ownership on firm characteristics (see Prendergast (2002) for a review).

Carlin and Mayer (2003) examined the role of more complex ownership structures on firm risk. Firms with two blockholders tend to be more volatile than firms with one blockholder, which is consistent with our findings. However, these authors did not attempt to deal with endogeneity and

⁵A small number of theoretical papers have proposed theories of why multiple blockholders may exist (see Edmans (forthcoming) for a recent survey). These papers have focused on how and why multiple blockholders can improve firm performance (Edmans and Manso (2011) or on their ability to extract and share rents from dispersed shareholders (see Bennedsen and Wolfenzon (2000)). These theories, however, are silent on the role of multiple blockholders in determining firm risk.

did not look at the role of other blockholders beyond the second largest.

Other studies have put the various statistics of the ownership structure in relation with firm performance. Holderness (2009) aggregated the percentage of stock ownership of all blockholders and found no distinction between one or multiple blockholders. Basu, Paeglis, and Rahnamaei (2016) looked at the impact of blockholders, depending on whether they were insiders or not, on firm value. Lehmann and Weigand (2000), Maury and Pajuste (2005), Laeven and Levine (2008) focused on the role of the first and second largest blockholder and concluded that the presence of a second blockholder increased firm value.

Similarly, Konijn, Kräussl, and Lucas (2011) looked at the relationship between Tobin's Q and various statistics for ownership structure: the Herfindhal index computed on the first five largest blockholders (rather than all blockholders with more than 5%) the number of blockholders, or the Gini coefficient. Using the same database as we did, they found a negative relationship between ownership dispersion and firm value. Bharath, Jayaraman, and Nagar (2013) instead found that firms with a higher number of blockholders suffer the most when there is a decrease in liquidity in the financial markets. This result supports the theory on the disciplining role of blockholders by exit threat proposed by Edmans and Manso (2011).

The remainder of the paper is organized as follows. Section 2 presents the theoretical framework. In section 3 data and methodology are discussed. Section 4 presents the results and section 5 concludes.

2 Theoretical framework

In this section we present the theories and their empirical predictions that link ownership structure and firm risk. From these theories, we draw the hypothesis we want to test.

Few theoretical models link ownership structure to firm risk. In a world without friction, investors hold a perfectly diversified portfolio, firm ownership structure is dispersed, and thus the firm's objective is the maximization of the net present value. In case of costly monitoring by shareholders increases firm value, dispersed ownership might not be the optimal ownership structure and a blockholder might then arise to overcome the free-rider problem inherent to the dispersed

ownership (Shleifer and Vishny (1986)). When the blockholder is risk averse, her risk preferences affect the firm's investment decisions and hence its risk (Admati, Pfleiderer, and Zechner (1994)). Empirically, this implies that the greater the participation of the monitoring shareholder is, the less diversified her portfolio is and hence she imposes more conservative policies on the firm (i.e. low risk/return policies).

In Dhillon and Rossetto (2014)'s model, the existence of a shareholder who holds a large stake and hence is not perfectly diversified creates an endogenous conflict of interest with the well-diversified investors. The large shareholder prefers lower risk/return projects while the smaller ones prefer higher risk/return projects. In the case of vote absenteeism, mid-sized blockholders can have the incentive to arise, become pivotal and shift the risk choice towards a middle-of-the-road outcome. Hence, these shareholders play a mitigating role in the conflict among the largest and the minority shareholders. This model suggests that when only one blockholder is present, the relationship between the fraction of shares and corporate risk-taking is negative. When multiple blockholders are present, however, the fraction of shares of the largest shareholder plays only an indirect role in corporate risk-taking. It is the overall ownership structure that plays a role. In particular, the model predicts that the higher the number of blockholders, the bigger the risk the firm will take.

Alternative theories suggest that mid-sized blockholders affect firm value either by expropriation or disciplining, but they predict no effect on firm risk (Zwiebel (1995) and Bennedsen and Wolfenzon (2000)). In Edmans and Manso (2011) blockholders discipline the manager through monitoring and exit threats. The competition for trading profits leads to a bigger exit threat when multiple blockholders are present. However, because of the nature of the threat, there is no clear empirical relation between share price volatility and ownership structure.

Last, a branch of literature proposes that inside equity is the main driver of a firm's policy and corporate risk taking (Prendergast (2002) and Edmans and Gabaix (2011)). From this perspective, when the manager holds shares, the firm tends to be more conservative. Alternatively, when the manager's compensation is based more on the firm's options, firm investment policies are less conservative. Although we do not test these theories, in what follows we do control for managers'

participation through a dummy.

Given the theoretical background, we test the following: 1) whether a firm's stock price volatility is negatively affected by the stake of the largest blockholder, as predicted by Admati, Pfleiderer, and Zechner (1994); 2) whether a firm's stock price volatility is positively affected by the number of blockholders, as predicted by Dhillon and Rossetto (2014); 3) whether stock price volatility is positively affected by the voting power of mid-sized blockholders relative to that of the largest one.

3 Data and descriptive statistics

We combined data from different sources. From Dlugosz, Fahlenbrach, Gompers, and Metrick (2006), we obtained the yearly data on the percentage of voting rights of every investor that holds a participation of at least 5% of 1913 US listed firms over a period of six years (1996–2001). The advantage of this database is that it has been cleaned from the mistakes and biases that affect publicly available databases. Dlugosz, Fahlenbrach, Gompers, and Metrick (2006), for example, showed that blockholdings are overstated in size and/or in number in Compact Disclosure and that this gives a significant bias in the relationship between firm value and ownership structure.

From this sample, we dropped the observations of firms operating in regulated sectors, i.e. financial, media and utility sectors, because ownership structures and investment choices in these sectors are heavily influenced by regulation (Demsetz and Lehn (1985)). We then have 5,301 observations. For most of our analysis, we consider only firms with at least one blockholder. This give us a sample of 3,919 observations.

We matched these data with the accounting data from COMPUSTAT and the stock data from CRSP, such as stock returns, age and SIC code. Because of missing accounting data, the number of observations in some regressions is reduced.

The primary measure of firm risk we consider is the daily stock return volatility over the year following the data on ownership (*Volatility*) multiplied by 100. This choice is driven by the observation that share price volatility is the risk relevant to shareholders and a statistic that cannot easily be manipulated.

Regarding the relationship between ownership structure and risk, we first look at the role of

the largest blockholder. In this case, we use the fraction of shares held by this investor, which is available in the database.

Alternatively, because we want to look at the effect of ownership structure beyond the role of the largest blockholder, we need a statistic to summarize it. Dhillon and Rossetto (2014) suggest a positive relationship between the number of blocks and firm risk. Thus, as the statistic for ownership structure, we choose the natural logarithm of the number of blockholders ($\ln N \text{ Block}$), with a blockholder being a shareholder with a participation larger than 5%.

We choose a series of control variables to mitigate potential estimation problems related to omitted variables. The criterion we adopt to select the control variables is that they should not be influenced by ownership structure and at the same time should affect firm volatility.

We consider two sets of control variables, one related to accounting data and one to corporate governance. As part of the first group, we consider *Age*. This is a variable that clearly cannot be influenced by ownership structure. At the same time, it might have a connection with volatility: older firms might be more established and hence less volatile.

Also *Size*, measured as the sum of equity market value plus debt, cannot be easily influenced by blockholders. At the same time, we might expect that bigger firms would be less risky.

Sales Growth measured as the annual growth rate of sales can be an indication of a firm's growth opportunity and hence we might expect this variable to be positively related to stock price volatility. *Tangibility* is also a relevant control variable as more intangible firms might have more volatile stock returns.

We also consider a set of control variables linked to corporate governance. Theoretical and empirical studies have shown that the presence of insiders as blockholders might affect vote outcomes and firm decisions (Prendergast (2002)). For this reason, we build two dummy variables: a dummy variable if at least one of the blockholders is also an insider - that is, if he/she is also a firm's director or officer (*D_Insider*) and a dummy variable if the firm has an Employee Share Ownership Plan (*ESOP*). This information is available in the Dlugosz, Fahlenbrach, Gompers, and Metrick (2006)'s database.

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

Table 1: Number (percentage) of firms for each type of ownership structure by year.

Year	One Blockholder	Multiple Blockholders	Widely held	Total
1996	160 (21.05%)	525 (69.08%)	75 (9.87%)	760 (14.34%)
1997	153 (21.58%)	488 (68.83%)	68 (9.59%)	709 (13.37%)
1998	170 (17.97%)	796 (75.31%)	91 (8.61%)	1,057 (19.94%)
1999	171 (18.00%)	709 (74.63%)	70 (7.37%)	950 (17.92%)
2000	155 (16.51%)	719 (76.57%)	65 (6.92%)	939 (17.71%)
2001	137 (15.46%)	682 (76.57%)	67 (7.56%)	886 (16.71%)
All	946 (17.85%)	3,919 (73.93%)	436 (8.22%)	5,301 (100.00%)

Table 1 divides the sample into firms with one blockholder, multiple blockholders and no blockholders, i.e., widely held firms for each year.

Only 8% of the firms in the sample are widely held; the large majority of the firms has more than one blockholder (74%), while 18% has only one blockholder. This distribution of types of ownership does not relevantly change within sectors (Table 2).

The results are in line with the findings of Holderness (2009), who noted that US firms display a more concentrated ownership structure than commonly thought. The same conclusion can be drawn by looking at the frequency of firms per number of blockholders (Figures 1).

In our sample, we have more 1384 observations with two blockholders, while observations with one blockholder are just 946. Even firms with three blockholders are more common than firms with one blockholder (1143 observations). Firms with four blockholders are slightly less frequent than firms with one blockholder (805 observations). Last, firms that are widely held are as frequent in order of magnitude as firms with five blockholders. Hence, firms with mid-sized shareholders are a good fraction of the overall universe of listed firms and their role merits examination.

Table 2: Number (percentage) of firms for each type of ownership structure by sector.

SIC	One Blockholder	Multiple Blockholders	Widely held	Total
Mining	55 (20.01%)	204 (74.18%)	16 (5.81%)	275 (5.08%)
Manufacturing & Construction	609 (18.04%)	2,436 (72.13%)	332 (9.83%)	3,377 (63.70%)
Whole Sale	38 (15.39%)	186 (75.30%)	23 (9.31%)	247 (4.67%)
Retail Trade	107 (17.01%)	496 (78.85%)	26 (4.14%)	629 (11.85%)
Services	137 (17.72%)	597 (77.23%)	39 (5.05%)	773 (14.60%)
<i>All</i>	<i>946</i> <i>(17.85%)</i>	<i>3,919</i> <i>(73.91%)</i>	<i>436</i> <i>(8.24%)</i>	<i>5,301</i> <i>(100.00%)</i>

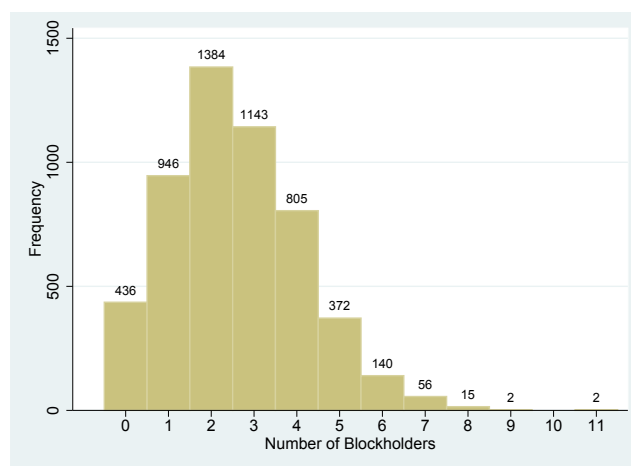


Figure 1: Histogram of the number of firms by number of blockholders.

Table 3: Descriptive statistics.

This table provides descriptive statistics for the whole sample. Appendix A provides definitions of all variables. We report the number of observations, arithmetic mean, the standard deviation, the minimum value, the 25th percentile, the median, the 75th percentile of the distribution and the maximum value for each variables.

	obs	mean	sd	min	p25	p50	p75	max
Volatility (%)	5301	3.363	1.757	0.142	2.224	2.925	4.014	40.934
Beta	5301	0.812	0.571	-6.848	0.434	0.713	1.069	3.906
Idiosyncratic Risk	5301	0.031	0.017	0.001	0.020	0.027	0.037	0.407
Share 1 (%)	4865	14.490	10.122	5.000	8.800	11.400	15.500	91.300
N block (#)	4865	2.799	1.433	1.000	2.000	3.000	4.000	11.000
Vot all blocks/Vot block1 (%)	4865	1.010	0.931	0.000	0.000	0.861	1.592	7.482
Vot block2/Vot block1 (%)	4865	0.553	0.336	0.000	0.305	0.636	0.839	1.000
Herfindahl	5301	0.471	0.295	0.000	0.269	0.384	0.564	1.000
Age (Ln)	5301	3.613	0.921	0.693	2.890	3.664	4.394	5.451
Size (Ln)	5301	7.198	1.680	1.270	6.061	7.095	8.222	13.299
Growth (%)	5293	0.117	0.383	-1.000	-0.011	0.072	0.179	11.518
Tangibility (%)	5280	0.312	0.208	0.000	0.157	0.262	0.419	0.970
D_Insider	5301	0.211	0.408	0.000	0.000	0.000	0.000	1.000
ESOP	5301	0.087	0.282	0.000	0.000	0.000	0.000	1.000
D_Second Block	5301	0.261	0.439	0.000	0.000	0.000	1.000	1.000
D_Widely	5301	0.064	0.244	0.000	0.000	0.000	0.000	1.000

Table 3 provides the descriptive statistics for the volatility proxies, ownership variables and firm characteristics. This sample covers 5301 firm-years except for the Share 1, N block, Vot all blocks/vot1 and Vot block 2/vot bloc1, which are reported only for the firms with at least one blockholder. Volatility is on average (median) 3.3% (2.95%) and is positively correlated with both the number of blockholders and the share of the largest blockholder (see Table 4). Also from the correlation matrix of Table 4, we can see that the number of blockholders is positively correlated with Vot all blocks/Vot block1 and Vot block2/Vot block1 and negatively correlated with Herfindahl index. Last, it should be noted that the correlation between the control variables is low and hence multicollinearity does not constitute a problem in our case.

Table 5 shows how the accounting variables change when firms are categorized by their ownership structure. Interestingly, firms with multiple blockholders have very different characteristics from both widely held firms and firms with one blockholder.

Table 5 indicates that firms with multiple blockholders are not simply half way between the single blockholder and widely held firms. All the variables (but *Tangibility*) display a non-monotonic relationship when we move from firms with one blockholder to multiple blockholders to the widely held ones. Firms with multiple blockholders are younger, smaller, and more volatile than firms with the other two types of ownership structure.

The lack of monotonicity of the univariate analysis indicates that firms with multiple blockholders need to be distinguished from both firms with one blockholder and widely held firms.

Tangibility is the only variable that shows monotonic behaviour in ownership concentration: the correlation between *Tangibility* and number of blockholders is negative. Because higher *Tangibility* is associated with smaller agency problems, this result is consistent with the notion that more severe agency problems are associated with more concentrated ownership.

Table 4: Correlation matrix.

This table presents the Pearson correlations between the main variables in the analysis. The sample consists of 5,301 firm-year observations.

	1	2	3	4	5	6	7	8
1. Volatility	1.0000							
2. Beta	0.313***	1.000						
3. Idio. Risk	0.988***	0.182***	1.000					
4. Share 1	0.026**	-0.086***	0.041**	1.000				
5. N block	0.092***	-0.105***	0.113***	0.195***	1.000			
6. Tot all /Tot block1	0.072***	-0.081***	0.088***	-0.077***	0.894***	1.000		
7. Tot block2 /Tot block1	0.049***	-0.061***	0.063***	-0.106***	0.662***	0.783***	1.000	
8. Herfindahl	-0.021	0.053***	-0.030**	0.271***	-0.428***	-0.556***	-0.481***	1.000
9. Age	-0.342***	-0.204***	-0.333***	-0.140***	-0.162***	-0.113***	-0.086***	0.011
10. Size	-0.279***	0.282***	-0.344***	-0.189***	-0.369***	-0.294***	-0.255***	0.056***
11. Sales Growth	0.057***	0.135***	0.042***	0.041***	-0.011	-0.016	-0.002	0.026**
12. Tangibility	-0.165***	-0.253***	-0.134***	0.004	-0.011	-0.003	0.001	-0.013
13. D.insider	0.057***	-0.025**	0.066***	0.153***	0.178***	0.112***	0.073***	0.008
14. ESOP	-0.118***	-0.087***	-0.111***	-0.005	0.064***	0.054***	0.073***	0.009
15. D.Second _Block	-0.011	0.019	-0.013	0.058***	-0.215***	-0.226***	0.213***	0.158***
16. D.Widely	-0.049***	0.052***	-0.057***	-0.254***	-0.333***	-0.233***	-0.293***	-0.180***

(Continued)

	9	10	11	12	13	14	15	16
9. Age	1.000							
10. Size	0.246***	1.000						
11. Sales Growth	0.116***	1.000						
12. Tangibility	0.099***	0.007	-0.028**	1.000				
13. D.insider	-0.147***	-0.175***	0.031**	-0.022	1.000			
14. ESOP	0.182***	0.029**	-0.047***	0.009	1.000			
15. D.Second _Block	0.025**	0.029**	0.021	0.000	-0.025*	0.042***	1.000	
16. D.Widely	0.114***	0.280***	-0.000	0.006	-0.117***	-0.059***	-0.108***	1.000

Table 5: Summary statistics of the main variables depending on the type of ownership structure.

This table shows the unconditional average and median (in brackets) of selected key continuous variables in firms with multiple blockholders, one blockholder and widely held firms. We tested for differences in mean using a t-test and a nonparametric test, the Wilcoxon/MannWhitney test. P-values are shown in the last three columns (p-values for the Wilcoxon/MannWhitney test are shown in brackets).

Variables	One	Multiple	Widely held	Test for difference:		Test for difference:
	Blockholder	Blockholders		N-Blockholders vs. 1-Blockholder	1-Blockholder vs. Widely held	N-Blockholders vs. Widely held
<i>Volatility</i>	0.0311 (0.0271)	0.0319 (0.0288)	0.0290 (0.0230)	0.1256 (0.0023)	0.0294 (0.0001)	0.0001 (0.0000)
<i>Age</i>	3.6959 (3.7612)	3.54846 (3.5553)	4.0091 (4.26268)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
<i>Size</i>	7.6606 (7.5096)	6.9016 (6.8594)	8.837 (9.1614)	0.0000 (0.0000)	0.0000 (0.0000)	0.0000 (0.0000)
<i>Sales Growth</i>	0.1201 (0.5321729)	0.1186 (0.5498808)	0.0884 (0.5384246)	0.9206 (0.0041)	0.2032 (0.2013)	0.0960 (0.4687)
<i>Tangibility</i>	0.3059 (0.2501)	0.3119 (0.2620)	0.32024 (0.2713)	0.4016 (0.3114)	0.2263 (0.0307)	0.4500 (0.0917)

4 Analysis and results

4.1 Shares of the Largest Blockholder and Risk

Theoretical studies, starting with Admati, Pfleiderer, and Zechner (1994), have shown that when a blockholder exists, her risk aversion and lack of diversification prompt her to choose low risk/return investments. Empirically, this implies that we should find that when the largest blockholder's stake is quite large, the firm volatility should be correspondingly small. John, Litov, and Yeung (2008) and Faccio, Marchica, and Mura (2011) tested this prediction empirically. Although John, Litov, and Yeung (2008) found a weak negative relationship between the largest blockholder's share and risk, Faccio, Marchica, and Mura (2011) obtained a positive relationship. At the same time, however, Faccio, Marchica, and Mura (2011) found that, in line with the predictions of Admati, Pfleiderer, and Zechner (1994), the degree of diversification of the largest blockholder has a positive effect on firm risk.

Dhillon and Rossetto (2014) suggested that the relationship between the largest blockholder's stake and risk should differ depending on whether the firm has multiple blockholders or only one. When only one blockholder is present, this investor determines the degree of firm risk. Hence, in firms with one blockholder, the stake of the blockholder negatively affects share price volatility. When multiple blockholders are present, however, the largest blockholder no longer determines share price volatility, but rather the mid-size blockholders are pivotal.

In order to verify this, we first consider the whole sample of firms with at least one blockholder and determined whether the fraction of share held by the largest blockholder affects share price volatility. By doing so, we were able to compare our results with those of the literature. We then repeated the analysis after splitting the sample in two: one composed of firms with only one blockholder and the other of firms with multiple blockholders.

The baseline regression equation is then the following:

$$Volatility_{i,t} = \alpha_0 + \alpha_1 \cdot Share1_{i,t} + \sum_{n=2}^N \alpha_n \cdot x_{n,i,t} + \epsilon_{i,t} \quad (1)$$

where $Volatility_{i,t}$, $Share1_{i,t}$, $x_{n,i,t}$ are respectively the share price volatility, the stake of the

largest blockholder and the $n - th$ control variable of firm i at time t . N is the total number of control variables and $\epsilon_{i,t}$ is the error term. α_0 and the vector α_1 are the parameters we want to estimate. Note that because the number of blockholders is a non-negative integer, we apply a Poisson specification in all our regressions (see Greene (2011) and Winkelmann (2008) for a discussion on the econometric issues).

To make our analysis comparable to that of previous studies, we first carry out the standard OLS estimation with year (*YearFE*) and industry fix effect (*IndustryFE*). Standard errors are clustered at the firm level. The results are presented in columns (1) and (2) of Table 6.

Because we want to see whether share price volatility has a different relationship with the largest blockholders stake depending on whether there is one or multiple blockholders, reverse causality is not a relevant concern. It is enough to show that the relationship is different. Hence, the OLS estimation is sufficient.

We nevertheless check the robustness of our results by addressing potential problems of reverse causality, estimating the same model using the 2SLS, and selecting an instrumental variable for the share of the largest blockholder (see columns (3) and (4) of Table 6). As in John, Litov, and Yeung (2008), Laeven and Levine (2007) and Faccio, Marchica, and Mura (2011), we choose the yearly sector average of the largest blockholders stake as instrumental variable, excluding the firm itself. We define a sector on the basis of the first two-digit SIC code. With this instrumental variable, we carry out a first-stage regression with the dependent variable being the largest blockholders stake. In the second stage we use the predicted value of the stake of the largest blockholder as independent variable in the regression where the dependent variable is the share price volatility. At the bottom of the table we report the estimation on the IV variables and the endogeneity tests. Note that in the 2SLS we do not include the industry and year fixed effect as, by construction, these effects are included in the instrumental variable (see Thompson (2011) for a discussion on this point).

As discussed in Section 3, we use various control variables which can be grouped in accounting and corporate governance variables. In the first set of regressions, i.e. (1) and (3), we include only the control variables that we consider the most likely not to be determined by ownership structure, namely *Age* and *Size*. In the other regressions we also consider the other control variables.

Table 6: Shareholding of the largest investor and volatility - Whole sample.

The table reports the estimations of the model (1). The sample considered is composed by firms with at least one blockholder. Columns (1) and (2) report the OLS estimations, while columns (3) and (4) the two-stage least square ones. We use the average fraction of shares of the largest shareholder of all the other firms in the same industry/year as an instrumental variable for the largest blockholder's fraction of shares. Appendix A provides definitions of the volatility measure and all the independent variables. Standard errors, in parentheses, are clustered at the firm level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ denote significance at the 1%, 5%, and 10% level, respectively. The coefficient and the standard error for the instrument are from the first-stage regression. F-statistic test for joint significance of the instruments in the first stage regression and on the remaining exogenous regressors. Shea's partial R2 records the additional explanatory power of the instrument. The Stock and Yogo (2005)'s test rejects the hypothesis that the bias exceeds the ordinary least squares bias by more than 5% in all cases. The Hausman test indicates the presence of attenuation bias in the coefficient estimates. The test rejects the equality of the OLS and 2SLS estimates.

VARIABLES	(1) Volatility	(2) Volatility	(3) Volatility	(4) Volatility
Share 1	-0.0076** (0.003)	-0.0077** (0.003)	-0.0280 (0.033)	-0.0281 (0.035)
Age	-0.4831*** (0.041)	-0.4262*** (0.041)	-0.5926*** (0.052)	-0.5291*** (0.048)
Size	-0.2486*** (0.031)	-0.2637*** (0.030)	-0.2417*** (0.034)	-0.2525*** (0.032)
Sales Growth		0.2349*** (0.089)		0.2789*** (0.084)
Tangibility		-1.3509*** (0.164)		-1.1107*** (0.147)
D Insider		-0.1117 (0.080)		-0.0438 (0.112)
ESOP		-0.3278*** (0.092)		-0.3939*** (0.094)
Industry FE	YES	YES	NO	NO
Year FE	YES	YES	NO	NO
Constant	7.4221*** (0.256)	7.6715*** (0.256)	7.6240*** (0.749)	7.8321*** (0.705)
Observations	4,853	4,824	4,853	4,824
Adjusted R-squared	0.230	0.255		
<u>First-stage regressions</u>				
IV: Average Larg. share [Same industry/year]			0.2696*** (0.094)	0.2586*** (0.096)
Partial R2 of excluded instruments			0.0048	0.0045
F-statistic of excluded instruments (p-value)			8.1450 (0.004)	7.2432 (0.007)
Stock and Yogo's test		18	23.4572***	21.6515***
Hausman test (p-values)			0.5509	0.5705

Table 7: Shareholding of the largest investor and volatility splitting the sample.

The table reports the estimations of the model (1) when splitting the sample between firms with multiple blockholders (columns (1)-(4)) and firms with one blockholder (columns (5)-(8)). Columns (1)-(2) and (5)-(6) report the OLS estimations while columns (3)-(4) and (7)-(8) report the two-stage least square estimations. We use the average fraction of shares of the largest shareholder of all the other firms in the same industry/year as an instrumental variable for the largest blockholder's fraction of shares. Appendix A provides definitions of the volatility measure and of all independent variables. Standard errors, in parenthesis, are clustered at the firm level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ denote significance at the 1%, 5%, and 10% level, respectively. The coefficient and the standard error for the instrument are from the first stage regression. F-statistic test for joint significance of the instruments in the first stage regression and on the remaining exogenous regressors. The Sheas partial R2 records the additional explanatory power of the instrument. The Stock and Yogo (2005)s test rejects the hypothesis that the bias exceeds the ordinary least squares bias by more than 5% in all cases. The Hausman test indicates the presence of attenuation bias in the coefficient estimates. The test rejects the equality of the OLS and 2SLS estimates. At the bottom of the table, we report the p -value of the difference of the coefficient of *Share_1* of subsample of firms with multiple blockholders with the one of the subsample of firms with one blockholder.

VARIABLES	Firms with multiple blockholders				Firms with 1 blockholder			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Volatility	Volatility	Volatility	Volatility	Volatility	Volatility	Volatility	Volatility
Share 1	-0.0051 (0.004)	-0.0047 (0.004)	-0.0377 (0.065)	-0.0464 (0.077)	-0.0118*** (0.004)	-0.0130*** (0.004)	-0.0866** (0.040)	-0.0782** (0.036)
Age	-0.4454*** (0.044)	-0.3863*** (0.044)	-0.5010*** (0.070)	-0.4453*** (0.066)	-0.6414*** (0.071)	-0.5857*** (0.069)	-0.8765*** (0.143)	-0.7882*** (0.127)
Size	-0.2861*** (0.037)	-0.3052*** (0.036)	-0.2466*** (0.047)	-0.2620*** (0.045)	-0.1485*** (0.041)	-0.1490*** (0.040)	-0.1577*** (0.052)	-0.1518*** (0.048)
Sales Growth		0.2925*** (0.085)		0.2974*** (0.085)		0.1447 (0.156)		0.3381*** (0.129)

(Continued)

Table 7: Continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Volatility	Volatility	Volatility	Volatility	Volatility	Volatility	Volatility	Volatility
Tangibility		-1.3325*** (0.180)		-1.1063*** (0.172)		-1.3567*** (0.275)		-0.7672** (0.371)
D Insider		-0.1565* (0.085)		-0.2116 (0.176)		0.0841 (0.154)		0.2120 (0.259)
ESOP		-0.2833*** (0.096)		-0.3114*** (0.106)		-0.5727*** (0.190)		-0.8420*** (0.202)
<i>IndustryFE</i>	YES	YES	NO	NO	YES	YES	NO	NO
<i>YearFE</i>	YES	YES	NO	NO	YES	YES	NO	NO
<i>Constant</i>	7.4984*** (0.289)	7.7911*** (0.287)	6.3586*** (1.376)	6.5333*** (1.473)	7.3627*** (0.444)	7.3926*** (0.439)	8.9165*** (1.099)	8.6440*** (0.893)
Observations	3,908	3,881	3,908	3,881	945	943	945	943
Adjusted R^2	0.2167	0.240			0.322	0.354		
0.289	0.321							
<u>First-stage regressions</u>								
IV: Average Larg. share [Same industry/year]			0.1603** (0.081)	0.1414** (0.071)		0.7639*** (0.289)		0.8203*** (0.295)
Partial R2 of excluded instruments			0.0022	0.0017		0.0411		0.0644
F-statistic of excluded instruments (p-value)			3.8789	2.9940		16.9696		17.7095

(Continued)

Table 7: Continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	<i>Volatility</i>	<i>Volatility</i>	<i>Volatility</i>	<i>Volatility</i>	<i>Volatility</i>	<i>Volatility</i>	<i>Volatility</i>	<i>Volatility</i>
Stock and Yogos test			(0.049)	(0.083)			(0.000)	(0.0007)
Hausman test (p-values)			8.5730	6.7318			28.3806***	24.3383***
			0.4703	0.4549			0.0001	0.0001
P-value on difference of the Share 1 coefficient of (1) and (5)					0.090			
P-value on difference of the Share 1 coefficient of (2) and (6)						0.050		
P-value on difference of the Share 1 coefficient of (3) and (7)							0.003	
P-value on difference of the Share 1 coefficient of (4) and (8)								0.043

Because we wanted to see whether firms with multiple blockholders differ from firms with one blockholder, we repeated the analysis of Table 6, splitting the sample between firms with one and multiple blockholders. Regressions (1)-(4) of Table 7 analysed the subsample of firms with multiple blockholders, while regressions (5)-(8) looked at the subsample of firms with only one blockholder. For each sample, the first two columns show the standard OLS estimations with sector and year fixed effects and different sets of control variables. The other two columns show the 2SLS estimations.

When the whole sample is considered (Table 6), the OLS estimation shows a negative relationship between the largest blockholders share and volatility that is significant at the 5% confidence level. In the 2SLS estimation, the coefficient of the largest blockholders stake is no longer significant.

Although we used the same instrument as John, Litov, and Yeung (2008), our endogeneity tests do not clearly indicate whether the instrument we chose is correct. The Hausman test indicates that the OLS estimation is better than the IV estimation, while the Stock-Yogo test on the weak-instrument bias rejects the hypothesis that the bias exceeds 5% from the OLS.⁶

These results are in part compatible with the findings of John, Litov, and Yeung (2008), who also found a negative relationship between the largest blockholders share and firm volatility. However, using the same instrumental variable as we did, they also find a causal relationship, which is not so clear in our sample.

When the sample was split between firms with one and multiple blockholders, the situation changed. First, we found a significant negative coefficient at the 1% level on the size of the first blockholder only in the subsample of firms with one blockholder (Column(5)-(8) of Table 7). For firms with multiple blockholders, this coefficient was no longer significant (Column(1)-(4) of Table 7).

The two samples also showed different behaviour in their 2SLS estimations. Here the coefficient of the largest blockholders share was significant at the 5% level when we considered firms with one blockholder, and the endogeneity tests confirmed that the regressions were correctly specified. This implies that when firms have only one blockholder the share of the largest blockholder decreases

⁶The F-statistic of excluded instruments is not above the threshold of 10. However, Stock and Yogo (2005) showed that the rule of thumb of having the F-statistic above 10 can be misleading.

share price volatility, and the risk concerns of the main shareholder plays a role in firm decisions. This relationship, however, is not present when firms have multiple blockholders. In such a case, share price volatility is not related and not affected by the shares of the largest blockholder.

Last, we also checked whether the coefficients found in the sample with multiple blockholders differed from those obtained in the sample of firms with one blockholder. At the bottom of Table 7, we present the test showing whether these coefficients differ one from the other. The test shows that the difference in the Share 1 coefficients across subsamples is always significant to the conventional significance levels. Hence, this confirms that the largest blockholder not only has a significant effect on the choice of firm risk, but also that this effect is different when multiple blockholders are present.

This result is important for two reasons. At the general level, it highlights the difference between firms with one and firms with multiple blockholders, indicating that a distinction should be made when ownership structure and its relationship to firm characteristics are studied. This result is in line with the findings of Laeven and Levine (2008), who noted that the effect of ownership structure on corporate valuation differs depending on whether firms have one, multiple or no blockholders.

More specifically, these findings contribute to the discussion initiated by John, Litov, and Yeung (2008), Faccio, Marchica, and Mura (2011) and Laeven and Levine (2009) on whether and how the largest blockholder affects a firms risk-taking. Our conclusion is that the largest blockholder affects share price volatility but only when she is the only one present in the firm.

Our regressions controlled for *Age*. Age had a negative effect on Volatility, which implies that the older and the more mature the firm is, the less risky it is. We also controlled for *Size* and found that larger firms have less volatile stock prices. The signs are consistent with the results of John, Litov, and Yeung (2008), Faccio, Marchica, and Mura (2011). We also observed that *Tangibility* is negatively related to share price volatility. This result is in line with the idea that firms with more intangible assets face greater uncertainty due to the difficulty of estimating their value.

The results on the control variables related to firm governance confirm that shareholders affect firm risk. Specifically, when one of the blockholders is an insider (*D Insider*) or the firm has a program of share distribution to employees (*ESOP*), stock volatility is smaller, suggesting that in-

siders might prefer conservative choices to limit their exposure to the firm’s share price movements. The negative effect of the share distribution program is in line with the results of Bova, Kolev, Thomas, and Zhang (2015), who found that when non-executives hold stock they have an incentive to reduce firm risk.

4.2 Number of Blockholders and Volatility

In the previous section we saw that firms with multiple blockholders differ on the determination of risk taking behavior from firms with only one blockholder. In what follows we look in greater detail at how ownership structure affects firm risk. We build on the model of Dhillon and Rossetto (2014), which predicts that the higher the number of blockholders, the riskier a firm will be. We checked this relationship estimating the following regression:

$$Volatility_{i,t} = \alpha_0 + \alpha_1 \cdot Ln_NBHs_{i,t} + \sum_{n=2}^N \alpha_n \cdot x_{n,i,t} + \epsilon_{i,t} \quad (2)$$

where $Ln_NBHs_{i,t}$ is the logarithm of the number of blockholders present in the firm. In the first set of regressions, columns (1) and (2) of Table 8, cross sectional regressions with industry- (*IndustryFE*) and year-fixed effects (Year FE) are carried out. As in the previous section we use various sets of control variables and the standard errors are clustered.

Regressions (3) and (4) present the panel data analysis. The introduction of firm fixed effects allowed us to control for unobservable characteristics and reduced the omitted variable bias and hence the risk of biased and inconsistent estimations (Wooldridge (2010)). Hence, our results relied only on within-firm variation in the ownership structure and were not driven by factors external to the firm. In addition, as noted in Zhou (2001), controlling for any time invariant firm-specific characteristics significantly raises the hurdle for finding significant relationships.

In the last set of regressions, we addressed reverse causality concerns estimating the model with the 2SLS and choosing the yearly industry averages of the number of blockholders as instrumental variable for the number of blockholders, excluding the firm itself. The sector average is a natural choice when testing the predictions of Dhillon and Rossetto (2014). In their model, industry characteristics constitute the determinants of the ownership structure, which in turn determine firm

risk. Industry averages have been widely used in other studies (among other Bharath, Jayaraman, and Nagar (2013) Brockman and Yan (2009), Faccio, Marchica, and Mura (2011), John, Litov, and Yeung (2008), Cronqvist and Fahlenbrach (2009) and Becker, Cronqvist, and Fahlenbrach (2011)).

When dealing with reverse causality, we carried out analyses both without and with firm-fixed effects, respectively columns (5)-(6) and columns (7)-(8). The results are presented in Table 8.

The coefficients on the number of blockholders in all regressions except the standard OLS are positive and are statistically significant at the 1%-level.

The results indicate that firms with more blockholders take more risk, and these results are economically relevant. When a firm has one blockholder, the addition of a second one leads to an increase of 3% in stock price volatility in the IV estimation and 6% in the IV estimation with fixed effect. Given that the average firm in our sample had a volatility of around 3%, this implies that the rise of a new blockholder has a very strong effect on the overall firm's policy.

The endogeneity tests presented at the bottom of the table, indicate that the regressions were correctly specified: the choice of the instrumental variable is correct and the use of the 2SLS is more appropriate than the standard OLS.

We compared the IV analysis to the corresponding OLS results and found that the bias was negative in the sense that the IV coefficients were larger than the OLS ones. The coefficient of the number of blockholders in the OLS without firm fixed effects was negative and significant at 5%. When we added firm fixed effects and/or used instrumental variables, the coefficients became positive and significant at 1%. This bias indicates that there are some unobserved firm characteristics or more generally some unobserved external factors that affect both risk and the number of blockholders in the same direction.

The impact of control variables is in line with previous results of Section 4.1. The older and the larger the firm is, the less volatile it is, whereas sales growth and tangibility are respectively positively and negatively related to volatility. Last, among the corporate governance variables only ESOP had a negative relationship with volatility, which implies that when employees are among the shareholders share price is less volatile.

Table 8: Number of Blockholders and Volatility.

The table reports the estimations of model (2). Columns (1) and (2) report the OLS regressions, columns (3) and (4) the firm-FE regressions, columns (5) and (6) the two-stage least square regressions, and columns (7) and (8) the firm-FE two-stage least square regressions. We use the average natural logarithm of the number of blockholders of all the other firms in the same industry/year as instrumental variable for the natural logarithm of the number of blockholders of each firm. Widely held firms-year are excluded from the sample. Appendix A provides definitions of the volatility measures and of all independent variables. Standard errors, in parenthesis, are clustered at the firm level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ denote significance at the 1%, 5%, and 10% level, respectively. The coefficient and the standard error for the instrument are from the first stage regressions. F-statistic test for joint significance of the instruments in the first stage regression and on the remaining exogenous regressors. For the firm-FE two-stage least square regressions, this statistic denotes the Cragg-Donald Wald F statistic. The Sheas partial R2 records the additional explanatory power of the instrument. The Stock and Yogo (2005) test rejects the hypothesis that the bias exceeds the ordinary least squares bias by more than 5% in all cases. The Hausman test indicates the presence of attenuation bias in the coefficient estimates. The test rejects the equality of the OLS and 2SLS estimates. Davidson-MacKinnon test computes a test of exogeneity for firm-FE two-stage least square regressions. The test rejects the equality of the OLS and 2SLS estimates.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Volatility	Volatility	Volatility	Volatility	Volatility	Volatility	Volatility	Volatility
<i>Ln N Block</i>	-0.1985** (0.079)	-0.1686** (0.077)	0.2000*** (0.063)	0.1954*** (0.061)	2.8561*** (0.781)	3.0903*** (0.803)	6.0231*** (1.618)	5.3829*** (1.421)
<i>Age</i>	-0.4794*** (0.041)	-0.4240*** (0.041)	2.8977*** (0.220)	2.8509*** (0.213)	-0.4930*** (0.053)	-0.4252*** (0.056)	1.6248*** (0.486)	1.7320*** (0.435)
<i>Size</i>	-0.2581*** (0.031)	-0.2714*** (0.031)	-0.4487*** (0.033)	-0.4288*** (0.032)	-0.0373 (0.065)	-0.0393 (0.063)	-0.1656* (0.096)	-0.1724* (0.089)
<i>Sales Growth</i>		0.2304** (0.095)		0.0445 (0.042)		0.2286*** (0.088)		0.0388 (0.077)
<i>Tangibility</i>		-1.3516***		-1.4281***		-1.1785***		-0.5232

(Continued)

Table 8: Continued

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Volatility	Volatility	Volatility	Volatility	Volatility	Volatility	Volatility	Volatility
<i>D Insider</i>		(0.165)		(0.361)		(0.188)		(0.707)
		-0.1179		-0.0719		-0.2977***		-0.4899***
		(0.079)		(0.073)		(0.114)		(0.179)
<i>ESOP</i>		-0.3101***		0.0431		-0.6425***		-0.6038**
		(0.093)		(0.112)		(0.132)		(0.256)
Industry FE	YES	YES	NO	NO	NO	NO	NO	NO
Year FE	YES	YES	YES	YES	NO	NO	NO	NO
<i>Constant</i>	7.6267***	7.8287***	-4.4220***	-3.9426***	1.8060	1.7517	-8.8673***	-8.0720***
	(0.298)	(0.298)	(0.808)	(0.803)	(1.484)	(1.482)	(2.037)	(1.951)
Observations	4,853	4,824	4,853	4,824	4,853	4,824	4,853	4,824
Adj. <i>R</i> ²	0.231	0.257	0.197	0.210				

(Continued)

Table 8: Continued

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
VARIABLES	Volatility	Volatility	Volatility	Volatility	Volatility	Volatility	Volatility	Volatility
<u>First-stage regressions</u>								
<i>IV:Ind Ln N Block</i>					0.3722*** (0.061)	0.3725*** (0.062)	0.2296*** (0.052)	0.2404*** (0.053)
Partial R^2 of excluded instruments		0.081				0.111		
Stock and Yogo's test		56.9456***				56.6019***		
F-stat. of excluded instruments				(0.0000)			19.14*** (0.0000)	20.70***
Hausman test (p-values)					0.000	0.000		
Davidson-MacKinnon test							0.0000	0.0000

4.3 Relative voting power

In the previous sections, we found that the largest blockholder and his/her role is relevant in determining share price volatility only when he/she is the only blockholder (Section 4.1). However, when multiple blockholders are present they too play a role in determining the volatility (Section 4.2).

Dhillon and Rossetto (2014) showed that mid-sized blockholders arise to counterbalance the decisional power of the largest blockholder. Based on this reasoning, we hypothesized that the larger the stake of the blockholders who are not the largest relative to the stake of largest one would imply a correspondingly larger influence on firm decisions and hence they would choose larger volatility.

In Table 9, we show the relationship between the distribution of voting rights and stock price volatility in order to test this hypothesis. We first built three variables to represent the relative voting power of the blockholders who are not the largest. The first variable is the ratio between the fraction of voting rights held by the second blockholder over the fraction of voting rights of the first one. The choice of this variable was based on the finding of Dhillon and Rossetto (2014) that the second largest blockholder is pivotal in the final vote. The second variable is the ratio of the voting rights of the all blockholders but the largest over the voting power of the first one.

Last, we also considered the Herfindahl index as a measure of ownership structure dispersion. The Herfindahl index takes into account both the number of blockholders and their degree of inequality. Formally, the Herfindahl index is computed as follows:

$$Herfindahl_{i,t} = \frac{\sum_{j=1}^n \alpha_{j,i,t}^2}{\left(\sum_{j=1}^n \alpha_{j,i,t}\right)^2} \quad (3)$$

where $\alpha_{j,i,t}$ and n are respectively the fraction of shares of shareholder j and the number of shareholders in firm i in year t . By construction, the Herfindahl index takes values between 0 and 1. A high value of the index is an indication of low dispersion. The larger the number of blockholders, the smaller the index will be.

The Herfindahl index as a measure of ownership structure dispersion has been used in other studies. Demsetz and Lehn (1985), Leech and Leahy (1991) and Goergen and Renneboog (2001)

used this index considering only the stake of blockholders rather than all the shareholders of the firm. Other studies have computed the index only considering the largest two or five shareholders, for example, Laeven and Levine (2008) or Konijn, Kräussl, and Lucas (2011). John, Litov, and Yeung (2008) considered only blockholders with a voting right greater than 10%.

Our approach was different. First, we used the available data that gave us the participation above 5%. For the remaining shares whose distribution we did not know, we assumed that they were widely dispersed, namely that each remaining share was held by a different shareholder. Our choice was based on the observation that in principle minority shareholders are likely to play a role, and we needed to consider how much of the total stake the blockholders detained. Also, with such a measure we were able to include the widely held firms that were thus far excluded from our analysis.

To make our results comparable with the analysis carried out in the previous section, among the control variables when using the Herfindhal index, we also considered a dummy variable if the firms were widely held (*D_Widely_Held*). This dummy variable was expected to capture control implications particular to this ownership structure.

Although the Herfindahl index might at first glance seem to be an appealing measure for ownership structure, we had to be careful in its interpretation. This index does not necessarily distinguish between firms with one blockholder and firms with multiple blockholders. A firm with one blockholder with a 22.9% stake has the same Herfindahl index of 0.0525 as a firm with three blockholders, one with a 20% stake, one with a 10% stake and one with a 5% stake.

We therefore did not consider this statistic as the main variable for our analysis. The aim of our study was to show that mid-sized blockholders play a role in determining share price volatility. Hence, we carried out this analysis as a robust check and to make our study comparable to the existing literature.

We excluded other types of statistics that have sometimes been used in the literature to describe ownership structure. The Gini coefficient is a measure of inequality and has been used in Pham, Kaley, and Steen (2003) and Konijn, Kräussl, and Lucas (2011). It takes into the account the difference in size of the blockholders' voting rights. However, this measure does not take into

account the number of blockholders. Alternatively, Zingales (1994) and Rydqvist (1996) used Shapley and Shubik's 1954 index. However, this statistic differs little from the fraction of shares held by dispersed shareholders and it hardly takes into consideration the difference in participation among blockholders. Hence, for our purposes we did not consider these measures.

We regressed these statistics to explain the variation in share price volatility using the same specification as before.

In columns (1) and (2), we used the ratio of the voting right of the second largest shareholder over the rights of the first, whereas in columns (3) and (4), we used the ratio of the voting rights all blockholders but the largest one over the voting rights of the largest shareholder. As two blockholders is a special case of the multiple blockholders' one, we add a dummy variable that has value 1 when firms have only two blockholders (*D_2Blocks*). Last, columns (5) and (6) used the Herfindhal index as a proxy for ownership structure. In this case, we included firms with blockholders and firms that are widely held. Therefore, to make the results in these regressions comparable, we added a dummy variable when firms were widely held (*D_Widely_Held*). As in the previous section, reverse causality concerns were addressed by estimating the regression with a 2SLS and using the sector averages of the ratios as instrumental variable.

Columns (1)(4) show that the ownership coefficient of ownership structure is positive and significant at more than 1%. Endogeneity tests again confirm that the choice of our instrumental variables was correct and that the regressions were correctly specified. This implies that the greater the voting power of the mid-sized blockholders relative to the largest one, the higher the share price volatility will be, confirming the idea that mid-sized blockholders play a role in determining firm policy and thereby limit the authority of the largest blockholder.

The coefficient of the Herfindhal index was negative and significant at 5-10% level. As the Herfindhal index is a measure of concentration, the sign of the coefficient confirmed our results: the more the shares are concentrated, the lower is the risk chosen by the shareholders. The limited degree of significance of the coefficient was due to the construction the index, which does not necessarily differentiate between a firm with multiple blockholders and a firm with only one blockholder in control.

Table 9: Volatility and Voting power.

The table reports the estimations of equation (2) where the measure of the ownership structure is given by the ratio of the fraction of shares held by the second largest blockholder over the one of the largest blockholder (columns (1) and (2)), the ratio of the fraction of shares held by all blockholders but the largest one over the fraction of shares held by the largest blockholders (columns (3) and (4)) and the Herfindahl index (columns (5) and (6)). The table reports the estimations of the two-stage least square regressions. We use the average voting power of all the other firms in the same industry/year as an instrumental variable for each firms voting power proxy. Widely held firms-year are included in the sample when we use the Herfindahl index. Appendix A provides definitions of volatility measure and of all independent variables. Standard errors, in parenthesis, are clustered at the firm level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ denote significance at the 1%, 5%, and 10% level, respectively. The coefficient and the standard error for the instrument are from the first stage regressions. F-statistic test for joint significance of the instruments in the first stage regression and on the remaining exogenous regressors. The Sheas partial R2 records the additional explanatory power of the instrument. The Stock and Yogo (2005) test rejects the hypothesis that the bias exceeds the ordinary least squares bias by more than 5% in all cases. The Hausman test indicates the presence of attenuation bias in the coefficient estimates. The test rejects the equality of the OLS and 2SLS estimates.).

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)
	Volatility	Volatility	Volatility	Volatility	Volatility	Volatility
<i>Vot Block2/Vot Block1</i>	4.3246*** (1.496)	4.8694*** (1.581)				
<i>Vot All Blocks/Vote Block 1</i>			4.6780*** (1.702)	5.2489*** (1.798)		
<i>Herfindahl</i>					-0.0178* (0.011)	-0.0225** (0.010)
<i>Age</i>	-0.5576*** (0.053)	-0.4765*** (0.057)	-0.5662*** (0.054)	-0.4828*** (0.058)	-0.0057*** (0.000)	-0.0050*** (0.000)

(Continued)

Table 9: Continued

VARIABLES	(1)	(2)	(3)	(4)
	Volatility	Volatility	Volatility	Volatility
0.401				
<u>First-stage regression</u>				
IV: <i>Vot block2/Votblock1</i>	0.2596*** (0.070)	0.2632*** (0.070)		
IV: <i>Vot all blocks/Vote block 1</i>			0.2388*** (0.070)	0.2429*** (0.070)
IV: <i>Ind_Herfindahl</i>				0.3045*** (0.058)
Partial R2	0.0400	0.0420	0.0133	0.0135
of excluded instruments				0.0073
Stock and Yogo's test	19.6772***	20.0042***	26.2344***	26.6864***
F-statistic	13.6754***	13.8550***	21.4722***	21.8505***
Hausman test (p-values)	0.0000	0.0000	0.0000	0.0000
				0.0600
				0.0100
				0.3102***
				(0.058)
				0.0106
				38.8502***
				40.1276***
				26.9313***
				27.718***

Overall, these results are in line with what has been found in the previous sections. The existence of other blockholders who are not the largest one plays a role in firm policy and, more specifically, the greater their voting power, the higher the share price volatility.

4.4 Specific Risk vs Systematic Risk

From the previous sections, we have learnt that mid-sized blockholders play a role in deciding firm risk. In this section, we determine whether they affect specific or systematic risk. According to the risk aversion argument of Dhillon and Rossetto (2014), undiversified investors should care about specific risk, while investors with more diversified portfolios should care less. The result should be that, if mid-sized blockholders arise to mitigate the power of the largest one by choosing low-risk investors, the fewer the blockholders, the greater the concerns will be about risk that cannot be diversified; hence, the lower the specific risk should be. Less clear are the concerns about systematic risk. The model of Dhillon and Rossetto (2014) and other theoretical models have no predictions. Intuition would suggest that systematic risk should be a concern both for the non-diversified investors and those who hold the market portfolio. Hence, there should be no effect.

We tested our hypothesis using the same model as in the previous sections but using either the beta or the systematic risk of the firm as dependent variable. Again, we ran a 2SLS analysis using the sector averages as the instrumental variable. We computed the beta from the standard market model in which the firms daily returns are regressed on a CRSP-weighted market portfolio for the period covered by the annual sample. For the specific risk, we used the standard error of the residuals from the above market model.

The coefficients of the number of blockholders were positive and significant at the 1% level when the specific risk was considered. When the explained variable was the systematic risk proxied by the beta, the coefficient of the number of blockholders was negative but not significant.

This result indicates that the fewer the number of blockholders, the smaller the specific risk of the firm is, while systematic risk remains invariant. This result further indicates that when there is one or few large blockholders who do not hold a perfectly diversified portfolio, specific risk is a concern. Hence, the lack of diversification affects corporate policies, inducing the firm to take less

Table 10: Systematic Risk vs Idiosyncratic Risk.

The table reports the estimations of equation (2) where the measure of the risk is either the beta (columns (1) and (2)) or the standard deviation of the residuals of the estimations of the beta (columns (3) and (4)). Standard errors, in parenthesis, are clustered at the firm level. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$ denote significance at the 1%, 5%, and 10% level, respectively. The coefficient and the standard error for the instrument are from the first stage regressions. F-statistic test for joint significance of the instruments in the first stage regression and on the remaining exogenous regressors. The Sheas partial R2 records the additional explanatory power of the instrument. The Stock and Yogo (2005) test rejects the hypothesis that the bias exceeds the ordinary least squares bias by more than 5% in all cases. The Hausman test indicates the presence of attenuation bias in the coefficient estimates. The test rejects the equality of the OLS and 2SLS estimates.

VARIABLES	<i>Beta</i>	<i>Beta</i>	<i>IdiosyncraticRisk</i>	<i>IdiosyncraticRisk</i>
<i>Ln N Block</i>	-0.1363 (0.203)	-0.0976 (0.193)	0.0261*** (0.007)	0.0282*** (0.008)
<i>Age</i>	-0.1707*** (0.015)	-0.1459*** (0.014)	-0.0044*** (0.000)	-0.0038*** (0.001)
<i>Size</i>	0.1256*** (0.016)	0.1237*** (0.015)	-0.0013** (0.001)	-0.0013** (0.001)
<i>Sales Growth</i>		0.0892** (0.041)		0.0021*** (0.001)
<i>Tangibility</i>		-0.6203*** (0.049)		-0.0090*** (0.002)
<i>D_Insider</i>		-0.0038 (0.026)		-0.0027*** (0.001)
<i>ESOP</i>		-0.1098*** (0.031)		-0.0057*** (0.001)
<i>Constant</i>	0.7023* (0.380)	0.7714** (0.354)	0.0233* (0.014)	0.0224 (0.014)
Observations	4,853	4,824	4,853	4,824
<u>First-stage regression</u>				

(Continued)

Table 10: Continued

VARIABLES	<i>Beta</i>	<i>Beta</i>	<i>IndiosyncraticRisk</i>	<i>IndiosyncraticRisk</i>
IV: <i>Average Ln N Block</i>	0.3722*** (0.061)	0.3725*** (0.062)	0.3722*** (0.061)	0.3725*** (0.062)
Partial R2 of excluded instruments	0.0116	0.0115	0.0116	0.0115
Stock and Yogo's test	56.9456***	56.6019***	56.9456***	56.6019***
F-statistic	36.5827***	35.8162***	36.5827***	35.8162
Hausman test (p-values)	0.0349	0.0166	0.0000	0.0000

specific risk.

As in the previous analysis, the tests confirmed that the regression was correctly specified.

5 Conclusions

Most of the studies in the literature investigating the effect of ownership structure on firm risk-taking have focused on the role of the largest blockholder. The assumption has been that the greater this blockholders stake, the larger her risk exposure; hence she should choose less risk. The results have been mixed.

Less attention has been given to the role of the other shareholders who are not the largest, but who hold substantial stakes. We focused on the role of mid-sized blockholders and examined whether and how ownership structure affects firm risk.

By taking into account potential problems of reverse causality and omitted variables, we showed that the largest shareholder affects share price volatility only when she is the only blockholder. In that case, the bigger her stake, the lower the firm risk will be. In firms with multiple blockholders, this relationship disappears and the participation of the largest blockholder does not affect firm risk.

The idea that mid-sized blockholders play a role in firm decisions becomes even more evident with the finding that firm risk rises with the increase in the number of blockholders. In particular,

our data show that blockholders do not affect systematic risk, but rather specific risk.

The idea that mid-sized blockholders play a role in firm decisions becomes even more evident with the finding that firm risk rises with the increase in the number of blockholders. In particular, our data show that blockholders do not affect systematic risk, but rather specific risk. Dhillon and Rossetto (2014).

Overall, we conclude that ownership structure, in all its complexity, has an effect on firm risk. This is an indication that studies of the relationships 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. Mid-sized blockholders are important and play an active role in firm policy. This new approach offers the possibility of re-examining and reinterpreting many aspects of firm policies related to corporate governance.

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A Appendices

A.1 Variables description

Variables	Definition
Volatility	Standard deviation of firms daily returns for subsequent to the year when we have the ownership information *100. Source: CRSP.
Beta	The regression coefficient from market model in which the firms daily returns are regressed on a value-weighted market portfolio for the period covered by the annual sample. Source: CRSP.
Idiosyncratic Risk	Standard error of the residuals from market model in which the firms daily returns are regressed on a value-weighted market portfolio for relative year. Source: CRSP.
Share 1	Percentage of voting rights of the largest shareholder. The data are from Dlugosz, Fahlenbrach, Gompers, and Metrick (2006).
Ln N Block	The natural logarithm of the number of direct blockholders. The data are from Dlugosz, Fahlenbrach, Gompers, and Metrick (2006).
Vot Block2/Vot Block1	Ratio of the voting rights of the second-largest blockholder over the voting rights of largest blockholder. Source: Dlugosz, Fahlenbrach, Gompers, and Metrick (2006).
Vot All Blocks/Vote Block	Ratio of the sum of the voting rights of all blockholders beyond the largest blockholder over the voting right of largest blockholder. Source: Dlugosz, Fahlenbrach, Gompers, and Metrick (2006).
Herfindahl Index	The Herfindahl index of the shareholders participation. Shareholders participation is based on the information on blockholders' participation and for the rest of the shares we assume they are individually held by investors.
Tangibility	Ratio of tangible, long-term assets (property, plant, and equipment) net of depreciation and amortization charges (ITEM 8) to sales (ITEM 12). Source: COMPUSTAT

Variables	Definition
Age	Natural log of the number of years (plus 1) since a firms founding (or incorporation or year since a firms first appearance in CRSP if founding year is unavailable). Source: Boyan Jovanovics website, http://www.nyu.edu/econ/user/jovanovi/whywait.xls .
Size	Natural log of capitalization (ITEM 2 4*ITEM25). Source: COMPUSTAT.
Sales Growth	Annual growth rate of sales. Source: COMPUSTAT.
D.Insider	Binary variable that takes a value of one if the firm has at least one blockholder which is an insider. Source: Dlugosz, Fahlenbrach, Gompers, and Metrick (2006).
ESOP	Binary variable that takes a value of one if the firm has put in place an Employee Share Ownership Plans. It does not include employee shares held through non-ESOP retirement plans (e.g. non-ESOP 401(k) plans). Source: Dlugosz, Fahlenbrach, Gompers, and Metrick (2006).
D.2Blocks	Binary variable that takes a value of one if the firm has at least 2 blockholders. Source: Dlugosz, Fahlenbrach, Gompers, and Metrick (2006).
D.Widely_Held	Binary variable that takes a value of one if the firm has no blockholders. Source: Dlugosz, Fahlenbrach, Gompers, and Metrick (2006).