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by Teodora Paligorova

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Teodora Paligorova

Financial Markets Department
Bank of Canada
Ottawa, Ontario, Canada K1A 0G9
tpaligorova@bankofcanada.ca

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Abstract

This paper investigates the determinants of corporate risk taking. Shareholders with substantial equity ownership in a single company may advocate conservative investment policies due to greater exposure to firm risk. Using a large cross-country sample, I find a positive relationship between corporate risk taking and equity ownership of the largest shareholder. This result is entirely driven by investors holding the largest equity stakes in more than one company. Family shareholders avoid corporate risk taking as their ownership increases unlike mutual funds, banks, financial and industrial companies. Stronger legal protection of shareholder rights is associated with more risk taking, while stronger legal protection of creditor rights reduces risk taking.

JEL classification: G34, G31
Bank classification: Financial markets; International topics

Résumé

L'étude porte sur les déterminants de la prise de risques en entreprise. Les actionnaires qui ont des intérêts considérables dans une seule firme ont tendance à préconiser la prudence en matière de politiques d'investissement parce qu'ils sont davantage exposés aux risques. À partir d'un vaste échantillon multipays, l'auteure découvre qu'il existe une relation positive entre la prise de risques et la part des capitaux propres détenue par l'actionnaire principal. Ce résultat ne vaut que pour les investisseurs qui sont actionnaires principaux de plus d'une entreprise. À la différence des fonds communs de placement, des banques et des sociétés financières et industrielles, les actionnaires familiaux évitent la prise de risques à mesure que leur participation augmente. La prise de risques s'accroît lorsque les droits des actionnaires bénéficient d'une meilleure protection juridique que ceux des créanciers, et elle diminue dans le cas contraire.

Classification JEL : G34, G31
Classification de la Banque : Marchés financiers; Questions internationales

1 Introduction

Agency theory prescribes that ownership structure affects the ability of owners to influence corporate risk taking (Jensen and Meckling (1976)). Large shareholders enjoy cash flow and control benefits from the companies they run.[1] They have powerful incentives to collect information and monitor managers in order to maximize their profits (Shleifer and Vishny (1986), Grossman and Hart (1980), Amihud and Lev (1981)). As the ownership stake increases, ceteris paribus, shareholders have greater incentives to raise a firm's profit by taking risky projects. Concentrating much of their wealth in a single firm may force large shareholders to conduct business from a more risk averse position than if they had a diversified portfolio of firms. John et al. (2008) reason that since private benefits are important to large shareholders, they may take more conservative projects to secure those benefits. Hence, large shareholders have the incentive to take more risky projects which, however, may be diluted due to the large exposure to a single company. The net effect of ownership structure on risk taking is less clear and depends on the optimal trade-off between the costs and benefits of large ownership stakes. In this paper, I examine how these incentives affect risk taking behavior of shareholders.

At least several reasons motivate research on corporate risk taking by large shareholders. Large shareholders are a prevalent class of investors wordldwide (Morck et al. (1988)).[2] Next, shareholders have significant impact on firms' financial decisions by holding sizable stakes in companies. They can shape the nature of a firm's corporate risk taking, which may affect its ability to compete, and eventually its survival (Wright et al. (1996)). An excessive appetite for risk can result in high-variance asset composition, which may cause negative repercussions in the whole economy. Finally, the role of large

[1]Benefits of control can be private and shared. Shared benefits of control arise from the superior management or monitoring that can result from the substantial collection of decision rights and wealth effects that come with large-block ownership. Private benefits of control that are derived from the voting power to consume resources could either be pecuniary, such as excess salary for an individual blockholder or synergies in production for a corporate blockholder, or they could be nonpecuniary, such as the amenities that apparently come from controlling corporations like professional sports, teams and newspapers. The concept of private benefits of control has received lots of attention in the literature. See Holderness (2003), Nenova (2003) and Dyck and Zingales (2004), among others.

[2]The majority of the US firms have at least one blockholder (Shleifer and Vishny (1986), Mehran (1995)). A recent study by Holderness (2009) reports that 96% of the firms in the US have a blockholder.

shareholders in corporate risk taking has received only limited attention in the empirical literature, unlike managerial ownership (Denis et al. (1997)), CEO pay-performance sensitivity (Coles et al. (2006)) and legal protection of investors (John et al. (2008)).

What are the factors that affect risk taking of shareholders? In addition to firm, industry and country specific characteristics, the size of the shareholder's stake plays a role. Agency theory assumes that managers are risk-averse and shareholders are risk neutral because they can diversify away idiosyncratic risks. Managers face an employment risk that can be reduced by achieving earnings smoothing through diversified mergers (Amihud and Lev (1981), May (1995)). According to these models, such risk reduction tendency will be subdued in owner-controlled firms in which shareholders have incentives to take more risks. Thus, risk taking is expected to be more pronounced in firms with large shareholders than in firms with dispersed ownership where risk-averse managers are more influential. A similar prediction is generated by Laeven and Levine (2009) who claim that diversified owners in banks will take more risks compared to relatively undiversified debt holders and nonshareholder managers.

However, if large shareholders are not well diversified they may protect their cash flow and control benefits by opting for conservative investment actions. The theoretical keystone is that shareholders who are diversified in their cash flow and control benefits will tend to advocate for more corporate risk taking than undiversified shareholders, the assumption being that the utility of undiversified investors is lower than that of diversified ones. While risks related to cash flows from a single company can be diversified away, it may be hard to alleviate excessive risk related to the benefits of controlling blocks. They are often characterized by privately negotiated trading of the whole block, the value of which depends on the private benefits of control (Dyck and Zingales (2004), Nenova (2003)).

One way to improve this situation is to hold the largest controlling stakes in multiple companies. In this paper, companies with the same largest shareholders are classified as *groups*. Under these conditions, groups consist of legally independent firms which are bound together by the presence of the same largest shareholder. Groups can be connected also through informal ties such as social ties, a common sense of identity,

and trade relations (Khanna and Yafeh (2007)). Viewed as diversified entities, groups provide a coinsurance effect by combining businesses whose cash flows are less than perfectly correlated and even more so if the stake of the largest shareholder is controlling. According to Lewellen (1971) reduced variance in a firm's cash flows from diversification serves to increase debt capacity, which may add value through taking more risky projects. Groups provide economies of scope as well. For example, the controlling shareholder may introduce the same marketing and distribution channel in firms in which they have controlling stakes. Similarly, a controlling shareholder may deal with the same suppliers, lenders and customers. Group organizational structure allows large shareholders to act from a more diversified position and thus take more risky projects. Under the assumption that active monitoring is associated with risk taking, large shareholders in groups may have an additional reason to take more risk due to the efficient cost reduction by using the same monitoring technology across firms in the groups.[3]

Second, the type of the shareholders plays a role in risk taking. Families, for example, may also avoid risk taking due to their goal of transferring the firm to the next generation (Anderson et al. (2003)). Risk taking may be affected by the regulatory constraints of mutual funds and pension funds (e.g., Black (1990) and Roe (1990)). Brav and Thomas (2008) compare firms before and after an activist hedge fund accumulates a stake and find significant changes in performance and firm policies. Without examining the incentives of each separate type of shareholder in detail, family owners are expected to be less risk taking than mutual funds, financial companies, banks and industrial companies.[4]

Third, Jensen and Meckling (1976) recognize that the legal environment can mitigate agency problems. Recent work by John et al. (2008) show that better investor protection leads to riskier and value-enhancing investments. Strong legal protection is a mechanism

[3]One of the purposes of monitoring is to reduce the information asymmetry between managers and owners (Holmstrom (1979)). Costly monitoring is associated with a greater precision in detecting the most relevant information for constructing an optimal CEO contract. Monitoring reduces the information asymmetry between managers and shareholders at the cost of a risk transfer from managers to shareholders, presumably without compromising performance incentives. Thus, instead of compensating the managers for risk taking, large shareholders take the risks themselves and receive compensation. Active monitoring may be particularly pronounced in groups where the same monitoring technology can be applied to a large number of firms and thus achieve cost reduction.

[4]Kempf et al. (2009) find that risk taking behavior of mutual fund managers is affected by compensation and employment incentives which depend on the mid-year performance of the funds.

for curbing the private benefits of large shareholders (La Porta et al. (2000)). Assuming that private benefits motivate conservative investments, the benefits of control are expected to be lower in countries with strong legal protection, which may indirectly give rise to risk taking. Thus, strong investor protection is expected to be positively related to risk-taking.[5] Acharya et al. (2008) propose that creditor rights protection affects risk taking. Better protected creditors cause shareholders to incur higher bankruptcy costs, which motivates the latter to avoid insolvency by engaging in conservative investment policies.

Using a large cross-section of companies from 38 countries, the key findings are as follows: First, corporate risk-taking and the percent of equity ownership are positively correlated.[6] Ownership concentration is the percentage of equity ownership of the largest shareholder, and risk-taking is measured with the variation in country- and industry-adjusted corporate earnings over total assets.

Second, to investigate the channel through which ownership affects risk taking, I examine the role of *groups*. Half of the firms are affiliated with a group, defined as a structure comprised of at least two companies having the same largest shareholder. Conditional on a shareholder's participation in a group, I first find that risk-taking is lower in group-affiliated companies; next, the relationship between risk-taking and ownership is positive only for shareholders that participate in the group; for the rest, it is negative and insignificant depending on the specification.

Third, the type of the shareholder affects incentives for corporate risk taking . Families do not take risky projects as their controlling stake increases. They also participate to a much smaller degree in groups, which makes it impossible to evaluate the effect of ownership on risk taking in family-controlled groups. The results suggest that they avoid risk-taking outside groups. Large mutual funds and industrial firms are taking more risks once being in a group, unlike banks and financial companies.

Finally, I analyze the influence of regulation on corporate risk-taking. La Porta

[5]Deposit insurance, capital regulation and shareholders' protection are found to affect the ability of bank owners to take risks (Laeven and Levine (2009), Gonzalez (2005)).

[6]As in Laeven and Levine (2009) this paper does not consider optimal risk taking, but rather it provides empirical assessment of how group affiliation interacts with ownership in shaping risk taking.

et al. (2000) posit that strong investor protection makes it more difficult for controlling shareholders to secure private benefits through conservative corporate activity, which forces them to pursue risky projects. Strong creditor rights protection, on the other hand, may decrease risk taking because in these countries bankruptcy is more costly for the shareholder. The results document that stronger shareholders' rights are associated with more risk-taking, and stronger creditor rights with less risk-taking. The former result is consistent with John et al. (2008), and the latter one with Acharya et al. (2008).

This paper is directly related to the strand of literature that examines the effect of ownership on corporate risk-taking. Wright et al. (1996) hypothesize that institutional owners exert a significant and positive influence on risk taking because of their incentive to increase firm value through the promotion of risk taking activities. Accounting simultaneously for the impact of insider and blockholders' ownership, the authors do not find a significant relationship between the latter and risk taking. Gadhoum and Ayadi (2003) test whether the ownership structure of Canadian firms is negatively related to firm risk. The authors find a nonlinear relationship between ownership and risk; risk taking is high at low and high levels of ownership. Laeven and Levine (2009) also document a positive relationship between risk taking and ownership in banks. Unlike the above studies, I emphasize the importance of group participation in risk-taking.

This paper also contributes to the literature on business groups. Khanna and Yafeh (2007) point out in their survey paper that groups, as "a hybrid organizational form between a firm and a market may play an important role in our understanding of firms." I complement the results of Khanna and Yafeh (2005) by finding that groups provide risk sharing, which is reflected in lower levels of risk taking in groups, all other things being equal. I extend this result by uncovering that shareholders with large equity stakes are taking more risks in groups as compared to outside groups.

The above results continue to hold after accounting for possible endogeneity of the decision of the largest shareholders to invest in more than one firm. Initially, I control for the unobservable group fixed effects that might affect risk taking. Second, I apply Heckman's correction method to control for self-selection bias induced by the decision of firms to participate in a group. Third, I estimate a two-stage model. At the first stage,

the residuals of time-varying corporate earnings are retrieved, and at the second stage the standard deviations of the residuals are regressed on ownership and firm-specific controls. The results are also robust to an application of the quantile estimation technique and a number of additional robustness checks.

The rest of the paper is organized as follows. In the next section, I briefly discuss related literature and develop the hypotheses. Section 2 describes the data, variables and descriptive statistics. Sections 3 and 4 present the estimates of risk-taking regressions with and without group affiliation. Section 5 addresses endogeneity, and Section 6 provides robustness checks and Section 7 concludes.

2 Data, Sample, and Empirical Design

I examine the above questions using firm-level ownership data from the OSIRIS database provided by Bureau Van Dijk. The initial sources of information are from World'Vest Base, Fitch, Thomson Financial, Reuters, and Moody's. The data contains the names of shareholders, their type and the percentage of shareholdings reported once during the period from 2003 to 2006 for listed firms in 38 countries. The initial sample consists of 21,755 listed companies over the period 2003-2006 totaling 83,672 firm-year observations. To ensure consistency, only firms with consolidated balance sheets are considered. After excluding firms from the financial sector (SIC 6000-6999) and firms with total assets less than $10 million, the sample consists of 13,486 firms.[7]

2.1 Definition of Variables

The OSIRIS data reports the percentage of ownership for each shareholder only once for the period from 2003 to 2006. Ownership is measured as the percentage of cash flow rights in the firm. Depending on the specification, ownership of less than 10% is coded at zero.

A business group in general is defined as a set of legally separated firms with a

[7]The sample in the regression analysis further drops due to availability of information on legal protection indexes.

common shareholder.[8] An important feature of the groups in this paper is that firms that belongs to the same group have the same *largest* shareholder (See Figure 1 for graphical representation of groups). Thus, groups are comprised of the firms in which shareholders have the largest stakes. It is also possible that firms are not only controlled by the same largest owner but they also control subsidiaries (Figure 2).

A proxy for risk-taking is the volatility of corporate earnings. In particular, I consider country- and industry-adjusted dispersion of firm-level earnings over the sample period from 2003 to 2006:

$$RISK = \sqrt{\sum_{t=1}^{T}(E_{i,c,k,t} - 1/T\sum_{t=1}^{T}E_{i,c,k,t})^2/(T-1)}$$

where

$$E_{i,c,k,t} = EBITDA_{i,c,k,t}/Assets_{i,c,k,t} - 1/N_{c,k,t}\sum_{j=1}^{N_{c,k,t}} EBITDA_{j,c,k,t}/Assets_{j,c,k,t}$$

$N_{c,k,t}$ indexes firms within country c, industry k and year t; $EBITDA$ is earnings before interest, taxes, and depreciation. For each firm with available earnings and assets data, I compute the deviation of a firm's EBITDA/Assets from the country and industry average for the corresponding year. Then, the standard deviation of this measure is used as a proxy for risk.

Several variables are found to explain most of the cross-sectional variation of earnings volatility at the firm level. These variable are sales, corporate earnings ($EBITDA/Assets$) and book leverage (the ratio is defined as the ratio of long-term and short term debt to assets) (John et al. (2008), Laeven and Levine (2009), Khanna and Yafeh (2005)). All accounting data items are converted into $U.S. million. The variables are winsorized at the 0.5% at each tail of the distribution. To characterize investor protection in each country, the indexes of anti-director rights and credit rights protection retrieved from La Porta et al. (1998) are employed.[9]

[8]See Cuervo-Cazurra (2006) and Khanna and Yafeh (2007) for discussion of various definitions of business groups in the literature.

[9]The anti-director rights index is "formed by adding one when: (1) the country allows shareholders to mail their proxy vote to the firm; (2) shareholders are not required to deposit their shares prior to

2.2 Summary Statistics

Table 1 provides descriptive statistics of the distribution of the number of firms across countries.[10] The number of firms per country reported in column (1) varies significantly. For example, the total number of firms in Columbia is 9 and in Japan it is 2,296. The total number of groups is 1,070 comprising of 6,936 firms. The data shows that 52% of all firms are part of a group, i.e., the largest shareholder has the largest equity ownership in more than one firm in the sample. 12% of all groups are located in Japan, 10% in Canada, 8.6% in the United Kingdom and 6.14% in Taiwan. Further investigation shows that 44% of all firms in the United Kingdom are in a group, similarly 90% in Japan, 56% in Canada, 50% in the US and 20% in Taiwan.

The risk-taking measure, RISK, ranges from a low of 4.54% in Taiwan to a high of 13.83% in Australia. On average, the most levered firms as measured by book leverage are in Thailand, Chile and Portugal. Equity ownership of the largest shareholder also varies substantially across countries. In Germany the average percent of shareholdings is 54.6, while in Japan it is only 10.33. The correlation between the risk-taking variable (RISK) and ownership is 0.02% and it is statistically significant (not tabulated). The correlations between RISK and anti-director rights, and between RISK and creditor rights are 13% and -10%, respectively.

Table 2 presents the results of mean and median comparisons for a number of characteristics of group affiliated and non-affiliated firms. The first two columns show means and medians for all firms. The average ownership stake of the largest shareholders is 25.82% while the median is 15.2%. A fraction of large firms contribute to the discrepancy between mean and median size as reported in million dollars of net sales. The comparison of group affiliated and unaffiliated firms shows that the average equity own-

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the general shareholders' meeting; (3) cumulative voting or proportional representation of minorities in the board of directors is allowed; (4) an oppressed minorities mechanism is in place; (5) the minimum percentage of share capital that entitles a shareholder to call for an extraordinary shareholders' meeting is less than or equal to 10%; (6) shareholders have preemptive rights that can be waived only by a shareholders' vote. The index ranges from zero to six. The creditor rights index is defined as a summation of four indexes defined in La Porta et al. (1998). The index ranges from 0 to 4.

[10]The statistics do not include firms in the financial sector and firms with total assets smaller than $10 million. Also, the sample is restricted by the availability of data on anti-director and creditor rights indexes.

ership stakes are 15.83% and 33.6%, respectively. Tests of the equality of mean and median ownership stakes suggest that equity ownership is significantly higher in unaffiliated firms as compared to that in affiliated ones. Unaffiliated firms are found to be more risky than the affiliated ones. The size of affiliated firms as measured by net sales is significantly larger than that for unaffiliated firms. In terms of profitability, the t-test of equally of means indicates that affiliated and unaffiliated firms do not differ, however the sum-of-ranks test indicates that unaffiliated firms are more profitable than the affiliated ones. Note that this observation is in line with well documented evidence that diversified (affiliated) firms are less profitable and risky compared to stand-alone firms (Berger and Ofek (1995), Lang and Stulz (1994) and Laeven and Levine (2007)).

The risk-adjusted measure of EBITDA/Assets is calculated by dividing the average profitability measure EBITDA/Assets by the standard deviation of corporate earnings (RISK). The risk-adjusted returns are lower for the unaffiliated firms compared to the affiliated ones. Also the unaffiliated firms rely more on debt than the affiliated ones.

To describe groups, Table 3 shows statistics for various group-specific characteristics that capture different aspects of group heterogeneity. Namely these measures are the number of firms in a group, the number of ultimate owners (UO) in a group (defined as a controlling shareholder at the 10% level), the number of different business segments as measured by 2-digit SIC, and the number of different countries in which firms operate. To measure the degree of ownership concentration in groups, I calculate a Hirfindahl index for shareholder distribution defined as: $D_j = \sum w_i^2$, where w_i is the weight of the stock in the $j-th$ group. High values of the index are associated with greater ownership concentration. The average value of the index is 0.6. On average, a group is comprised of almost 5.73 companies. Groups are operating in 3.9 distinct 2-digit SIC industries. The average number of firms operating in different countries, a measure of international diversification is 2, and the average number of ultimate owners, a measure of ownership concentration in the group is 2.10.

The simple correlation matrix in Table 3 shows that risk is negatively related with all diversification measures and positively related with ownership concentration captured by the number of ultimate owners. The measures of diversification are highly correlated,

however the correlation is far from perfect, suggesting that these proxies for group diversification are not redundant. The correlation between the average number of UO in a group and all other diversification measures is weak suggesting that the two measures capture different aspects of diversification.

The dataset offers information on the type of the largest shareholders. Overall, the bank largest shareholders comprise 11.03% of the sample (Table 4), families account for a fifth of the sample and industrial companies for a third of it. Shareholders classified as financial companies are less then 10%. Ownership patterns depend on the type of the shareholders. 80% of the firms with family largest shareholder have an ultimate owner, though, only a small fraction of these shareholders participate in a group. Shareholders defined as banks and mutual funds, on the other hand exhibit different ownership pattern—they have smaller shareholders and participate more frequently in groups.

2.3 Basic Regressions

Specification (1) allows us to test the effect of ownership on corporate earnings volatility.

$$\begin{aligned} RISK_i &= \alpha Ownership_i + \beta FirmControls_i + \gamma InvestorProtection_c \\ &\quad + \eta CountryDummies + \delta IndustryDummies + \epsilon_i, \end{aligned} \tag{1}$$

The dependent variable, RISK, is the standard deviation of country- and industry-adjusted EBITDA/Assets of firm i. $Ownership$ is percentage of direct and indirect equity ownership of the largest shareholder. If the largest owner has less than 10% ownership, the value is coded at zero.[11] $FirmControls$ includes logarithm of sales, book leverage (short and long term debt over assets) and corporate earnings (EBITDA/Assets) specified at the beginning of the sample period that is year 2003;[12] $InvestorProtection$ includes country level indexes such as anti-director rights and creditor rights as reported in La Porta et al. (1998). To estimate the above equation, OLS method with clustered

[11]This modification is widely used in the literature (John et al. (2008), Faccio and Lang (2001)). In the robustness section a threshold of 20% is used. The results still hold.

[12]As a robustness check I use the time average of each variable for each firm.

standard errors at the country level is applied. As shown in Table 1, the number of firms per country differs substantially. To avoid the possibility that this particular sampling feature affects the results, each individual firm observation is weighted with the inverse of the number of country observations (sampled firms) in a country.[13]

Risk and ownership might be jointly determined by common unobservable factors which violates the consistency of the OLS estimator. As suggested by Demsetz and Lehn (1985) ownership structure arises endogenously within the firm. One way to address this issue is to use an instrumental variable that is correlated with ownership structure and uncorrelated with risk-taking. A potential candidate variable is the average ownership of firms in the same industry group and country.

To examine whether group affiliation affects risk-taking, I augment equation (1) with a group dummy variable and an interaction term of ownership and the group dummy variable:

$$\begin{aligned} RISK_i &= \alpha_1 Ownership_i + \rho Group + \xi Ownership_i \times Group + \\ &\quad \beta_1 FirmControls_i + \gamma_1 InvestorProtection_c + \eta_1 CountryDummies + \\ &\quad \delta_1 IndustryDummies + \epsilon_{1i}, \end{aligned} \tag{2}$$

Group takes the value one if a firm belongs to a group, and zero otherwise. A positive ξ is expected if a high level of stock ownership in affiliated firms increases risk-taking compared to a high level of ownership in unaffiliated firms. This specification is similar to Khanna and Yafeh (2005), however it differs by incorporating ownership. In additional (unreported) specifications, I include a set of group diversification measures to further investigate the relation between diversification and risk-taking.

Group affiliated firms may not comprise a random sample, which is confirmed by observing substantial differences in firm characteristics for these firms affiliated to a group and these that remain unaffiliated (Table 2). If a firm's decision to diversify affects corporate risk-taking, i.e., if *Group* and ϵ_{1i} are correlated, the *Group* estimate

[13]See John et al. (2008) and Khanna and Yafeh (2005) for the use of similar approach.

will be biased and inconsistent. To address this issue, I first estimate the Heckman self-selection model that explicitly models the decision to diversify and incorporates its effect into the risk-taking regression, which attenuates biases in the estimates ρ and ξ. Second, I estimate a two-stage model that first takes into consideration firm-specific factors affecting average earnings and then evaluates the impact of ownership on the risk-taking at the second stage. Third, group fixed effects are included, assuming that the unobserved heterogeneity, leading to correlation between the error term and the *Group* variable, is constant over time.

3 Risk-Taking: First Results

Specification (1), defined in Section 3.3 is in line with Laeven and Levine (2009) that examine 288 banks across 48 countries. By estimating similar regressions on a sample of 13,486 non-financial firms across 38 countries, I provide complimentary evidence of the effect of ownership on risk-taking. This exercise sheds light on whether the relationship between risk-taking and ownership is solely bank-specific as suggested by Laeven and Levine (2009), or of it is prevalent across industries. In effect, the agency argument that risk-taking and ownership are related is not constrained only to banks. The extension of Laeven and Levine (2009)'s analysis to non-financial firms demonstrates this point.

The main focus of the analysis is on the relationship between risk taking and ownership. Using three different measures of ownership, Table 5 columns (1)-(3), indicates that ownership and risk-taking are positively correlated. In column (1) ownership is defined as an indicator variable taking the value of zero if ownership is smaller than 10% and one if it is larger; in column (2) if the percent of ownership is less than 10% the variable is coded at zero; in column (3) the percent ownership of the top five largest shareholders is considered.

All specifications include a set of control variables. The estimates on the initial values of sales, earnings and leverage assume the expected signs. Larger firms and firms with initially higher earnings are associated with lower operating risks. Previous literature points out that earnings smoothing may lead to lower variability of corporate earnings.

When including proxy for earnings smoothing as in John et al. (2008), its estimate is not statistically significant, potentially due to the relatively short time period. This variable is omitted from other regression specifications. In an untabulated specification, I include a quadratic term of equity ownership as suggested by Gadhoum and Ayadi (2003) and Wright et al. (1996). While the coefficient on this term is negative and significant in the above mentioned studies, it is negative and insignificant in the current specification for which reason I omit the squared ownership from the specifications.

To exclude the possibility that the relationship between ownership and risk-taking might be driven by a parent-subsidiary tie, I exclude the fraction of shareholders who own more than 50% of a firm. The results shown in column (4), Table 5, are preserved.

The anti-director rights and creditor rights indexes are defined in La Porta et al. (1998). John et al. (2008) outline a number of arguments in support of either positive or negative relationship between risk-taking and investor protection. Because investor protection and ownership concentration are substitutes, in countries with strong investor protection corporations with risk-averse dominant shareholders are expected to be less prevalent. This explains the negative relation between risk-taking and investor protection. La Porta et al. (2000) provide different argument of why risk-taking might be lower in countries with strong shareholder rights. To secure their private benefits, large shareholders abstain from taking risky projects. In countries with strong investor protection, it might be more costly to secure these benefits through passive corporate policies. This will force shareholderholder to switch from conservative risk-taking that secures private benefits to more aggressive risk-taking.

In column (1), the coefficient on the anti-director rights index takes a positive sign. John et al. (2008) include a richer set of investor protection indexes such as rule of law and accounting disclosure standards. They also find a positive, but not always significant relationship between anti-director rights and corporate risk-taking. One explanation of the lack of a significant link between external ownership and regulation is a substitution effect between the actual availability of large shareholders and strong investor protection (La Porta et al. (1999), Burkart et al. (2003)).

Another proxy for investor protection is the index of creditor rights. Acharya et al.

(2008) propose that countries with stronger creditor rights make firms engage in risk-reduction activities, the argument being that strong creditor rights incur higher liquidation costs for investors. Consistent with this argument, I find that the coefficient on the creditor rights index is negative and significant in all specifications in Table 5.

Table 6 presents results for the sample of firms having a controlling shareholder (ultimate owner) defined as a shareholder with more than 10% ownership. The rational for splitting the initial sample is to unveil any potential correlation between large ownership and firm characteristics that might affect the estimate on ownership. The estimate on ownership in column (1) clearly indicates that the entire effect of ownership on risk-taking is coming from the sample of firms with controlling shareholders that comprises 64% of the entire sample.

Columns (2) to (6) present the results from regressions of risk-taking on ownership of different types of shareholders. As reported in column (2) family owners are found to take less risky projects as their ownership increases. They may have incentives to avoid risks in order to secure a firm's long-term survival (Anderson et al. (2003)). On the other hand, shareholders such as mutual funds and financial companies that target high returns and maintain well-diversified portfolios are expected to take more risks. The results in columns (4) and (5) show that the relationship between ownership and risk-taking is positive for these types of owners. This is not the case for bank large shareholders, shown in column (6). A closer investigation of bank controlling owners suggest that a third of them have stocks in US firms and they exhibit somewhat similar positive relationship between ownership and risk taking. It is possible that bank equity ownership is a subject of specific regulation which requires an additional investigation beyond the scope of this paper.

Overall, this analysis suggests that large shareholders are taking greater risks as measured by the standard deviation of firms country- and industry-adjusted corporate earnings. To a certain extent, this relationship depends on the type of the largest shareholder: families do not take risks as their ownership increases. The results confirm previous results of the effect of ownership on risk taking (Laeven and Levine (2009)) and the effect of legal protection on risk-taking (John et al. (2008), and Acharya et al. (2008)). These

studies do not ask whether large shareholders preserve their risk-taking tolerance had they hold a portfolio of the largest ownership stakes. The next section addresses the issue of holding equity stakes in more than one company.

4 Results: Group Affiliation and Risk-Taking

Table 7 reports the results of regression specification (2) defined in Section 3.3.[14] The model in column (1) is similar to those estimated in Section 3, however, it accounts for the presence of group effect by including a group dummy and the interaction term between the group dummy and the ownership stake of the largest shareholder. The dummy variable, *Group*, equals one if a firm belongs to a business group and zero otherwise. The estimates show that the coefficient on the group dummy is negative and significant. Firms affiliated with a group exhibit 0.85% lower standard deviation of earnings than unaffiliated firms. This result is similar to Khanna and Yafeh (2005) who examine twelve emerging markets and interpret the negative effect of group on risk-taking as a form of risk-sharing. The estimates of ownership and the interaction term between group affiliation and ownership are of particular interest. The positive sign of the interaction term suggests that owners with large stakes tend to advocate risk-taking only if they are in a group. One explanation of the positive marginal effect of ownership on risk-taking conditional on group participation is that shareholders achieve better diversification in groups. Because diversified owners derive greater utility of risk-taking, they are expected to be more prone to taking projects with more volatile earnings.

The coefficients on $IntialSales$, $InitialBookLeverage$ and $InitialEBITDA$ take the expected signs. As in John et al. (2008) the coefficient on firm size measured by log sales is negative and significant, indicating that large firms exhibit lower risk-taking. Similarly, initially more profitable firms are associated with lower risk-taking.

I estimate the specification in column (1) separately for group affiliated and stand-alone firms. The estimation with the partitioned sample removes biases that arise from correlation between the group dummy and other controls. The estimates of ownership

[14] All standard errors of the estimates are clustered at the country level. Clustering at the group level does not affect the significance of the estimates.

clearly confirm that the positive link between ownership and risk-taking is pertinent to the group-affiliated firms (column 2). On the contrary, ownership stakes and risk-taking are negatively correlated for stand-alone firms (column 3). One standard deviation increase in ownership increases the group-affiliated firms' volatility , on average, by 12 basis points of its mean; while outside groups the volatility decreases by 15 basis points of its mean.

Column (4) presents the results for controlling shareholders defined at the 10% of ownership that comprise 70% of the full sample. The effect of ownership on risk-taking conditional on shareholder being in a group is valid only for controlling shareholders. Taking together the results from column (2) in Table 5 and from column (4) in Table 7, large owners seem to take higher risks if they are in groups and low risks outside group.[15]

In Table 7 column (5), I summarize the estimated coefficients from a specification using Hirfendahl index to account for the degree of ownership concentration in groups. The index is multiplied by -1, which means that high values of the index indicate significant degree of diversification. Firms that are not group affiliated have index that equals -1. The estimate on ownership for a firm with median Hirfendahl index is 0.03 percentage points [0.016+1/2*0.026], while the estimate for a firm that is not diversified at all is 0.016 which confirms that greater ownership diversification is associated with more risk taking.

The presented results thus far, except for the specification in column (5), imply that all groups affect firms' risk-taking in the same way. Accounting for group characteristics might affect the results presented in Table 7. I estimate specifications (untabulated) with three different proxies for diversification: (i) corporate diversification is the number of different industry groups (two-digit SIC industries) in which firms in the group operate;[16] (ii) the second measure captures geographical diversification by counting the number of different counties in which firms in the group operate; (iii) the third measure captures the degree of ownership concentration of the group and it is measured by the number of firms in which the largest shareholder owns more than 10% equity. For all specifications

[15]As a robustness check, I exclude groups comprised of very large number of companies. The results are preserved.

[16]This measure is widely employed in the literature. See Martin and Sayrak (2003), Khanna and Yafeh (2005), Aggarwal and Samwick (2003), Denis et al. (2002) among others.

the coefficient on the group affiliation remains negative and statistically significant, and the coefficient on the interaction term with ownership is positive and significant. The proxies for diversification do not affect risk-taking significantly, even though all estimates take the expected signs.

Table 8 presents the results from similar specifications for different types of shareholders. Several interesting patterns emerge from these results. Mutual funds that are affiliated to a group do not advocate for risk taking. However, when considering only 940 mutual funds with stakes higher than 10%, the results indicate that these investors take risks. Controlling ownership by banks and financial companies does not influence a firm's risk taking decision either inside or outside groups. Family owners, remaining in most of the cases outside groups, promote less risk-taking as their ownership stake increases. Finally, shareholders classified as industrial companies take more risk once in a group, however they avoid this behavior outside groups.

5 Endogeneity Issues

The estimated models raise some econometric concerns. As pointed out by Campa and Kedia (2002), Graham et al. (2002), Laeven and Levine (2007), and others, firm-specific factors that drive the decision to be in a group might affect risk-taking. Thus, to evaluate the effect of group diversification on risk-taking per se one has to control for the underlying factors that drive the group decision. Thus, group affiliation should be treated as an endogeneous outcome that optimizes risk-taking, given a set of exogeneous determinants of diversification. Evaluating the impact of group affiliation on risk-taking therefore requires taking into account the endogeneity of the decision to hold shares in more than one company.

To account for the possibility that ownership and risk taking are endogeneous due to unmodelled heterogeneity for example, Table 9 column (1) shows results of instrumental variable estimation. As in Laeven and Levine (2009), firm ownership is instrumented with the average ownership of all other firms operating in the same 2-digit SIC and the same country. It is not expected that the change in risk in one firm will affect

the average ownership of the whole industry. The results show that the instrument enters significantly the first stage. The Hausman test of endogeneity confirms that the IV estimate of ownership is larger than the OLS estimate, which suggests that OLS understates the "true" effect of ownership on risk-taking.

To control for the endogeneity of the group affiliation decision, I take three steps. First, I include a set of group fixed effects. The main idea behind this approach is to control for *unobserved* and unchanging characteristics that are related to both the firm controls and the risk-taking variable. Since, the size of groups varies substantially, from 2 firms in a group up to 300 firms, in order to account for the group fixed effect, I focus only on a subset of groups that have more than 15 firms in a group (at the 90th percentile). In column (2) and (3) the OLS and group fixed effects are displayed. The signs of the coefficients on all variables remain similar to the OLS estimates presented in Table 7 column (1). The standard errors of the estimate on ownership increase under the fixed effect as compared for the OLS estimates, however, it remains statistically significant. The smaller magnitude of the estimate suggests that group fixed effects and ownership are correlated to some extent; however, the ownership stake of the largest shareholders affects risk-taking independently from unobserved group heterogeneity.

Second, I estimate an endogeneous self-selection model using Heckman (1979) two-step selection procedure. In the first step, I estimate a probit model of whether a firm belongs to a group. The control variables in this specification are the fraction of groups in an industry, industry size, industry and country dummies.[17] The fraction of groups in an industry is expected to affect group affiliation choice, but not a firm's earnings volatility. In the second stage, risk-taking is the dependent variable and the controls are firm characteristics and the predicted probability of group participation. The estimates are presented in column (4) in Table 9. The coefficient on ownership is positive and significant, and it is consistent with that found in the previous specifications. The self-selection parameter, lambda is negative and significant, which suggests that factors affecting the decision to be in a group are negatively correlated with risk-taking.

[17]Campa and Kedia (2002) use the fraction of all conglomerate firms in an industry as a proxy for industry attractiveness to account for diversification decisions and its impact on excess value. For a similar approach, see Laeven and Levine (2007).

The final test of endogeneity of group affiliation follows Khanna and Yafeh (2005). For example, it might be the case that firms with high profits systematically share risks with firms with low profits in the group, which will result in stable performance within groups. To account for this type of endogeneity, a two-stage estimation is considered. At the first stage, I allow profitability to be determined by firm characteristics and firm fixed effects. The second stage employs the standard deviation of the residuals from the first stage as a dependent variable. In such a way only the "unexplained" variation in profitability is explored. In addition to the controls from the first stage, the group dummy and its interaction with ownership are included. This approach, labeled by Khanna and Yafeh (2005) the conditional variance of profitability, is quite intuitive. Unexplained changes in profitability are expected to be smaller for group-affiliated firms. The results are presented in column (5) in Table 9. Although the estimate on the group dummy decreases in magnitude, it preserves the same negative and significant sign. The interaction term between group and ownership is still positive and significant which does not question the conclusion that the percent of ownership of the largest shareholder in group-affiliated firms is positively linked to corporate risk-taking.

In sum, whether using fixed effects, two-stage estimation method, or self-selection model, equity ownership by the largest shareholder is found to be positively related to firm risk-taking.

6 Robustness Checks

6.1 Groups and Subsidiaries

Groups so far are defined as horizontally-linked entities, however, they may be vertically-linked as depicted in Figure 2. In such a complex ownership structure where the ultimate owner controls subsidiaries via a chain of firms, there is a divergence between control and cash flow rights. One consequence of having high control and low cash flow rights in many firms is that the controlling shareholder may have incentives to benefit by tunneling cash flow from firms where they have low cash flow rights (at the bottom) to firms where they have high cash flow right at the top (Johnson et al. (2000)). John et al. (2008) reason that

such tunneling may increase variability in earnings due to reshuffling of resources from low to high cash flow units. Also, large shareholders may be more risk taking because they face a weaker constraint of financial distress in firms where they have low cash flow rights and high voting rights (Morck et al. (2005)).

To the extent that groups are also pyramidal in structure, it may be difficult to isolate the tunneling story from the group-driven diversification. Consistent with the argument of Khanna and Yafeh (2007) that "groups are not always pyramids, nor are all pyramids groups," I document that only 14% of all group affiliated firms have subsidiaries. Table 10 reports results from specifications that account for the presence of subsidiaries. The coefficient estimate on the subsidiary dummy variable in column (1) suggest that on average firms with subsidiaries (regardless of groups affiliation) are risk taking, though the estimate is not statistically significant. Ownership is positively linked to risk taking, however, less so in firms with subsidiaries. Thus far the results suggest that groups with subsidiaries exhibit completely opposite risk taking behavior than groups without subsidiaries. In columns (4) and (5), risk taking of groups with and without subsidiaries is examined. It is evident that ownership is positively linked with risk taking only in groups that do not have subsidiaries, while in groups with subsidiaries risk avoidance is observed. Only 728 firms are both group-affiliated and have at least one subsidiary, which may be the reason for the noisy statistically insignificant estimate on ownership. Interestingly, ownership is negatively linked to risk taking both in unaffiliated firms with and without subsidiaries (columns 5 and 6). Using the set of firms that are group-affiliated but do not have subsidiaries as a control group to the set of firms that are group affiliated but have subsidiaries to estimate the role of subsidiaries in groups confirms the positive relationship between ownership and risk taking in groups. Although the choice of large shareholders to control firms with subsidiaries may arise endogenously within firms, the results allow to rule out the tunneling story in explaining risk taking in groups.

6.2 Risk-Taking by the Largest Shareholders in the USA

In this section, I examine US firms that comprise a half of the total sample. One advantage of examining a single country as opposed to many countries is that one can avoid the

impact of uncontrolled cross-country heterogeneity that may otherwise bias the results. Due to data availability for the US, this section offers an alternative measure of risk that is the variability in monthly stock returns from CRSP over the period 2003-2006. This measure, based on monthly stock returns is less noisy. Risk here is defined as the standard deviation of monthly stock returns adjusted for industry returns. Columns (1) and (2) in Table 11 show OLS and IV results similar to column (1) in Table 5 and column (1) in Table 9. The OLS and IV estimates are quantitatively and qualitatively similar to those from the full sample (Tables 5 and 9) which gives reassurance that the definition of risk does not alter the conclusions.

Group affiliated firms, which comprise 45% of the firms in the US, exhibit higher risk-taking conditional on an increase in equity ownership. In particular, owners defined as mutual funds and banks that are part of a group also exhibit risk-taking behaviour with an increase in their equity stakes. The results from the last column in Table 11 finally confirm that outside of groups, the percentage of ownership does not affect corporate risk-taking of the US firms. This evidence is closely related to the results for the whole sample which alleviates concerns that the results are valid for only a small subsample of firms.

6.3 Quantile Regressions

The results might be driven by outliers in the distribution of corporate earnings. To address this possibility, I estimate a series of quantile regressions. The advantage of quantile over ordinary least squares regressions is that the former permit the estimation of the marginal effect of a covariate on risk-taking at various points of the distribution.[18] Specifically, I run the following regression:

$$[\psi(\mu), \beta(\mu)] = arg \min_{\psi,\beta} \sum_i \theta_\mu (RISK_i - \beta Ownership_i - \psi Controls_i)$$

[18]For detailed introduction of quantile regressions, see Koenker and Hallock (2001), and Buchinsky (1998).

where the coefficient $\beta(\mu)$ captures the quantile effect of ownership on risk-taking, $\theta_\mu(u) = u(\mu - I(u < 0)$ and $I(.)$ is an indicator function, $Controls_i$ includes the same set of variables specified in equation (1). The estimation is conducted for $\mu = 0.25, 0.50, 0.75, 0.90$. Table 12 presents a series of quantile regressions of risk-taking on the set of controls as specified in equation (1). The results in columns (1) to (4) refer to the group-affiliated firms, and in columns (5) to (8) refer to the unaffiliated firms. For the affiliated firms, ownership affects the whole distribution of the risk-taking measure (standard deviation of corporate earnings over assets), however ownership influences only a little the top and the bottom of the distribution. Columns (5)-(8) show that ownership does affect risk-taking negatively, however, this result is (statistically) preserved only for the firms located at the bottom of the distribution earnings' volatility of unaffiliated firms.

6.4 Miscellaneous

Pooling a large set of countries, might mask heterogeneity across countries. In columns (1) to (2) of Table 13, I exclude sequentially Japan and Canada as countries with high percentage of group-affiliated firms. After excluding each country separately from the sample, the estimated coefficients do not differ from the results of the full sample. In column (3), I exclude the largest industry, manufacturing. In column (4), I exclude shareholders classified as mutual funds and banks. The specification in column (5) includes all firms and the ownership variable is coded at the 20% as opposed to 10%. The results are preserved. The last column (6) omits the country specific anti-director and creditor rights indexes which are not available for all countries in the sample. The increased sample size does not affect the main estimates of ownership and group affiliation.

7 Conclusion

This study examines the relationship between ownership and corporate risk-taking. Using data from a large cross-country sample, I find that ownership and risk-taking are positively related. This result is preserved only for owners having equity ownership in more than one company. Being in a group allows shareholders to act from a more di-

versified position which explains the higher risk taking. The results continue to hold after controlling for the endogeneity of group affiliation in several different ways. Legal protection also plays a role in risk-taking. Countries with better protection of shareholder rights seem to be associated with more risk-taking, while in countries with strong protection of creditor rights corporate risk-taking is restrained.

This paper contributes to the literature on corporate risk taking by analyzing ownership of the largest shareholder in non-financial companies and the literature on corporate diversification. The results lend support to the view that equity ownership plays a role in risk-taking if owners hold the controlling stakes in multiple companies. Having different risk-taking incentives, the type of shareholders also affects the relationship between ownership and risk taking. Family controlling owners are avoiding corporate risk as their equity ownership increases. Consistent with theory, I argue that ignoring group participation may lead to incomplete conclusions about the impact of ownership on corporate risk taking.

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Table 1: Summary Statistics by Country

The table shows the distribution of firms across countries and summary statistics of selected variables from OSIRIS data over the period 2003-2006. RISK is the standard deviation of country- and industry-adjusted EBITDA/Assets. Book leverage is defined as short term debt plus long term debt over assets. EBITDA is earnings before interest, taxes, depreciation and amortization. Ownership is the percentage of equity stake of the largest shareholder in the firm.

Country	Number Firms	Number Firms in Groups	RISK	Book Leverage	Sales	EBITDA/ Assets	Own. %
Argentina	42	13	6.83	32.91	646	14.44	40.14
Australia	633	235	13.83	24.30	499	8.37	27.72
Austria	49	8	5.45	26.65	859	9.74	53.58
Belgium	90	11	5.96	26.51	1377	11.81	46.57
Brazil	147	50	7.42	34.00	1398	14.35	45.14
Canada	744	416	10.23	23.59	960	4.61	27.60
Chile	118	48	4.13	35.06	711	11.54	51.10
Colombia	9	3	6.88	26.15	587	8.58	46.27
Denmark	98	21	7.59	25.92	922	9.57	34.98
Egypt	92	65	5.98	29.07	195	13.94	52.49
Finland	111	22	7.03	24.81	1429	11.57	30.36
France	440	50	6.12	23.75	1454	9.61	50.29
Germany	400	64	7.18	23.32	1814	9.49	54.60
Greece	138	17	4.69	33.87	552	9.76	37.20
Hong Kong	110	39	5.87	21.88	1051	9.72	36.86
India	186	143	7.39	30.34	409	14.85	29.04
Indonesia	416	67	5.72	38.12	219	10.24	35.13
Ireland	50	23	7.13	28.42	1133	6.14	27.47
Israel	105	47	7.80	20.12	431	4.55	24.35
Italy	203	34	5.18	27.73	1468	8.78	39.27
Japan	2,296	2,063	3.66	22.31	1576	8.75	10.33
Malaysia	695	211	6.10	26.91	149	8.26	19.63
Mexico	82	41	4.87	24.82	2480	13.76	23.82
Netherlands	130	42	7.89	33.54	2733	11.40	33.92
New Zealand	77	27	7.21	24.07	291	15.06	29.10
Norway	151	37	7.27	29.63	860	9.73	35.61
Pakistan	30	17	6.76	26.56	508	22.39	45.09
Peru	17	4	9.05	25.78	351	18.04	47.41
Portugal	44	8	5.83	40.70	1540	9.39	37.30
Singapore	459	105	7.63	23.87	256	9.45	31.18
South Africa	139	46	10.46	16.99	885	18.79	39.59
Spain	101	23	7.65	28.06	2571	15.93	30.87
Sweden	232	92	8.12	19.07	1298	7.40	32.93
Taiwan	958	192	4.54	29.56	423	10.45	15.41
Thailand	256	126	6.08	34.01	340	12.23	21.65
Turkey	59	44	6.32	17.85	1374	15.07	27.01
United Kingdom	1,110	487	8.38	22.72	1166	7.49	25.58
US	3,979	1,995	9.57	22.08	1501	4.48	23.33

Table 2: Descriptive Statistics: Comparison of Groups and Unaffiliated Firms

Groups affiliated refers to firms in a group which is defined as a collection of firms having common largest shareholder. Ownership is the percentage of equity stake of the largest shareholder in the firm. RISK is the standard deviation of country and industry adjusted EBITDA/Assets. RISK (stock returns, only US) is the standard deviation of industry-adjusted monthly stock returns for US companies. EBITDA is earnings before interest, taxes, depreciation and amortization. Sales is the net sales (millions of US dollars). Risk-adjusted EBITDA/Assets is country- and industry-adjusted corporate earnings over RISK. Book leverage is defined as short term debt plus long term debt over assets. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	Total Sample		Group		Unaffiliated		Mean Diff.	Median Diff.
	Mean	Median	Mean	Median	Mean	Median	t-test	sum-of-ranks
	(1)	(2)	(3)	(4)	(5)	(6)	(5)-(3)	(6)-(4)
Ownership	25.82	15.2	15.83	8.96	33.6	25.13	44.29***	52.72***
RISK	7.36	5.05	6.65	4.74	8.21	5.45	10.53***	12.85***
RISK (stock returns, only US)	11.2	11.4	11.45	10.72	12.5	12.05	6.58***	6.69***
Sales	1035	137	1540	295.99	781	100.84	-15.77	-28.46
EBITDA/Assets	8.27	9.54	8.17	9.54	8.4	10.02	0.85	2.12**
Risk-adj. EBITDA/Assets	2.93	2.01	3.2	2.18	2.72	1.87	-6.53	-8.17
Book Leverage	25.37	22.59	22.55	19.92	25.9	23.1	9.26***	9.11***

Table 3: Summary Statistics of Group Specific Characteristics

Group is a set of firms having common largest shareholder. Number of Industries (Countries) indicates the number of different industries (countries) in which the group operates. Number of ultimate owners (UO) is the number of firms in a group having shareholder with more than 10% ownership. RISK is the standard deviation of country and industry adjusted corporate earnings. Groups' Hirfendahl is the summation of squared weights of the largest stocks in the portfolio of the largest shareholder.

				Correlation Matrix				
	Mean	Median	St. Dev.	RISK	Number of Firms in Group	Number of Industries	Number of Countries	Number of UO
Within Groups								
Groups Hirfendahl	0.60	0.57	0.25					
Number of Firms	5.73	2	17.85	-0.1	1			
Number of Industries	3.91	2	5.15	-0.13	0.95	1		
Number of Countries	2	1	1.51	-0.09	0.75	0.75	1	
Number of UO	2.20	2	3.46	-0.01	0.38	0.34	0.13	1

Table 4: Distribution of Firms by Type of the Largest Shareholders

Ultimate owner (UO) is defined as a shareholder with equity ownership at least 10%. Ownership is the percent equity ownership of the largest shareholder. RISK is the standard deviation of country- and industry adjusted-corporate earnings.

Type	% Firms	% Firms with UO	% Firms in Groups	Ownership	RISK
Bank	11.03	29.36	90.89	9.47	6.4
Family	22.01	80	8.81	26.89	11
Financial Company	8.66	55	55.41	19.07	8.42
Industrial Company	33.35	82	26.35	41.05	9.47
Mutual Fund	21.2	52	68.2	14.87	10.2

Table 5: Risk-Taking Regressions: Basic Specification

This table reports the estimates from OLS firm-level regressions of corporate risk-taking (RISK). Group dummy equals one for firms affiliated with a group. *OwnershipDummy* is an indicator variable taking the value of 1 for ownership greater than 10%. Top-five Ownership is the summation of the ownership stakes of the top-five shareholders. *Ownership* is the percentage of equity stake of the largest shareholder in the firm, coded at zero if it is smaller than 10%. EBITDA/Assets is earnings before interest, taxes, depreciation and amortization divided by total assets. Sales is the logarithm of net sales. Book leverage is defined as short term debt plus long term debt over assets. All controls are retrieved for the year of entry in the sample. ADR is anti-director rights index and CR is the creditor rights index. Column (4) includes only firms with largest shareholder having less than 50%. Clustered standard errors are reported in brackets. Each firm observation is weighted with the inverse of the number of firms from its domicile country. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	(1)	(2)	(3)	(4)
Ownership Dummy	0.186*			
	[0.108]			
Ownership		0.005**		0.009***
		[0.002]		[0.003]
Top-five Ownership			0.006***	
			[0.002]	
ADR	0.585***	0.586***	0.571***	0.744***
	[0.019]	[0.019]	[0.015]	[0.023]
CR	-1.585***	-1.574***	-1.560***	-1.817***
	[0.062]	[0.058]	[0.058]	[0.080]
Initial Sales	-0.656***	-0.656***	-0.657***	-0.632***
	[0.025]	[0.025]	[0.022]	[0.018]
Initial EBITDA/Assets	-0.181***	-0.181***	-0.181***	-0.181***
	[0.011]	[0.011]	[0.011]	[0.011]
Initial Book Leverage	0.006	0.006	0.006	0.005
	[0.004]	[0.004]	[0.004]	[0.004]
Firms	11678	11678	11678	9581
R^2	0.29	0.29	0.29	0.3

Table 6: Risk-Taking Regressions: Controlling Shareholders

This table reports the estimates from OLS firm-level regressions of corporate risk-taking (RISK). Group dummy equals one for firms affiliated with a group. *Ownership* is the percentage of equity stake of the largest shareholder in the firm, coded at zero if it is smaller than 10%. EBITDA/Assets is earnings before interest, taxes, depreciation and amortization divided by total assets. Sales is the logarithm of net sales. Book leverage is defined as short term debt plus long term debt over assets. All controls are retrieved for the year of entry in the sample. ADR is anti-director rights index and CR is the creditor rights index. Mutual Funds indicates that the largest shareholder is a mutual fund, similarly, Fin. Firm stands for financial firm. Clustered standard errors are reported in brackets. Each firm observation is weighted with the inverse of the number of firms from its domicile country. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	Controlling shareholders					
	Full	Ind. Firm	Family	Fin. Firm	Mutual Funds	Banks
	(1)	(2)	(3)	(4)	(5)	(6)
Ownership	0.004*	0.005*	-0.013***	0.045*	0.007***	0.003
	[0.002]	[0.003]	[0.003]	[0.024]	[0.002]	[0.008]
ADR	0.578***	0.542***	-0.867***	0.622	0.459***	1.572***
	[0.011]	[0.051]	[0.033]	[0.396]	[0.029]	[0.163]
CR	-1.388***	-1.373***	-1.339***	2.214***	-0.233***	0.095
	[0.029]	[0.140]	[0.048]	[0.288]	[0.011]	[0.156]
Initial Sales	-0.575***	-0.784***	-0.662***	-0.495***	-0.147*	-0.351***
	[0.019]	[0.179]	[0.016]	[0.151]	[0.077]	[0.060]
Initial EBITDA/Assets	-0.200***	-0.185***	-0.162***	-0.133***	-0.260***	-0.170***
	[0.005]	[0.012]	[0.005]	[0.027]	[0.004]	[0.006]
Initial Book Leverage	0.010***	0.011*	0.004	-0.01	0.010*	-0.002
	[0.002]	[0.006]	[0.003]	[0.009]	[0.006]	[0.009]
Firms	7459	2740	1798	552	1546	426
R^2	0.27	0.27	0.2	0.24	0.34	0.38

Table 7: Risk-Taking Regressions: Group Affiliation

This table reports the estimates from OLS firm-level regressions of corporate risk-taking (RISK). Group (Affiliated) is an indicator variable that equals one for firms affiliated with a group and zero otherwise. Ownership is the percentage of equity stake of the largest shareholder in the firm, coded at zero if it is smaller than 10%. All controls are retrieved for the year of entry in the sample. EBITDA/Assets is earnings before interest, taxes, depreciation and amortization divided by total assets. Sales is the logarithm of net sales. Book leverage is defined as short term debt plus long term debt over assets. ADR is anti-director rights index and CR is the creditor rights index. In column (4) only firms having an ultimate owner (UO), $Ownership > 10\%$, are considered. In column (5) Hirfendahl index, multiplied by -1, is the summation of the squared weights of the equity stake of the largest shareholders within groups. The higher the index is, the smaller is the concentration of the equity stakes in groups. Clustered standard errors are reported in brackets. Each firm observation is weighted with the inverse of the number of firms from its domicile country. Country and industry (one-digit SIC code) dummies are not reported. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	OLS	Affiliated	Not Affiliated	UO	
	(1)	(2)	(3)	(4)	(5)
Group	-0.854***			-1.533***	
	[0.075]			[0.110]	
Ownership	-0.007***	0.007***	-0.006***	-0.012***	0.016**
	[0.003]	[0.002]	[0.002]	[0.003]	[0.006]
Ownership×*Group*	0.014***			0.026***	
	[0.002]			[0.003]	
CDF Hirfindahl					-1.184***
					[0.073]
Ownership×$CDFHirfindahl$					0.026***
					[0.008]
Initial Sales	-0.589***	-0.586***	-0.601***	-0.467***	-0.634***
	[0.013]	[0.016]	[0.016]	[0.017]	[0.019]
Initial EBITDA/Assets	-0.187***	-0.168***	-0.206***	-0.209***	-0.181***
	[0.012]	[0.022]	[0.006]	[0.005]	[0.011]
Initial Book Leverage	0.005	0.005	0.008**	0.008***	0.006
	[0.004]	[0.005]	[0.003]	[0.002]	[0.004]
ADR	0.168***	0.194***	0.685***	0.563***	0.590***
	[0.007]	[0.012]	[0.015]	[0.010]	[0.018]
CR	-0.596***	-0.281***	-1.667***	-1.447***	-1.571***
	[0.009]	[0.015]	[0.046]	[0.028]	[0.060]
Firms	11630	5721	5909	7423	11678
R^2	0.29	0.32	0.26	0.28	0.29

Table 8: Risk-Taking Regressions: Group Affiliation and Type of the Largest Shareholder

This table reports the estimates from OLS firm-level regressions of corporate risk-taking (RISK). Affiliated (Unaffiliated) stands for firms (un)affiliated with a group. Ownership is the percentage of equity stake of the largest shareholder in the firm, coded at zero if it is smaller than 10%. All controls are retrieved for the year of entry in the sample. EBITDA/Assets is earnings before interest, taxes, depreciation and amortization divided by total assets. Sales is the logarithm of net sales. Book leverage is defined as short term debt plus long term debt over assets. ADR is anti-director rights index and CR is the creditor rights index. Ind. Firm indicates that the largest shareholder is an industrial firm; Similarly, Fin. Firm stands for financial firm. Clustered standard errors are reported in brackets. Each firm observation is weighted with the inverse of the number of firms from its domicile country. Country and industry (one-digit SIC code) dummies are not reported. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	Mutual Fund		Banks		Family		Ind. Firm		Fin. Firm	
	Group	Unaff.	Group	Unaff.	Group	Unaff.	Group	Unaff.	Group	Unaff.
Ownership	-0.007	-0.021***	0.002	-0.007	0	-0.010***	0.010***	-0.004*	0.017	0.011
	[0.009]	[0.006]	[0.016]	[0.023]	[0.020]	[0.004]	[0.002]	[0.002]	[0.011]	[0.010]
Initial Sales	-0.633***	0.043	-0.515***	-1.611*	-0.173	-0.745***	-0.570***	-0.707***	-0.721***	-0.794***
	[0.011]	[0.055]	[0.021]	[0.903]	[0.162]	[0.014]	[0.065]	[0.077]	[0.102]	[0.260]
Initial EBITDA/Assets	-0.187***	-0.293***	-0.134***	-0.187***	-0.279***	-0.161***	-0.167***	-0.212***	-0.06	-0.162***
	[0.009]	[0.009]	[0.037]	[0.012]	[0.022]	[0.004]	[0.028]	[0.011]	[0.043]	[0.050]
Initial Book Leverage	0.009***	0.014**	-0.001	-0.040**	0.032***	-0.005	0.001	0.020**	-0.002	0.001
	[0.003]	[0.006]	[0.008]	[0.019]	[0.011]	[0.003]	[0.003]	[0.008]	[0.003]	[0.019]
ADR	0.272*	0.515***	5.240***	2.235***	-0.806***	-1.316***	0.162***	0.519***	1.111***	-1.884***
	[0.139]	[0.044]	[0.129]	[0.197]	[0.206]	[0.038]	[0.044]	[0.070]	[0.126]	[0.370]
CR	-0.332*	-0.190**	-1.615***	1.674**	-0.643	0.265***	-1.162***	-1.478***	-0.474***	5.236***
	[0.193]	[0.073]	[0.019]	[0.660]	[0.476]	[0.053]	[0.044]	[0.157]	[0.039]	[0.547]
Firms	2172	688	1525	89	199	2075	1045	2592	724	390
R^2	0.34	0.35	0.31	0.42	0.46	0.21	0.25	0.28	0.31	0.26

Table 9: Additional Estimation Procedures

This table reports the estimates from firm-level regressions of corporate risk-taking (RISK). Group is an indicator variable that equals one for firms affiliated with a group and zero otherwise. Ownership is the percentage of equity stake of the largest shareholder in the firm, coded at zero if it is smaller than 10%. All controls are retrieved for the year of entry in the sample. EBITDA/Assets is earnings before interest, taxes, depreciation and amortization divided by total assets. Sales is the logarithm of net sales. Book leverage is defined as short term debt plus long term debt over assets. ADR is anti-director rights index and CR is the creditor rights index. Column (1) presents estimates form instrumental variable regressions. Column (2) shows fixed effect estimates at the group level for groups consisted of a large number of firms. Column (3) covers the same sample as in column (2) however it does not account for group fixed effects. Clustered standard errors are reported in brackets. Each firm observation is weighted with the inverse of the number of firms from its domicile country. Country and industry (one-digit SIC code) dummies are not reported. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	IV	Fixed Effects	OLS	Self-Selection	Two-Stages
	(1)	(2)	(3)	(4)	(5)
Group					-0.295*
					[0.147]
Ownership	0.120***	0.031**	0.074***	0.009**	-0.005
	[0.046]	[0.015]	[0.018]	[0.004]	[0.004]
Ownership×*Group*					0.010*
					[0.005]
Initial Sales	0.647**	-0.738***	-0.657***	-0.843***	-0.489***
	[0.278]	[0.063]	[0.107]	[0.091]	[0.073]
Initial EBITDA/Assets	-1.213**	-0.092***	-0.079***	-0.138***	-0.001
	[0.570]	[0.008]	[0.019]	[0.007]	[0.003]
Initial Book Leverage	-0.582***	0.003	0.004	0.012**	-0.084***
	[0.072]	[0.005]	[0.007]	[0.005]	[0.010]
ADR	-0.191***	0.299	0.842***	0.155	1.049***
	[0.012]	[0.194]	[0.223]	[0.650]	[0.062]
CR	-0.005	-0.617***	-0.939***	-1.293	-0.576***
	[0.006]	[0.154]	[0.176]	[1.073]	[0.061]
Lambda				-3.46	
				[1.07]	
Firms	11910	2885	2885	11980	11153
R^2	0.18	0.16	0.19	0.3	0.2

Table 10: Groups and Subsidiaries

This table reports the estimates from firm-level regressions of corporate risk-taking (RISK). Group is an indicator variable that equals one for firms affiliated with a group and zero otherwise. Subsidiaries is an indicator variable that equals one for firms that have at least one subsidiary. Ownership is the percentage of equity stake of the largest shareholder in the firm, coded at zero if it is smaller than 10%. EBITDA/Assets is earnings before interest, taxes, depreciation and amortization divided by total assets. Sales is the logarithm of net sales. Book leverage is defined as short term debt plus long term debt over assets. ADR is anti-director rights index and CR is the creditor rights index. All controls are retrieved for the year of entry in the sample. Clustered standard errors are reported in brackets. Each firm observation is weighted with the inverse of the number of firms from its domicile country. Country and industry (one-digit SIC code) dummies are not reported. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	Full	UO	Groups with Subsidiaries	Groups without Subsidiaries	Unaffiliated with Subsidiaries	Unaffiliated without Subsidiaries
Subsidiaries	0.233	0.475				
	[0.257]	[0.408]				
Ownership	0.010***	0.010***	-0.013	0.026***	-0.010***	-0.006**
	[0.002]	[0.003]	[0.015]	[0.009]	[0.002]	[0.003]
Ownership×*Subsidiaries*	-0.011***	-0.014*				
	[0.004]	[0.008]				
Initial Sales	-0.011***	-0.544***	0.015	-0.460***	-0.528***	-0.681***
	[0.004]	[0.017]	[0.112]	[0.058]	[0.056]	[0.057]
Initial EBITDA/Assets	-0.011***	-0.201***	-0.254***	-0.177***	-0.197***	-0.216***
	[0.004]	[0.005]	[0.030]	[0.006]	[0.010]	[0.009]
Initial Book Leverage	-0.011***	0.011***	-0.002	0.010***	0.005	0.018**
	[0.004]	[0.002]	[0.002]	[0.002]	[0.004]	[0.008]
ADR	-0.011***	0.621***	0.862***	0.744***	-0.086	0.339***
	[0.004]	[0.009]	[0.199]	[0.034]	[0.093]	[0.029]
CR	-0.011***	-1.444***	0.211	-0.773***	-0.516***	-0.845***
	[0.004]	[0.020]	[0.398]	[0.068]	[0.041]	[0.089]
Firms	11572	7122	728	1705	1932	2757
R^2	0.29	0.27	0.31	0.36	0.22	0.27

Table 11: Risk-Taking in the USA

This table reports the estimates from firm-level regressions of corporate risk-taking (RISK) defined as the standard deviation of monthly stock returns adjusted for industry returns over the period 2003-2006. Group (Affiliated) is an indicator variable that equals one for firms affiliated with a group and zero otherwise. Ownership is the percentage of equity stake of the largest shareholder in the firm, coded at zero if it is smaller than 10%. All controls are retrieved for the year of entry in the sample. EBITDA/Assets is earnings before interest, taxes, depreciation and amortization divided by total assets. Sales is the logarithm of net sales. Book leverage is defined as short term debt plus long term debt over assets. Column (1) presents OLS estimates from the full sample of US firms. Column (2) presents instrumental variable regressions similar to those in Table 9, column (1). Column (3) covers only the sample of firms affiliated to a group. Clustered standard errors are reported in brackets. Industry (one-digit SIC code) dummies are not reported. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	Full OLS	Full IV	Group	Group Mutual Funds	Group Banks	Unaffiliated
Ownership	0.010***	0.093***	0.021***	0.032**	0.038*	0.004
	[0.003]	[0.025]	[0.006]	[0.014]	[0.02]	[0.004]
Initial Sales	-1.056***	-0.989***	-1.046***	-1.026***	-1.026***	-1.014***
	[0.038]	[0.047]	[0.049]	[0.064]	[0.107]	[0.062]
Initial EBITDA/Assets	-0.048***	-0.053***	-0.057***	-0.055***	-0.052***	-0.041***
	[0.004]	[0.005]	[0.006]	[0.007]	[0.013]	[0.006]
Initial Book Leverage	0.010***	-0.002	0.009*	0.001	0.002	0.012**
	[0.003]	[0.004]	[0.005]	[0.006]	[0.009]	[0.005]
Firms	3324	3323	1778	1010	354	1513
R^2	0.39	0.21	0.46	0.46	0.5	0.29

Table 12: Risk-Taking: Quantile Regressions

This table reports the estimates from quantile firm-level regressions of corporate risk-taking (RISK). Affiliated firms have common largest shareholder. Ownership is the percentage of equity stake of the largest shareholder in the firm, coded at zero if it is smaller than 10%. Book leverage is defined as short term debt plus long term debt over assets. EBITDA/Assest is earnings before interest, taxes, depreciation and amortization divided by total assets. Sales is the logarithm of net sales. All controls are retrieved for the year of entry in the sample. ADR is anti-director rights index and CR is the creditor rights index. Country and industry (one-digit SIC code) dummies are not reported. Bootstrapped standard errors are reported in brackets. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	Affiliated Firms				Unaffiliated Firms			
	25th	50th	75th	90th	25th	50th	75th	90th
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Ownership	0.003**	0.003**	0.009*	0.006	-0.003**	-0.001	-0.002	-0.002
	[0.001]	[0.001]	[0.004]	[0.006]	[0.001]	[0.003]	[0.004]	[0.004]
Initial Sales	-0.146***	-0.261***	-0.607***	-1.035***	-0.128***	-0.305***	-0.594***	-0.594***
	[0.014]	[0.030]	[0.053]	[0.076]	[0.020]	[0.037]	[0.063]	[0.063]
Initial EBITDA/Assets	-0.055***	-0.086***	-0.123***	-0.170***	-0.072***	-0.114***	-0.189***	-0.189***
	[0.001]	[0.004]	[0.008]	[0.016]	[0.002]	[0.004]	[0.008]	[0.008]
Initial Book Leverage	0.001	0.001	-0.005	0.004	-0.003**	-0.008***	-0.011**	-0.011**
	[0.001]	[0.002]	[0.005]	[0.007]	[0.001]	[0.003]	[0.005]	[0.005]
ADR	0.595***	0.615	0.856	-0.095	0.511***	0.696***	1.154***	1.154***
	[0.168]	[0.388]	[0.561]	[0.344]	[0.134]	[0.252]	[0.402]	[0.402]
CR	-1.119***	-1.171*	-1.257**	-0.442	-1.173***	-1.883***	-2.578***	-2.578***
	[0.189]	[0.600]	[0.631]	[0.531]	[0.257]	[0.489]	[0.769]	[0.769]
Firms	5781	5781	5781	5781	6034	6034	6034	6034

Table 13: Risk-Taking and Ownership: Subsamples

This table reports the estimates from OLS firm-level regressions of corporate risk-taking (RISK). Group is an indicator variable that equals one for firms affiliated with a group and zero otherwise. Ownership is the percentage of equity stake of the largest shareholder in the firm, coded at zero if it is smaller than 10%. Book leverage is defined as short term debt plus long term debt over assets. EBITDA/Assets is earnings before interest, taxes, depreciation and amortization divided by total assets. Sales is the logarithm of net sales. All controls are retrieved for the year of entry in the sample. ADR is anti-director rights index and CR is the creditor rights index. Country and industry (one-digit SIC code) dummies are not reported. Standard errors are reported in brackets. In column (1) Japan is excluded, in column (2) Canada is excluded, in column (3) manufacturing is excluded, in column (4) largest shareholders defined as mutual funds and banks are excluded, in column (5) ownership is defined at the 20% level of control and in column (6) ADR and CR are dropped. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	(1)	(2)	(3)	(4)	(5)	(6)
Group Affiliation	-0.762***	-0.825***	-0.819***	-0.752***	-0.777***	-0.813***
	[0.097]	[0.061]	[0.073]	[0.066]	[0.062]	[0.071]
Ownership	-0.006***	-0.005**	-0.009***	-0.004	-0.005***	-0.006***
	[0.002]	[0.002]	[0.002]	[0.003]	[0.001]	[0.002]
Ownership×*Group*	0.007***	0.008***	0.006*	0.010***	0.012***	0.009***
	[0.002]	[0.002]	[0.002]	[0.003]	[0.002]	[0.002]
Initial Sales	-0.505***	-0.521***	-0.628***	-0.603***	-0.532***	-0.534***
	[0.034]	[0.034]	[0.054]	[0.042]	[0.034]	[0.033]
Initial EBITDA/Assets	-0.217***	-0.209***	-0.183***	-0.203***	-0.209***	-0.208***
	[0.004]	[0.011]	[0.012]	[0.009]	[0.011]	[0.011]
Initial Book Leverage	0.008***	0.004	0.001	0.020***	0.005	0.005
	[0.002]	[0.004]	[0.002]	[0.006]	[0.004]	[0.004]
ADR	-0.209***	0.576***	0.459***	0.645***	0.571***	
	[0.008]	[0.019]	[0.015]	[0.011]	[0.017]	
CR	0.335***	-1.641***	-1.759***	-1.491***	-1.637***	
	[0.010]	[0.067]	[0.062]	[0.063]	[0.068]	
Firms	9,703	11,391	8,047	7,357	11,829	13,380
R^2	0.35	0.36	0.31	0.35	0.36	0.36

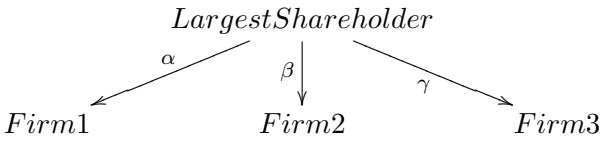

Figure 1: **Group**. α, β and γ are the largest equity stakes in Firm1, Firm2 and Firm3 respectively.

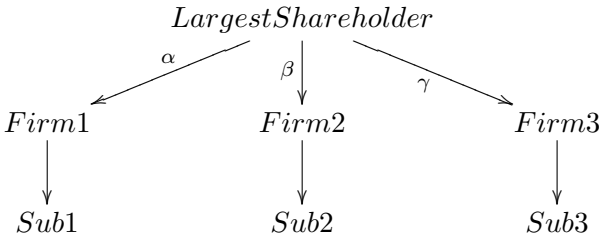

Figure 2: **Group with Subsidiaries**. α, β and γ are the largest equity stakes in Firm1, Firm2 and Firm3. Sub1, Sub2 and Sub3 indicate subsidiaries of Firm1, Firm2 and Firm3 respectively.