LARGE SHAREHOLDER DIVERSIFICATION AND CORPORATE RISK-TAKING

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ABSTRACT

Using new data for the universe of firms covered in *Amadeus,* we reconstruct the portfolios of shareholders who hold equity stakes in private and publicly-traded European firms. We find great heterogeneity in the degree of portfolio diversification across large shareholders. Exploiting this heterogeneity, we document that firms controlled by diversified large shareholders undertake riskier investments than firms controlled by non-diversified large shareholders. The impact of large shareholder diversification on corporate risk-taking is both economically and statistically significant. Our results have important implications at the policy level because they identify one channel through which policy changes aimed at improving capital market development can improve economic welfare.

JEL Classifications: G11, G15, G31

Keywords: Risk-taking choices; Large shareholders; Portfolio diversification

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This paper provides direct evidence that firms controlled by non-diversified large shareholders invest more conservatively than firms controlled by well diversified large shareholders. The impact of large shareholder diversification on corporate risk-taking is both statistically and economically meaningful.

The effect of portfolio diversification on corporate risk-taking has important economic implications. Prior studies have shown that entrepreneurs' willingness to take risks in the pursuit of profitable opportunities is a fundamental underpinning of long term economic growth (Acemoglu and Zilibotti, 1997, Baumol, Litan, and Schramm, 2007, DeLong and Summers, 1991, John, Litov, and Yeung, 2008). Sustained growth, in turn, results in higher levels of economic development. Thus, understanding the determinants of risk-taking helps to identify channels through which policy changes can improve economic welfare.

This study has also related implications for the literature that uses ownership concentration as a proxy for shareholder portfolio diversification. A central theme in this literature is that *if* their *wealth* is largely concentrated in the firms they own, *risk-averse* owners will seek to avoid risk more than they would had they held a diversified portfolio. The intuition behind this idea is simple. Generally speaking, the expected utility of any risk-averse investor decreases with increased variance of her wealth. If a controlling shareholder is risk-averse and poorly diversified, an increase in firm specific risk will decrease her expected utility. When this effect is large enough, this controlling shareholder will prefer to decrease firm risk so as to achieve higher utility. By contrast, the utility of a well diversified controlling shareholder is unaffected by firm specific risk, which has been diversified away. As a consequence, a poorly diversified controlling shareholder is more likely to decrease firm risk as a means to increase her expected utility.

In this literature, authors have used ownership concentration as a proxy for both well diversified and undiversified investors, making diametrically opposed assumptions about diversification, neither of which presumption is based on hard evidence.[1] Ironically, these studies have reached mixed conclusions. Anderson and Reeb (2003) find that the presence of block positions held by founder families, whom they assume to be undiversified investors, is surprisingly associated with higher operating risk. In contrast, Amihud and Lev (1981) find that risk reducing investments such as diversifying acquisitions, are less likely when a large blockholder, whom they assume to be a more diversified investor, is present. In a more recent study, John *et al.* (2008) find no significant relation between ownership concentration and corporate risk-taking.[2] The evidence presented in this study provides future researchers with new information regarding appropriate assumptions about shareholder diversification.

To investigate the impact of large shareholder diversification on corporate risk-taking, we exploit the data available in *Amadeus* to reconstruct the stock portfolios of a large panel of shareholders who hold equity stakes in privately-held and publicly-traded European firms. In our sample, on average, the largest (ultimate) shareholder controls 63.96% of votes across all firm-years. As such, it is very realistic to assume that the largest shareholder has effective (and active) control of the firm. Thus, the risk-taking we observe is, at least in part, a consequence of large shareholders' choices.

We estimate both cross-sectional and panel regressions to investigate the relation between owners' portfolio diversification and corporate risk-taking. We use three proxies to measure diversification for each company's largest shareholder: (i) the (natural log of the) number of firms in which this investor holds shares across all countries in our sample; (ii) the Herfindhal index of wealth concentration; and (iii) the correlation of the stock returns of a firm's industry with the shareholder's overall portfolio returns. Our primary measure of firm riskiness is the volatility of firm-level profitability over a given 5-year period. Profitability is measured as a firm's return on assets (ROA). We primarily

[1] In the agency literature, studies have focused more specifically on *managers'* risk-avoidance behavior in corporate investment decisions due to reputational concerns (Holmstrom and Ricart i Costa, 1986, and Hirshleifer and Thakor, 1992) or to their undiversified human capital (Amihud and Lev, 1981, Agrawal and Mandelker, 1987, Kempf, Ruenzi, and Thiele, 2009). Those papers focus on managers' incentives to lower risk and on the consequent conflict of interests between managers and shareholders.

[2] Paligorova (2010) examines the extent to which the relation between ownership concentration and corporate risk-taking is altered when a firm belongs to a business group. She shows that the positive association between ownership concentration and corporate risk-taking is specific to firms that belong to a business group.

focus on this measure of risk-taking as John *et al.* (2008) have previously documented that the volatility of firm-level profitability has a positive impact on long term economic growth.

We find strong *statistical* evidence that firms controlled by non-diversified large shareholders invest more conservatively than firms controlled by well diversified large shareholders. Further, and more importantly, the *economic impact* of large shareholder diversification on risk-taking is non-negligible. Across all OLS specifications, on average, an increase in the level of portfolio diversification (as measured by *Ln No. Firms*) from the first to the third quartile of the distribution results in a 7.52% increase in the volatility of ROA, relative to the mean. Moreover, among all explanatory variables, shareholder diversification ranks second in terms of economic significance.

The results are qualitatively similar when we analyze three alternative proxies for firm risk-taking: the likelihood of survival (which is not subject to the criticism of being potentially affected by accounting manipulation), the difference between the maximum and minimum ROA, and the volatility of return on equity. The results are also robust to using alternative proxies for portfolio diversification.

One potential issue with our argument is that our results may be driven by endogeneity. One source of concern comes from omitted variables which may affect both risk-taking and diversification choices. A second manifestation of endogeneity is self-selection, e.g., shareholders *selecting* firms with a risk profile that best suits their preferences, rather than influencing these firms' risk-taking choices. A third manifestation is reverse causality. Admittedly, while one cannot fully eliminate concerns of endogeneity with non-experimental data, we take a number of steps to address them. While taken individually none of these steps perfectly addresses endogeneity, they all confirm our main conclusion.

First, across all regressions, we control for other observable characteristics beside shareholder portfolio diversification that might affect corporate risk-taking. We control for firm profitability, leverage, growth, firm size, age, ultimate ownership as well as for industry and country fixed effects.

Second, we show that the positive association between portfolio diversification and corporate risk-taking persists in a panel regression framework, in which we control for both time-varying firm/investor characteristics as well as for industry, shareholder, and year fixed effects. Such a framework has the benefit of controlling for *any* investor-specific (time-invariant) omitted variables that affect the investor's decision to diversify, such as differences in the shareholder-specific utility function and investor type.[3]

Third, we exploit successions as a natural experiment determining an exogenous shock to the portfolio of the heirs. We find that, on average, the portfolio of a successor is less diversified than the portfolio of a departed controlling shareholder. In line with our previous findings, the reduction in portfolio diversification resulting from an exogenous shock in the identity of the controlling shareholder results in a decrease in corporate risk-taking for the firms experiencing such a shock. Additionally, we document that the exogenous addition of one or more firms to the portfolio of the heir on average results in a significant increase in the level of risk-taking across *all other* firms in her portfolio.

Fourth, we consider acquisitions as an alternative source of large shareholders' portfolio changes. In particular, we investigate the impact of an acquisition-driven increase in portfolio diversification on the risk-taking of the *other* firms in the portfolio of the acquirer. Consistent with our story, we find that acquisitions are followed by increased risk-taking by the other firms in the acquirer's portfolio.

Fifth, we extract the exogenous component of shareholder diversification by constructing an instrumental variable (IV) that captures the "natural" tendency to diversify across all large shareholders involved in similar types of activities. For this purpose, we follow Laeven and Levine (2007, 2009) and use the average portfolio diversification of large shareholders of all the other companies in the same country and industry as an instrumental variable for each shareholder's degree of portfolio diversification. As an alternative instrument, we use the fraction of other firms in the same country and industry whose largest shareholder holds a diversified portfolio.

By and large, endogeneity does not appear to explain the documented association between portfolio diversification and risk-taking. We verified the robustness of our results using a variety of methods, including adding various control variables, using fixed effects, exploiting a natural experiment,

[3] The estimation of panel regressions with fixed effects has become relatively common in the recent U.S.-based literature. However, due to the difficulty in gathering ownership data for non U.S. firms, non-U.S. studies typically still only exploit the cross-sectional variation in the data and thus largely neglect the omitted variables problem.

considering alternative shocks to the portfolio of a large shareholder, or using instrumental variables. We consistently find that portfolio diversification per se *leads* to (more) corporate risk-taking.

Our results have important policy implications. A rich literature has emphasized the importance of developed capital markets as a key factor in stimulating economic growth. This literature goes back at least to Schumpeter (1912).[4] In this study, we show that diversification (at the shareholder portfolio level) is conducive to more corporate risk-taking. To the extent that the presence of more developed capital markets allows investors to achieve higher levels of diversification, our results point to a channel through which policy changes can have a positive impact on economic welfare. Specifically, policies that promote capital market development and facilitate investors' portfolio diversification are likely to promote corporate risk-taking.

Examined from a different angle, our results show that controlling shareholders' traits affect corporate choices. Poorly diversified controlling shareholders may choose to forgo some positive net-present-value projects simply because they are too risky. In contrast, well diversified controlling shareholders are likely to invest in all positive net-present-value projects, regardless of these projects' riskiness.

This paper relates in general to the literature investigating the determinants of risk-taking. Djankov, Ganser, McLiesh, Ramalho, and Shleifer (2010) show that corporate taxes have a large adverse impact on entrepreneurial activities. Djankov *et al.* (2010) and John *et al.* (2008) show that better protection of property rights has a positive effect on the propensity to start up new businesses and on corporate risk-taking. Morck, Wolfenzon, and Yeung (2005) survey the literature on the consequences of wealth concentration in an economy on the allocation of capital, innovation, and economic growth. The authors discuss how wealth concentration in an economy may lead insiders to augment rent-seeking and to curtail investment in innovation.

[4] More recent studies include, but are not limited to, Beck, Levine and Loayza (2000), Jayaratne and Strahan (1996) and Rajan and Zingales (1998), as well as the studies cited above.

Finally, our study relates to a large literature on the economic behavior of firms. Our empirical analysis allows us to assess the validity of some stylized assumptions in this literature. A typical assumption is that corporate insiders are not well diversified. Examples of such studies include Anderson and Reeb (2003), John *et al.* (2008), Shleifer and Vishny (1997), and Stulz (2005).[5] Our study adds to this literature in two ways. First, while we provide hard evidence that the typical large shareholder is relatively undiversified,[6] we also document a high degree of heterogeneity across large shareholders. There are in fact many cases in which a firm's largest shareholder is very well diversified, holding stakes in hundreds of firms. Second, while we find some empirical support for the trade-off between holding a dominant position in a *relatively large* firm and achieving a reasonable degree of portfolio diversification (Demsetz and Lehn, 1985), we find that the correlation between ownership concentration and portfolio diversification is relatively low. For example, the correlation coefficient between ownership concentration and the number of firms in which a company's largest shareholder holds shares is -0.31. This means that, while shareholders who hold large ownership stakes in a firm tend to be less diversified than shareholders who hold smaller stakes, this relation is relatively weak. This result suggests that caution should be exercised when ownership concentration is used as a proxy for the degree of an individual's presumed portfolio diversification, as many large (small) shareholders are in fact well (poorly) diversified.

The rest of the paper is organized as follows. In Section I we describe the data sources used. Section II presents descriptive statistics as well as the results of regressions of risk-taking variables against our measures of large shareholder's portfolio diversification. Section III addresses endogeneity concerns. Section IV presents the results of various robustness tests. Section V summarizes our findings and concludes.

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[5] A limited number of papers have made the opposite claim, e.g., that large shareholders hold somewhat diversified portfolios (e.g., Jensen and Meckling, 1976, Amihud and Lev, 1981). Limited empirical evidence that at least some large shareholders are well diversified is found in the literature on business groups (Bertrand, Johnson, Samphantharak and Schoar, 2008, Bertrand, Metha and Mullainathan, 2002, Faccio, Lang and Young, 2001, Khanna and Yafeh, 2005, Morck, 2005).

[6] In the U.S., the portfolios of households investing in the private equity market also appear to be quite concentrated (Moskowitz and Vissing-Jørgensen, 2002). Further evidence of a general lack of portfolio diversification for small individual investors is reported in Barber and Odean (2000), Goetzmann and Kumar (2008), Karhunen and Keloharju (2001).

I. Data

To address our question, we gather (direct) ownership and accounting data for all companies included in "*Amadeus top 250,000.*" *Amadeus* is one of the *Bureau van Dijk Electronic Publishing*'s databases. This database includes European privately-held and publicly-traded companies that satisfy the following criteria. For France, Germany, Italy, Russia, Spain, Ukraine, and the United Kingdom, *Amadeus top 250,000* includes all companies with revenues of at least €15m, or total assets of at least €30m, or at least 200 employees. For the other countries, it includes all companies with operating revenues of at least €10m, or total assets of at least €20m, or at least 150 employees. The database excludes companies with operating revenues per employee or total assets per employee of less than €1,000. Disclosure requirements in Europe require private companies to submit their annual accounting and ownership data, so that this information is publicly available. However, some limitations exist. For example, in Portugal and Germany many companies fail to comply with the filing requirements. In Bosnia, Macedonia, Russia, Serbia & Montenegro, Switzerland, and Ukraine, publication is not required. As a consequence, the number of companies with available data is limited in these countries. In Austria, the disclosure of financial information only covers a few basic items for small and medium sized enterprises.[7]

A. Risk-taking Variables

Our primary measure of corporate risk-taking behavior is the volatility of country-adjusted and industry-adjusted profitability, *σ(ROA)*. Profitability is measured by the firm's operating return on assets (ROA), defined as the ratio of earnings before interests and taxes to total assets. For each year, we

[7] The inclusion of country or investor fixed effects in the regression specifications does allow us to control for systematic differences in the level of diversification (across countries and/or investors) due to differences in the cutoffs for inclusion in *Amadeus*. We nevertheless further verify the robustness of our regression results by focusing on countries in which disclosure is mandatory for all private companies. For this sub-sample, we find the coefficients of the shareholder diversification variables to be very close in magnitude to those reported later on in Table 2. Further, in each specification, the shareholder diversification variable has a p-value of less than 0.001. This suggests that differences in the disclosure requirements and/or the requirements for inclusion in *Amadeus* across countries do not have any consequential impact on our results.

compute the difference between a firm's ROA and the average ROA across all firms in the same 4-digit SIC industry and from the country in which the company is registered. By removing the influence of the home country and industry's economic cycle, which cannot be controlled by the actions of insiders, we have a cleaner measure of the level of risk resulting from corporate operating decisions. In the cross-sectional regressions, we calculate the standard deviation of the adjusted returns for each firm over the entire sample period (1999-2007), requiring a minimum of 5 observations. This approach is similar to the procedure used by John *et al.* (2008). In the panel regressions, we measure performance volatility over 5-year over-lapping periods (1999-2003, 2000-2004, 2001-2005, 2002-2006, and 2003-2007).

In section IV.A.1, we show that the results are qualitatively similar when, as alternative proxies for firm risk-taking, we consider the likelihood of firm survival, as well as other accounting based proxies for risk such as the difference between the maximum and minimum ROA, and the volatility of return on equity.

B. Ownership and Portfolio Diversification Variables

For each company that has available ownership data, we identify all ultimate shareholders. That is, whenever the direct shareholder of a firm is another firm, we identify its owners, the owners of its owners, and so on. If a shareholder i owns a fraction α_{iy} of the shares of firm *Y*, which owns a fraction β_{yj} of the shares of firm *J*, we measure shareholder *i*'s control over voting rights in *J* (*Ultimate Control*) by the weakest link along the chain, i.e., the minimum of α_{iy} and β_{yj}. This approach was earlier used by Claessens, Djankov, and Lang (2000) and Faccio and Lang (2002). Consistent with the procedure used in those papers, we trace ownership of pyramids of any length. A clear improvement in this calculation over prior studies is that *Amadeus* provides information on the ownership of private, as well as public firms, which allows us to trace the ownership of unlisted companies.

After tracing each ownership stake to its ultimate shareholders, we identify the shareholder controlling the largest fraction of voting rights in each firm, whom we label as the firm's *Largest Ultimate Shareholder.* The ownership, control, and diversification variables employed throughout the paper always refer to each firm's largest ultimate shareholder. We focus on the shareholder controlling the largest fraction of voting rights in the firm because control of voting rights indicates more power in corporate decision making.

For each shareholder, we also compute the cash flow rights in the firm's earnings. Using the example above, if a shareholder i owns a fraction α_{iy} of the shares of firm *Y*, which owns a fraction β_{yj} of the shares of firm *J*, then *i* will be entitled to a fraction $uo_{ij} = \alpha_{iy}\beta_{yj}$ of the cash flows of *J*, which we label *Ultimate Ownership*.

We develop three proxies of portfolio diversification for each largest shareholder. The first measure, *Ln No. Firms*, is the natural log of the number of companies in which a company's largest ultimate shareholder holds shares, directly or indirectly, in a given year, across all countries in our sample. We build this variable exploiting all information available in *Amadeus*, including ownership in companies for which *Amadeus* does not disclose any accounting data. We only require that, for a given year, based on the data in *Amadeus*, we are able to identify a particular investor as one of the ultimate shareholders of a given firm. A firm is considered part of the shareholder's portfolio regardless of the size of the investor's stake in that firm.

The underlying assumption of this measure is that the greater the number of stocks in a portfolio, the greater *potential* there is for diversification. The number of stocks in an investor's portfolio is a very commonly used proxy of portfolio diversification (e.g., Barber and Odean, 2000, Bodie, Kane, and Marcus, 2010, Elton and Gruber, 1989; Goetzmann and Kumar, 2008, and Karhunen and Keloharju, 2001). Admittedly, this is a crude measure of diversification. In some cases, it may overstate the true level of diversification (Blume, Crockett, and Friend, 1974, Goetzmann and Kumar, 2008). For example, regardless of how many stocks are included in her portfolio, an investor who has put most of her wealth in a single stock is unlikely to be fully diversified. Despite this limitation, this measure has one important benefit: it allows for the measurement of portfolio diversification without requiring any further information about the portfolio (such as the portfolio structure or returns distribution).

The other measures of portfolio diversification that we use attempt to overcome the limitations of the first measure. However, overcoming those limitations comes with a cost: in some cases we have to make assumptions about the precise structure of the investors' portfolios or the distribution of stock returns.

The second proxy that we use is the *Herfindhal Index,* a measure of wealth concentration for the portfolio owned by each firm's largest ultimate shareholder. To compute this index, we first calculate the dollar value of the investment made by a given shareholder in each firm in her portfolio, as the book value of equity of that company, BE_j, multiplied by the shareholder's ultimate ownership stake in that given firm, uo_{ij}. Because we have both public and private companies in the sample, we have to rely on book values for this calculation. Additionally, in the calculation of the Herfindhal Index we can include only firms with available data for the book value of equity.[8] After computing the value of a shareholder's investment in each firm in her portfolio, we sum the value of these investments to obtain the shareholder's total equity wealth, $W_i = \sum_{j=1}^{J} BE_j \cdot uo_{ij}$. Next, we compute the incidence of the investment in each firm in the shareholder's equity portfolio, as the ratio of the value of the investment made in that given firm over the shareholder's total equity wealth, $\omega_{ij} = (BE_j \cdot uo_{ij})/(\sum_{j=1}^{J} BE_j \cdot uo_{ij})$. The *Herfindhal Index* is the sum of the squared values of these weights, $\sum_{j=1}^{J} \omega_{ij}^2$.

The Herfindhal index has an intuitive economic interpretation. Under the assumption that the security weights in the well-diversified market portfolio are close to zero, the Herfindhal index approximates the divergence of a shareholder's portfolio from the market portfolio.[9] For this reason, the

[8] We exclude companies with negative or missing book value of equity. As with the *Ln No. Firms* proxy, we include companies that are controlled through pyramids. This leads to some double counting, because the value of a firm controlled through a pyramid is counted once in the equity value of that firm itself, and it is counted again in the equity value of its parent. In unreported tests, we find that our results are robust to the exclusion of firms controlled through pyramids.

[9] The divergence of a shareholder's portfolio from the market portfolio can be measured as $\sum_{j=1}^{J}(\omega_{ij} - \omega_{mj})^2$, where ω_{ij} is the weight of security j in the portfolio of shareholder i, and ω_{mj} is the weight of that security in the market portfolio, *m*. As the number of stocks in the market portfolio increases, the weight of each security tends to zero, so that $\sum_{j=1}^{J}(\omega_{ij} - \omega_{mj})^2 \approx \sum_{j=1}^{J} \omega_{ij}^2$, which is the Herfindhal index.

Herfindhal index is also commonly used to measure portfolio diversification (e.g., Blume *et al*., 1974, Bodnaruk, Kandel, Massa, and Simonov, 2008, Goetzmann and Kumar, 2008).

The index ranges from 0 to 1, with 1 indicating that all wealth is invested in one firm (fully concentrated wealth), and 0 indicating a totally diversified portfolio. To ease the interpretation of our results, in the regressions we use (1-*Herfindhal Index*) as an independent variable, so that a higher value of the index denotes a more diversified portfolio.

Our third measure of diversification is the correlation of the stock returns of a firm's industry with the shareholder's overall portfolio returns, multiplied by -1 (as in Bodnaruk *et al.*, 2008). We refer to this as *-Correlation*. We use the industry as a proxy for the stock returns of a given firm. This process gives us enough observations to estimate this independent variable with relatively little noise. (This is especially important when a firm is not publicly traded). The industry (weekly) return is defined as the weekly average return across all publicly traded European firms within a given 4-digit SIC industry classification. We include only firms that have stock price data available in *Datastream*.[10] For each investor, the portfolio returns are computed as the weighted average of returns on the individual stocks in her portfolio. In this calculation, we use the weights of each firm in the investor's equity portfolio, ω_{ij}, at the beginning of each year.

This measure of diversification is higher for stocks from industries with low correlation with the investor's portfolio returns. While our first measure is likely to overstate diversification for some investors, this measure is likely to understate diversification as the returns of two stocks in the same industry are perfectly correlated by construction.

In the calculation of all ownership or portfolio diversification variables discussed in this section, we include equity ownership in (1) privately-held and publicly-traded firms; (2) domestic and foreign firms; and (3) non-financial as well as financial firms. We also include both minority as well as dominant equity stakes held by large shareholders. Despite the wide coverage of firms, some limitations nevertheless exist. First, we are unable to track small equity positions as well as investments in smaller

[10] To compute returns we use prices in U.S. dollars for consistency across stocks and investors.

companies that are not covered in *Amadeus*. Given that these companies are small, their exclusion is unlikely to have a major impact on our value-based portfolio concentration measures, such as the Herfindhal index. Second, we capture equity investments, but we miss other significant investments, such as bonds and real estate. Third, due to *Amadeus's* coverage, we are unable to include equity investments in firms incorporated outside Europe. Thus, for those investors who are truly well diversified internationally and hold stock outside Europe, our diversification measures might incorrectly look highly under-diversified. While this is true in some cases, it is well known that investors exhibit a strong home bias (e.g., French and Poterba, 1991, and Coval and Moskowitz, 1999), so that the magnitude of this measurement error is likely to be small. Further, the inclusion of shareholder fixed effects in the panel regressions allows us to control for investments (e.g., specific stocks, bonds, or real estate) that are present in the portfolio of the investor through time but that we are unable to capture because of data limitations.

Nevertheless, to get a better sense of the magnitude of this measurement error, we use data from *Worldscope* to identify cases in which our largest shareholders hold more than 5% of the equity of any non-European publicly traded firm (the 5% cutoff is chosen because of data availability in *Worldscope*). In 1999, out of 15,696 largest shareholders in our dataset, we identified only 72 such cases. Further, to rule out the possibility that the ranking of investors based on our measures of portfolio diversification is incorrect (this would happen if investors who we classify as non-diversified are especially likely to hold equity outside of Europe), we compute the correlation coefficient between (the *Amadeus*-based) *No. Firms* and the number of the additional non-European publicly traded firms in which these investors hold equity.[11]

[11] For 1999, across all largest shareholders, this correlation coefficient is 0.019, indicating that the measurement error is uncorrelated with our measure of portfolio diversification, so that OLS coefficient estimators are consistent (Wooldridge, 2002, p. 74).

C. Control Variables

As control variables, we use: (1) *Ln (Size)*, defined as the natural log of total assets (in thousands US$), expressed in 1999 prices,[12] where total assets is the sum of fixed assets (tangible and intangible fixed assets and other fixed assets) and current assets (inventory, receivables, and other current assets). (2) *Leverage*, defined as the ratio of total debt to total assets, where total debt includes non-current liabilities (long term debt and other non-current liabilities) and current liabilities (loans, accounts payable and others). (3) Profitability, measured by the firm's return on assets (*ROA*), defined as the ratio of EBIT to total assets. As high ROA volatility may potentially stem from poor management ability rather than risk-taking choices, we include firm profitability (ROA) in all regressions to control for differences in management quality across firms. (4) *Sales Growth*, calculated as the annual growth rate of sales. (5) *Ln (1+Age)*, defined as the natural log of (1 + the number of years since incorporation). This variable controls for differences in the life cycle of a firm, as one would expect that firm riskiness may decline with firm age. (6) *Ultimate Ownership* is calculated as the cash flow rights of the largest shareholder on a firm's earnings. As a high level of ownership aligns the controlling shareholder's incentives with those of minority shareholders, we use ultimate ownership to address the possibility that our results may reflect tunneling. (We discuss tunneling in greater detail in Section IV.B.1).

All variables are measured at the first year-end of the sample period over which the volatility of earnings is measured. In all cross-sectional tests, we also include country and industry fixed effects. In the panel analysis, we instead include shareholder, industry and year fixed effects.

D. Selection Criteria

D.1. Ownership Data

For each company that has ownership data available in *Amadeus* for at least one year during 1999-2003, we first identify all shareholders. (This results in an initial sample of 1,315,558 shareholder-year observations.) Our ownership sample starts in 1999 because that is the year in which *Amadeus*

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[12] Using country CPI data from the International Monetary Fund's *International Financial Statistics*.

started using a unique identifier for each corporate shareholder in the database. (The quality of the data is discussed in Appendix A). The identifier minimizes the chances of classification errors. The ownership sample ends in 2003 since we require 5 subsequent years of data to compute the risk-taking variables. Because of data constraints, the procedure we use to identify a company's ultimate shareholders differs slightly from that used in Claessens *et al.* (2000) and Faccio and Lang (2002).[13]

On the basis of ownership categories reported in *Amadeus*, and on the basis of a careful analysis of the owners' names, we identify firms in which the Government is a shareholder.[14] (These are 24,482 firm-year observations.) We exclude these firms from the analysis because the motivations for government intervention in the economy and governments' risk-taking preferences are typically different from those of private investors. After these filters, we are left with ownership data for 1,198,372 shareholder-year observations, which include 243,856 different firms. These screening criteria are summarized in Appendix B, Panel A.

D.2. Accounting Data

We gather accounting data for all non-financial[15] firms having data available for both total assets and EBIT for at least one year during 1999-2007. This results in an initial "accounting" sample of 1,754,714 firm-year observations. To ensure the accuracy of the accounting variables, we compare them to values computed using accounting identities (further tests are discussed in Appendix A). For example, when "fixed assets" is missing, we compute it by summing "intangible fixed assets," "tangible fixed

[13] There are three differences. First, we exclude 2,890 firm-year observations that exhibit cross-holdings in their ownership structure because the identification of ultimate owners is not always obvious. Second, we exclude shareholders who are labeled "private shareholder," "private citizen," or "legal person" in *Amadeus*; these shareholders cannot be traced back to a specific individual. (These are 41,878 shareholder-year observations.) However, we keep the companies in which they own shares in the sample, and we track the ownership of all remaining shareholders. Finally, because of the size of our sample, we are unable to aggregate investments by members of the same family; thus, each individual is treated separately.

[14] We check whether the shareholder's name reported by *Amadeus* contains terms such as "Ministry", "State of", "Government", "Treasury", "Council", in different languages.

[15] We include investments in financial firms (e.g., companies with a primary 4-digit SIC between 6000 and 6999) in calculating ultimate control, ownership, and portfolio diversification. However, financial firms are excluded from subsequent analyses because their risk-taking behavior is heavily influenced by regulation.

assets," and "other fixed assets;" similarly, we compute "current assets" by summing "current assets stocks" (inventory), "current assets debtors" (receivables), and "other current assets." If the value of fixed assets or current assets is missing in *Amadeus*, but we are able to compute it using one of the accounting identities, we use the computed value. We eliminate observations whenever the *Amadeus* value and the computed value differ by more than 5 percent. This process affects only a small number of observations, but it is important to remove possible data errors. In a number of cases, we discover a small difference between the *Amadeus* value and the computed value. Further verification indicates that this difference is usually due to *Amadeus* adding or dropping decimals, and is thus not consequential. When this occurs, we use the figure originally reported in *Amadeus*.

To further reduce the impact of outliers, across all analyses, accounting variables other than sales growth and leverage are winsorized at the top and bottom 1% of the distribution. As sales growth and leverage exhibit large positive skewness, these two variables are winsorized at the bottom 1% and at the top 5% of the distribution. Age was winsorized at the top 1% of the distribution. The results are qualitatively similar if we trim observations at the top and bottom 1% of the distribution, or winsorize all variables at the top and bottom 1% of the distribution.

We then restrict the sample to companies with data available for both total assets and EBIT for at least 5 years, because a 5-year period is required to compute the volatility of ROA, our main dependent variable. These requirements reduce the sample to 1,208,666 firm/year observations from 168,193 firms. After merging these data with the ownership data sample, we retain only firms that meet two criteria. First, the firm must have enough data to compute the volatility of ROA for at least one period, i.e., at least 5 years of accounting data. And second, for each of these 5 year periods, the firm must have ownership data at the first year-end. Applying these criteria reduces the sample to 332,301 firm/year observations from 50,049 firms. Finally, we exclude firms with no data for the main control variables, leaving us with a final sample of 123,640 firm/year observations from 46,691 firms for the main cross-sectional and panel tests. These selection criteria are summarized in Appendix B, Panels B and C.

II. Results

A. Univariate Results

Table I reports descriptive statistics for all non-financial firms included in the panel regressions. This sample includes 123,640 firm-year observations. In Panel A, we provide information on the country distribution of observations. Although our sample includes at least two firms from 30 different countries, three countries represent an overwhelming fraction of the sample: the United Kingdom (27.39%), France (25.12%), and Spain (15.65%).

[Table I goes here]

In Panel B, we report *investor-level* descriptive statistics for the portfolio diversification variables. In computing the statistics of Panel B, we treat each investor/year combination as an observation. Thus, the mean of *No. Firms* is calculated through time and across investors, rather than across firms.

On average, the largest shareholder holds a stake in 4 firms. Thus, large shareholders are moderately diversified. This figure is similar to estimates reported in Barber and Odean (2000), Goetzmann and Kumar (2008), and Karhunen and Keloharju (2001); they show that an average retail investor (not necessarily a blockholder) holds equity in 2-7 publicly-traded firms. A comparable level of diversification is documented by Moskowitz and Vissing-Jørgensen (2002) for U.S. households investing in the private equity market.

The distribution of our portfolio diversification variable is relatively skewed. The median large shareholder in the sample is totally non-diversified, holding a stake in only 1 firm. However, 43.5% of investors are at least somewhat diversified holding equity in two or more companies.[16] In fact, 14.75% of investors hold stakes in 5 companies or more; 6.63% of investors hold equity in 10 companies or more; 0.87% of investors hold equity in 50 firms or more; finally, 0.34% of investors hold equity in over 100 firms. Some shareholders are extremely diversified, holding stake in as many as 972 firms. Thus, it is hard to make generalizations about large shareholders' level of portfolio diversification.

[16] 31.8% of investors are diversified across industries and 7.09% of investors are diversified across countries.

An alternative measure of portfolio diversification is (*1-Herfindhal Index*), for which a higher value denotes more diversification. For (*1-Herfindhal Index*), the highest possible value, 1, denotes perfect diversification, and the lowest possible value, 0, denotes no diversification at all. In our sample, the mean value of (*1- Herfindhal Index*) is 0.174. This value is relatively low, which means that although the average large shareholder holds equity stakes in four different firms, most of her wealth is concentrated in one of them. To give an example, if the average largest shareholder instead invested equally in the 4 firms, (*1- Herfindhal Index*) would equal 0.75. A coefficient of 0.174 is consistent with a shareholder putting about 91% of her wealth in one company and distributing the rest equally among the remaining 3 firms. Not all investors are the same, however: in fact, while many investors are totally non-diversified, some others are extremely well diversified.

Our third proxy of diversification, *-Correlation*, confirms that investors are relatively undiversified. In our sample, the mean value of *-Correlation* of -0.89 reflects the fact that many investors only hold one stock in their portfolio.

In Panel C, we report *firm-level* descriptive statistics. In computing the statistics of Panel C, we treat the firm as the unit of observation. We report two sets of statistics. The first set of statistics (on the left hand side of the table) is the summary statistics for the cross-section of (46,691) firms. Each firm enters the calculation only once. The second set of statistics (on the right hand side of the table) is similar summary statistics for the panel of observations (123,640 firm/years). The statistics in Panel C are used later in the paper to calculate the economic significance of the regression coefficients. In the discussion that follows, for brevity, we only discuss the second set of statistics (the panel results).

The mean (median) 5-year volatility of ROA is 0.048 (0.037), with an interquartile range of 0.041. The sample includes both very large and small firms. The typical firm is highly levered, with an average (median) leverage ratio of 67.5% (70.5%). Companies appear to be relatively profitable, with an average ROA of 7.1%. The sample firms exhibit a wide range of growth rates, with a mean (median) annual rate of growth of sales of 25.1% (9%). The average (median) firm in our sample is 25 (18) years old.

On average, the largest shareholder owns 62.29% of a company's cash flow rights (i.e., is entitled to 62.29% of the dividends), and controls 63.96% of voting rights. Thus, the largest blockholders are indeed very large and influential investors. This raises the question of whether large investors are more or less likely to hold diversified portfolios than small investors. Our evidence suggests a tradeoff between owning a large fraction of cash flow rights and being able to hold a diversified portfolio. We find a negative correlation between the fraction of cash flow rights owned by the largest shareholder and the diversification level of her portfolio. However, the correlation coefficient between ultimate ownership and the number of firms in which a large shareholder holds equity is only -0.31. Similarly, we find a correlation of -0.32 between ultimate ownership and (*1- Herfindhal Index*), and a correlation of -0.31 between ultimate ownership and our third proxy of diversification, -*Correlation*.

Note that our methodology will produce a higher shareholder diversification measure in Panel C compared to Panel B. This happens because a single investor may be the largest shareholder of multiple firms. To give an example, the mean of *Ln No. Firms* in Panel C is the mean of *Ln No. Firms* across *firms* (rather than across investors, as in Panel B) and through time, so that an investor who is the largest shareholder of multiple firms may enter the calculation more than once in Panel C but not in Panel B.

B. Regression Analysis

To analyze the impact of the largest shareholder's portfolio diversification on corporate risk-taking, we present two main sets of tests. The first set includes ordinary least squares cross sectional regressions of *volatility* of (country-adjusted and industry-adjusted) firm-level profitability, $\sigma(ROA)$, against proxies for large shareholder diversification, along with a number of variables, x_{nj}, that control for other determinants of risk-taking that might otherwise induce spurious correlations. (In particular, we control for leverage, profitability, sales growth, firm size, firm age, and ultimate ownership.) In a similar vein to John *et al.*, (2008), we isolate firms for which we have a minimum of five years of ROA data over 1999-2007. For these companies, we then compute the standard deviation of the (country-adjusted and industry-adjusted) ROA over all the available data points. Therefore, for each firm, we generate a single observation of $\sigma(ROA)$. The control variables are measured, for each firm, at the first available year-end (or, for the flow variables, during the first year). Our regression equation is:

$$\sigma(ROA) = \alpha_0 + \alpha_1 \cdot \ Large\ Shareholder\ Diversification_j + \sum_{n=2}^{N} \alpha_n \cdot x_{nj} + \qquad (1)$$

$$+ Industry\, F.E. + \ Country\ F.E. + \varepsilon_j$$

In all cross-sectional regressions we include industry (*Industry F.E.*) and country fixed effects (*Country F.E.*).

The second set of regression tests uses a panel of observations to investigate how the volatility of firm-level profitability changes in response to changes in the largest shareholder's portfolio diversification. The panel regressions allow us to control for unobservable shareholder-specific characteristics that impact the largest shareholder's risk-taking decisions by using fixed effects. For example, it is possible that the effect of risk-aversion on risk-taking depends not only on the dominant shareholder's level of portfolio diversification, but also on the dominant shareholder's utility function. Shareholder-fixed effects control, among other things, for differences in the shareholder-specific utility function as well as differences in shareholder type. More generally, the use of a panel of data, alongside the inclusion of fixed effects allows us to control for any time-invariant shareholder specific characteristic which may be correlated with the omitted explanatory variables. Controlling for shareholder fixed effects helps reduce the omitted variable bias which would render our estimated coefficients biased and inconsistent (Wooldridge, 2002). In this second set of tests, our regression equation is:

$$\sigma\left(ROA_{j,(t,t+4)}\right) = \ \alpha_0 + \ \alpha_1 \cdot Large\ Shareholder\ Diversification_{jt} + \sum_{n=2}^{N} \alpha_n \cdot x_{njt} +$$

$$+ Industry\, F.E. + \ Shareholder\, F.E. + \ Year\ F.E. + \varepsilon_{jt} \qquad (2)$$

Large Shareholder Diversification$_{jt}$ is the proxy for large shareholder diversification; x_{njt} are controls for other (observable) determinants of risk-taking that might otherwise induce spurious correlations; *Industry*

F.E. are industry fixed effects, *Shareholder* $F.E.$ are shareholder fixed effects, and $Year\ F.E.$ are year fixed effects.

[Table II goes here]

The results for the cross-sectional tests are reported in Table II. In these tests, the volatility of the firm's ROA is the dependent variable. In the first regression, our measure of shareholder diversification is *Ln No. Firms*, the natural log of the number of companies in which a company's largest ultimate shareholder holds shares. In the second specification, we use (*1- Herfindhal Index*), and in the third we use *-Correlation*, the correlation of the stock returns of a firm's industry with the shareholder's overall portfolio returns, multiplied by -1. In all three specifications, a higher value of the independent variable reflects a higher degree of portfolio diversification.

The results for all three specifications indicate that shareholder diversification is positively and significantly related to firm risk-taking. All three coefficients on the shareholder diversification variables are positive, with p-value of less than 0.001. This result provides direct evidence that well diversified large shareholders are willing to accept greater firm-level risk.

The economic impact of shareholder diversification on risk-taking is non-negligible. On average, an increase in *Ln No. Firms* from first to the third quartile of the distribution results in a 7.80% increase in the volatility of ROA relative to its mean. To compute this economic impact, we first multiply the interquartile range of *Ln No. Firms* (from Panel C of Table I)[17], by the coefficient of *Ln No. Firms* in Regression (1) of Table II. This calculation (2.197×0.192=0.422) gives the increase in the dependent variable, $\sigma(ROA) \times 100$, associated with an increase in *Ln No. Firms* from the first to the third quartile of the distribution. We then compare this increase in risk-taking to the average $\sigma(ROA) \times 100$ across firms, 5.410. This comparison indicates that an increase in *Ln No. Firms* from first to the third quartile of the distribution results in a 7.80% (0.422/5.410) increase in risk-taking relative to the cross-sectional mean of $\sigma(ROA) \times 100$. We could alternatively measure the economic impact by comparing the change in risk-

[17] As in the regressions the unit of observation is the firm, rather than the investor, we use portfolio diversification across firms to compute the economic impacts.

taking to the interquartile range of $\sigma(ROA) \times 100$, 4.448. We can observe that an increase in portfolio diversification from the first to the third quartile leads to an increase in risk-taking (0.422) that is about 1/10th of the interquartile range of risk-taking across firms (e.g., 1/10th of 4.448).

An increase in *(1-Herfindhal Index)* from the first to the third quartile is associated with an 8.25% increase in the volatility of ROA relative to the mean of $\sigma(ROA) \times 100$. Similarly, an increase in -*Correlation* from the first to the third quartile is associated with a 10.11% increase in the volatility of ROA relative to the mean of $\sigma(ROA) \times 100$.

By comparison, in the first regression, an increase in leverage from the first to the third quartile is associated with a 3.59% increase in the volatility of ROA (relative to the mean); an increase in ROA from the first to the third quartile is associated with a 3.88% increase in the volatility of ROA; an increase in the rate of growth of sales from the first to the third quartile is associated with a 3.48% increase in the volatility of ROA; an increase in size from the first to the third quartile is associated with a 18.26% decrease in the volatility of ROA; an increase in Ln (1+Age) from the first to the third quartile is associated with a 2.67% decrease in the volatility of ROA; and an increase in ultimate ownership from the first to the third quartile is associated with a 3.69% increase in the volatility of ROA. Thus, among all regressors, shareholder diversification ranks second in terms of economic significance. The control variables exhibit consistent signs across the specifications. Further, their signs are consistent with those reported in John *et al.* (2008).

[Table III goes here]

Table III presents the results for the panel regressions. In this second set of tests we include shareholder fixed effects to control for time-invariant shareholder characteristics, along with industry and year fixed effects. In these regressions, the coefficients of the diversification variables can be interpreted as the impact of *changes* in portfolio diversification on *changes* in the level of risk-taking. These results show that an increase (decline) in portfolio diversification is associated with an increase (decline) in risk-taking. Across all specifications, we continue to find a statistically significant, positive relation between portfolio diversification and firm risk-taking, providing further evidence in support of the hypothesis that well diversified shareholders increase the risk-taking of the companies they control. While the statistical significance of our results is diminished when shareholder fixed effects are included among the control variables, the shareholder diversification variables continue to remain strongly statistically significant.

In the panel regressions, an increase in the level of diversification, as measured by *Ln No. Firms,* from the first to the third quartile (Δ *Ln No. Firms* =2.303) results in a 5.36% increase in the volatility of ROA relative to the mean of $\sigma(ROA) \times 100$ of 4.850 (e.g., 0.113*2.303/4.850=5.36%). An increase in *(1-Herfindhal Index)* from the first to the third quartile of the distribution is associated with a 3.85% increase in the volatility of ROA. An increase in *-Correlation* from the first to the third quartile of the distribution is associated with a 3.00% increase in the volatility of ROA.

III. Self-Selection and Reverse Causality

A. Self-Selection

Suppose that more diversified large shareholders *select* riskier firms, rather than directly affecting these firms' risk. If this were the case, risk-taking at the firm level could be correlated with the degree of portfolio diversification, even though the large shareholder would not be affecting the investment decisions of the firms in her portfolio. To address the question of whether controlling shareholders *do* affect corporate risk-taking choices, as opposed to selecting firms that best suit their preferences, we isolate special instances in which the portfolios of large shareholders change, and investigate whether risk-taking changes subsequently.

A.1. Successions

As a first event, we exploit successions as a natural experiment determining an exogenous shock to the portfolio of some investors (the heirs). To identify successions, we first search for all instances in which a company's largest shareholder changes. We then restrict the sample to those instances in which the departed shareholder disappears from the ownership structure of a given firm in the years subsequent to the ownership change. We further require that the new and the departed shareholder share the same last name. Finally, we run keyword searches in *Lexis-Nexis*, *Factiva*, and *Google* to identify (and remove) any instances in which the transaction in question is described as something other than a succession (e.g., a sale of shares). The application of these screenings yields a sample of 102 successions.

[Table IV goes here]

We conduct two tests. In the first test, we examine the *change* in corporate risk-taking among companies experiencing an *exogenous change* in the identity of their largest shareholder. The results of this test are reported in Panel A of Table IV. Of course, changes in risk-taking can be measured only when we have at least 5 years of (ROA) data pre-succession as well as 5 years of data post-succession to compute the standard deviation of ROA. This requirement reduces the sample in Panel A to 84 successions.

We first document that, on average, the shock results in a drop in the degree of portfolio diversification as the departed shareholder (typically an older individual) tends to be more diversified than the incoming heir. As a consequence of this exogenous reduction in the degree of portfolio diversification, we expect risk-taking to decline, which is what the test shows. In particular, on average, the volatility of ROA drops from 4.09% pre-succession to 3.50% post-succession. Despite the small sample size, this change is statistically significant with a p-value of 0.082. To compare the magnitude of this change to the change implied by the regression *coefficients*, we compute the ratio of the change in corporate risk-taking (the Δy in the regressions, e.g., 3.497-4.090) relative to the change in portfolio diversification (the Δx in the regressions, e.g., ln(3.784)-ln(4.119)), as measured by *Ln No. Firms.* The resulting ratio is 6.99. This compares with a coefficient of 0.192 for *Ln No. Firms* in Regression (1) of Table II. Based on this regression, the decrease in *Ln No. Firms* observed around successions, from ln(4.119) to ln(3.784), should result in a 0.3% decrease in risk-taking relative to the mean (-0.3% = 0.192*(ln(3.784)-ln(4.119))/5.410). Instead, we find that following successions, risk-taking declines by 14.50% ((3.497-4.090)/4.090). This difference indicates that the regression coefficients substantially understate the impact of large shareholder diversification on corporate risk-taking.

A possible concern with the test above is that the timing of successions may not be random. For example, past performance could affect the timing of successions. To address this concern we employ a propensity score matching estimator (Rosenbaum and Rubin, 1983). This approach allows us to identify a control sample of firms that did not experience a succession that have similar characteristics to those observed in our firms prior to the succession. We then compare the change in risk-taking of companies experiencing a succession to the matched control sample.

To estimate the propensity score we first isolate, as possible matching firms, all firms that have the same largest shareholder for at least three years. We then calculate the probability (e.g., the propensity score) that a firm with given characteristics experiences a succession. This probability is calculated using firm characteristics, during the "pre succession" period, for both firms experiencing a succession and for firms that do not experience a succession. We select characteristics that a shareholder could use to cherry pick firms that match her preferences for risk. In particular, we use shareholder diversification (*Ln No. Firms*), firm leverage, profitability, sales growth, the natural log of total assets, the natural log of firm age, ultimate ownership, year, country and industry dummies as well as "pre-succession" risk-taking. To make sure that the firms in the control sample are sufficiently similar to the firms experiencing a succession, we require that the maximum difference between the propensity score of the firm experiencing the succession and its matching peer does not exceed 0.1% in absolute value. As an outcome of this procedure, firms experiencing the succession and their matching peers have indistinguishably similar characteristics. For example, the p-values for the differences in individual characteristics between the two samples all range between 0.47 and 0.93.

Finally, we compare the change in risk-taking of firms experiencing a succession to the change in risk-taking of the control sample. As shown in Panel B of Table IV, we find that the volatility of ROA of the matching control firms increases from 4.02% "pre-succession" to 4.37% after the succession. The change in risk-taking for the matching control firms is insignificantly different from zero, with a p-value of 0.40. In contrast, the succession firms experience a drop in the volatility of ROA from 4.09% to 3.50% (as reported in Panel A of Table IV). The difference between the change in risk-taking for the succession firms and the change in risk-taking for the matching control firms (e.g., (3.497 - 4.090) - (4.375 - 4.024) = -0.944) is statistically significant with a p-value of 0.05. Thus, the change in risk-taking observed subsequent to successions is not the product of (observable) firm characteristics that might have determined the timing of successions. As a caveat, however, we recognize that it is still possible that the results might be explained by other unobservable variables that predict both the timing of successions and the subsequent change in volatility.

We use a second test to circumvent this issue. In this test we examine the change in risk-taking across *all other* firms in the portfolio of the heir following the succession.[18] Presumably, a founder will choose to pass the baton to a heir when the timing best fits her own preferences, rather than the heir's. In other words, the heir is likely to have little say on the timing of the succession. If we instead believed the heir could affect the timing of the succession, so that the succession occurs when the characteristics of the firms inherited best fit the heir's taste for risk, we should not observe any change in risk-taking among the *other* firms in the portfolios of the heir following the succession. Thus, we can assess whether the exogenous addition to her portfolio leads the heir to change, in particular increase, the risk-taking of the other firms in her portfolio.

By definition, this test can only be run to the extent that the heir held stocks in at least one company prior to the succession. Further, as in the previous test, we require 5 years of (ROA) data pre-succession as well as 5 years of data post-succession in order to measure changes in the level of risk-taking of the other companies in the portfolio of the heir. We are able to retrieve this information for 29 separate successions. As, absent any sales, the succession exogenously increases the degree of portfolio diversification for the heir, we expect risk-taking to increase as well. In Panel C of Table IV we first document that, as effect of the succession, the portfolio of the heir indeed becomes more diversified. More importantly, we show that, as a *consequence*, the level of corporate risk-taking of the other companies in the portfolios of the heirs increases as well. In particular, the volatility of ROA increases

[18] To minimize the loss of observations due to missing values, we gather additional data on ROA from *FAME* (a product of Bureau van Dijk that contains comprehensive information on firms in the UK and Ireland), *OneSource, Lexis-Nexis* and *Mergent WebReports*.

from 4.56% pre-succession to 6.63% post-succession. Despite the small size of this sample, the change is statistically significant at conventional levels (p-value = 0.088).

Once again, we compare the magnitude of this change to the change implied by the regression coefficients by computing the ratio of the change in corporate risk-taking relative to the change in portfolio diversification. We find this ratio to be equal to 2.834 (2.834=(6.633-4.565)/(ln(7.655)-ln(3.690))). This compares with a coefficient of 0.192 for *Ln No. Firms* in Regression (1) of Table II. Based on this regression, an increase in *Ln No. Firms* from ln(3.690) to ln(7.655) should result in a 2.59% increase in risk-taking relative to the mean $\sigma(ROA) \times 100$ (2.59%=0.192*(ln(7.655)-ln(3.690))/5.410). Instead, our succession results indicate that risk-taking increases by 45.30% ((6.633-4.565)/4.565).

A.2. Acquisitions

Acquisitions are another event that changes the portfolios of some investors. The decision to acquire a firm is indisputably endogenous. However, if an investor was simply purchasing firms that fit her taste for risk we should not observe any change in risk-taking among the other firms in her portfolio following the acquisition. We thus investigate whether the risk-taking of *other* firms in the portfolio of an acquirer changes subsequent to an acquisition.

To identify acquisitions, we first isolate shareholders who experience a net increase in the number of firms in their portfolios. From this sample, we select relatively large acquisitions that are likely to have a substantial impact on the portfolio held by the investor. In particular, we focus on additions that account for at least 10% of the equity wealth of the investor. This procedure allows us to identify 5,454 acquisitions made by 4,786 different large shareholders.

[Table V goes here]

As before, we require 5 years of (ROA) data pre-acquisition as well as 5 years of data post-acquisition to measure changes in the level of risk-taking of the *other* firms in the portfolios of the acquirers. We are able to retrieve this information for 2,185 acquirers. By construction, acquisitions increase the portfolio diversification of the acquirer. As such, if large shareholders do influence corporate risk-taking decisions, the risk-taking of the other firms in the portfolio of the acquirer should increase. Consistent with our prediction, the increase in portfolio diversification that follows an acquisition is associated with an increase in the volatility of ROA from 5.00% to 5.51% (as shown in Table V). This change is statistically significant, with a p-value of less than 0.001. This result is consistent with our hypothesis that large shareholders influence and alter corporate risk-taking so as to achieve the desired level of risk.

B. Reverse Causality

In Section II, we first addressed endogeneity concerns arising from omitted variables by controlling for time-varying observables that may affect both risk-taking and diversification. We further added shareholder fixed effects to the regression specifications to control for time invariant unobservables that differ across large shareholders. Another possible endogeneity concern, however, relates to the direction of causality in our results. Reverse causality would require that there be some feedback effects moving from risk-taking to portfolio diversification. For example, investors planning to invest in risky (less risky) firms would, as a *consequence*, adjust the structure of their holdings so as to increase (decrease) portfolio diversification.

Notice that such a story implies periodic changes to the portfolios held by large shareholders that are simply not observed in the data. In fact, as almost 95% of the firms in our sample are *illiquid* privately-held companies, it is easy to argue that large shareholders can more easily adjust the riskiness of the firms they control, than adjusting the portfolio holdings. We nevertheless report a formal test addressing the reverse causality issue. In this test, we utilize an instrumental variables technique.

In this test, we extract the exogenous component of shareholder diversification by constructing an instrumental variable (IV) that captures the "natural" tendency to diversify across all large shareholders involved in similar types of activities. For this purpose, we follow Laeven and Levine (2007, 2009) and, for each firm, we compute the average portfolio diversification of large shareholders across all *other* companies in the same country and industry. This variable is then employed as an IV for each shareholder's degree of portfolio diversification. As an alternative (although related) instrument, we use the fraction of other firms in the same country and industry whose largest shareholder holds a diversified portfolio.

[Table VI goes here]

In the first stage regressions, we use all exogenous variables along with the "natural" degree of portfolio diversification for each company's largest shareholder to explain a large shareholder's actual diversification choice. (In Table VI, we only report the coefficient and the p-value for the IV). In the second stage, we employ the predicted value of the largest shareholder's degree of portfolio diversification. The IV estimates are consistent under the assumption that the IVs are correlated with the endogenous variable but have no direct or indirect effect on the outcome under study. To assess the relevance of our IV, we compute the F-statistic and the partial R^2 on the instruments in the first-stage regression. As shown in Regression (1) of Table VI, the "natural" degree of portfolio diversification is highly correlated with the endogenous variable, with an F-stat of 609.2 and a partial R^2 of 0.037. (As a rule of thumb, an F-statistic below 10 would be suggestive of a weak instrument, as discussed in Staiger and Stock, 1997). In the second IV specification, we report an F-stat of 2,277 and a partial R^2 of 0.071. These results alleviate possible concerns that our coefficient estimators suffer from biases due to having weak instruments (Bound, Jaeger, and Baker, 1995). More importantly, with either instrumental variable, the (second stage) regression results continue to indicate more risk-taking among firms controlled by well diversified large shareholders.

A limitation of the IVs above, however, is that they might capture the extent of competition within an industry/country, which might itself directly or indirectly affect corporate risk-taking through other channels (e.g., competition might affect profitability, which in turn might affect risk-taking choices). We attempt to circumvent this concern by running our IV regressions for the sub-set of continental European firms and alternatively measuring our IVs across U.K. firms. The presumption here is that U.K. firms only indirectly compete in the continental European landscape. This presumption is supported by the data as, based on the CIA's *World Factbook*,[19] the U.K. does not appear among the top three import partners for any of the continental European countries in our sample. With either one of the IVs, the second stage results in regressions (3) and (4) confirm a large impact of large shareholder portfolio diversification on corporate risk-taking. Thus, the IV regressions are consistent with the view that large shareholder portfolio diversification leads to more risk-taking.

C. Commentary

By and large, we conclude that self-selection and reverse causality do not appear to generate the documented association between portfolio diversification and risk-taking. Whether exploiting successions, acquisitions, or using an instrumental variables technique, we consistently find that portfolio diversification per se *leads* to (more) corporate risk-taking. The results in this section also indicate that the previously estimated marginal effects are likely to understate the true economic significance of the impact of portfolio diversification on risk-taking.

IV. Robustness Tests

In this section, we assess the robustness of our results to a number of alternative variable specifications, and we consider alternative interpretations of the relation between risk-taking and large shareholder diversification.

A. Alternative Variables Definitions

A.1. Risk-Taking

One could argue that we are not actually measuring the amount of risk that shareholders are willing to engage in, as ROA is not controlled just by the actions of mangers/large shareholders but it is also the outcome of environmental outcomes and/or the result of managerial competence. We believe such criticism is inappropriate. First, we remove the influence of factors that cannot be controlled by the actions of insiders, such as the economic cycle of each industry and country, by focusing on the

[19] https://www.cia.gov/library/publications/the-world-factbook

difference between a firm's ROA and the average ROA across all non-financial firms in the industry and country in which the company is registered. Second, in all specifications we control for managerial skills/competence by including firm performance among the control variables. Third, as we show later in Section IV.B.1., our results cannot be explained by a tunnelling story. Fourth, we compare our primary risk-taking proxy with measures used in prior studies, such as John *et al.* (2008) and Djankov *et al.* (2010). At the country level, the correlation coefficient between our volatility of ROA and the measure of risk-taking employed by John *et al.* (2008) is 0.87. The correlation coefficient between our volatility of ROA and the "average entry rate" (e.g., entrepreneurs' propensity to start-up a new business) in Djankov *et al.* (2010) is 0.53. Thus, our measure of risk-taking appears to share underlying commonalities with the measures used in earlier studies of finance and growth.

Nevertheless, we verify the robustness of our results to three alternatives to our specification for the dependent variable, firm riskiness. First, we exploit the idea that firms that take more risk are less likely to survive through time. Hence, we look at the likelihood of surviving 5 years for all firms with accounting and ownership data for at least one year during 1999-2003. A clear advantage of this specification is that it does not suffer from any survivorship bias, as both surviving and non-surviving companies are included in the sample. This variable has the additional benefit of not suffering of the problems of accounting-based variables, such as being potentially affected by manipulation by insiders. To analyze the likelihood of survival, we employ Logit models, in which the outcome is 1 if a company survives 5 years, and 0 otherwise. In our sample, 45.15% of firms survive a 5-year period. The Logit results are reported in Panel A of Table VII. They document lower survival rates for companies controlled by diversified shareholders; all coefficients for portfolio diversification variables are negative and highly significant. This is consistent with the notion that companies controlled by diversified shareholders tend to engage in riskier projects.

[Table VII goes here]

The second alternative measure of firm risk that we test is the difference between the maximum and minimum ROA reported over the 5-year interval. Results are reported in Panel B of Table VII. In columns (1) – (3), we report results for cross-sectional tests similar to those in Table II; in columns (4)-(6), we report results for panel regressions comparable to those in Table III. The results are qualitatively similar to those reported in Tables II and III and confirm that portfolio diversification is positively associated with risk-taking; all coefficients on portfolio diversification variables are positive and statistically significant.

Third, we use the standard deviation of a firm's return on equity (ROE), rather than the standard deviation of ROA, as the measure of firm riskiness. ROE is the ratio of net income to shareholders' funds. The standard deviation of ROE reflects both the riskiness of a firm's projects and the additional risk induced by the use of leverage in the capital structure. The results are reported in Panel C of Table VII. As in Panel B, columns (1) – (3) report cross-sectional tests, and columns (4) – (6) report panel-regression results. Consistent with previously reported tests, the results indicate that portfolio diversification is positively and significantly related to firm risk-taking.

A.2. Portfolio Diversification

We also consider two alternative proxies for portfolio diversification. First, we consider diversification across countries. (In our sample, 7.09% of large shareholders are diversified across countries.) We construct a dummy variable that equals 1 if a shareholder holds shares in firms from different countries, and zero otherwise. This variable is highly significant in explaining risk-taking (see Regression (1) of Table VIII). Consistent with our previous findings, shareholders who hold a diversified portfolio are likely to take more risk.

[Table VIII goes here]

Second, we consider the weight of a firm in the largest investor's portfolio, ω_{ij}. For a totally non-diversified shareholder, her single investment will have a weight of 1 (e.g., 100%) relative to her total wealth. For a diversified shareholder, weights will be less than 1. For consistency with prior regressions, we use ($1-\omega_{ij}$), so that a larger (smaller) number denotes a more diversified (less diversified) portfolio. The results are reported in Regression (2) of Table VIII. The results are consistent with our previous results; increased shareholder portfolio diversification is associated with greater firm risk-taking.

B. Other Interpretations

B.1. Tunneling and Risk-Taking

A potential concern is that higher risk-taking by diversified large shareholders might simply reflect tunneling (Bertrand *et al.*, 2002, John *et al.*, 2008, Johnson, La Porta, Lopez-de-Silanes, and Shleifer, 2000). The tunneling hypothesis predicts more (less) risk-taking by companies in which the largest shareholder holds fewer (more) cash flow rights, as this investor would instruct a company in which she has fewer cash flow rights to take excess risk, and would then siphon off any gains from this firm to the company in which she has more cash flow rights (see John *et al.*, 2008, pp. 1684-1685, for a formal discussion). As a consequence, over time, the performance of companies in which the dominant shareholder has fewer cash flow rights would be more volatile. If this were the case, the higher level of corporate risk-taking that we observe is not necessarily associated with high-risk positive-NPV investments, and this strategy might actually lead to lower growth ex-post and/or economic instability.

To address this possibility, in all regressions we controlled for ownership concentration. Across all regressions, we find a positive and significant relation between ownership concentration and risk-taking.[20] This result is inconsistent with tunneling.

While consistent with the results in Amihud and Lev (1981), our results are inconsistent with their interpretation, which is that the presence of blockholders, whom they assume to be more diversified investors, is associated with more risk-taking. We have shown earlier that larger blockholders tend to be relatively less diversified than smaller blockholders. The positive relation between ownership concentration and risk-taking is, instead, consistent with empirical evidence that ownership and incentive schemes with convex payoffs induce insiders to take on more risk (e.g., Agrawal and Mandelker, 1987, Coles, Daniel, and Neveen, 2006, Guay, 1999). Our result is also consistent with the recent findings by

[20] Similarly, in unreported tests, we find less risk-taking in companies located further down in a pyramid, which are more likely to have a high discrepancy between ultimate control and ultimate ownership.

Paligorova (2010), who shows that companies that are part of business groups exhibit a positive association between ownership concentration and corporate risk-taking.

B.2. Firm-Level Diversification and Risk-Taking

It might be argued that the association between large shareholders' portfolio diversification and firm risk is actually the result of the level of diversification at the firm-level. A firm with an overall well-diversified set of risky projects might have low volatility of profitability, even though the individual projects are high-risk and high NPV investments. In this situation, the low volatility of profitability would not be associated with low economic growth. To rule out the possibility that low firm risk is driven primarily by diversification at the firm level, rather than by investors' portfolio diversification, we add a control for the number of 4-digit SIC sectors in which a company operates. The results are reported in Regression (3) of Table VIII. As expected, we find that firm-level diversification is associated with lower volatility of ROA. More importantly, after controlling for firm-level diversification, we continue to find that greater investor portfolio diversification is associated with more risk-taking at the firm level.

C. Other Robustness Tests

C.1. Shareholder Control of Corporate Decisions

The ability of large shareholders to control corporate decisions is presumably more pronounced among privately held firms, as controlling families are more likely to be involved in top management positions in private firms.[21] As a consequence, the impact of portfolio diversification on risk-taking should be comparatively weaker for publicly traded firms. Regression (4) of Table VIII confirms this conjecture. We find a negative and statistically significant coefficient for the interaction between an indicator denoting whether a firm is publicly traded and large shareholder portfolio diversification. Further, the economic impact of shareholder diversification on risk-taking is substantially larger for private than for publicly traded firms.

[21] In Europe, families cover top management positions in 68.45% of the publicly traded firms they control (Faccio and Lang, 2002).

Another way to ensure that the impact of portfolio diversification on risk-taking reflects shareholder control of corporate decisions is to focus on firms in which the largest shareholder controls at least 50% of a firm's voting rights. In Regression (5) of Table VIII, we show results of a cross-sectional regression run on a subsample that includes only companies in which the largest shareholder controls 50% of voting rights or more. The results confirm our previous evidence: there is a positive and significant relation between portfolio diversification and risk-taking.

C.2. Institutional Determinants of Risk-Taking

In our earlier cross-sectional tests, we included country fixed effects to control for the effect of *any* country-specific factors that influence firm risk-taking choices. However, the analysis of which factors have an impact on risk-taking is potentially interesting. In this section, we include two variables representing the quality of institutions within each country; security of property rights and the level of earnings management.

As proxy for the security of property rights, we include the revised *Anti-Director Rights* index, which "is formed by summing: (1) vote by mail; (2) shares not deposited; (3) cumulative voting; (4) oppressed minority; (5) pre-emptive rights; and (6) capital to call a meeting." This index is taken from Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2008). As a proxy for the quality of accounting information we use the *Earnings Management Score*, computed as the average rank across "the country's median ratio of the firm-level standard deviations of operating income and operating cash flow," "the country's Spearman correlation between the change in accruals and the change in cash flow from operations," "the country's median ratio of the absolute value of accruals and the absolute value of the cash flow from operations" and the "number of "small profits" divided by the number of "small losses" for each country." This index is taken from Burgstahler, Hail, and Leuz (2006). It is built such that a higher value denotes a higher degree of earnings management.

The results reported in Regression (6) of Table VIII show that risk-taking is significantly higher in countries that provide stronger protection of shareholder rights. Further, we find that earnings management is negatively correlated with risk-taking. Both results are consistent with earlier evidence in John *et al.* (2008). More importantly, shareholder diversification remains positively and significantly related to risk-taking after controlling for these two specific institutional differences across countries.

C.4. Non-U.K. Firms

The ownership data in *Amadeus* for the U.K. appears to be relatively noisy compared to the data from other countries in the sample (see Appendix A). While this is likely to have no effect other than bias against finding significant results, we would like to confirm that this data problem does not affect our central finding. For this purpose, we re-run our tests excluding U.K. firms. The results are reported in Regression (7) of Table VIII. For the non-U.K. sample, we continue to find a positive and significant association between shareholder diversification and risk-taking. Results are similar to those reported for the whole sample. Thus, we conclude that the noise introduced by the inclusion of U.K. firms does not impact our main result.

V. Conclusions

It is commonly assumed in the economics and finance literature that risk-averse insiders will avoid firm-level risk because their wealth is concentrated in a few firms. For example, John *et al.* (2008, p. 1683) argue that:

> "…[t]he resources available to dominant insiders, including both their equity ownership and the private benefits of control, are inevitably concentrated within the firms they control, that is, because of their large exposure to these firms, these dominant insiders are likely to direct the corporations they control to invest more conservatively than they would if they held a diversified portfolio of firms."

In this literature, because of data limitations, authors have traditionally used ownership concentration to proxy for portfolio diversification, despite the lack of hard evidence supporting any assumptions about diversification. They have reached mixed conclusions. As a preliminary step, we reconstruct the portfolios of shareholders who hold the largest equity position in privately-held and publicly-traded European firms. These new data allow us to revisit some standard assumptions and thus contribute to this literature. Although our evidence indicates that, on average, a company's largest shareholder is relatively undiversified, we observe great heterogeneity in the degree of diversification across shareholders. We show that there are many cases in which large shareholders hold well diversified portfolios. While the large shareholders who hold smaller equity stakes tend to hold more diversified portfolios, this correlation is relatively low. These findings will be useful to future researchers in making appropriate assumptions of two types: first, assumptions regarding large shareholder diversification; and second, assumptions regarding the trade-off between holding a reasonably diversified portfolio and holding a dominant position in a *relatively large* firm.

We exploit the heterogeneity in large shareholders' portfolio diversification to investigate the impact of large shareholder diversification on corporate risk-taking. We report strong statistical evidence that firms controlled by diversified large shareholders are more likely to undertake riskier projects than firms controlled by non-diversified investors. The impact of large shareholder diversification on risk-taking is also economically meaningful.

We also show that the positive association between portfolio diversification and corporate risk-taking is robust to the inclusion of shareholder fixed effects which alleviates a possible omitted variable bias. Second, we find significant changes in risk-taking behavior following shocks to the portfolios of large shareholders. For example, risk-taking changes following successions. We show that heirs tend to be less diversified than departed shareholders. As a consequence, corporate risk-taking declines for the firms experiencing a succession. Further, we document that the addition of one or more firms to the portfolio of the heirs results in a significant increase in the level of risk-taking across *all other* firms in their portfolios. These results are consistent with our hypothesis that large shareholders influence and alter corporate risk-taking so as to achieve the desired level of risk. Third, we use instrumental variables to extract the exogenous component of shareholder diversification. Whether we use fixed effects, exploit shocks to the portfolios of large shareholders, or use instrumental variables, we consistently find that portfolio diversification per se *leads* to (more) corporate risk-taking.

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Table I. Descriptive statistics

No. Firms is the total number of firms in which a company's largest ultimate shareholder (e.g., the ultimate shareholder controlling the largest fraction of voting rights in the firm) holds shares, directly or indirectly, in a given year, across all countries in our sample. The *Herfindhal Index* is the sum of the squared values of the weight that each investment has in a largest shareholder's portfolio, $\sum_{j=1}^{J} \omega_{ij}^2$. *-Correlation* is the correlation of the stock returns of a firm's industry with the shareholder's overall portfolio returns, multiplied by -1. *Diversification Dummy* is a binary variable that equals 1 if a shareholder holds more than one company in her portfolio, and zero otherwise. *σ(ROA)* is the 5-year volatility of a firm's country- and industry-adjusted return on assets, *ROA*, where *ROA* is the ratio of EBIT to total assets. *Leverage* is defined as the ratio of total debt to total assets, where total debt includes non-current liabilities (long term debt and other non-current liabilities) and current liabilities (loans, accounts payable, and others). *Sales Growth* is the annual growth rate of sales. *Ln (Size)* is the natural log of total assets (in thousands US$), expressed in 1999 prices, where total assets is the sum of fixed and current assets. *Age* is the number of years since incorporation. *Ultimate Ownership* measures the cash flow rights of the largest ultimate shareholder. In particular, assume that if a shareholder i owns a fraction α_{iy} of the shares of firm *Y*, which owns a fraction β_{yj} of the shares of firm *J*, then *i* will be entitled to a fraction $uo_{ij} = \alpha_{iy}\beta_{yj}$ of the cash flows of *J*. *Ultimate Control* measures the voting rights of the largest ultimate shareholder. If a shareholder i owns a fraction α_{iy} of the shares of firm *Y*, which owns a fraction β_{yj} of the shares of firm *J*, we measure shareholder i's control over voting rights in *J* by the weakest link along the chain, i.e., the minimum of α_{iy} and β_{yj}.

Panel A: Country distribution of observations

Country	No. Firms	%	Country	No. Firms	%
Austria	476	0.38	Latvia	261	0.21
Belgium	3,347	2.71	Liechtenstein	2	0.00
Bulgaria	468	0.38	Lithuania	285	0.23
Croatia	813	0.66	Luxembourg	2	0.00
Czech Republic	191	0.15	Netherlands	3,711	3.00
Denmark	4,491	3.63	Norway	4,526	3.66
Estonia	204	0.16	Poland	1,622	1.31
Finland	1,152	0.93	Portugal	1,791	1.45
France	31,054	25.12	Russian Federation	1,001	0.81
Germany	2,518	2.04	Slovak Republic	13	0.01
Greece	5,128	4.15	Slovenia	9	0.01
Hungary	4	0.00	Spain	19,351	15.65
Iceland	12	0.01	Sweden	4,269	3.45
Ireland	48	0.04	Switzerland	63	0.05
Italy	2,965	2.40	United Kingdom	33,863	27.39
			Overall	123,640	100.00

Table I. Descriptive statistics (Cont'd)

Panel B: Investor-level summary statistics for the portfolio diversification variables (82,479 investor-year observations)

Variable	Mean	Median	Interquartile range	Min.	Max.
No. Firms	3.997	1	2	1	972
Ln No. Firms	0.615	0	1.099	0	6.879
1-Herfindhal Index	0.174	0	0.392	0	0.985
-Correlation	-0.892	-1	0.202	-1	0.119
Diversification Dummy	0.435	0	1	0	1

Panel C: Firm-level summary statistics for the main dependent and independent variables

Variable	Mean	Median	Interquartile range	Mean	Median	Interquartile range
	Cross-section of firms (46,691 firms)			Panel of observations (123,640 firm-year observations)		
σ(ROA) ×100	5.410	4.320	4.448	4.850	3.735	4.056
Leverage	0.679	0.715	0.323	0.675	0.705	0.311
ROA	0.070	0.058	0.104	0.071	0.060	0.099
Sales Growth	0.375	-0.139	1.626	0.251	0.090	0.451
Size	10.156	9.945	1.796	10.246	10.038	1.729
Age	22.645	15	22	25.222	18	24
Ln (1+Age)	2.761	2.773	1.237	2.938	2.944	1.157
Ultimate Ownership	62.225	58	66.5	62.288	57.425	65.000
Ultimate Control	63.795	59.985	60.1	63.964	59.000	58.000
Ln No. Firms	1.381	0.693	2.197	1.420	0.693	2.303
1-Herfindhal Index	0.330	0.242	0.652	0.351	0.327	0.676
-Correlation	-0.782	-1	0.429	-0.785	-0.889	0.417

Table II. Cross-sectional regressions

This table reports OLS regression results. The dependent variable is the volatility of a firm's country- and industry-adjusted return on assets σ(ROA)×100, where *ROA* is the ratio of EBIT to total assets. We calculate the standard deviation of the country- and industry-adjusted returns of each firm over the entire sample period (1999-2007), requiring a minimum of 5 observations, following John *et al.* (2008). *Ln No. Firms* is the natural log of the total number of firms in which a company's largest ultimate shareholder (e.g., the ultimate shareholder controlling the largest fraction of voting rights in the firm) holds shares, directly or indirectly, in a given year, across all countries in our sample. The *Herfindhal Index* is the sum of the squared values of the weight that each investment has in a largest shareholder's portfolio, $\sum_{j=1}^{J} \omega_{ij}^2$. *-Correlation* is the correlation of the stock returns of a firm's industry with the shareholder's overall portfolio returns, multiplied by -1. *Leverage* is defined as the ratio of total debt to total assets where total debt includes non-current liabilities (long term debt and other non-current liabilities) and current liabilities (loans, creditors and others). *Sales Growth* is the annual growth rate of sales. *Ln (Size)* is the natural log of total assets (in thousands US$), expressed in 1999 prices, where total assets is the sum of fixed and current assets. *Ln (1+Age)* is the natural log of (1 + the number of years since incorporation). *Ultimate Ownership* is calculated as the cash flow rights of the largest shareholder on a firm's earnings. All independent variables are measured at the first year-end of the period over which the volatility of earnings is measured. All tests include country and industry fixed effects. P-values, adjusted for heteroskedasticity and clustering at the industry level, are reported in brackets below the coefficients. The economic significance of the portfolio diversification variables is reported beneath the p-values (in bold); this number is the percentage change in the dependent variable (relative to its mean) in response to an increase in the portfolio diversification variable from the first to the third quartile.

	(1)	(2)	(3)
Ln No. Firms	0.192***		
	[0.000]		
	7.798%		
(1-Herfindhal Index)		0.684***	
		[0.000]	
		8.249%	
-Correlation			1.273***
			[0.000]
			10.110%
Leverage	0.609***	0.475***	0.602***
	[0.000]	[0.000]	[0.000]
ROA	1.758***	2.471***	2.021***
	[0.000]	[0.000]	[0.000]
Sales Growth	0.124***	0.117***	0.116***
	[0.000]	[0.000]	[0.000]
Ln (Size)	-0.567***	-0.520***	-0.550***
	[0.000]	[0.000]	[0.000]
Ln (1+Age)	-0.114***	-0.108***	-0.117***
	[0.000]	[0.000]	[0.000]
Ultimate Ownership	0.003***	0.002***	0.003***
	[0.000]	[0.004]	[0.000]
Intercept	9.792***	9.544***	11.021***
	[0.000]	[0.000]	[0.000]
Country fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Adj. R-squared	0.153	0.151	0.156
No. of observations	46,691	45,891	43,973

Table III. Panel regressions

This table reports OLS regression results. The dependent variable is the volatility of a firm's country- and industry-adjusted return on assets σ(ROA)×100, where *ROA* is the ratio of EBIT to total assets. We calculate the standard deviation of the country- and industry-adjusted returns of each firm over 5-year partially overlapping periods (1999-2003, 2000-2004, 2001-2005, 2002-2006, and 2003-2007). *Ln No. Firms* is the natural log of the total number of firms in which a company's largest ultimate shareholder (e.g., the ultimate shareholder controlling the largest fraction of voting rights in the firm) holds shares, directly or indirectly, in a given year, across all countries in our sample. The *Herfindhal Index* is the sum of the squared values of the weight that each investment has in a largest shareholder's portfolio, $\sum_{j=1}^{J} \omega_{ij}^2$. *-Correlation* is the correlation of the stock returns of a firm's industry with the shareholder's overall portfolio returns, multiplied by -1. *Leverage* is defined as the ratio of total debt to total assets where total debt includes non-current liabilities (long term debt and other non-current liabilities) and current liabilities (loans, creditors and others). *Sales Growth* is the annual growth rate of sales. *Ln (Size)* is the natural log of total assets (in thousands US$), expressed in 1999 prices, where total assets is the sum of fixed and current assets. *Ln (1+Age)* is the natural log of (1 + the number of years since incorporation). *Ultimate Ownership* is calculated as the cash flow rights of the largest shareholder on a firm's earnings. All independent variables are measured at the first year-end of the period over which the volatility of earnings is measured. All regressions include industry, shareholder and year fixed effects. P-values, adjusted for heteroskedasticity and clustering at the company level, are reported in brackets below the coefficients. The economic significance of the portfolio diversification variables is reported beneath the p-values (in bold); this number is the percentage change in the dependent variable (relative to its mean) in response to an increase in the portfolio diversification variable from the first to the third quartile.

	(1)	(2)	(3)
Ln No. Firms	0.113***		
	[0.007]		
	5.364%		
(1-Herfindhal Index)		0.276*	
		[0.077]	
		3.846%	
-Correlation			0.349*
			[0.071]
			3.003%
Leverage	0.916***	0.919***	0.859***
	[0.000]	[0.000]	[0.000]
ROA	-0.730*	-0.652	-0.719*
	[0.074]	[0.113]	[0.093]
Sales Growth	0.071***	0.074***	0.069***
	[0.000]	[0.000]	[0.000]
Ln (Size)	-0.642***	-0.641***	-0.639***
	[0.000]	[0.000]	[0.000]
Ln (1+Age)	-0.073**	-0.070**	-0.078**
	[0.024]	[0.029]	[0.018]
Ultimate Ownership	0.005***	0.005***	0.005***
	[0.003]	[0.002]	[0.007]
Intercept	11.001***	10.893***	11.593***
	[0.000]	[0.000]	[0.000]
Industry fixed effects	Yes	Yes	Yes

Shareholder fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Adj. R-squared	0.420	0.405	0.419
No. of observations	123,640	121,851	116,857

Table IV: Successions

To identify successions, we first search for all instances in which a company's largest shareholder changes. We then restrict the sample to those instances in which the departed shareholder disappears from the ownership structure of a given firm in the years subsequent to the ownership change. We further require that the new and the departed shareholder share the same last name. Finally, we run keyword searches in *Lexis-Nexis*, *Factiva*, and *Google* to identify (and remove) any instances in which the transaction in question is described as something other than a succession (e.g., a sale of shares). In Panel A, we examine the *change* in corporate risk-taking among companies experiencing an *exogenous change* in the identity of their largest shareholder (succession). *No. Firms (departed; pre-succession)* is the number of firms in the portfolio of the departed largest shareholder, as measured before the succession. *No. Firms (heir; post-succession)* is the number of firms in the portfolio of the heir, as measured immediately after the succession. In Panel B, we analyze the change in portfolio diversification and risk-taking for a matching control sample of firms that do not experience a succession. The matching control firms are identified using a propensity score matching estimator. In Panel C, we examine the change in risk-taking across *all other* firms in the portfolio of the heir following the succession. This test can only be run to the extent that the heir held stocks in at least one company prior to the succession. *No. Firms (heir; pre-succession)* is the number of (other) firms in the portfolio of the heir, as measured before the succession. For both tests, we require 5 years of (ROA) data pre-succession as well as 5 years of data post-succession in order to measure changes in the level of risk-taking. σ(ROA)×100 is the volatility of a firm's country- and industry-adjusted return on assets (ROA), where *ROA* is the ratio of EBIT to total assets.

Panel A: Change in risk-taking following a change in the identity of the largest shareholder: Companies experiencing a succession

Variable	Obs	Mean	Δ Mean (post-pre)	P-value of diff. post- vs. pre-
No. Firms (*departed*; pre-succession)	84	4.119		
No. Firms (*heir*; post-succession)	84	3.784		
σ(ROA)×100 (pre-succession)	84	4.090		
σ(ROA)×100 (post-succession)	84	3.497	-0.593	0.082

Panel B: Change in risk-taking for the matching control sample

Variable	Obs	Mean	Δ Mean (post-pre)	P-value of diff. post- vs. pre-
No. Firms (pre-succession)	84	4.329		
No. Firms (post-succession)	84	4.512		
σ(ROA)×100 (pre-succession)	84	4.024		
σ(ROA)×100 (post-succession)	84	4.375	0.351	0.399

Panel C: Change in risk-taking across *all other firms* in the portfolio of the heir

Variable	Obs	Mean	Δ Mean (post-pre)	P-value of diff. post- vs. pre-
No. Firms (*heir*; pre-succession)	29	3.690		
No. Firms (*heir*; post-succession)	29	7.655		
σ(ROA)×100 (pre-succession)	29	4.565		
σ(ROA)×100 (post-succession)	29	6.633	2.068	0.088

Table V: Acquisitions: Change in risk-taking in the *other firms* in the portfolios of acquirers

To identify acquisitions, we first isolate shareholders who experience a net increase in the number of firms in their portfolios. From this sample, we select additions that account for at least 10% of the equity wealth of the investor. Finally, we require 5 years of (ROA) data pre-acquisition as well as 5 years of data post-acquisition to measure changes in the level of risk-taking of the *other* firms in the portfolios of the acquirers. We are able to retrieve this information for 2,185 acquirers. In the table below, we examine the change in risk-taking in the *other* firms in the portfolios of acquirers. *No. Firms (acquirer; pre-acquisition)* is the number of (other) firms in the portfolio of the acquirer, as measured before the acquisition. *No. Firms (acquirer; post-acquisition)* is the number of firms in the portfolios of acquirers, as measured immediately after an acquisition. σ(ROA)×100 is the volatility of a firm's country- and industry-adjusted return on assets (ROA), where *ROA* is the ratio of EBIT to total assets.

Variable	Obs	Mean	Δ Mean (post-pre)	P-value of diff. post- vs. pre-
No. Firms (*acquirer*; pre-acquisition)	2,185	14.54		
No. Firms (*acquirer*; post-acquisition)	2,185	21.86		
σ(ROA)×100 (pre-acquisition)	2,185	5.001		
σ(ROA)×100 (post-acquisition)	2,185	5.507	0.506	0.000

Table VI: Instrumental variables regressions

In the second stage regressions, the dependent variable is the volatility of a firm's country- and industry-adjusted return on assets σ(ROA)×100, where *ROA* is the ratio of EBIT to total assets. We calculate the standard deviation of the country- and industry-adjusted returns of each firm over the entire sample period (1999-2007), requiring a minimum of 5 observations, following John *et al.* (2008). In Regression (1), we use *Average Divers. (Same Country/Industry)*, defined as the average portfolio diversification of large shareholders across all *other* firms in the same country and industry as the firm in question, as instrument for *Ln No. Firms*. In Regression (2), the IV is the *Fraction of Other Firms (Same Country/Industry) With Diversified Investors*, defined as the fraction of other firms in the same country and industry whose largest shareholder holds a diversified portfolio. In Regression (3), which is run for the sub-set of non-U.K. firms, the IV is the *Average Divers. (Same Industry/U.K.)*, defined as the average portfolio diversification of large shareholders across all U.K. firms from the industry as the firm in question. In Regression (4), which is also run for the sub-set of non-U.K. firms, the IV is the *Fraction of Other Firms (Same Industry/U.K.) With Diversified Investors*, defined as the fraction of U.K. firms in the same industry whose largest shareholder holds a diversified portfolio. *Ln No. Firms* is the natural log of the total number of firms in which a company's largest ultimate shareholder (e.g., the ultimate shareholder controlling the largest fraction of voting rights in the firm) holds shares, directly or indirectly, in a given year, across all countries in our sample. *Leverage* is defined as the ratio of total debt to total assets where total debt includes non-current liabilities (long term debt and other non-current liabilities) and current liabilities (loans, creditors and others). *Sales Growth* is the annual growth rate of sales. *Ln (Size)* is the natural log of total assets (in thousands US$), expressed in 1999 prices, where total assets is the sum of fixed and current assets. *Ln (1+Age)* is the natural log of (1 + the number of years since incorporation). *Ultimate Ownership* is calculated as the cash flow rights of the largest shareholder on a firm's earnings. All independent variables are measured at the first year-end of the period over which the volatility of earnings is measured. P-values, adjusted for heteroskedasticity are reported in brackets below the coefficients. *Hausman test* is the Hausman test of endogeneity for the difference between the OLS and the IV estimators.

	(1)	(2)	(3)	(4)
Sample	Whole Sample		Non-U.K. Firms	
Second stage regressions:				
Ln No. Firms (fitted)	1.749***	1.042***	2.196***	2.815***
	[0.000]	[0.000]	[0.000]	[0.000]
Leverage	-0.217	-0.133	-0.302**	-0.053
	[0.219]	[0.430]	[0.048]	[0.717]
ROA	1.926***	2.129***	2.356***	2.206***
	[0.000]	[0.000]	[0.000]	[0.000]
Sales Growth	0.063**	0.069**	-0.009	-0.047**
	[0.038]	[0.012]	[0.704]	[0.046]
Size	-0.834***	-0.568***	-1.004***	-0.523***
	[0.000]	[0.000]	[0.000]	[0.001]
Ln (1+Age)	-0.323***	-0.284***	-0.155***	-0.187***
	[0.000]	[0.000]	[0.000]	[0.000]
Ultimate Ownership	0.343***	0.022***	0.029***	0.012*
	[0.000]	[0.000]	[0.000]	[0.096]
Intercept	10.330***	8.853***	11.160***	33.314***
	[0.000]	[0.000]	[0.000]	[0.000]
Country fixed effects	No	No	No	No
Industry fixed effects	No	No	No	No
No. of observations	46,574	46,502	34,935	34,935

Table VI: Instrumental variables regressions (Cont'd)

	(1)	(2)	(3)	(4)
Sample	Whole Sample		Non-U.K. Firms	
First stage regressions:				
IV: Average Divers. (Same Country/Industry)	0.367***			
	[0.000]			
IV: Fraction of Other Firms (Same Country/ Industry) With Diversified Investors		2.097***		
		[0.000]		
IV: Average Divers. (Same Industry/U.K.)			0.070***	
			[0.000]	
IV: Fraction of Other Firms (Same Industry/ U.K.) With Diversified Investors				0.228***
				[0.000]
Partial R-squared of excluded instruments	0.037	0.071	0.001	0.000
F-test of excluded instruments	609.2	2,277	40.95	19.83
Hausman test (p-values)	0.000	0.000	0.000	0.000

Table VII: Robustness tests: Alternative definitions of the dependent variable

In Panel A, we report the results for Logit regressions analyzing the likelihood of survival over a 5-year period. In Panel B, the dependent variable is the difference between the maximum and minimum values of firm's country- and industry-adjusted return on assets, ×100. *ROA* is the ratio of EBIT to total assets. In Panel C, the dependent variable is the volatility of a firm's country- and industry-adjusted return on equity, σ(ROE)×100. ROE is defined as the ratio of net income to total shareholders' funds. In Panels B and C, columns (1) - (3) report the results for cross-sectional regressions; Columns (4) - (6) report results for panel regressions. *Ln No. Firms* is the natural log of the total number of firms in which a company's largest ultimate shareholder (e.g., the ultimate shareholder controlling the largest fraction of voting rights in the firm) holds shares, directly or indirectly, in a given year, across all countries in our sample. The *Herfindhal Index* is the sum of the squared values of the weight that each investment has in a largest shareholder's portfolio, $\sum_{j=1}^{J} \omega_{ij}^2$. *-Correlation* is the correlation of the stock returns of a firm's industry with the shareholder's overall portfolio returns, multiplied by -1. *Leverage* is defined as the ratio of total debt to total assets where total debt includes non-current liabilities (long term debt and other non-current liabilities) and current liabilities (loans, creditors and others). *Sales Growth* is the annual growth rate of sales. *Ln (Size)* is the natural log of total assets (in thousands US$), expressed in 1999 prices, where total assets is the sum of fixed and current assets. *Ln (1+Age)* is the natural log of (1 + the number of years since incorporation). *Ultimate Ownership* is calculated as the cash flow rights of the largest shareholder on a firm's earnings. All independent variables are measured at the first year-end of the period over which the volatility of earnings is measured. All cross-sectional tests include country and industry fixed effects. All panel regressions include industry, shareholder and year fixed effects. P-values, adjusted for heteroskedasticity and clustering at the industry level, are reported in brackets below the coefficients. In the panel regressions, standard errors are also adjusted for clustering at the company level. The economic significance of the portfolio diversification variables is reported beneath the p-values (in bold); this number is the percentage change in the dependent variable (relative to its mean) in response to an increase in the portfolio diversification variable from the first to the third quartile.

Table VII: Robustness tests: Alternative definitions of the dependent variable (Cont'd)

Panel A: Likelihood of survival

	(1)	(2)	(3)
Ln No. Firms	-0.092***		
	[0.000]		
	-14.598%		
(1-Herfindhal Index)		-0.271***	
		[0.000]	
		-9.675%	
-Correlation			-0.438***
			[0.000]
			-10.262%
Leverage	-0.055*	-0.031	-0.042
	[0.077]	[0.332]	[0.197]
ROA	1.742***	1.700***	1.729***
	[0.000]	[0.000]	[0.000]
Sales Growth	0.055***	0.053***	0.056***
	[0.000]	[0.000]	[0.000]
Ln (Size)	0.188***	0.173***	0.176***
	[0.000]	[0.000]	[0.000]
Ln (1+Age)	0.096***	0.092***	0.092***
	[0.000]	[0.000]	[0.000]
Ultimate Ownership	-0.001***	0.0003	0.0002
	[0.008]	[0.126]	[0.328]
Intercept	-3.230***	-3.181***	-3.640***
	[0.000]	[0.000]	[0.000]
Country fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Pseudo R-squared	0.094	0.092	0.094
No. of observations	103,312	100,962	96,925

Table VII: Robustness tests: Alternative definitions of the dependent variable (Cont'd)

Panel B: Max(ROA)-Min(ROA)

	Cross-sectional tests			Panel regressions		
	(1)	(2)	(3)	(4)	(5)	(6)
Ln No. Firms	0.472***			0.274***		
	[0.000]			[0.005]		
	7.162%			***4.959%***		
(1-Herfindhal Index)		1.515***			0.651**	
		[0.000]			[0.014]	
		6.827%			***3.461%***	
-Correlation			3.571***			0.733*
			[0.000]			[0.095]
			10.592%			***2.319%***
Leverage	0.636***	0.259***	0.598***	2.197***	2.204***	2.076***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
ROA	5.284***	7.278***	5.884***	-1.203	-0.982	-1.167
	[0.000]	[0.000]	[0.000]	[0.188]	[0.283]	[0.221]
Sales Growth	0.290***	0.277***	0.270***	0.169***	0.174***	0.163***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Ln (Size)	-1.116***	-0.991***	-1.094***	-1.542***	-1.539***	-1.537***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Ln (1+Age)	-0.322***	-0.307***	-0.348***	-0.159**	-0.207***	-0.217***
	[0.000]	[0.000]	[0.000]	[0.039]	[0.002]	[0.001]
Ultimate Ownership	0.008***	0.003***	0.008***	0.011***	0.011***	0.010***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Intercept	19.596***	18.976***	23.242***	26.444***	26.218***	27.780***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Country fixed effects	Yes	Yes	Yes	No	No	No
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Shareholder fixed effects	No	No	No	Yes	Yes	Yes
Year fixed effects	No	No	No	Yes	Yes	Yes
Adj. R-squared	0.093	0.091	0.096	0.422	0.408	0.421
No. of observations	46,691	45,891	43,973	123,640	121,851	116,857

Table VII: Robustness tests: Alternative definitions of the dependent variable (Cont'd)

Panel C: $\sigma(ROE)$

	Cross-sectional tests			Panel regressions		
	(1)	(2)	(3)	(4)	(5)	(6)
Ln No. Firms	1.600***			0.608*		
	[0.000]			[0.070]		
	11.854%			***5. 236%***		
(1-Herfindhal Index)		6.002***			1.260*	
		[0.000]			[0.094]	
		13.221%			***3.193%***	
-Correlation			10.460***			3.220**
			[0.000]			[0.049]
			15.174%			***5.035 %***
Leverage	47.624***	45.699***	47.801***	52.590***	52.576***	52.911***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
0ROE	4.064***	2.329	3.753	2.078**	2.155**	2.128**
	[0.000]	[0.002]	[0.000]	[0.015]	[0.018]	[0.017]
Sales Growth	-0.155	-0.072	-0.178	-0.330*	-0.325*	-0.384**
	[0.262]	[0.601]	[0.210]	[0.079]	[0.084]	[0.048]
Ln (Size)	-1.166***	-1.049***	-1.183***	-1.573***	-1.563***	-1.570***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Ln (1+Age)	1.107***	0.880***	1.106***	-0.561*	-0.541	-0.609***
	[0.000]	[0.001]	[0.000]	[0.097]	[0.109]	[0.079]
Ultimate Ownership	0.024***	0.010***	0.016***	0.019	0.020	0.022
	[0.000]	[0.000]	[0.000]	[0.198]	[0.182]	[0.166]
Intercept	-5.524***	-4.314***	-7.070***	8.520*	8.312***	11.923*
	[0.000]	[0.000]	[0.000]	[0.061]	[0.006]	[0.056]
Country fixed effects	Yes	Yes	Yes	No	No	No
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Shareholder fixed effects	No	No	No	Yes	Yes	Yes
Year fixed effects	No	No	No	Yes	Yes	Yes
Adj. R-squared	0.174	0.162	0.174	0.392	0.359	0.387
No. of observations	44,293	43,535	41,682	119,290	117,590	112,763

Table VIII: Other robustness tests

The dependent variable is the volatility of a firm's country- and industry-adjusted return on assets σ(ROA)×100, where *ROA* is the ratio of EBIT to total assets. We calculate the standard deviation of the country- and industry-adjusted returns of each firm over the entire sample period (1999-2007), requiring a minimum of 5 observations, following John *et al.* (2008). *Ln No. Firms* is the natural log of the total number of firms in which a company's largest ultimate shareholder (e.g., the ultimate shareholder controlling the largest fraction of voting rights in the firm) holds shares, directly or indirectly, in a given year, across all countries in our sample. *Country Diversif. Dummy* is a binary variable that equals 1 if a shareholder holds shares in firms from different countries, and zero otherwise. *Fraction of Wealth* the ratio of the value of the investment made in a given firm over the shareholder's total equity wealth. *Firm-level diversification* is the natural log of the number of 4-digit SIC sectors in which a company operates. *Publicly Traded Dummy* is a binary variable that equals 1 if a company is publicly traded, and 0 otherwise. *Anti-Self-Dealing Index* "is formed by summing: (1) vote by mail; (2) shares not deposited; (3) cumulative voting; (4) oppressed minority; (5) pre-emptive rights; and (6) capital to call a meeting." This index is taken from Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2008). *Earnings Management Score* is the average rank across "the country's median ratio of the firm-level standard deviations of operating income and operating cash flow," "the country's Spearman correlation between the change in accruals and the change in cash flow from operations," "the country's median ratio of the absolute value of accruals and the absolute value of the cash flow from operations" and the "number of "small profits" divided by the number of "small losses" for each country." This index is taken from Burgstahler, Hail, and Leuz (2006). *Leverage* is defined as the ratio of total debt to total assets where total debt includes non-current liabilities (long term debt and other non-current liabilities) and current liabilities (loans, creditors and others). *Sales Growth* is the annual growth rate of sales. *Ln (Size)* is the natural log of total assets (in thousands US$), expressed in 1999 prices, where total assets is the sum of fixed and current assets. *Ln (1+Age)* is the natural log of (1 + the number of years since incorporation). *Ultimate Ownership* is calculated as the cash flow rights of the largest shareholder on a firm's earnings. All independent variables are measured at the first year-end of the period over which the volatility of earnings is measured. All cross-sectional tests include country and industry fixed effects. P-values, adjusted for heteroskedasticity and clustering at the industry level, are reported in brackets below the coefficients. The economic significance of the portfolio diversification variables is reported beneath the p-values (in bold); this number is the percentage change in the dependent variable (relative to its mean) in response to an increase in the portfolio diversification variable from the first to the third quartile.

Type of Robustness Test:	(1) Different proxy for portfolio diversification	(2) Different proxy for portfolio diversification	(3) Firm-Level diversification	(4) Private vs. publicly traded firms	(5) Majority controlled firms	(6) Institutional determinants of risk taking	(7) Non-U.K. firms
Ln No. Firms			0.188***	0.212***	0.172***	0.244***	0.203***
			[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
			7.635%	***8.610%***	***5.068%***	***9.909%***	***8.244%***
Country Diversif. Dummy	0.651***						
	[0.000]						
	12.033%						
(1-Fraction of Wealth)		0.632***					
		[0.000]					
		10.854%					

Firm-level diversification			-0.191***				
			[0.000]				
Publicly Traded Dummy				0.842***			
				[0.000]			
Ln No. Firms* Publicly Traded Dummy				-0.191***			
				[0.000]			
Anti-Self-Dealing Index						2.159***	
						[0.000]	
Earnings Management Score						-0.019***	
						[0.000]	
Leverage	0.621***	-0.021	0.216**	0.688***	0.422***	0.669***	0.034
	[0.000]	[0.813]	[0.020]	[0.000]	[0.000]	[0.000]	[0.773]
ROA	1.771***	3.927***	1.829***	1.818***	2.324***	1.908***	2.131***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Sales Growth	0.123***	0.098***	0.096***	0.123***	0.120***	0.137***	0.063***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Ln (Size)	-0.554***	-0.472***	-0.423***	-0.583***	-0.412***	-0.570***	-0.324***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Ln (1+Age)	-0.110***	-0.102***	-0.200***	-0.116***	-0.163***	-0.122***	-0.204***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Ultimate Ownership	0.002***	0.002***	0.004***	0.004***	0.007***	0.006***	0.005***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Intercept	9.807***	9.105***	8.235***	9.806***	7.493***	2.654***	7.057***
	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]	[0.000]
Country fixed effects	Yes	Yes	Yes	Yes	Yes	No	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adj. R-squared	0.153	0.157	0.096	0.154	0.084	0.145	0.086
No. of observations	46,691	44,670	42,434	46,691	32,483	42,209	34,940

Appendix A: Data Quality

A. Ownership Data

The ownership data that we use to compute ultimate ownership, ultimate control, and the shareholder diversification variables are gathered by *Amadeus* from a variety of sources: official bodies, associated information providers (i.e., *Jordans* for Ireland and the U.K.; *Coface* for France; *Lexis-Nexis* for the Netherlands), and directly from the companies themselves. To assess the quality of the ownership data in *Amadeus*, we compare the stake held by the largest direct shareholder, as reported in *Amadeus*, with the same information from alternative sources. We check data from three markets for which the collection of ownership data from online sources is relatively easy: Italy, Spain, and the U.K. For each of these countries, we collect year-end data for 2007 for a sample of 100 firms. For Italy, we obtain official data for publicly-traded firms from the *Italian Stock Exchange*.[22] For Spain, the official data are from the *Comisión Nacional del Mercado de Valores*.[23] For the U.K., the data come from the *Hemscott-Corporate Register.*[24]

For these companies, we compute the correlation coefficient between the ownership of the largest shareholder as reported in *Amadeus* and that reported in the alternative sources. The overall correlation coefficient is 0.87. Although this coefficient appears to be reasonably high, two caveats are in order. First, the ownership data in *Amadeus* appears to be noisier in the U.K. In particular, while the correlation coefficient between the ownership of the largest shareholder as reported in *Amadeus* and that reported in the alternative sources is 0.89 for the Spanish sample, and 0.83 for the Italian sample, it is only 0.67 for the U.K. sample. These discrepancies are due, at least in part, to differences in the dates on which ownership changes are recorded in the different data sources. (As the market for corporate control is relatively more liquid in the U.K., one would expect to find more discrepancies in the U.K. ownership data across different sources.) To address this potential problem, we show in our robustness tests that our

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[22] http://www.borsaitaliana.it/frame/torna.jsp?src=http://www.consob.it/main/emittenti/societa_quotate/index.html

[23] http://www.cnmv.es/Portal/consultas/DerechosVoto/BusquedaEntidad.aspx

[24] http://www.hemscott.com/

results are robust to the exclusion of U.K. firms. The second caveat is that in some cases, the name of the largest direct shareholder as reported in *Amadeus* does not match the name in the official data sources. Unfortunately, given the size of the database, it is not possible to manually check all entries. However, we have no reason to think that this inconsistency in the ownership data would not result in anything other than noise in the data. Thus, if anything, it should bias against finding significant results.

B. Accounting Data

We use two tests to assess the accuracy of the accounting data. First, for a random sample of 250 publicly-traded companies covered in *Amadeus*, we collect data on "total assets" at year-end 2007 from *Datastream*. We then compute the correlation coefficient between the total assets as reported in *Amadeus* for 2007 and that reported in *Datastream*. The correlation coefficient is 0.93. Further, for a random sample of 250 privately-held firms, we gather data on total assets at year-end 2007 from *OneSource*, a database which contains a limited amount of basic information for more than half a million public and private businesses across nineteen European countries.[25] We then compute the correlation coefficient between the total assets as reported in *Amadeus* and that reported in *OneSource*. The correlation coefficient is 0.98. Based on these calculations, we conclude that the accounting data in *Amadeus* appear to be as reliable as the data available from alternative sources.

[25] http://www.onesource.com

Appendix B. Selection criteria

A. OWNERSHIP DATA	Total	B. ACCOUNTING DATA	Total
Initial ownership database (1999-2003)	1,315,558 shareholder-years	Initial accounting dataset for non-financial companies with at least one year of ROA data (1999-2007)	1,754,714 firm-years
- Cross-held companies	- 2,890 firm-years		
- Shareholders disclosed in *Amadeus* as "aggregate categories"	- 41,878 shareholder-years	- Firms with less than 5 years of ROA data	-546,048 firm-years
- State-owned firms	- 24,482 firm-years		
Total Number of Observations	1,198,372 shareholder-years 645,394 firm-years (243,856 firms)	Total Number of Observations	1,208,666 firm-years (168,193 firms)

C. MERGED PANEL	Total
Merged ownership (1999-2003) and ROA volatility data (1999-2007)	332,301 firm-years (50,049 firms)
- Firms with missing data for the main control variables	- 208,661 firm-years
Final sample	**123,640 firm-years** **(46,691 firms)**