How Does Owners' Exposure to Idiosyncratic Risk Influence the Capital Structure of Private Companies?

Elisabeth Müller

ZEW

Zentrum für Europäische
Wirtschaftsforschung GmbH

Centre for European
Economic Research

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Non-technical Summary

Private companies typically have only a limited number of owners, each with a large ownership share. This concentrated ownership helps to overcome control problems caused by the opaqueness of business operations. However, it also exposes owners to idiosyncratic risk, since they often invest a high share of their personal net worth in a single company. Their personal portfolios are therefore not well diversified. If owners require a compensation for their risk exposure, they have to demand higher returns on their equity investment, which is equivalent to higher costs of equity capital.

We test two hypotheses about the consequences of owners' lack of diversification. First, since poor diversification increases the cost of equity capital, we expect a higher demand for bank financing from owners who have invested a higher share of their personal wealth in the company. This would be the consequence if owners tried to equalize the marginal cost of equity and debt capital. Second, we hypothesize that a higher exposure to idiosyncratic risk leads to higher leverage. This is the central point of interest of this paper: a higher cost of equity capital for less diversified owners should lead to a more extensive use of bank financing.

These hypotheses are tested with data from a survey of private companies from the US. As hypothesized, we find that less diversified owners confronted with higher costs of equity capital evince a higher demand for bank loans. The probability that a company made an application for a new loan in the three years preceding the survey increases with lack of diversification. Furthermore, being less diversified has a positive and large effect on leverage. Owners' exposure to idiosyncratic risk is therefore an important determinant of the capital structure of private companies.

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Abstract

This paper identifies the owner's exposure to idiosyncratic risk as an important determinant of the demand for loans and the capital structure of private companies. The analysis is based on a sample of small and medium-sized companies from the United States. The exposure to idiosyncratic risk is approximated by the share of personal net worth invested in one company (SNWI). Exposure to idiosyncratic risk increases the cost of equity capital, since higher equity returns are required as compensation. This therefore makes bank financing more attractive. We find that SNWI increases both the demand for new bank loans and leverage substantially.

JEL classification: G32, G30

Keywords: capital structure, exposure to idiosyncratic risk, private companies

[a]Centre for European Economic Research (ZEW), Department of Industrial Economics and International Management, L7,1, 68161 Mannheim, Germany, phone: +49-621-1235-383, fax: +49-621-1235-170, e-mail: Mueller@zew.de

1 Introduction

Private companies typically have only a limited number of owners, each with a large ownership share. This concentrated ownership helps to overcome control problems caused by the opaqueness of business operations. However, it also exposes owners to idiosyncratic risk, since they often invest a high share of their personal net worth in a single company (Moskowitz and Vissing-Jørgensen (2002)). Their personal portfolios are therefore not well diversified. If owners require a compensation for their risk exposure, they have to demand higher returns on their equity investment, which is equivalent to higher costs of equity capital. External finance from banks is therefore more attractive for owners with a concentrated investment.

The main point of this paper is to investigate how owners' exposure to idiosyncratic risk influences demand for new bank loans and capital structure. Tests concerning capital structure have so far neglected influences that stem from the specific ownership structure of private companies. We test two hypotheses about the consequences of owners' lack of diversification. First, since poor diversification increases the cost of equity capital, we expect a higher demand for bank financing from owners who have invested a higher share of their personal wealth in the company. This would be the consequence if owners tried to equalize the marginal cost of equity and debt capital. Second, we hypothesize that a higher exposure to idiosyncratic risk leads to higher leverage. This is the central point of interest of this paper: a higher cost of equity capital for less diversified owners should lead to a more extensive use of bank financing.

The empirical analysis is based on the Survey of Small Business Finances (SSBF) from the year 1998. The survey is well suited for our analysis, since it provides information on

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the financial structure of private companies and the personal wealth of their owners. The survey includes companies with up to 500 employees, i.e. companies for which concentrated ownership is typical. The exposure to idiosyncratic risk can be empirically approximated by the share of the owner's net worth which is invested in one company. Since we are confronted with reverse causality, we use an instrumental variables approach with age of the owner and sex of the owner as instruments for the share of net worth invested.

Our hypotheses are confirmed by the data. Less diversified owners confronted with higher costs of equity capital evince a higher demand for bank loans. The probability that a company made an application for a new loan in the three years preceding the survey increases with lack of diversification. Furthermore, being less diversified has a positive and large effect on leverage. A one standard deviation increase in the share of net worth invested leads, ceteris paribus, to an increase in leverage of 16.2 percentage points. This is substantial, especially when considering that average leverage in the sample is 33.3%. Owners' exposure to idiosyncratic risk is therefore an important determinant of the capital structure of private companies.

The empirical results improve our understanding of the financing of private companies. We find that owners who are more exposed to the idiosyncratic risk of their companies use bank financing more extensively. It allows them to reduce their own investment if they keep company size constant or, alternatively, to grow their companies without increasing their risk exposure further. Since exposure to idiosyncratic risk increases the cost of equity capital and accordingly the required returns of an investment project, the availability of bank loans enables the profitable realization of some investment projects that would not have been realized otherwise. Bank financing decreases the returns that are required for the realization of an investment project.

This paper is related to the literature investigating loan demand and capital structure of private companies. Several studies investigate specific aspects of loan demand. For example, Cavalluzzo et al. (2002) look at the influence of gender, race and ethnicity, and Berkowitz and White (2004) consider the effect of bankruptcy law. The most prominent explanations for the capital structure of companies are the trade-off theory and the pecking order theory, which have been mainly tested for listed companies (see, for example, Titman and Wessels (1988), Rajan and Zingales (1995) and de Jong (2002)). There are also studies for private companies, but influences from their concentrated ownership structure have so far not be taken into consideration. Chittenden et al. (1996) investigate the importance of company characteristics such as size, age and the ability to provide company assets as collateral. Berger and Udell (1998) study how the capital structure changes in the financial growth cycle. Giannetti (2003) focuses on differences among countries, aiming to identify the impact of legal rules and financial development.

The remaining part of this paper is structured as follows. Section 2 presents the theoretical background and develops the hypotheses; Section 3 explains the data set and defines the variables; Section 4 shows the empirical results; and Section 5 concludes.

2   Theory and Hypotheses

In this section we state advantages of concentrated ownership derived from theory, explain that the exposure to idiosyncratic risk increases the cost of equity capital, and argue that, for most companies, this will make bank loans but not new equity more attractive.

Two theoretical models can be employed to derive the advantages of concentrated ownership. A high ownership share is used as a signal for company quality in the model by

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Leland and Pyle (1977). Keeping a large ownership share allows high quality entrepreneurs to achieve a high valuation for the equity sold. It is not profitable for owners of low quality companies to mimic this behaviour, since they will then receive a larger share of the expected low profits. Whereas the true value of the firm is exogenous in the signalling model, agency theory models company value as endogenously dependent on managers' effort. Managers will exert more effort if they own a higher share of the equity, because they will receive a higher share of the resulting profits (see, for example, Berhold (1971) and Jensen and Meckling (1976) for early contributions). Both the signalling view and the agency view result in an inefficient allocation of risk. Owners are exposed to more idiosyncratic risk than would be optimal under symmetric information.

The theoretically derived advantages of concentrated ownership are especially relevant for private companies, since their operations are typically opaque, which leads to high costs of information acquisition for external providers of finance.[1] There is also evidence that concentrated ownership exposes the owners to substantial levels of idiosyncratic risk. Moskowitz and Vissing-Jørgensen (2002) document that, on average, owners of private companies have invested 41% of their net worth in private equity, 82% of which is invested in just one actively managed company.[2]

The cost due to lack of diversification has been described in the literature for different situations. Tobin (1958) finds in his early contribution that risk-averse investors divide their investment in monetary assets between interest-earning but risky assets and non-interest earning but safe cash, in such a way as to achieve their preferred risk-return trade-off. Also for investors, Brennan and Torous (1999) investigate investments in the stock market and find that significant welfare gains can be attained by increasing the number of securities in the portfolio. Managers of public companies are often deliberately exposed to the idiosyncratic

risk of their companies through stock or stock options in order to provide them with incentives to exert effort. Managers value stock or stock options in their compensation contracts less, when greater parts of their wealth are already correlated with the value of the company (Lambert et al. (1991), Meulbroek (2001), Hall and Murphy (2002) and Kahl et al. (2003)).[3]

The specific situation of owners of companies has also been addressed. Kerins et al. (2004) show that lack of owners' diversification increases the cost of equity capital. The authors use the capital asset pricing model and data on newly public companies to derive the cost of capital for an entrepreneur with concentrated ownership. Their simulations show that exposure to idiosyncratic risk has a large influence on the cost of equity capital of private companies. The authors calculate the returns achievable in the stock market with a portfolio that has the same total risk as an investment divided between a private company and the stock market. Underlying the calculation is the presumption that rational owners will demand compensation for their exposure to idiosyncratic risk. The model predicts an increase of 14.2 percentage points in the opportunity cost of equity capital for a small company, if the share of net worth invested in the company changes from 15% to 25%. This is a substantial risk premium considering that annual returns on public equity, as calculated by Moskowitz and Vissing-Jørgensen (2002), were 11.0%, 14.6% and 24.7% for the periods 1990–92, 1993–95 and 1996–98 respectively. The returns on public equity can be used as a benchmark for the cost of equity capital if investors can diversify, since the returns do not include a compensation for exposure to idiosyncratic risk.

Given the costs of concentrated ownership, owners have an incentive to limit their exposure to idiosyncratic risk by using external financing. The pecking order theory (Myers and Majluf (1984)) predicts that companies prefer to finance with retained earnings (internal equity), riskless debt and new equity in decreasing order, because the costs of asymmetric

information are smallest for retained earnings and largest for new equity.[4] The relatively low average level of leverage of 33% in the sample suggests that most companies have not used up their debt capacity. The pecking order theory predicts that these companies will consider debt instead of equity when raising external finance.[5] In addition to the argument made by the pecking order theory, owners may be reluctant to issue new equity since they lose part of their control, if new owners join the company. It can also be difficult to find a person who fits into the existing team. Furthermore, the advantages of large ownership shares expounded by Leland and Pyle (1977) and agency theory are reduced, if external equity is raised. Bankruptcy costs can increase the cost of bank finance for higher levels of leverage. If owners equalize the marginal costs of internal equity and debt finance, they will have a higher demand for bank loans for higher exposure to idiosyncratic risk.

In summary, we expect that, for most companies, the influence of idiosyncratic risk on the cost of equity capital influences the demand for bank loans but not the demand for external equity. A lack of diversification makes bank loans more attractive for them. We derive the first hypothesis accordingly:

Hypothesis 1: Owners with a higher exposure to idiosyncratic risk have a higher demand for bank loans.

Since a higher demand for loans is not necessarily matched by a higher supply of loans, it is worthwhile to consider leverage – as the result of repeated demand and supply decisions – as well. From the increased cost of equity capital we would expect lack of diversification to have a sizable positive effect on leverage.

Hypothesis 2: Owners with a higher exposure to idiosyncratic risk choose higher leverage.

An alternative hypothesis can also be put forward. One can argue that owners with a higher exposure to idiosyncratic risk will have less incentive to borrow, since they wish to avoid financial risk. There is evidence for this behaviour for large companies. CEOs whose wealth is more sensitive to the stock price of the company choose lower leverage (Coles et al. (2006)). Chava and Purnanandam (forthcoming) find that CFOs but not CEOs who are more exposed to company risk reduce the share of floating rate debt in the floating-to-fixed rate debt structure. It is possible that owners of small companies try to reduce the level of risk by restricting their use of bank finance. A negative relationship between exposure to idiosyncratic risk and leverage is therefore also possible. However, we expect that for most private companies the benefits of the availability of additional bank finance (e.g. the opportunity to grow the company) will outweigh the cost of higher financial risk.

Moskowitz and Vissing-Jørgensen (2002) find that, on average, returns to private equity are not higher than returns to public equity. This is a puzzle, since there does not seem to be a compensation for idiosyncratic risk. This puzzle concerns the level of returns. For owners who are also managers a possible explanation for low average returns could be additional nonpecuniary benefits, such as utility from being one's own boss. It is also possible that owners are overoptimistic with respect to the future success of their companies. In this paper we are not concerned with levels, but look at variation in exposure to idiosyncratic risk and in the financing of companies. We do not think that non-pecuniary benefits or overoptimism explain the variation in financing addressed in this analysis.[6]

3 Data

3.1 Data Source

The Survey of Small Business Finances 1998 (SSBF), which is conducted by the Board of Governors of the Federal Reserve System, Washington, DC, is used for the empirical analysis. The survey provides information on private companies with up to 500 employees from non-agricultural and non-financial sectors in the United States. The survey provides information on basic firm and owner characteristics, sources of financial services, experience with the most recent loan application, information on the private wealth and credit history of the largest owner, balance sheet information as well as income and expenses information. This survey is well suited for our study because it provides information on the financial situation of private companies *and* on the personal wealth of their owners. The investigation is restricted to the wave from 1998, since previous waves do not include information on personal wealth.[7]

Only companies with positive equity values are included in the analysis, because it is otherwise not possible to derive the share of the owner's net worth that is invested.[8] In addition, companies are required to have positive assets and owners are required to have positive private wealth. 2,617 companies are eventually included in the analysis.

3.2 Variables

The main concern of this paper is the influence of poor diversification on the financial structure of private companies. We measure lack of diversification as the ratio of the largest owner's equity investment to the net worth of the largest owner, i.e., as share of net worth invested (SNWI). Net worth is defined as the book value of the equity investment plus the equity value of the primary residence plus the sum of all assets minus the sum of all other

liabilities. 90% of the companies in the SSBF are managed by an owner and not by a hired employee. For the owner-managed companies it is likely that the largest owner takes part in the management. The level of diversification of the largest owner's investments will therefore be important for financial decisions.

Two measures of diversification are calculated. The first measure, denoted by SNWI A, considers only the value of the equity investment.

$$\textbf{SNWI A} = \frac{(ownership\ share * book\ value\ of\ equity)}{net\ worth}$$

The second measure, SNWI B, takes into account that the equity investment may not be the only way in which the owner's assets are tied to the company. Owners can also give personal guarantees for company loans, they can use private assets as collateral and they can extend loans to the company. The survey includes information on the extent of these activities for all of the owners combined. This information is therefore multiplied by the ownership share of the largest owner to obtain an approximation of that owner's personal involvement.

$$\textbf{SNWI B} =$$

$$\frac{ownership\ share * (book\ value\ of\ equity + guarantees + collateral + loans)}{net\ worth}$$

Share of net worth invested is an approximation of the risk exposure of owners due to their equity investment in a private company. Owners are exposed to several types of risk. For example, there is a concentration of income from one source and the possibility that the value of the ownership share could fall. These risks certainly increase with SNWI. In order to

completely describe the risk exposure of owners, it would be desirable to have information on the correlation structure of the returns of the assets in the owners' portfolios. For instance, if the returns to private equity have a negative correlation with the stock market, the total risk of the portfolio is lower compared to a positive correlation, if the owner has an investment in both. The surveys do, however, not contain information from which the correlation structure could be derived.

It can be argued that SNWI underestimates the risk exposure of the owner. The measure is based on the book value of equity, because the survey does not provide the market value. This reduces the variation in SNWI, since underestimation is more pronounced for successful companies. However, there is still a large cross-sectional variation in SNWI. The book value is also more similar to the original investment of the owner, which may be of relevance for the owner's perception of risk.

The data set under analysis also includes companies whose owners have unlimited liability, i.e. they are liable for company obligations with all their private assets. The question arises whether our measure of lack of diversification is meaningful in this situation. The bankruptcy law in the USA stipulates that private assets below exemption limits can be kept by owners in a bankruptcy proceeding. In practise, owners often have no assets exceeding these limits and therefore only lose their equity investment in a bankruptcy (Berkowitz and White (2004, p. 71) and Fan and White (2003, p. 544)). It follows that SNWI is a valid proxy for risk exposure for owners with unlimited liability as well.[9]

As a first dependent variable we use the demand for new loans. The variable **loan application** is equal to 1 if an application for a *new* loan was filed in the three years preceding the survey and 0 otherwise. Hypothesis 1 relates to the demand of bank loans in general; it is independent of whether loans are new or renewals. We use data on new loans,

since the SSBF does not include information on loan renewals. Most companies applied for a new loan at a commercial bank (71%). Finance companies were used by 11%, savings banks and credit unions by 7%. 11% used other sources.

Leverage is the second dependent variable. It is defined as the sum of a company's total liabilities divided by its total assets (sum of equity and liabilities). Total liabilities are the sum of long-term liabilities, such as loans, mortgages, notes or bonds, and short-term liabilities due within one year, such as accounts payable, accrued expenses, taxes payable, prepayments, deposits and advances from customers. Leverage includes loans that are made by owners to their companies and the outstanding amount on company credit cards. The use of personal credit cards for company expenses is not included.[10]

The regressions include controls for many company and owner characteristics. We control for **company size**, measured by number of employees, and **company age**, defined as the number of years since the company was founded or acquired. **Ownership share** is defined as the share of equity owned by the largest owner. **Dummies for legal form** differentiate between sole proprietorships, partnerships, S- and C-corporations.[11] All regressions include **industry dummies** defined at the two-digit SIC level. **Regional dummies** differentiate between nine regions. A further dummy differentiates between **urban and rural location**.

The **education level** of the largest owner is captured by dummies for high school graduate and college/postgraduate degree, with no high school degree being the base category. The entrepreneurial work **experience** is measured as number of years owning or managing a company. Dummies for the **ethnicity** of the owner cover Hispanic, Asian and African-American ownership with White as base category.

We also include control variables to capture the financial standing of the company. First, the **credit rating** by Dun and Bradstreet classifies companies in five categories. The rating

reflects the likelihood of payment delinquency during the next 12 months. Second, we use dummies for the **credit history of the company and the owner**. They cover whether the firm or its principal owner declared bankruptcy within the past seven years, whether the owner has been delinquent on personal obligations for 60 or more days within the past three years, whether the firm has been delinquent on business obligations for 60 or more days within the past three years, and whether any judgements have been rendered against the principal owner within the past three years. The variable **length** gives the length of the relationship with the company's main financial institution in months.[12]

3.3 Summary Statistics

Descriptive statistics for all of the variables can be found in Table 1. The measures SNWI A and SNWI B document a considerable lack of diversification. SNWI A has an average of 25.3%. By additionally considering guarantees, collateral and loans, the average value of SNWI B increases by six percentage points.

The SSBF data cover small to medium-sized companies. The average number of employees is 28.3 with a substantially lower median value of 5. 26.3% of the companies applied for a new loan in the three years preceding the survey. It can be seen that not all companies have investment opportunities that would require additional loans.[13] The average level of leverage stands at 33.3%. As is typical for private companies, the ownership structure is concentrated with an average ownership share of the largest owner of 79.6%. Even the median company has only one owner. As Table 2 shows, the industry spectrum of the survey covers almost the whole US economy.

Table 3 shows the share of companies with demand for new loans in the last three years

according to three categories of SNWI A. Companies with higher values of SNWI A are more likely to demand new loans. The median of leverage is also increasing in SNWI A.[14]

The SSBF data has a two-stage stratified random sample design. The sample is stratified according to size, region and urban versus rural area. In addition, companies with Hispanic, Asian and African-American majority ownership and large companies are oversampled. We use unweighted regressions with controls for the variables used for stratification and over-sampling. This approach was also chosen by Bitler et al. (2005).

[Table 1], [Table 2], [Table 3]

4 Empirical Results

4.1 Endogeneity of Regressors

In the empirical analysis we need to be concerned with potential endogeneity of our main variable of interest, share of net worth invested (SNWI). First of all, there is the problem of reverse causality. If owners demand loans (and get the application granted), they have access to financial resources that allow them to limit their equity investment. Hence, demand for loans may have a negative influence on SNWI. Reverse causality also introduces a negative relationship between leverage and SNWI, since the accumulated use of bank loans allows a reduction in equity finance. The negative influence of the reverse causality effect on SNWI makes it more difficult to find evidence in favour of our hypotheses.

Second, we need to be wary of measurement error in company and owner related variables. Most of the small companies included in the SSBF are not required by law to draw up a balance sheet. Therefore, the measurement of leverage may be imprecise. Information on the net worth of the principal owner is provided in three categories: the value of the equity

investment, the value of home equity and the value of other nonfirm assets. There could also be measurement error in the wealth information.[15]

Third, omitted variables may bias the coefficient of SNWI. Controls for company risk are important, since risk can influence both the owner's invested share of personal wealth and leverage. Bitler et al. (2005) find a negative correlation between firm risk and ownership share.[16] Owners are only willing to take on a high ownership share if they consider the risk to be manageable. In an extreme case, this could result in a negative correlation between SNWI and exposure to risk. Risk is also an important factor for the bank's decision whether to extend a loan. Companies with higher risk will find it more difficult to obtain loans, i.e. they will have lower leverage. The influence of risk could then lead to a spurious positive correlation between leverage and SNWI. We control for risk with the credit rating of the company and with the credit history of both company and owner. Other company characteristics included, such as size, age and industry, also help to control for risk. Nevertheless, the controls may not capture company risk perfectly.

Fourth, the regression concerning demand for bank loans has a potential endogeneity problem in that the left hand side variable is measured before the right hand side variables. The information for the incidence of loan applications, spans the time period of the three years preceding the survey, i.e. of 1996–1998, whereas lack of diversification and the other regressors are measured at the end of fiscal year 1998.[17]

To deal with the above-mentioned problems of endogeneity we use the instrumental variables approach. We run a first-stage regression with specific owner characteristics as instruments to predict instrumented values of the endogenous regressor SNWI. In the second-stage or main regression we use the predicted value of the endogenous variable as regressor to obtain a consistent parameter estimate. Both the first- and the second stage regressions contain

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the same set of additional control variables for owner and company characteristics.

The first instrument is age of the largest owner measured in years. Owner age should be related to SNWI, as Heaton and Lucas (2000) document that the portfolio composition of individuals is influenced by their age. Individuals above the age of 65 have a smaller share invested in private equity. Furthermore, net worth may increase with age, since individuals have had more time to save. For age to be a valid instrument, it is important that we control for other variables in the second stage regression. First, we control for the education level and the experience of the owner, since they are related to age and it is to be expected that better educated and more experienced owners will find it easier to obtain bank loans. By using education and experience as explicit controls, we use only the part of SNWI that can be explained by age, net of experience and education. Second, we control for company age. Within 10 years, 80% of companies exit the market (Dunne et al. (1988)). It is therefore possible that older owners run more successful companies. Owners of successful companies may have more outside wealth and therefore lower SNWI. Also, according to the pecking order theory, it can be expected that successful companies finance more with retained earnings and less with bank loans. Survivorship bias may therefore lead to a positive spurious relationship between SNWI and demand for bank financing through the instrument owner age, if we do not control for the age of the company.

A further instrument is the sex of the owner. The dummy 'female owner' takes the value 1 for female owners and the value 0 for male owners. It has to be acknowledged that there may be differences in demand for bank loans or capital structure in a univariate analysis of male and female owned companies resulting from company characteristics that differ between male and female owners. For example, the SSBF data show that the companies of male owners are on average larger than the companies of female owners. However, there is no reason to

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expect that male and female owners differ in their financing strategies after detailed company and owner characteristics are controlled for. We therefore include variables capturing, among other things, company size and industry as well as education, experience and credit history of the owner. For example, Cavalluzzo and Wolken (2005) find that after controlling for owner wealth and other owner and company characteristics there are no differences between loan turndowns for male and female owners. In addition, Wilson et al. (2007) find no evidence of systematic differences in the perceptions held by bank officers of male and female business owners.

Table 4 shows the first-stage regression results. From columns (1) and (2) it can be seen that owner age has a significant negative influence on SNWI. Older owners have had more time to build up wealth outside the company by saving their income. This income can be either from owning a company or wage income from employment. The dummy for female owners shows that women invest a smaller share of their personal wealth in one company. A possible explanation for the higher investment shares among men would be if owning or managing a company has a higher importance for them. This could be the case, if they are under more pressure to earn a living. For example, our calculations with data from the 2001 Survey of Consumer Finances show that male entrepreneurs work more hours per week than female entrepreneurs.[18]

The results of instrumental variables regressions can be biased if the instruments are weak, i.e. if the instruments are only weakly correlated with the endogenous variable. We apply the quantitative definition of weak instruments given by Stock and Yogo (2005) and are able to reject the null hypothesis of weak instruments. The critical value of the test for a desired maximum size of 10% for a 5% Wald test is 19.93. Our test statistic is 25.72 and therefore surpasses the critical value.[19]

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[Table 4]

4.2   Demand for Bank Loans

Table 5 presents probit regressions on demand for bank loans. The specification without instruments in column (1) shows a higher demand for bank loans for owners with higher values of SNWI, but the result is affected by reverse causality. If owners decide, for whatever reason, not to use bank loans as a means of financing their company, they must rely more heavily on their own resources; this increases SNWI. The results also show that larger and younger companies exhibit a higher demand for new loans. In order to identify the influence of SNWI, the regressions include additional control variables whose coefficients are not shown for brevity.

In the regressions in columns (2) to (6) we instrument SNWI to control for reverse causality. The basic specification in column (2) supports Hypothesis 1; SNWI increases the probability of loan applications. Owners who are less diversified approach banks more often in order to obtain additional funds. Bank finance is more attractive for them, because they have a higher cost of equity capital. Specifically, a one standard deviation increase in SNWI A leads, *ceteris paribus*, to an increase of 30.2 percentage points in the probability of making a loan application. The influence of poor diversification is therefore quite substantial, especially considering that the probability of applying for a new loan is only 26.3%. The IV estimate is considerably larger than the OLS estimate, although an upward bias from reverse causality is expected for OLS. We therefore conclude that the OLS estimate was affected by a bias towards zero from measurement error.

The remaining specifications are intended as a robustness check. In column (3) we ad-

ditionally control for the ownership share of the largest owner. The coefficient of this variable is positive at the 10% significance level. Owners who choose a high ownership share to have control over their companies may need more bank financing for their investment opportunities.[20] In column (4) we employ our second measure of diversification, SNWI B. Here the results suggest as well that lack of diversification increases demand for bank loans.

Next, we investigate whether results change, if only companies with limited liability (S- and C-corporations) are included in the regressions. As already mentioned, owners are, in practice, unlikely to lose more money than they have invested, even with unlimited liability. However, it is still of interest to report results for companies with limited liability separately, since there may be differences in the way owners perceive risk. When we restrict our analysis to companies with limited liability, we still find that lack of diversification increases loan demand (column 5).

In companies with more than one owner, the exposure to idiosyncratic risk and therefore the cost of equity to the owner can differ between owners. In order to remove the influence of other owners, we investigate our hypotheses separately for companies with just one owner. However, we think that the focus on the largest owner makes sense in most cases, since the largest owner will be the least diversified, if the external wealth of the owners is the same. It is therefore likely that we captured the owner with the highest exposure to idiosyncratic risk in the previous regressions. The results for companies with just one owner are shown in column (6). As before, we find a significant influence of lack of diversification on the demand for loans.

As an additional robustness check we investigate the influence of SNWI on the desired loan volume (results not reported). We use Tobit regressions since all companies without loan applications have a loan demand of zero. We find a positive and statistically significant

influence of SNWI A on the desired loan volume without using instruments (coefficient [beta] 0.94, standard error 0.18) and using instruments (coefficient [beta] 5.91, standard error 1.64).

Overall, there is robust evidence for the hypothesis that a higher exposure to idiosyncratic risk leads to a higher demand for bank financing.

[Table 5]

4.3   Influence on Leverage

Table 6 displays the effect of poor diversification on leverage. In column (1) we present the results of the OLS specification. The negative sign of SNWI is due to non-standard measurement error. The measurement error is non-standard, since the error in measuring liabilities is included in both the dependent variable leverage and in the regressor SNWI. Liabilities constitute the numerator of the dependent variable. SNWI has equity times ownership share in its numerator with equity calculated as the difference between total assets and liabilities. If there is measurement error in liabilities, this will introduce a negative relationship between leverage and SNWI. In order to control both for measurement error and for reverse causality, we use an instrumental variables approach in the remaining specifications.

In column (2) we find a positive and significant coefficient of SNWI. A more severe lack of diversification therefore leads to higher leverage, after controlling for endogeneity. The influence of poor diversification on the equilibrium value of leverage is quite large. A one standard deviation increase in SNWI A leads, *ceteris paribus*, to an increase in leverage of 18.0 percentage points. This is indeed substantial, especially when considering that the average value of leverage in the sample is 33.3%. The empirical evidence clearly confirms Hypothesis 2: less diversified owners choose higher leverage for their companies. The additional controls

show an insignificant influence of size on leverage and a significant negative influence of age. As companies grow older they often use accumulated profits to pay down debt and to increase their equity base.

In addition to the regressors already employed in the demand equation, we control for the length of the relationship with the company's main financial institution, since it was shown that an established banking relationship can influence the quantity and the price of available credit (see, for example, Petersen and Rajan (1994), Berger and Udell (1995), Cole (1998) and Harhoff and Körting (1998)).[21] Without a relationship control, the instrument owner age may be directly related to leverage, since this instrument can be correlated with the length of the banking relationship. The length of the relationship with the main financial institution has a quadratic influence on leverage with a maximum at about 11 years. Since we have more instruments than endogenous variables, we can test the statistical validity of the instruments with overidentifying restrictions. As reported in Table 6, the instruments pass this test for all specifications.[22]

In the next two columns we show robustness checks with all observations. In column (3) we additionally control for the ownership share of the largest owner. Ownership share has no significant influence on leverage, but the influence of SNWI remains unchanged. In column (4) we use SNWI B as an alternative measure for the level of diversification. Again, we find higher leverage for owners with a higher exposure to idiosyncratic risk.

As in the previous subsection, we also investigate the robustness of the results with subsamples of companies with limited liability and of companies with only one owner. The regressions in columns (5) and (6) show that the results remain unchanged by the restrictions on the included companies.

We also investigate the influence of SNWI on different measures of leverage (results not

reported). We use net leverage (total debt net of cash divided by total assets) and find a coefficient of SNWI A of 1.40 with a standard error of 0.32. We also find a positive and significant influence of SNWI A on leverage when we separate leverage into long-term (coefficient 0.32, standard error 0.16) and short-term (coefficient 0.44, standard error 0.13). Long-term leverage includes liabilities with a maturity of more than one year.

Petersen and Rajan (1997) show that trade credit (accounts payable) are an important source of funding for private companies. In our sample trade credit makes up 8.5% of total assets and is therefore a substantial part of total leverage. We find that SNWI A has a positive influence on the use of trade credit (coefficient 0.37, standard error 0.10). Thus SNWI has not only an influence on bank loans, but also on the use of other forms of debt. The instruments pass the test for overidentifying restrictions also for the specifications with alternative measures of leverage.

[Table 6]

Strebulaev (forthcoming) cautions that in the presence of adjustment costs, cross-sectional relationships between leverage and other variables determined by empirical analysis may differ from the relationships expected if variables are at their target level. The argument is illustrated with the help of the trade-off theory, which postulates a positive relationship between leverage and profitability since interest paid can be deducted from profits for the calculation of taxes. Even if the trade-off theory is valid, a negative relationship between leverage and profitability may still be observed, if profits are used to pay down loans and leverage is adjusted infrequently. In our case, both leverage and SNWI are likely affected by adjustment costs. Higher profits will lead to lower leverage and, to a small degree, to lower values of SNWI, if profits are partially used to reduce debts and partially paid out to the owners. This could introduce a positive relationship between the variables. However, this

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influence of profitability is removed from our analysis through the use of instruments which are unrelated to profitability.

Overall, our empirical analysis shows that lack of diversification leads to higher leverage. The empirical results have important implications for our understanding of the capital structure of private companies. We find that entrepreneurs who are more exposed to the idiosyncratic risk of their companies use bank financing more extensively. Bank financing allows them to grow their companies without increasing their risk exposure further through additional equity investment. Alternatively, entrepreneurs can use bank financing to reduce their own investment. Since exposure to idiosyncratic risk increases the cost of equity capital and, accordingly, the required returns of an investment project, this also means that the availability of bank loans makes the realization of some investment projects profitable that would not have been carried out if no such loans were available.

5 Conclusion

The financing of private companies relies to a large extent on the personal resources of their owners. Equity investments often amount to a substantial share of owners' total net worth, which exposes them to the idiosyncratic risk of their companies. Since this risk exposure increases the cost of equity capital substantially, it should have an important influence on the capital structure of private companies. If owners try to equalize the marginal costs of equity and debt financing, companies led by owners who have a higher share of net worth invested should have a higher demand for bank loans and should display higher values for leverage. These are the core hypotheses tested in this paper.

Using survey data of private companies in the US, we find that lack of diversification

increases demand for loans, measured as the probability of making a loan application, as well as leverage. This paper identifies owners' risk exposure as a statistically and economically important influence on the capital structure of private companies.

In future research it would be of interest to test whether the effect of exposure to idiosyncratic risk on leverage found for private companies also exists for public companies. On theoretical grounds, we would also expect an effect for public companies with a concentrated ownership structure. It may be possible to use public companies in which families or founders hold high ownership shares for a corresponding test.

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Notes

[1]We do observe concentrated ownership in our sample of private companies. The companies in the Survey of Small Business Finances 1998 have an average ownership share of the largest owner of 79.6% and a median value of 100%.

[2]Although the holding of large ownership shares leads to a lack of diversification at the individual level, the correlation between share of net worth invested and ownership share in the data is -0.01 and statistically not different from zero. Differences in company size and net worth are more important in explaining the share of net worth invested than ownership share.

[3] Heaney and Holmen (2002) use data on the exposure to idiosyncratic risk for Swedish shareholders of listed companies to approximate the value they attach to control using the model developed by Lambert et al. (1991).

[4]We empirically capture retained earnings in the book value of equity. The book value of equity is defined as the original investment of the owners plus the retained earnings of past years. The cost of capital for original investment and retained earnings are the same, since both are part of the owners' wealth that is invested in the company.

[5]This prediction of the pecking order theory is reflected in the data. Companies in the legal form of a corporation were asked whether they obtained additional equity from new owners in the year 1998. Only 1% of the corporations did. For comparison, 31% of the corporations applied for a new loan in the three years preceding the survey. (There is no information covering an identical time period.)

[6]Müller (2004) finds that owners with a higher exposure to idiosyncratic risk do obtain

higher returns to their equity investment. The paper does not explain the low average returns to private equity.

⁷Detailed information on the 1998 SSBF survey is available in Bitler et al. (2001).

⁸21% of the companies have negative or zero equity values. This is a common finding for small and medium-sized enterprises. For example, KfW Research (2006) finds that almost 20% of German SMEs have negative equity values.

⁹If a private company goes bankrupt in the USA with obligations still outstanding, an owner with unlimited liability can declare personal bankruptcy in order to dispose of the company debt. It is possible to give up all assets that are not exempt, but to keep future earnings (chapter 7) or to keep all assets and agree to a repayment plan to repay part of the debts (chapter 13). The exemption rules differ between states. The median value for home equity is USD 15,000 and the median value for other personal assets is USD 7,000 (Berkowitz and White (2004)). If owners agree to keep up payments on loans that are secured on their home or private car, they do not lose these assets. Furthermore, if the retirement savings are not excluded from the bankruptcy proceeding in the first place, they can be kept if the amount is reasonably necessary to support oneself upon retirement (Jackson (2001)).

¹⁰Our definition of leverage follows accounting rules by using information shown in balance sheets. Average leverage increases by 2 percentage points if personal credit cards are included in the definition. Average leverage decreases by 3 percentage points if loans from owners are excluded. We obtain identical regression results for both modifications.

¹¹C- and S-corporations are both characterized by limited liability. C-corporations have to pay corporation tax on profits that are paid out to shareholders, whereas the profits of

S-corporations are only charged with the personal income tax rate of their owners.

[12]1% of the highest values are replaced with the value of the 99th percentile (480 months) in order to reduce the influence of extreme values.

[13]6.2% of the companies obtained additional equity capital from new or existing owners in the year 1998. Overall, 29.8% of the companies applied for new loans or obtained additional equity.

[14]We report a tabulation of the median since the results for average leverage would be influenced by measurement error.

[15]Browning et al. (2003) consider problems that may arise when questions about aggregate values are asked in surveys. They discuss the usefulness of total expenditure questions as opposed to asking for expenditure in different categories. First, rounding can happen, i.e. values may be noisy. However, even with rounding, the total expenditure questions still contain valuable information. Second, it is possible that total expenditure is underestimated, if only one question about the total is asked.

[16]Bitler et al. (2005) measure firm risk as the absolute value of the residual of a regression of the profit-to-equity ratio on firm characteristics.

[17]Cavalluzzo and Wolken (2005) face the same situation in their analysis of loan turndowns and discrimination also conducted with the SSBF data.

[18]Bitler et al. (2005) use similar instruments for ownership for data from the Survey of Consumer Finances, namely age, age squared and dummies for type of company acquisition.

[19]We obtain identical results for the main specifications if we use the instruments indi-

vidually. However, a test for redundancy shows that using both instruments improves the asymptotic efficiency of the estimation (See Hall and Peixe (2003) for a discussion of this test.).

[20]We instrument ownership share, since it may be affected by reverse causality. If bank financing is not available and a firm's original owner has too few resources to meet the total investment required, it may be necessary to take on an additional owner. For the specifications with ownership share in Table 5 and Table 6 we additionally use dummies for the type of the company acquisition – the basis category is founded with dummies for purchased and inherited respectively – as instruments, since the informational content of our two standard instruments is not sufficient here.

[21]We do not use this regressor in the demand equation. For companies who applied for a loan we could use the length of the relationship with the institution where they applied; for companies who did not apply for a loan, however, there is no meaningful equivalent.

[22]We also tried a specification with additional controls for company profitability (ROA) and a proxy for the company's tangible assets. According to the trade-off theory both variables can influence leverage. We find a negative and significant influence of ROA on leverage. Since it can be argued that profitability is an endogenous variable, we do not keep it in the main specification. Tangible assets are not reported separately in the SSBF. We calculate the share of the book value of land plus depreciable assets (including intangible assets) to total assets as a proxy. This variable has a positive but insignificant influence on leverage. The results for SNWI do not change with the inclusion of these variables.

Table 1: Descriptive Statistics

Variable	Mean	Median	Stdev.	Min	Max
Company characteristics					
Number of employees	28.3	5	58.1	1	482
Company age (in years)	15.3	12	12.4	1	104
Dummy loan application	0.263	0	0.440	0	1
Leverage (in %)	33.3	27.3	31.0	0	99.8
Length banking relationship (in months)	99.8	60	97.4	1	480
Owner characteristics					
Net worth (in million US-$)	1.538	0.448	4.412	0.001	116
SNWI A (in %)	25.3	17.9	24.1	0.004	98.9
SNWI B (in %)	31.3	22.3	29.0	0.014	100
Ownership share (in %)	79.6	100	27.8	1	100
Owner age (in years)	51.2	51	11.3	21	95
Dummy female owner	0.206	0	0.404	0	1

Note: Descriptive statistics refer to the sample information without weighting. The displayed statistics reflect the variation in the sample, but are not representative of the US economy.

Table 2: Industry Distribution

Industry	No. of companies	% of companies
SIC 1 – Mining, construction	262	10.0
SIC 2 – Manufacturing	125	4.8
SIC 3 – Manufacturing	177	6.8
SIC 4 – Transp., communication, utilities	97	3.7
SIC 5 – Retail trade	731	27.9
SIC 6 – Real estate	152	5.8
SIC 7 – Services	592	22.6
SIC 8 – Services	481	18.4
Total	2617	100

Note: Descriptive statistics refer to the sample information without weighting. The displayed statistics reflect the variation in the sample, but are not representative of the US economy. Industry dummies at the 2-digit level are included in the regression analysis.

Table 3: Tabulation of Financing Decisions With Respect to SNWI A

Category of SNWI A	Share of companies with loan demand	Median of Leverage (in %)	No. of companies
Lowest third	0.187	22.5	863
Middle third	0.275	28.1	864
Highest third	0.325	28.7	890
All categories	0.263	27.3	2617

Note: Descriptive statistics refer to the sample information without weighting. The displayed statistics reflect the variation in the sample, but are not representative of the US economy. The lowest third includes values of SNWI A between 0 and 8.4%, the middle third between 8.4% and 30.1%, and the highest third includes values of SNWI A larger than 30.1%.

Table 4: First-Stage Regression Results

Dep. variable:	SNWI A	SNWI B
	(1)	(2)
Owner age	-0.341***	-0.406***
	(0.055)	(0.064)
Dummy female owner	-3.679***	-4.238***
	(1.174)	(1.352)
Company size	0.104***	0.133***
	(0.011)	(0.013)
Company age	0.016	-0.070
	(0.046)	(0.053)
Number of observations	2617	2617
Joint significance of excluded instruments, F(2, 2545)	24.40***	25.18***
Shea's partial R squared	0.019	0.020
R squared	0.179	0.228

Note: *, **, *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively. Robust standard errors are in parentheses. The regressions also include dummies for industry at the 2-digit level as well as dummies for legal form, region, urban/rural area and credit history. Controls for the credit rating of the company, experience, education and ethnicity of the owner are also included.

Table 5: Demand for New Loans – Marginal Effects of Probit Estimations

Dep. variable	Loan application					
	(1)	(2)	(3)	(4)	(5)	(6)
	all companies	all companies	all companies	all companies	limited liability	one owner
SNWI A	0.141***	1.256***	1.113***		1.259***	1.302***
	(0.037)	(0.165)	(0.253)		(0.276)	(0.173)
SNWI B				1.090***		
				(0.139)		
Ownership share			1.500*			
			(0.847)			
Company size	0.001***	-0.001**	0.001	-0.001***	-0.001	-0.001
	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)
Company age	-0.004***	-0.003***	-0.002	-0.002*	-0.003***	-0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Number of observations	2617	2617	2617	2617	1406	1560
SNWI and own. share instrumented	no	yes	yes	yes	yes	yes
Log Pseudo Likelihood	-1385.8	-1099.5	-1375.1	-1500.4	-682.9	-509.0

Note: *, **, *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively. Robust standard errors of the marginal effects are in parentheses. The dependent variable 'loan application' equals 1 if an application for a new loan was filed in the three years preceding the survey. SNWI and ownership share are instrumented in the IV specifications. SNWI and ownership share are expressed as ratios. The regressions also include dummies for industry at the 2-digit level, dummies for legal form, region, urban/rural area and credit history. Controls for the credit rating of the company, experience, education and ethnicity of the owner are also included.

Table 6: Influence on Leverage

Dep. variable			Leverage			
	(1)	(2)	(3)	(4)	(5)	(6)
	all companies	all companies	all companies	all companies	limited liability	one owner
SNWI A	-0.196***	0.749***	0.590***		0.744*	0.758***
	(0.023)	(0.220)	(0.217)		(0.410)	(0.228)
SNWI B				0.636***		
				(0.171)		
Ownership share			0.669			
			(0.730)			
Company size	0.092***	-0.001	0.061	-0.014	-0.012	0.021
	(0.111)	(0.027)	(0.072)	(0.026)	(0.047)	(0.044)
Company age	-0.221***	-0.187***	-0.100	-0.140**	-0.156*	-0.025
	(0.059)	(0.072)	(0.122)	(0.068)	(0.088)	(0.122)
Length	0.015	0.010	0.019	0.011	0.020	0.036*
	(0.015)	(0.014)	(0.024)	(0.013)	(0.019)	(0.021)
Length squared	-0.000	-0.000**	-0.000*	-0.000**	-0.000	-0.000***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Number of observations	2617	2617	2617	2617	1406	1560
SNWI and own. share instrumented	no	yes	yes	yes	yes	yes
Overidentification test, χ^2		0.97	1.75	1.24	2.00	0.09
(dof, p-value)		(1, 0.32)	(2, 0.42)	(1, 0.26)	(1, 0.16)	(1, 0.77)

Note: *, **, *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively. Robust standard errors are in parentheses. SNWI and ownership share are instrumented in the IV specifications. The regressions also include dummies for industry at the 2-digit level, dummies for legal form, region, urban/rural area and credit history. Controls for the credit rating of the company, experience, education and ethnicity of the owner are also included.