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**Working Paper**

## Returns to Private Equity: Idiosyncratic Risk Does Matter!

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Discussion Paper No. 04-29

**Returns to Private Equity –  
Idiosyncratic Risk Does Matter!**

Elisabeth Müller

**ZEW**

Zentrum für Europäische  
Wirtschaftsforschung GmbH

Centre for European  
Economic Research

Discussion Paper No. 04-29

## **Returns to Private Equity – Idiosyncratic Risk Does Matter!**

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## **Non-technical Summary**

Owners of private companies typically have a high share of their personal net worth invested in a single private company. The large investments give them high ownership shares, which reduces agency costs but also exposes them to the idiosyncratic risk of the company. It is often necessary that owners invest their own wealth, because their companies provide no collateral and banks are reluctant to extend unsecured loans. The theoretical literature suggests that lack of diversification increases the cost of equity capital substantially. Owners of private companies should only be willing to invest, if the expected returns are high enough to provide a compensation for their exposure to idiosyncratic risk. However, so far it is not known whether owners of private companies receive a compensation for this risk exposure. This paper tries to answer this question.

Two separate data sources are used for the analysis: the Survey of Consumer Finances (SCF) and the Survey of Small Business Finances (SSBF). Both surveys include information on private companies and on the wealth of their owners for the USA. Empirically, we measure lack of diversification as the value of the equity investment in the private company divided by the net worth of the owner. Net worth is calculated as the sum of personal assets minus the sum of personal liabilities. Instrumental variables are used to deal with problems of endogeneity.

We find evidence that returns to equity are higher if owners have a higher exposure to idiosyncratic risk. This holds for both the earnings rate (profits divided by equity value) and capital gains. The results are statistically and economically significant and robust to the use of different specifications in both data sets. Furthermore, we find that owners with and without an active management role are concerned about idiosyncratic risk. Investment considerations therefore give rise to the results. They cannot solely be explained by possibly higher effort of owner-managers with higher exposure to idiosyncratic risk.

The results have important implications for the investment decisions at private companies. Since lack of diversification increases required returns, it follows that the realisation of a business idea depends on the scale of the required investment in relationship to the net worth of the potential entrepreneur. If lack of diversification drives the required return above the expected return of the project, then the business opportunity will not be realised.

# Returns to Private Equity - Idiosyncratic Risk Does Matter!

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## Abstract

Owners of private companies often invest a substantial share of their net worth in one company, which exposes them to idiosyncratic risk. For US companies we investigate whether owners require compensation for lack of diversification in the form of higher returns to equity. Exposure to idiosyncratic risk is measured as the share of the owner's net worth invested in the company. Equity returns are measured as the earnings rate and as capital gains. For both returns measures we find a positive and significant influence of exposure to idiosyncratic risk. This paper improves our understanding of returns to private equity.

**JEL classification:** G32, G11, L26

**Keywords:** returns to private equity, exposure to idiosyncratic risk, private companies

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This paper was formerly entitled: Underdiversification in Private Companies Required Returns and Incentive Effects

# 1 Introduction

Owners of private companies typically have a high share of their personal net worth invested in a single private company. The large investments give them high ownership shares, which reduces agency costs but also exposes them to the idiosyncratic risk of the company. Rational owners will require a compensation for this risk exposure in the form of higher returns to their investment.

In this article, we investigate whether the owners of private companies require a compensation for their risk exposure. Moskowitz and Vissing-Jørgensen (2002) find that, on average, returns to private equity are not higher than returns to public equity. Private equity has an unfavourable risk-return trade-off, because there does not seem to be a compensation for idiosyncratic risk. In an analysis at the company level, we test whether equity returns vary systematically with risk exposure. We do not address the question of why returns are, on average, low.

Information on private companies from the Survey of Consumer Finances (SCF) and the Survey of Small Business Finances (SSBF) is used. We measure exposure to idiosyncratic risk as the share of net worth that the owner has invested in the company. For all regressions we use an instrumental variables approach, since owners may be willing to invest a larger amount in companies which are more profitable.

We find evidence that returns to equity are higher if owners have a higher exposure to idiosyncratic risk. This holds for both the earnings rate (profits divided by equity value) and capital gains. The results are statistically and economically significant and robust to the use of different specifications in both data sets. Furthermore, we find that owners with and without an active management role are concerned about idiosyncratic risk. Investment considerations therefore give rise to the results. They cannot solely be explained by possibly higher effort of owner-managers with higher exposure to idiosyncratic risk.

The analysis improves our understanding of the behaviour of owners of private companies. Owners demand higher expected returns from business opportunities, if they have a higher share of net worth invested in the company. Owners can influence expected returns by deciding in which companies to invest, what activities the company engages in and when to close the company down or when to sell their stake.

How does this analysis relate to the unfavourable risk-return trade-off of private equity found by Moskowitz and Vissing-Jørgensen (2002)? We find that owners of private companies

demand compensation for their exposure to idiosyncratic risk. We therefore exclude one possible explanation for low returns, namely that owners do not care about risk. However, we cannot explain why individuals invest in private equity given the low average level of returns. Hamilton (2000) finds that both initial earnings and earnings growth are lower for entrepreneurs than for individuals in paid employment. The author gives nonpecuniary benefits, such as utility from being one's own boss, or overoptimism as likely explanations.

Our paper adds to the literature on return characteristics of private equity. Most studies are concerned with returns on venture capital projects or venture capital funds (see, for example, Cochrane (2005), Kaplan and Schoar (2005) and Ljungqvist and Richardson (2003)). Specifically, Jones and Rhodes-Kropf (2004) develop a model to analyze the role of idiosyncratic risk in the pricing of private equity investments. The authors find higher returns for venture capital and buyout funds with higher idiosyncratic risk. The paper adds also to the literature on the influence the concentrated ownership structure of private companies has for their performance. Ang et al. (2000) finds that a higher ownership share by the manager reduces agency costs. Bitler et al. (2005) document a positive influence of ownership share on effort and a positive influence of effort on firm performance. Himmelberg et al. (2002) argue that a higher share of insider ownership should increase cost of capital, since insiders are exposed to idiosyncratic risk. They find confirming evidence for public companies. In their study the variable insider ownership captures both the effect due to lack of diversification and the effect due to better incentives.

The rest of the paper is organized as follows: Section 2 develops the hypothesis; Section 3 describes the measure of exposure to idiosyncratic risk; Section 4 introduces the data sets and gives summary statistics; Section 5 investigates the return measures in detail, Section 6 presents the empirical results, and Section 7 concludes.

## **2 Development of Hypothesis**

The prevalence of owners' lack of diversification has been documented for the USA by Moskowitz and Vissing-Jørgensen (2002). Households with an investment in private equity have, on average, 41% of their net worth invested in private equity, of which 82% is invested in just one company in which the household has an active management interest. Owners are therefore exposed to the idiosyncratic risk of the company.

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. 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 a greater part of their wealth is correlated with the value of the company (Lambert et al. (1991), Meulbroek (2001), Hall and Murphy (2002) and Kahl et al. (2003)).<sup>1</sup>

Kerins et al. (2004) 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 increases the cost of equity capital substantially. 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. The stock market returns determine the opportunity cost of capital for the entrepreneur.

Since the literature shows that exposure to idiosyncratic risk is costly, we expect that owners of private companies will demand compensation for their risk exposure, if they behave rationally. Owners can influence equity returns by deciding which projects the company should realize. If they have a high share of their net worth invested in the company, they will only agree to projects if the expected returns of the projects are sufficient to compensate them for their lack of diversification. Accordingly, we test the following hypothesis in this paper: Owners with a higher exposure to idiosyncratic risk demand higher returns on their equity investment as compensation.

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<sup>1</sup> 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).



### 3 Measuring Exposure to Idiosyncratic Risk

To measure the lack of diversification we use information on the owner's equity investment in the company and on the owner's net worth. The share of net worth invested in the company is then used as proxy for exposure to idiosyncratic risk. Net worth is defined as the sum of all assets minus the sum of all liabilities of the owner.

Two measures for the share of net worth invested (SNWI) are calculated. The first method considers only the value of the equity investment. This variable is denoted as SNWI A.

$$\text{SNWI A} = \frac{(\textit{ownership share} * \textit{total value of equity})}{\textit{net worth}}$$

The second calculation takes into account that the equity investment is not 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 or receive loans from the company. The second measure for exposure to idiosyncratic risk, SNWI B, takes these possibilities into account. It is calculated according to the following formula:

$$\text{SNWI B} = \frac{(\textit{ownership share} * \textit{total value of equity}) + \textit{guarantees} + \textit{collateral} + \textit{net loans}}{\textit{net worth}}$$

We now turn to the discussion of whether SNWI is a good measure for risk exposure. Owners are confronted with variability in the earnings of the company and with variability in the value of their equity investment. These risks normally increase with SNWI. However, company risk can also influence how much owners invest. Bitler et al. (2005) find a negative correlation between firm risk and ownership share.<sup>2</sup> Owners may only be willing to take on a high ownership share if they consider the risk to be manageable. The correlation between ownership share and SNWI is quite low according to both of the surveys used here. The SCF reports a value of 0.09, the SSBF a value of 0.01. Nevertheless, it is possible that the total risk of the company influences how much the owner is willing to invest. Since SNWI

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<sup>2</sup>Bitler et al. (2005) measure firm risk as the absolute value of the residual of a regression of the earnings rate on firm characteristics.

has a large variation in the data, we are confident that the variation in SNWI dominates possible adjustments of the owners caused by total risk and that SNWI is a good proxy for risk exposure.

In order to completely describe owners' risk exposure, it would be desirable to have information on the correlation structure of the returns of the assets in the owners' portfolios. The total risk of the portfolios of owners who have an investment in the stock market is lower if the returns to private equity are negatively correlated with the stock market compared to a situation with a positive correlation. However, the surveys do not contain information from which the correlation structure could be derived.

The data used for the analysis also include companies whose owners have unlimited liability, i.e. they are liable for company obligations with all their private assets. The question arises as to whether our measure of exposure to idiosyncratic risk is meaningful in this situation. The bankruptcy law in the USA stipulates that private assets below exemption limits can be kept by owners in the case of 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.<sup>3</sup>

## 4 Data

### 4.1 Data Sources

The first data source used is the Survey of Consumer Finances (SCF), which is conducted by the Board of Governors of the Federal Reserve System, Washington, DC. The survey

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<sup>3</sup>If 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)). Furthermore, if owners agree to keep up payments on loans that are secured on their home or private car, they do not lose these assets. If 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)).

provides detailed information about the financial situation of households. We select two subsamples from the five SCF waves between 1989 and 2001. The first subsample includes all households with an active management interest in a private company. The survey asks for information about the largest three companies. We designate the household member who makes the largest contribution to the running of the company as the main owner. Overall, the subsample contains complete information on 4974 households.<sup>4</sup> The survey asks for an estimate of the market value of the equity share in the company. Observations for companies with an equity value below USD 1,000 are deleted, because very small values of equity can lead to implausibly high earnings rate figures. As a further measure to ensure plausible earnings rate figures, the smallest and largest 1% of observations of this variable are excluded. For the variable capital gains the largest 1% of observations is deleted. In addition, households are required to have positive net worth and positive private wealth, i.e. positive net worth not considering equity investments in private companies. In the end, 4746 households are included in the analysis. Of the included households, 69% have a management interest in only one company, 19% in two and 12% in three.<sup>5</sup>

For the second subsample of the SCF all households with ownership in a private business in which they do not have an active management role are selected. The survey provides information on up to six companies with different legal forms. Should a household have more than one company of the same legal form, then information is only available for the sum of those. Overall, full information on 1486 households with ownership in 2090 (partly combined) companies is available. The same selection rules as for the first subsample apply,

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<sup>4</sup>The SCF includes information on assets, such as private businesses or the value of the primary residence, only at the household level. Some information, for example education, job characteristics and gender are given for individual household members. To be able to control for individual characteristics, we determine which household member is the main owner according to job characteristics. The survey states separately for each private business which household members work for it. If only one person works for the business, this person is the main owner. If both work for the business, then the single person who is self-employed in the main job is the main owner. If both are self-employed in their main jobs, then the main owner is the one who works the higher number of weekly hours in the main job. The same criteria apply for the second job, if both work for the business, but neither is self-employed in the main job. We use individual owner characteristics as instruments and as controls in the regression analysis. In the following, we use the term “owner” of the private company and not “household” owning the private company, although different owners may share the same household characteristics. The clustering of the error terms in regressions is at the household level.

<sup>5</sup>See Kennickell et al. (2000) for more information on the 1998 SCF survey.

with the sole difference that the minimum size of USD 1,000 applies to the household's equity share and not to the total equity of the company. Finally, information on 1424 households and 1924 companies is used. 76% of these households have ownership in only one company, 16% in two companies, and 8% in between three and six companies.<sup>6</sup>

The second data source is the Survey of Small Business Finances (SSBF), which is also conducted by the Board of Governors of the Federal Reserve System. This survey provides information on private companies with up to 500 employees from the non-agricultural, non-financial sectors. From the SSBF only the 1998 wave is used, because this is the only wave with information on the net worth of owners. Full information for 3496 companies is available. In contrast to the SCF, the owner information refers always to the largest owner and the value of equity is given as book value. In the majority of companies, the largest owner is active in the management. For the 10.7% of companies with a hired manager, it is possible but not necessarily the case that the largest owner is active in the management. The SSBF data differentiates between three categories of total net worth of the owner: the book value of the ownership share, the equity value of the primary residence and the remaining net worth.<sup>7</sup> The same inclusion criteria as for the SCF apply. In the SSBF, a high share of companies (21%) have negative equity values. Since SNWI is not well defined if the equity value is negative, only observations with positive equity values can be included in the empirical analysis.<sup>8</sup> Due to more extreme values, trimming of the earnings rate is done to the 5% level. 2345 companies are included in the analysis.<sup>9</sup>

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<sup>6</sup>We select the head of household as the main owner for companies in which the household has no active management role. Since the owners do not work for the company, it is not possible to determine the main owner according to job characteristics.

<sup>7</sup>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 figures in different categories. First, rounding can happen, i.e. values may be noisy. However, even with rounding, the total expenditure questions still contained valuable information. Second, it is possible that total expenditure is underestimated, if only one question about the total is asked.

<sup>8</sup>21% 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 book values for equity.

<sup>9</sup>More detailed information on the 1998 SSBF survey is available in Bitler et al. (2001).

## 4.2 Summary Statistics

Descriptive statistics for all variables can be found in Tables 1, 2 and 3. The average size of the companies does not exceed 93 employees in all three subsamples. We measure company size in the SCF with the logarithm of the number of employees. In the SSBF, which only includes small and medium-sized companies, we use the number of employees. Average company age in both surveys is around 15 years.

One component of returns to equity is the earnings rate. It is defined as profits divided by equity value. The profit figures in both surveys are reported before the payment of corporate tax. To make the numbers better comparable across legal forms, we calculate the corporate tax, which has to be paid only by C-corporations, and subtract it from the reported profits.<sup>10</sup>

The second component of returns to equity is capital gains, which is calculated according to the following formula:

$$\text{Capital gains} = \left( \frac{\text{Market value of equity}}{\text{Value of original investment}} \right)^{1/(\text{Years since founded or acquired})}$$

We use the two measures separately in the empirical analysis. It is not possible to add them to obtain the total returns to equity, since this would lead to double counting of retained earnings. The retained earnings cannot be subtracted from the earnings rate, since it is not known which portion of profits companies retain. The descriptive statistics for earnings rate and capital gains are discussed in detail in the next section.

The measures SNWI A and SNWI B document a considerable lack of diversification. For owners with active management interests, SNWI A is on average 26.5% (SCF) and 27.1% (SSBF). When guarantees, collateral and loans are taken into account as well, the average value of SNWI increases by 4.1 and 5.8 percentage points respectively.<sup>11</sup> Owners without management interests have a lower average value of SNWI A of 12.9%. As is typical for private companies, ownership is concentrated. The average ownership share is 73% (SCF)

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<sup>10</sup>C- and S-corporations are both characterized by limited liability. C-corporations have to pay corporation tax on profits that are paid out to their shareholders. In contrast, profits of S-corporations are only taxed via the income tax paid by their owners. Corporate tax rates differ according to the size of profits and have changed over the years. For our calculations we use the historical rates according to tax brackets which can be found at [www.taxpolicycenter.org](http://www.taxpolicycenter.org) and, for 1994 onwards, at the home page of the American Internal Revenue Service, [www.irs.gov](http://www.irs.gov).

<sup>11</sup>The SSBF does not include information on loans that owners receive from their companies.

Table 1: Descriptive Statistics SCF - Owners Active In Management

	<b>Mean</b>	<b>Median</b>	<b>Stdev.</b>	<b>Min</b>	<b>Max</b>
Number of employees	92.43	6	407	1	5000
Company age (in years)	15.08	12	11.65	1	71
Earnings rate (in %)	40.84	10.48	100	-22.95	1062
Capital gains (in %)	27.17	10.52	60.16	-99.88	747
SNWI A (in %)	26.50	17.8	25.13	0.004	100
SNWI B (in %)	30.58	21.35	28.24	-16.19	100
Ownership share (in %)	72.86	100	32.56	0.001	100
Experience (in years)	29.84	29.50	13.21	0	85
Value primary residence (in m. USD)	0.758	0.350	1.37	0	20
Dummy home ownership	0.937	1	0.24	0	1
Owner age (in years)	52.33	52.00	12.20	19	95
Dummy founded	0.64	1	0.49	0	1
Dummy purchased	0.29	0	0.45	0	1
Dummy inherited	0.06	0	0.24	0	1
Dummy female owner	0.17	0	0.38	0	1
<i>Industry</i>	<i>Legal form</i>		<i>Education</i>	<i>Ethnicity</i>	
Agriculture 9.2%	Sole prop. 32.7%		No high school 5.8%	White 92.7%	
Construction, mining 8.7%	Partnership 23.4%		High school 20.1%	Hispanic 1.8%	
Manufacturing 11.2%	S-corp. 26.2%		BA 38.9%	Black 2.0%	
Retail, wholesale 16.3%	C-corp. 17.7%		MA 15.3%	Asian 3.5%	
Services 53.8%			PhD 19.9%		
Not classified 0.8%					

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: Descriptive Statistics SCF - Owners Not Active In Management

	Mean	Median	Stdev.	Min	Max
Earnings rate (in %)	17.42	1.83	54.97	-20	549
SNWI A (in %)	12.87	4.34	19.56	0.002	100
Experience (in years)	33.30	33	13.10	0	87
Value primary residence (in m. USD)	1.09	0.60	1.74	0	20
Dummy home ownership	0.95	1	0.22	0	1
Owner age (in years)	52.33	52.00	12.20	19	95
Dummy female owner	0.06	0	0.23	0	1
<i>Legal form</i>					
Sole prop.	5.9%				
Partnership	14.9%				
Limited Partnership	43.1%				
S-corp.	16.2%				
C-corp.	14.7%				
Other	5.2%				
<i>Education</i>					
No high school	3.1%				
High school	8.7%				
BA	39.8%				
MA	21.0%				
PhD	27.4%				
<i>Ethnicity</i>					
White	95.0%				
Hispanic	0.6%				
Black	1.3%				
Asian	3.1%				

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.

and 80% (SSBF).

The regressions contain control variables for industry, legal form, the owner's level of education and the ethnicity of the owner. The descriptive statistics for the control variables are also shown in Tables 1, 2 and 3. Experience in the SCF includes all occupations, counting years in full-time employment as such and weighting years in part-time employment with a factor of 0.5. Experience in the SSBF is defined as the number of years owning or managing a company. The SCF regressions for owners with active management interest contain dummies differentiating between seven industries; the SSBF regressions contain industry controls at the 2-digit SIC level.

Table 3: Descriptive Statistics SSBF

	<b>Mean</b>	<b>Median</b>	<b>Stdev.</b>	<b>Min</b>	<b>Max</b>
Number of employees	29.13	5	59.37	1	482
Company age (in years)	15.59	13	12.58	1	104
Earnings rate (in %)	118	40.53	188	-61.95	1002
SNWI A (in %)	27.12	20.37	24.14	0.004	98.92
SNWI B (in %)	32.93	24.30	28.86	0.041	100
Ownership share (in %)	79.60	100	27.78	1	100
Experience (in years)	20.22	20	11.98	0	72
Value primary residence (in m. USD)	0.163	0.1	0.373	0	15
Dummy home ownership	0.905	1	0.29	0	1
Owner age (in years)	51.39	51	11.36	21	95
Dummy founded	0.74	1	0.44	0	1
Dummy purchased	0.20	0	0.40	0	1
Dummy inherited	0.06	0	0.24	0	1
Dummy female owner	0.21	0	0.41	0	1
<i>Industry</i>		<i>Legal form</i>	<i>Education</i>	<i>Ethnicity</i>	
Construction, mining 10.1%	Sole prop. 39.5%	No high school 2.8%	White 80.3%		
Manufacturing 11.9%	Partnership 5.0%	High school 44.0%	Hispanic 6.8%		
Retail trade 28.4%	S-corp. 29.3%	College 53.2%	Black 7.0%		
Services 49.4%	C-corp. 26.2%		Asian 5.9%		
Not classified 0.2%					

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.



## 5 Characteristics of Returns to Equity

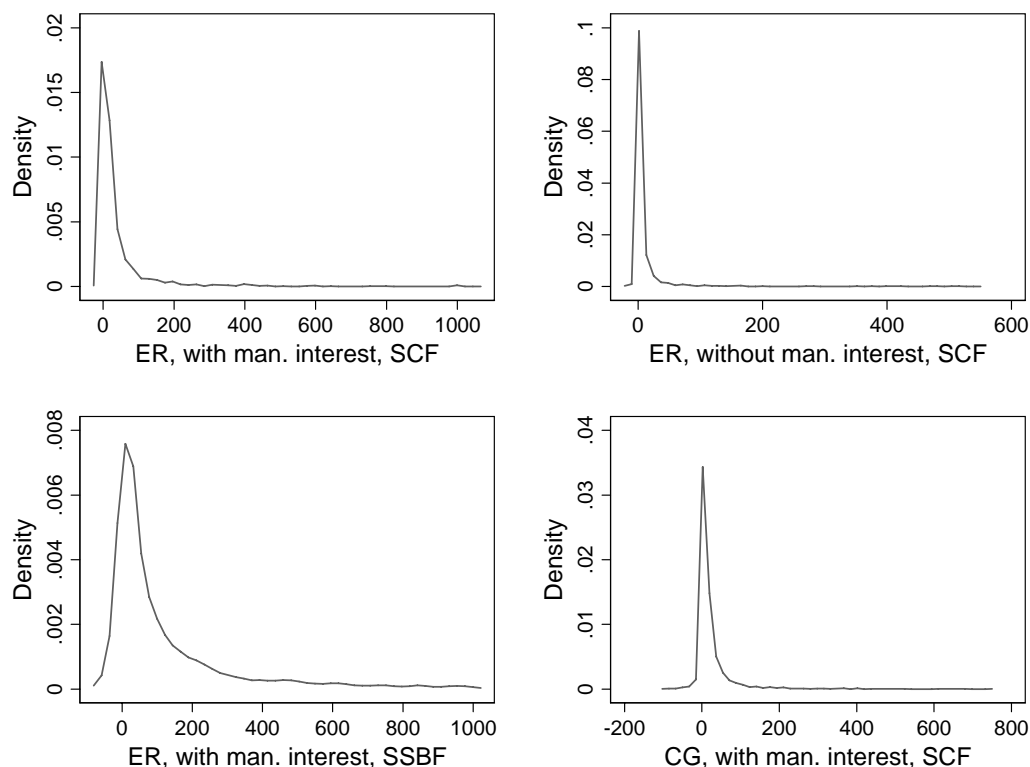
In Table 4 we compare the returns to equity values of the two data sets. Columns (1) and (2) show relatively high mean returns for the SCF with an earnings rate of 41% and capital gains of 27%. When calculating returns weighted by equity value, we obtain substantially lower numbers: 14.5% for the earnings rate and 10.3% for capital gains. Total returns to equity with an assumed retention rate of 20% for sole proprietorships and partnerships and 40% for corporations are then 20.7%. This falls within the range of values found by Moskowitz and Vissing-Jørgensen (2002) for value-weighted returns without adjustments using the same retention rates (12.3%, 17.0% and 22.2% for the time periods 90-92, 93-95 and 96-98). The authors calculate returns for the intervals between two SCF survey waves that include the returns from profits as well as the returns from appreciation of equity values.

The mean and median values of the SSBF earnings rate (column (3)) are substantially higher than the SCF values (118% and 41% respectively). To investigate whether the explanation for the differences lies with the use of the book value of equity in the SSBF data, we calculate the earnings rate for the SCF with book values for the year 1989, the only year in which book values are available. We find a substantially higher mean value in the SCF (column (4)) but a smaller effect on the median. Overall, the differences in the two data sources cannot be completely explained by the use of book and market values respectively. We then plot the distribution of returns in Figure 1 to get a better understanding of the data. All return measures have a unimodal distribution with high skewness, which explains that means are substantially higher than medians. The SSBF earnings rate has a higher density for relatively large returns, but otherwise the shape is similar for all return measures. If the returns are measured with SCF data, there does not appear to be a reward for exposure to idiosyncratic risk when looking at average returns. If the SSBF data are used, the premium could be large. A very careful analysis with appropriate adjustments to the data is necessary to judge whether the returns are higher or lower than the returns to public equity. Such an analysis of the returns in the SSBF data is beyond the scope of this paper. We conclude that the SSBF data is reliable for the purpose of investigating whether returns vary with the exposure to idiosyncratic risk and leave an investigation of the level of the returns to future research.

Table 4: Comparison of Returns to Equity Values

Returns measure Equity value Owners active in management Data source	(1) Earnings rate market yes SCF		(2) Capital gains market yes SCF		(3) Earnings rate book yes SSBF		(4) Earnings rate book yes SCF		(5) Earnings rate market no SCF	
	mean	median	mean	median	mean	median	mean	median	mean	median
All	40.8	10.5	27.2	10.5	117.9	40.5	85.2	14.4	17.4	1.8
<i>Survey year</i>										
1989	42.4	8.3	29.2	8.9			85.2	14.4	14.3	1.0
1992	36.4	9.6	22.7	9.1					17.8	1.3
1995	38.5	8.4	32.3	11.6					20.7	2.5
1998	43.3	12.1	26.3	11.1	117.9	40.5			20.7	4.2
2001	44.3	13.5	25.5	10.8					14.5	4.2
<i>Legal form</i>										
Sole proprietorships	61.3	20.8	22.2	7.6	139.3	66.7	109.0	20.8	16.9	5.4
Partnerships	37.3	7.4	25.3	9.4	173.6	93.1	106.6	8.3	17.2	1.8
Corporations	30.3	9.3	29.9	13.6	96.0	27.5	58.1	14.9	19.7	1.9
<i>Industry</i>										
Agriculture	18.0	3.8	12.8	4.7			28.1	4.7		
Construction, mining	64.3	22.2	25.4	11.1	134.9	59.1	101.3	35.5		
Manufacturing	26.8	8.8	33.1	15.8	79.5	24.2	66.2	16.4		
Retail, wholesale	32.2	12.6	24.1	10.8	104.6	36.1	64.8	16.8		
Services	47.8	11.3	28.4	10.5	131.5	47.6	108.4	16.7		
<i>Size</i>										
≤ 5 employees	47.1	10.1	25.1	8.0	132.4	55.6	77.3	12.1		
> 5 employees	34.9	10.7	29.1	12.9	102.6	32.0	93.6	16.5		
<i>Age</i>										
≤ 12 years	43.3	10.0	41.0	17.1	124.6	50.9	78.9	14.2		
> 12 years	38.3	11.1	12.7	7.6	111.3	31.9	93.4	14.5		

Figure 1: Distribution of Returns to Equity



Note: ER stands for earnings rate; CG stands for capital gains.

Column (5) shows lower returns for owners without an active management role compared to owners with an active management role. A further investigation of the data shows variation in the returns over time, with low values in the survey year 1992. Compared to other legal forms, corporations have lower earnings rates but higher capital gains. There are industry differences as well: Agriculture has low earnings rates and low capital gains, whereas manufacturing has low earnings rates but high capital gains.<sup>12</sup> Larger and older companies show relatively smaller earnings rates.

It is important to discuss whether there are aspects that could lead to a spurious positive relationship between SNWI and equity returns. We first address the influence of tax evasion. King and Ricketts (1980) and Parker (1984) conclude from an evaluation of the 1977 economic census that households report their true income to surveys, if the surveys do not use tax forms as a basis. The SCF is not based on tax forms, whereas the SSBF refers respondents

<sup>12</sup>Some industries in column (2) have fewer than 100 observations. The values should therefore be interpreted with care.

to tax statements for the company details but not for the wealth information. Tax evaders may report lower earnings rates and also lower values of SNWI to the extent that they saved the gains from tax evasion. Therefore a positive relationship between the earnings rate and SNWI can be induced for tax evaders. However, since SNWI is a stock variable shaped by many other factors, the influence of tax evasion is likely to be too small to affect the results.

Some owners may be overoptimistic about the prospects of their investment. Overoptimism can lead to a high investment volume combined with low profitability, i.e. it can lead to a negative relationship between SNWI and equity returns. This may be reinforced, if these owners overestimate the market value of their company, which increases SNWI and decreases the earnings rate. This makes it more difficult to identify an influence through lack of diversification. However, a positive relationship between SNWI and equity returns is possible, if overoptimistic owners have low profitability and give an unbiased estimate of the market value.

Companies with venture capital investment may have lower values of SNWI since they have additional owners. At the same time the companies may have low earnings, since venture capitalists often invest at an early stage, when companies are still unprofitable. This could lead to a positive relationship between SNWI and the earnings rate. However, this effect should be quantitatively negligible, since overall less than 1% of all private equity (defined as equity in sole proprietorships, partnerships and corporations) in the USA is held by venture capitalists (Moskowitz and Vissing-Jørgensen (2002)).

## **6 Exposure to Idiosyncratic Risk and Equity Returns**

### **6.1 Dealing With Endogeneity**

In order to establish causality from exposure to idiosyncratic risk to equity returns, we need to deal with the problem of endogeneity. Using the instrumental variables approach, we run a first-stage regression to predict instrumented values of the endogenous regressors SNWI and ownership share. In the second-stage or main regression we use the predicted values of the endogenous variables as regressors to obtain consistent parameter estimates.

SNWI is affected by reverse causality, since owners who know that a company is of high quality may be willing to invest more. In this case there is a positive effect of the equity return on the share of net worth invested. The same effect is possible for ownership share.

Owners may be willing to buy a larger share of a good company.

A further issue is measurement error. The market value of equity in the SCF data may be a noisy estimate, since private companies have no quoted market value. The book value of equity in the SSBF is calculated as the difference of the company's assets and liabilities. It is possible that there are errors in the measurement of assets and liabilities, because many respondents are not required by law to draw up a balance sheet. If the instruments are not related to the measurement error, there will be no resulting bias.

We use the logarithm of the value of the owner's primary residence, a dummy for home ownership and the age of the owner as instruments. The SCF gives the market value and the SSBF the equity value (i.e. market value minus mortgages) of the primary residence. The variable is set to zero, if the owner is renting. The dummy for home ownership has a value of one, if the owner of the company owns his or her primary residence. Descriptive statistics for these variables are displayed in Tables 1, 2 and 3.

The instruments are only valid if they are correlated with the endogenous regressor and uncorrelated with the dependent variable. There should be a negative correlation between the value of the primary residence and SNWI. If the primary residence has a higher value, a smaller share of net worth will be available for investment in the company. The value of the primary residence will, in most cases, be unrelated to equity returns. However, owners of profitable companies accumulate wealth over time, which may be used to buy a more expensive house or to pay off the mortgage faster. A high value of the house would then be related to high equity returns. However, the first-stage regression for SNWI shows the opposite effect. We find that a high value of the house is related to low equity returns. If there is a relationship between instrument and dependent variable, then the coefficient for SNWI will be underestimated and we will obtain a lower bound on the true effect.

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 of their wealth invested in private equity. Furthermore, net worth may increase with age, since individuals have had more time to save. We argue that owner age itself is unrelated to equity returns. When using it as an instrument, it is, however, important to include controls for work experience and education, since they are related to age and it is possible that experience and education have a direct influence on returns.<sup>13</sup>

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<sup>13</sup>Bitler et al. (2005) use similar instruments for ownership share, namely age, age squared and dummies for type of company acquisition.

Table 5: First-stage regressions

	(1)	(2)	(3)	(4)	(5)
	SCF	SCF	SCF	SSBF	SSBF
Dep. variable	SNWI A	Ownership share	SNWI A	SNWI A	Ownership share
Owners active in management	yes	yes	no	yes	yes
Ln value primary residence	-3.83*** (0.284)	1.40*** (0.358)	-2.64*** (0.442)	-2.76*** (0.418)	0.862** (0.349)
Dummy home owner	3.46* (1.95)	-4.35** (1.88)	-0.324 (3.88)	8.01* (4.20)	-9.17*** (3.35)
Owner age	-0.415*** (0.441)	0.027 (0.050)	0.026 (0.069)	-0.305*** (0.058)	-0.087 (0.056)
Company size	4.69*** (0.190)	-4.96*** (0.217)		0.103*** (0.011)	-0.075*** (0.011)
Company age	0.321*** (0.029)	0.258*** (0.035)		0.027 (0.051)	-0.131** (0.055)
Number of observations	6781	6781	1924	2345	2345
Number of households	4746	4746	1424	2345	2345
R squared	0.208	0.433	0.104	0.221	0.442
Shea's partial R squared	0.016	0.001	0.041	0.090	0.005

Note: \*, \*\*, \*\*\* indicate statistical significance at the 10, 5, and 1 percent levels, respectively. Standard errors in parentheses are robust to heteroscedasticity and autocorrelation at the household level. All regressions contain additional controls for education, experience, ethnicity and legal form. Regressions (1) and (2) also contain controls for industry and year. Regression (3) also contains controls for year. Regressions (4) and (5) also contain controls for industry at the 2-digit SIC level, region and urban versus rural area.

In Table 5 we present the results of the first-stage regressions for SNWI A and ownership share for both data sets. Results for SNWI B are omitted, since they are very similar. The regressions include all control variables from the second stage, but not all coefficients are shown for brevity.<sup>14</sup> As expected, there is a negative correlation between the value of the primary residence and SNWI A. The dummy for home ownership has a significant positive coefficient for owners with active management interests but is insignificant for the SCF subsample of owners without management interests. Owner age has a significant negative coefficient in the regressions with SNWI A as dependent variable for owners with active management interests. As can be seen from Shea’s partial R squared (Shea (1997)), the instruments have a better explanatory power for SNWI than for ownership share.

## 6.2 Influence on the Earnings Rate

### 6.2.1 Owners Active In Management

Table 6 shows results of the investigation into how exposure to idiosyncratic risk influences the earnings rate. In column (1) we show a standard OLS regression that suffers from reverse causality and non-standard measurement error. The non-standard measurement error causes a negative bias since equity is included in the denominator of the dependent variable and in the numerator of the independent variable SNWI A. It is therefore not possible to interpret the negative sign of SNWI A in an economic sense. The coefficient of ownership share is not influenced by measurement error. We find a positive and significant incentive effect. Owners with a higher ownership share may work harder, because they obtain a higher share of the resulting profits.

In column (2) we show the first instrumental variable (IV) estimate. The coefficient on SNWI A is now positive and significant. A 10 percentage point increase in SNWI A increases the earnings rate by 11.5 percentage points. Compared to the mean earnings rate of 40.8%, it is clear that this effect is economically important. This result is in line with our hypothesis that owners demand compensation for exposure to idiosyncratic risk. After instrumenting ownership, we no longer find a positive incentive effect. Since there are more instruments

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<sup>14</sup>The SCF data includes five imputations for missing values. The reported results are calculated for the average of the imputed values. As Ang et al. (2000) and Bitler et al. (2005) we use unweighted regressions. For the SSBF the variables used for stratification and oversampling are publicly known. They are included as controls in the regressions.

Table 6: Influence on Earnings Rate - Owners Active in Management (SCF)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
OLS	IV	IV	IV	IV	IV	IV	IV-re	IV-fe
all comp.	all comp.	all comp.	all comp.	one owner	largest comp.	all comp.	all comp.	all comp.
SNWI A	-0.627*** (0.049)	1.15*** (0.451)	1.06*** (0.406)	0.461* (0.254)	0.749** (0.356)	0.927*** (0.204)	1.36*** (0.523)	4.69* (2.51)
SNWI B								
Ownership share	0.146*** (0.040)	1.62 (1.91)	1.50 (1.83)	0.088 (1.09)	0.719** (0.314)	0.767** (0.370)	0.767** (0.370)	-0.231 (0.845)
Company size	1.93** (0.827)	1.78 (7.58)	1.00 (7.18)	-9.55*** (1.88)	-4.06 (4.58)	-1.60 (1.80)	-3.04 (2.54)	-27.65* (14.34)
Company age	0.151 (0.110)	-0.643 (0.614)	-0.562 (0.572)	0.023 (0.179)	-0.103 (0.326)	-0.352** (0.152)	-0.449** (0.213)	-1.73 (1.16)
Number of observations	6781	6781	6781	3500	4746	6781	6781	6781
Number of households	4746	4746	4746	2978	4746	4746	4746	4746
Overidentification test, $\chi^2$ (dof, p-value)		0.857 (1, 0.355)	0.697 (1, 0.404)	2.24 (2, 0.326)	2.39 (1, 0.122)	3.19 (3, 0.363)		

Note: \*, \*\*, \*\*\* indicate statistical significance at the 10, 5, and 1 percent levels, respectively. Standard errors in parentheses are robust to heteroscedasticity and autocorrelation at the household level. The regressors SNWI and ownership share are instrumented. The regressions contain additional controls for industry, year, education, experience, ethnicity and legal form. Instruments in columns (2) to (5) are the logarithm of the value of the owner's primary residence, a dummy for home ownership and the age of the owner; instruments in columns (6) and (7) are the logarithm of the value of the owner's primary residence, a dummy for home ownership, type of company acquisition and sex of owner; instruments in column (8) are type of company acquisition and sex of owner.



than endogenous regressors, it is possible to test the overidentifying restrictions. In this as in the following regressions the test of overidentifying restrictions is passed. Company size and company age have no influence on the earnings rate. The regressions contain controls for the owner's level of education, work experience and ethnicity as well as controls for legal form, industry and year. The coefficients are not shown for brevity.

To test the robustness of the results, we calculate several variations shown in columns (3) to (5). We use the broader measure for exposure to idiosyncratic risk, SNWI B. We restrict the analysis to companies in which the household has an ownership share of 100%, thereby excluding the possibility that the earnings rate could be influenced by the exposure to idiosyncratic risk of an other owner. We also restrict the analysis to the largest company of each household. This means that we cover the most important investment and there is no need to be concerned about auto-correlation of the error terms. All variations confirm the significant positive influence of SNWI found for the base case.

As a further robustness check, we employ a second set of instruments in column (6). We keep the instruments related to the primary residence but replace owner age with type of company acquisition and sex of owner. Whether the company was founded, purchased or inherited can affect how much personal resources the owner invests in the company, but it should be unrelated to equity returns. Also, the sex of the owner should have no direct relationship with equity returns, once we control for detailed owner and company characteristics. The different set of instruments leaves the result for SNWI A almost unchanged, but the coefficient of ownership share is now significant. The second set of instruments explains a higher share of the ownership variable.

The fact that some owners have an investment in more than one private company allows us to control for unobserved owner heterogeneity using panel data techniques. For example, owners differ in their degree of risk aversion, which has an influence on the risk premium they demand. For the panel regressions we choose the alternative set of instruments, since it has a higher variation in the within-dimension. The random-effects estimate in column (7) confirms the positive and significant influence of SNWI A and ownership share. For the fixed-effects regression we have to drop the instruments related to home ownership, because they have no variation at the owner level. Column (8) still confirms the significant influence of SNWI A.

Table 7: Influence on Earnings Rate - Owners Active in Management (SSBF)

	(1)	(2)	(3)	(4)	(5)
	OLS	IV	IV	IV	IV
	all comp.	all comp.	all comp.	one owner	all comp.
SNWI A	-1.66*** (0.155)	2.17*** (0.681)		2.62*** (0.780)	1.95*** (0.759)
SNWI B			2.08*** (0.650)		
Ownership share	0.595*** (0.180)	3.94 (3.02)	3.69 (2.95)		6.39** (3.32)
Company size	0.110* (0.065)	-0.031 (0.233)	-0.091 (0.231)	-0.518*** (0.174)	0.179 (0.256)
Company age	-0.122 (0.359)	0.401 (0.589)	0.592 (0.598)	0.481 (0.716)	0.725 (0.646)
Number of observations	2345	2345	2345	1394	2345
Number of owners	2345	2345	2345	1394	2345
Overidentification test, $\chi^2$ (dof, p-value)		0.448 (1, 0.503)	0.793 (1, 0.373)	2.90 (2, 0.235)	4.74 (3, 0.192)

Note: \*, \*\*, \*\*\* indicate statistical significance at the 10, 5, and 1 percent levels, respectively. Standard errors in parentheses are robust to heteroscedasticity. The regressors SNWI and ownership share are instrumented. The regressions contain additional controls for industry at the 2-digit SIC level, education, experience, ethnicity, legal form, region and urban versus rural area. Instruments in columns (2) to (4) are the logarithm of the value of the owner's primary residence, a dummy for home ownership and the age of the owner; instruments in column (5) are the logarithm of the value of the owner's primary residence, a dummy for home ownership, type of company acquisition and sex of owner.

Results from the SSBF are shown in Table 7. The results of the SCF and the SSBF are quite similar. In the IV estimation of column (2) we find a positive influence of SNWI on the earnings rate. An increase of SNWI A by 10 percentage points is related to an increase of the earnings rate of 21.7 percentage points. The results are robust to the use of the alternative measure of exposure to idiosyncratic risk, SNWI B and to a restriction to companies with only one owner.<sup>15</sup> In column (5) the second set of instruments is employed. As with the SCF, we now see a positive incentive effect for ownership share. No information is available about other investments the owners may have, therefore no panel analysis is possible.

### 6.2.2 Owners Not Active In Management

Investment objectives differ between owners with and without management interests. For owners with management interests, the equity investment is connected to the employment decision. Not only are the returns on investment important, but alternative employment opportunities must also be taken into account. Some owners with management interests also obtain substantial non-pecuniary benefits from being their own boss. In our investigation, the results for owners with an active management role are possibly influenced by effort. An owner-manager with a higher share of net worth invested in a company is financially more dependent on its success and may therefore work harder. The instrumental variables approach does not control for this possibility. With an exploratory regression of self-reported weekly hours worked available in the SCF as dependent variable (results not reported), we find that owners who are more exposed to idiosyncratic risk work harder.<sup>16</sup> The results for owners without active management interests are a more direct test of our hypothesis in the sense that they cannot be influenced by effort.

The results for owners without a management role are presented in Table 8. The regressions do not contain a control for ownership share, since this information is not available. As in the previous tables, the OLS regression in column (1) shows a negative coefficient for SNWI A due to non-standard measurement error. The instrumented regression in column

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<sup>15</sup>For each company, the SSBF gives the sum for all owners for the amount of loans that are guaranteed by the owners, the value of owner assets that are used as collateral and the volume of loans between owner and company. For the calculation of SNWI B this information is multiplied by the ownership share of the largest owner and added to the equity investment to get an approximation of this owner's personal involvement.

<sup>16</sup>As a further robustness check we included hours worked as control for effort in the regressions with the SCF data. The results do not change.

Table 8: Influence on Earnings Rate - Owners Not Active in Management (SCF)

	(1)	(2)	(3)	(4)	(5)
	OLS	IV	IV	IV	IV-re
	all comp.	all comp.	largest comp.	all comp.	all comp.
SNWI A	-0.146**	0.856**	0.995*	0.852**	0.853**
	(0.073)	(0.444)	(0.530)	(0.437)	(0.345)
Number of observations	1924	1924	1424	1924	1924
Number of households	1424	1424	1424	1424	1424
Overidentification test, $\chi^2$		0.976	0.045	0.905	
(dof, p-value)		(2, 0.614)	(2, 0.978)	(2, 0.636)	

Note: \*, \*\*, \*\*\* indicate statistical significance at the 10, 5, and 1 percent levels, respectively. Standard errors in parentheses are robust to heteroscedasticity and autocorrelation at the household level. The regressor SNWI is instrumented. The regressions contain additional controls for year, education, experience, ethnicity and legal form. Instruments in columns (2) and (3) are the logarithm of the value of the owner's primary residence, a dummy for home ownership and the age of the owner; instruments in columns (4) and (5) are the logarithm of the value of the owner's primary residence, a dummy for home ownership and the sex of the owner.

(2) confirms our hypothesis for owners without active management role as well. A 10 percentage points increase in SNWI A translates into an 8.6 percentage points increase in the earnings rate.

As a robustness check we restrict the analysis to the owner's largest company. The results in column (3) show that the influence of idiosyncratic risk remains. In columns (4) and (5) we replace the instrument owner age by owner sex and keep the instruments related to the primary residence. We cannot use dummies for the type of acquisition, since this information is not available for this subsample. Again, the results are robust for the standard instrumental variables and random effects estimation. The overidentification test is passed for all specifications. We cannot calculate SNWI B for this subsample. Furthermore, a fixed-effects regression is not possible, since no instruments with variation in the owner-dimension are available.

### 6.3 Influence on Capital Gains

In Table 9 we present results relating to the second component of returns to equity, capital gains. The number of observations in the capital gains regressions is smaller, since companies with an initial investment of zero cannot be included. In contrast to the earnings rate regression, the OLS estimate is not influenced by non-standard measurement error. A comparison of the OLS and IV results in column (1) and (2) shows a higher coefficient for the IV estimate. The bias towards zero in OLS due to standard measurement error therefore exceeds the expected upward bias due to reverse causality.

The standard specification in column (2) shows a positive influence of exposure to idiosyncratic risk on capital gains. An increase of SNWI A by 10 percentage points is associated with an increase in capital gains of 12.4 percentage points. The ownership share variable indicates a positive incentive effect on capital gains. As robustness checks, we use the alternative regressor SNWI B, we only consider companies with one owner and we restrict the analysis to the largest company of the owner. All specifications confirm the positive influence of exposure to idiosyncratic risk on capital gains, but the test for overidentifying restrictions is not passed for the specification including only the largest company of the owner. The alternative set of instruments replacing owner age with type of company acquisition and sex of owner confirms the positive influence of SNWI in the standard instrumental variable specification and in the random-effects regression, but results in the influence of SNWI showing up as insignificant in the fixed-effects regression.

### 6.4 Implications

It is instructive to compare the size of the influence of idiosyncratic risk on returns to equity with the size of the effect as simulated by Kerins et al. (2004). This comparison can only be very tentative, since both calculations rely on strong assumptions. Our regression specification imposes a specific functional form and the model of Kerins et al. (2004) relies on the applicability of the capital asset pricing model. Kerins et al. (2004) calculate for companies with 0-25 employees that an increase of SNWI from 15% to 25% increases the cost of equity capital by 14.2 percentage points. With an assumed retention rate of 30% we find that a 10 percentage point increase in SNWI A leads to an increase in returns to equity of 20.5 percentage points. We therefore find a larger effect than Kerins et al. (2004).

Table 9: Influence on Capital Gains - Owners Active in Management (SCF)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
OLS	IV	IV	IV	IV	IV	IV	IV-re	IV-fe
all comp.	all comp.	all comp.	all comp.	one owner	largest comp.	all comp.	all comp.	all comp.
SNWI A	0.301*** (0.036)	1.24** (0.499)	1.12*** (0.440)	0.386*** (0.153)	1.17*** (0.369)	0.411** (0.165)	0.674** (0.314)	-0.349 (1.17)
SNWI B								
Ownership share	-0.041 (0.030)	4.03* (2.07)	3.82** (1.95)	2.14** (1.04)	0.644*** (0.239)	0.605** (0.250)	0.431 (0.608)	
Company size	0.682 (0.507)	15.65** (8.05)	14.63** (7.54)	-0.376 (1.16)	7.28* (4.09)	3.40*** (1.14)	1.95 (1.63)	5.23 (5.88)
Company age	-1.43*** (0.079)	-2.68*** (0.645)	-2.56*** (0.591)	-1.31*** (0.104)	-2.03*** (0.301)	-1.63*** (0.118)	-1.70*** (0.140)	-1.41** (0.643)
Number of observations	6096	6096	6096	3193	4351	6096	6096	6096
Number of households	4351	4351	4351	2739	4351	4351	4351	4351
Overidentification test, $\chi^2$ (dof, p-value)		(1, 0.919)	(1, 0.999)	(2, 0.015)	(1, 0.971)	(3, 0.055)		

Note: \*, \*\*, \*\*\* indicate statistical significance at the 10, 5, and 1 percent levels, respectively. Standard errors in parentheses are robust to heteroscedasticity and autocorrelation at the household level. The regressors SNWI and ownership share are instrumented. The regressions contain additional controls for industry, year, education, experience, ethnicity and legal form. Instruments in columns (2) to (5) are the logarithm of the value of the owner's primary residence, a dummy for home ownership and the age of the owner; instruments in columns (6) and (7) are the logarithm of the value of the owner's primary residence, a dummy for home ownership, type of company acquisition and sex of owner; instruments in column (8) are type of company acquisition and sex of owner.

The empirical findings of this paper have important implications for our understanding of investment decisions at private companies. We show that owners exposed to idiosyncratic risk require higher returns as compensation for their risk exposure. The realization of a business idea can therefore depend on the net worth of the potential entrepreneur. If the investment volume is large relative to the net worth, then the business idea needs to have a higher expected return in order to be realized. Furthermore, the available volume of additional bank or equity finance can be crucial, since it allows the potential entrepreneur to employ fewer of his or her own resources.

It was found that the probability of becoming an entrepreneur and of staying in business increases after an inheritance (Holtz-Eakin et al. (1994a) and Holtz-Eakin et al. (1994b)) which is interpreted as evidence of liquidity constraints. Our results suggest an additional interpretation. Since the exposure to idiosyncratic risk decreases through the inheritance, the required rate of return on investment projects decreases and therefore more business ideas will become worthwhile.

Does the finding of this study that owners receive compensation for their exposure to idiosyncratic risk open up a possibility for some owners to earn excess returns? Ownership shares are often equal in private companies due to control considerations (Bennedsen and Wolfenzon (2000)). If a rich owner invests a share in a company that otherwise has poorer owners, he or she could expect a return that is more than sufficient to compensate for his or her own risk exposure. However, this consideration leaves the open question of low average returns of private equity untouched.

## 7 Conclusions

Owners of private companies typically have a high share of their personal net worth invested in a single private company, which exposes them to the idiosyncratic risk of the company. This paper tries to answer the question of whether the owners require compensation for their risk exposure. Using information from the Survey of Consumer Finances (SCF) and the Survey of Small Business Finances (SSBF) we find that the degree of risk exposure has a statistically and economically significant positive influence on returns to equity. We calculate separate results for the earnings rate and for capital gains, as well as for owners with and without an active management role. We therefore show that owners are aware of the risk

and demand compensation.

This result improves our understanding of the behaviour of owners of private companies. When deciding in which companies to invest, they require higher returns from their investments if they have a higher exposure to idiosyncratic risk. One question the paper cannot answer is why average returns to private equity are not higher than average returns to public equity. Looking at the level of equity returns, this asset class generally has an unattractive risk-return trade-off.

In future research it would be interesting to test whether owners of public companies also receive higher returns, if they are exposed to idiosyncratic risk. Founders or families hold concentrated ownership stakes in some public companies. If these owners demand compensation for their exposure to idiosyncratic risk, it could be reflected in a higher earnings rate or in a better stock market performance.



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