The Performance of Private Companies: An Empirical Investigation Into the Role of Control, Risk and Incentives

Elisabeth Mueller

PhD Thesis

Department of Economics
London School of Economics and Political Science
University of London

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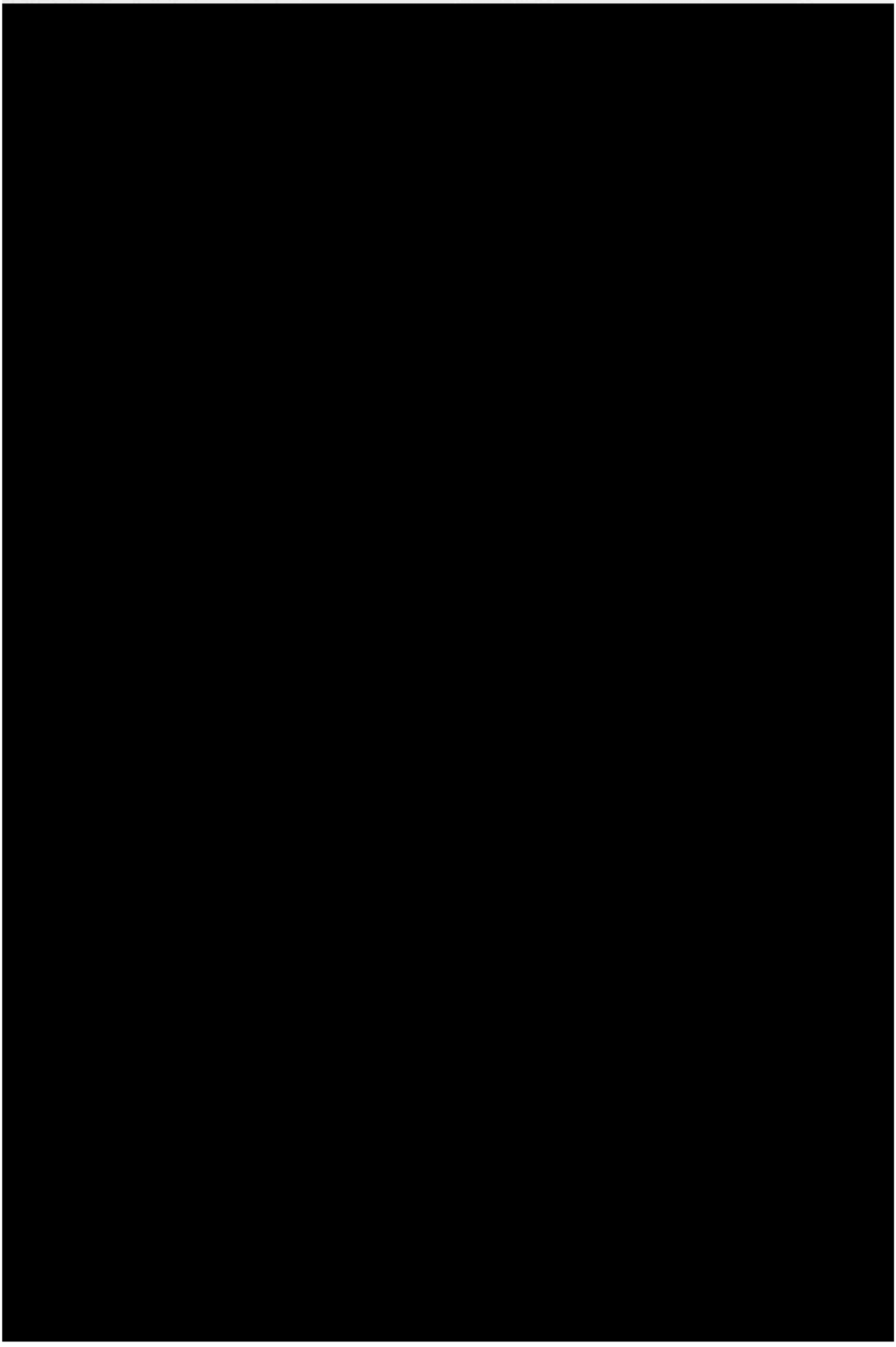
ProQuest LLC
789 East Eisenhower Parkway
P.O. Box 1346
Ann Arbor, MI 48106-1346



Statement of Joint Work

Chapter 5, "Managerial Ownership and Company Performance", is joint work by Elisabeth Mueller and Alexandra Spitz.

This is to confirm that the contribution of Elisabeth Mueller to this chapter amounts to 50%.

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(Alexandra Spitz)

Contents

List of Tables

List of Figures

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Abstract

This thesis analyses empirically the determinants of company performance. Its scope is restricted to private companies and to the issues of control, risk and incentives.

Chapter two studies the effects of the private benefits of control on private British companies with limited liability. We hypothesise that companies in which existing owners would lose more control if they expanded, have smaller equity increases, are more highly levered and grow more slowly. Potential loss of control is measured as the difference in the probability of winning a vote for the largest owner before and after a hypothetical equity increase. The empirical results are broadly consistent with the hypotheses.

Chapter three studies the influence of owners' underdiversification on the profitability of private US companies. Theory suggests that underdiversification increases the returns required for investment. We find a strong positive relationship between underdiversification (measured as the share of personal net worth invested), and profitability (measured as the return on equity). The analysis identifies two causes for this effect: higher required returns and higher effort.

Chapter four studies the influence of owners' underdiversification on the financial structure of their companies. Higher underdiversification is related to a higher demand for loans, higher leverage and lower liquidity. Bank loans are therefore used as an alternative source of financing that reduces the exposure of the owner to company-specific risk caused by the equity investment.

Chapter five studies the effects of the share of managerial ownership on performance and the determinants of this share for German private companies with limited liability. Ownership up to around 80 percent has a positive impact on performance (incentive effect), for higher ownership the effect becomes negative (entrenchment effect). The risk-aversion of owner-managers and signalling of company quality lead to a non-linear relationship between the company's riskiness and ownership.

Chapter 1

Introduction

1.1 Introductory Remarks

Economic activity in market-based economies mainly takes place through companies. It is therefore important to have a good understanding of the internal workings of a company. The economics profession has so far mostly concentrated its analysis on public companies (see, for example, the seminal book by Berle and Means (1932)). This restriction can partly be explained by better data availability. But recently, there has been an increased interest in private companies. This seems to be an appropriate development, since in industrialised countries the vast majority of companies are privately held. Private companies also contribute an important share to overall economic activity in terms of employment and turnover.

This thesis studies the determinants of company performance specifically for private companies. The scope of the thesis is restricted to the empirical analysis of issues of control, risk and incentives. More specifically, chapter two of this thesis addresses the influence of private benefits of control on the capital structure and the growth of private companies, using a sample of British companies. Chapters three and four concentrate on the underdiversification of owners. The influence of underdiversification on company profitability and on the financing of a company is studied through a sample of private companies in the USA. Finally, chapter five studies the relationship between the ownership share of managers and company performance through a sample of German private companies. The determinants of managerial ownership are also discussed.

Private companies are different from public companies in several ways. By the very definition of a private company, they are excluded from a listing on a stock exchange;

their equity must be privately held. In contrast, public companies have the option to offer their shares to the public. Another distinguishing feature is size. Whereas private companies are typically small, public companies are usually above a certain size threshold. There are, of course, exceptions. Virgin in the UK and Robert Bosch GmbH in Germany are examples of large companies not listed on a stock market. Another distinguishing feature is the number of owners. Private companies typically have less than 10 owners, and often have only between one and five. In addition, private companies are on average younger than public companies. One reason for this is a pronounced entry and exit activity. Also, most public companies started out in private form. Finally, private companies are often in family ownership, although, depending on the country, this can also be true of public companies.

It is possible to subdivide private companies into different legal forms. The most important differences are according to the number of owners (one or more), the personal liability of owners (unlimited or limited) and the tax status (profits being subject to the corporate tax rate or subject to the personal income tax rate of the owner). The specific legal rules differ between the three countries that are included in the empirical analysis of this thesis, but on a crude basis the following three types can be distinguished. Sole proprietorships have only one owner with unlimited liability and profits are subject to income tax. Partnerships have several owners with unlimited liability and profits are also subject to income tax. Corporations have one or more owners with limited liability and profits are subject to corporate tax. Depending on country specific regulations, additional forms are possible. Chapters two and five of this thesis focus on private companies with limited liability. In chapters three and four, however, all possible legal forms are included.

A major difference between private and public companies lies in the availability of different forms of financing. Private companies are typically restricted to equity investments from a limited number of owners and bank loans (Berger and Udell (1998)). For companies with large capital requirements, the organisational form of the private company is therefore impractical. The private wealth of a few individuals is not sufficient for the demands on equity capital. Public companies, in contrast, can raise larger investment amounts, because they can offer their shares to the public. Furthermore, they can approach financial markets with a bond issue.

Other important differences are agency costs and the opportunities for risk diversification. Private companies provide managers with good incentives to exert effort,

because managers are often also significant shareholders. On the downside, the concentrated investment in the private company exposes managers to idiosyncratic risk. The situation for public companies is just the opposite. There is an agency problem between the managers and the owners of the company, because their objectives can differ. Managers may pursue interests besides maximising the value of the company, because they often only own a small share. However, the wide-spread ownership allows risk diversification.

In the empirical analysis in the main chapters, we will return to some of the characteristics of private companies highlighted in this introduction.

1.2 Economic Importance of Private Companies

This thesis concentrates on private companies. It would therefore be interesting to present the relative importance of private and public companies for the countries that are covered in the empirical analysis. However, data on legal forms are less widely available than data according to the size of companies. Since private companies are typically small, their relative importance can also be gauged by concentrating on the small and medium-sized companies.

The following tables group companies into different size classes according to their number of employees. They show the number of companies as a percentage of the total number of companies. The contribution to overall employment and the contribution to overall turnover is also given according to size class. Each country that is covered in the empirical analysis is considered: UK, USA and Germany.

The following table 1.1 gives an indication of the significant importance of small and medium-sized companies for the UK economy. Focusing on the 2002 figures, 'micro' companies with nine or fewer employees make up almost 95% of all companies in the UK. When looking at small and medium-sized companies with fewer than 250 employees, we find that they account for almost the entire company stock with 99.7%. The picture changes somewhat, when the share of employment and the share of turnover is considered, but the importance of small and medium-sized companies is still clearly visible. Small and medium-sized companies contribute more than 50% to total employment and total turnover. The remaining half is contributed by large companies.

Of the small and medium-sized companies, many will be privately owned. They are the focus of this thesis. For comparison with other countries below, it should be noted

Table 1.1: Size Distribution of UK Companies

	Year	Number of Employees			
		0–9	10–49	50–249	250+
Number of Companies (in %)	1996	94.7	4.4	0.6	0.2
	2002	94.6	4.4	0.7	0.2
Employment (in %)	1996	30.6	15.3	12.5	41.8
	2002	29.4	14.3	11.9	44.4
Turnover (in %)	1996	25.0	17.3	14.0	43.7
	2002	22.0	15.0	15.0	48.0

Source: DTI (2000) for 1996, Small Business Service (2003) for 2002. Some figures do not add up to 100 due to rounding.

that the smallest category (with zero to nine employees) includes companies without employees and also the self-employed.

Table 1.2 shows the size distribution of companies for the US. Similar to the UK, small and medium-sized companies with fewer than 500 employees account for almost the entire company population (99.7%) in 2001. The smallest size category with zero to nine employees is responsible for about 11% of total employment and for about 9% of turnover. These numbers are significantly lower than in the UK, which can be explained by discrepancies of data definition. In the company statistics for the US, "non-employers" without a payroll are not included; i.e. the smallest category excludes those companies without employees and also the self-employed. The reason that the counting of employees is started from zero is that employment is measured once a year in March. Some companies, for example start-ups after March and closures before March, will have zero employment at that date but some on the annual payroll. They are therefore included in the statistics. The economic importance of small and medium-sized companies is clearly also evident for the US. This size group contributes to about 50% of employment and to about 40% of turnover.

Table 1.3 displays the size distribution for German companies. These data are not directly comparable with UK and US data, because companies are not always counted as *one* entity. Plants that are in one area and have the same sectoral orientation are counted as one unit. In addition, for Germany, there are no statistics available on turnover according to size class. Nevertheless, with respect to the number of companies,

Table 1.2: Size Distribution of US Companies

	Year	Number of Employees				
		0–9	10–19	20–99	100–499	500+
Number of Companies (in %)	1990	78.3	11.1	9.0	1.4	0.3
	1995	78.8	10.8	8.8	1.4	0.3
	2001	78.1	10.9	9.2	1.5	0.3
Employment (in %)	1990	12.2	8.1	19.0	14.5	46.3
	1995	11.8	7.7	18.4	14.6	47.5
	2001	10.7	7.2	17.7	14.3	50.1
Turnover (in %)	1992	10.9	6.3	15.7	12.9	53.6
	1997	9.0	5.2	13.8	11.9	59.1

Source: US Small Business Administration (www.sba.gov/advo). Some figures do not add up to 100 due to rounding.

the small and medium-sized companies also dominate. Companies with fewer than 500 employees account for 98.2% of all companies in 2003. Due to the mentioned differences in statistical methodology, the employment share of the largest size class of companies (with 500 or more employees) is significantly lower than in the US. This size class reaches only 21.5% of employment.

Job creation by private companies should also be taken into account when discussing the economic importance of private companies. It is often claimed that small companies are important contributors to job creation. In Germany, for example, small companies have created more jobs than they have destroyed in every year from 1985 to 2000 (see

Table 1.3: Size Distribution of German Companies

	Year	Number of Employees				
		1–9	10–19	20–99	100–499	500+
Number of Companies (in %)	1999	80.6	9.5	8.1	1.6	0.2
	2003	80.6	9.4	8.1	1.7	0.2
Employment (in %)	1999	18.4	10.0	25.5	24.5	21.6
	2003	18.2	9.7	25.5	25.1	21.5

Source: German Labour Office (http://statistik.arbeitsamt.de).

Mittelstandsmonitor (2004, p. 91ff.)). A small company is defined here as one with fewer than 50 employees. For companies with more than 50 employees, the balance was negative from 1993 to 2000 – more jobs being lost than created. In contrast, in the period 1985 to 1992, companies with more than 50 employees had both positive and negative balances, depending on the year. One does admittedly have to be careful with the interpretation of these statistics. When large companies re-organise, they sometimes create smaller, independent entities. They will be included in the job creation of smaller companies, even though no genuine creation of employment has taken place.

1.3 Chapter Summaries

This thesis studies determinants of company performance from an empirical perspective. The scope of the thesis is restricted first to private companies and second to the issues of control, risk and incentives.

1.3.1 The Role of Control

Chapter two studies the influence of the private benefits of control on the capital structure and the growth of private companies. Surveys document the importance that owners give to keeping control of their companies (e.g., Cressy and Olofsson (1997); Poutziouris et al. (1998)). However, so far, it is unclear what effect this may have on company characteristics such as the use of different financing instruments and the growth of companies. This chapter tries to answer this question.

In order to investigate the consequences of the private benefits of control, it is important to be able to quantify them. We approximate the extent of control by the probability that the largest owner will win a vote. We then calculate this probability after a hypothetical equity increase. Potential loss of control is measured by the difference in the probability of winning a vote before and after a hypothetical equity increase. This potential loss of control can then be related to specific company characteristics of interest. If potential loss of control is higher, then the owner would lose more private benefits in an equity-driven expansion.

This chapter investigates three hypotheses. First, we expect a negative relationship between potential loss of control and the size of equity increases. Owners who lose more control for a given equity increase face a cost component in addition to the required

return on the new equity – the cost of losing influence. This makes equity increases less attractive. Second, it is hypothesised that potential loss of control is positively related to the leverage of companies. Companies where existing owners would lose more control in an expansion will rely more extensively on bank financing and will therefore have higher leverage than otherwise comparable companies. Owners are prepared to pay higher interest rates for additional loans in order to keep control. Third, the relationship between potential loss of control and company growth is anticipated to be negative. This is a consequence of the first two hypotheses. Some growth opportunities become unprofitable, if they are financed with debt in a situation when debt levels are already high. Even if the returns of the growth opportunity exceeds the cost of equity capital, equity finance may not be used, because a control premium is demanded. Fewer growth opportunities will be realised as a result, and company growth will be smaller.

To study these effects, information on private UK companies with limited liability is used. The data set comprises 8,964 companies and covers the years 1997 to 2001. Only independent companies are included in the data set, because a company that is 100% owned by another company has no direct owner who would care about control. Also, independent companies whose largest owner is a company, or neither a company nor an individual (e.g. a trust or a fund), are excluded. These types of owners will not have an interest in control comparable to that of individuals.

There is a clear indication that potential loss of control has a negative effect on the size of equity increases. Since the majority of companies have a zero equity increase, we use a tobit model to measure the effect. We also find that potential loss of control has a positive influence on leverage. Owners who would lose more influence in an equity-driven expansion prefer to use debt more extensively. Finally, there is a negative relationship between potential loss of control and company growth. Owners are willing to give up some growth opportunities in order to stay in control.

1.3.2 The Role of Risk

Chapters three and four study the influence of owners' underdiversification on the profitability and financing of their companies. Owners of private companies are often highly underdiversified. They have a large share of their net worth invested in one company, which exposes them to idiosyncratic risk (see Moskowitz and Vissing-Jørgensen (2002)). It is often necessary that entrepreneurs invest their own wealth, because their companies

provide no collateral. Since banks are confronted with problems of asymmetric information, they are reluctant to extend unsecured loans. By investing their own money, entrepreneurs also document their confidence in the quality of their company. This can help to overcome the problems of asymmetric information that banks are confronted with. We expect underdiversification to have important consequences for the effort exerted by owners who are at the same time managers, the selection of projects, and the financial structure of private companies.

Empirically we measure underdiversification as the share of the personal net worth of an owner that is invested in the company. We use two measures of underdiversification. The first considers only the value of the equity investment. It is calculated as the ownership share in the company times the total value of the equity divided by the net worth of the owner. The second measure 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. For the calculation of the second measure, these commitments are added to the value of the equity investment.

Effects on the Profitability of Private Companies

Chapter three concentrates on the relationship between underdiversification and the profitability of private companies. The theoretical literature suggests that underdiversification increases the returns that are required for investment. This is because owners are exposed to idiosyncratic risk. So far, we only know that average returns on public equity are not higher than average returns on private equity, i.e. there seems to be no compensation for idiosyncratic risk at the aggregate level (Moskowitz and Vissing-Jørgensen (2002)). However, we do not know how the situation looks like when analysed at the company level.

We investigate two possible responses to underdiversification. First, owners can select the projects in which they invest such that the expected returns are sufficient to cover the cost of underdiversification. To depict the mechanism involved, we present a microeconomic model that derives a positive relationship between underdiversification and required returns in a simple framework with investment opportunities in one safe and one risky asset. Second, owners who are at the same time managers can work harder to ensure the success of their company. The more underdiversified they

are, the more does their financial well-being depend on the profitability of the company. Both responses predict a positive relationship between underdiversification and company profitability.

Two separate data sources are used for the analysis: the Survey of Consumer Finances (SCF, wave 1989 to wave 2001) and the Survey of Small Business Finances (SSBF, wave 1998); they both include information on companies and households in the USA. Their specific advantage for this chapter lies in the provision of information on the characteristics of private companies *and* on the private wealth of their owners. Both surveys were conducted by the Board of Governors of the Federal Reserve System, Washington, DC.

In our empirical analysis we find a positive, significant relationship between underdiversification and the profitability of companies. Profitability is measured as return on equity. The effect of underdiversification is smaller for richer owners, which is consistent with decreasing relative risk aversion. For a sub-sample of owners who do not have an active management interest in the private company they own, we also find a positive relationship between underdiversification and profitability. In this case, higher effort can be excluded as a cause and it is possible to tie down the result to higher required returns. We also find that owners who are at the same time managers exert more effort if they have a higher degree of underdiversification. Effort is measured as self-reported weekly hours worked. Underdiversification is therefore a source of incentives.

Our findings imply that the realisation of a business idea can depend on the net worth of the potential owner. 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 realised. Furthermore, the available loan volume of additional bank finance can also be crucial, since it allows the potential owner to scale back the use of own resources.

Effects on the Financial Structure of Private Companies

Chapter four studies how the owner's underdiversification affects the financial structure of the company. Private companies are restricted in the choice of financial resources they can tap. They have to rely on two main sources for their financing. On the one hand, equity is provided by a limited number of owners; on the other hand, loans are taken out from banks (Berger and Udell (1998)). To a certain degree, equity and bank financing are substitutes. Since the cost of equity capital increases in underdiversifi-

cation, we hypothesise that owners with a higher degree of underdiversification have a higher demand for bank finance. As we have seen in chapter 3 that companies with more underdiversified owners are more profitable, we also expect that the supply of loans is increasing in underdiversification. From these considerations it follows that underdiversification should be related to higher leverage. There is no clear prediction for the equilibrium interest rate, since higher demand should increase and higher supply should decrease the interest rate. We also hypothesise that liquid asset holdings are lower if owners are more highly underdiversified, because the opportunity costs of liquidity are higher.

The empirical analysis is based on the 1998 wave of the Survey of Small Business Finances (SSBF). The survey gives not only a detailed account of the financial structure of private companies, but also information on the most recent loan application. For example, it is asked whether the most recent loan application was approved, for which amount the company applied and which interest rate the company had to pay.

Our hypotheses are broadly confirmed by the data. More underdiversified owners, confronted with a higher cost of equity capital, have a higher demand for bank loans. Underdiversification increases not only the probability of a loan application, it also increases the loan volume applied for. With respect to the supply of loans our expectation was not confirmed. Underdiversification has no strong influence on the probability that a loan application is approved. As hypothesised, there is a significant positive and large effect of underdiversification on leverage. There is no clear hypothesis with respect to the interest rate and in the empirical analysis we also find that underdiversification does not influence the interest rate. With respect to liquidity, we find a clear negative relationship between underdiversification and liquid asset holdings. This confirms that the opportunity cost of liquidity is higher for owners with a higher degree of underdiversification.

These findings add to our understanding of how underdiversification of owners affects the financial structure of private companies. Owners try to reduce their risk exposure from underdiversification with the help of additional bank finance. This also implies that the availability of bank finance is important for the scope of business activities that private companies engage in.

1.3.3 The Role of Incentives

Chapter five studies the effects of the share of managerial ownership on performance and the determinants of this share for German private companies with limited liability. The ownership share of managers can have two opposing effects on performance – the incentive and the entrenchment effect. Managers with a higher ownership share have better incentives to exert effort, because they can keep a higher portion of the resulting increase in profits (the incentive effect). The incentive effect predicts a positive relationship between ownership share and company performance. However, if managers hold large shares of the equity, it becomes more difficult for outside owners to exercise control (the entrenchment effect). This effect is especially important for high ownership shares. It predicts a negative relationship between ownership share and performance.

We also investigate the relationship between the riskiness of the company and the ownership share of managers. The risk aversion of managers predicts a negative relationship between riskiness and ownership. However, managers also use their ownership stake to signal company quality to banks. Since banks are especially reluctant to lend money to risky companies, there can also be a positive relationship between the riskiness of the company and the ownership share of managers.

The analysis is based on information about small and medium-sized private companies with limited liability (GmbHs) in the German business-related service sector. The sample includes 2,797 observations referring to 1,351 companies. It is an unbalanced panel that covers the years 1997 to 2000. Since there is no accounting information available for this type of German company, we base our performance measure on a business survey that is conducted by the Centre for European Economic Research (ZEW) in Mannheim, Germany. The data derived from the survey are merged with company information provided by Creditreform, a German credit rating agency.

We address the potential endogeneity of managerial ownership share by estimating lagged specifications as well as employing instrumental variable methods. Furthermore, we investigate the dynamic structure of the panel using the Arellano-Bond GMM estimation technique.

The analysis shows that the ownership share of managers is associated with the incentive as well as the entrenchment effect. Increasing the ownership share up to around 80 percent has a positive impact on company performance. The effect becomes negative for higher values of ownership share. The positive effect reflects better incentives,

whereas the negative effect is due to an entrenchment effect.

Risk has a non-linear influence on the ownership share of managers. For high and low levels of risk, the relationship is positive, whereas for medium levels, it is negative. The positive relationship between risk and managerial ownership share can be an indication of signalling of company quality by management; the negative relationship can be due to the risk aversion of managers.

Chapter 2

Private Benefits of Control, Capital Structure and Company Growth

2.1 Introduction

In many industrialised countries, governments are concerned that small companies find it difficult to obtain enough finance to realise their growth potential (e.g., Cressy (2002); Wren and Storey (2002)). However, owners would sometimes not accept additional finance, even if it were available, because they want to remain in control of their companies. They want to remain in control because they obtain private benefits over and above the financial return on their investment. In order to stay in control they need to forego some growth opportunities, if the opportunities are too extensive to be realised with debt finance alone. This means that companies do not reach their growth potential and employ fewer people than would otherwise be the case.[1]

Surveys document the importance that owners give to keeping control of their companies (e.g., Cressy and Olofsson (1997); Poutziouris et al. (1998)). However, so far, it is unclear what effect this may have on company characteristics such as the use of different financing instruments and the growth of companies. This chapter tries to answer this question.

A possible method of investigating the consequences of the private benefits of control is first to calculate how much control the largest owner would lose in a hypothetical equity increase. This potential loss of control can then be related to company charac-

[1]There is also an argument that overlending occurs (see, for example, de Meza and Webb (1987) and de Meza (2002)).

teristics of interest. The extent of control is approximated by the probability that the largest owner will win a vote. Potential loss of control is calculated as the difference in the probability of winning a vote before and after a hypothetical equity increase.

This chapter tests three hypotheses. The first two hypotheses are related in that they are concerned with the use of financing instruments; the last hypothesis is related to company growth. First, we expect a negative relationship between potential loss of control and the size of equity increases *(H1a)*. Owners who lose more control for a given equity increase face a cost component in addition to the required return on the new equity – the cost of losing influence. This makes equity increases less attractive. Second, it is hypothesised that potential loss of control is positively related to the leverage of companies *(H1b)*. Companies where existing owners would lose more control in an expansion will rely more extensively on bank financing and will therefore have higher leverage than otherwise comparable companies. Owners are prepared to pay higher interest rates for additional loans in order to stay in control. Third, the relationship between potential loss of control and company growth is anticipated to be negative *(H2)*. This is a consequence of the first two hypotheses. Some growth opportunities become unprofitable, if they are financed with debt in a situation when debt levels are already high. Even if the returns of the growth opportunity exceed the cost of equity capital, equity finance may not be used, because a control premium is demanded. Fewer growth opportunities will be realised as a result, and company growth will be smaller.

To study these effects, information on private UK companies with limited liability is used. The dataset comprises 8,964 companies and covers the years 1997 to 2001. Private companies are used because their ownership is typically more concentrated than that of public companies. Owners of companies with dispersed ownership do not suffer a loss of control in an equity expansion, because they have negligible influence to start with. There are also public companies with concentrated ownership but because private and public companies are different in many respects, it would be difficult to combine them in one analysis.

For the identification of the effect of potential loss of control on company characteristics, it is important to deal with two related econometric problems. First, for the econometrician it is not possible to observe whether companies have growth opportunities and yet do not use them, as the owners want to stay in control. It is only possible to work with proxies for growth opportunities, but the proxies themselves are typically influenced by decisions taken by the owners or managers. For example, expenditure on

R&D is often used as a measure of growth opportunities. However, an owner who wants to stay in control would not undertake R&D in the first place, even if possibilities to expand existed. Second, it is not possible to directly investigate the relationship between loss of control due to actual ownership changes and the dependent variable of interest, because actual ownership changes are inherently endogenous. For example, an owner would only give up control if he had profitable growth opportunities. It would therefore not be surprising to find that companies in which the largest owner lost control are growing faster.

One way of dealing with the above-mentioned problems is to work with hypothetical equity increases that are the same for all companies. This mitigates the endogeneity problem and does not require a good measure of growth opportunities. The loss of control resulting from the hypothetical equity increase needs to be quantified and can then be used in the regression analysis. Section 2.3 of this chapter gives a detailed description of how potential loss of control is calculated.

The empirical results confirm the expected effects of potential loss of control. Companies in which the largest owner would lose more influence in the face of an equity increase have smaller equity increases, are more highly levered and exhibit slower growth than comparable companies.

The remainder of the chapter is organised as follows. Section 2.2 gives an overview of the related literature. Section 2.3 covers the measurement of potential loss of control. Section 2.4 highlights important institutional details of private companies in the UK. Section 2.5 explains the dataset. Section 2.6 presents the empirical analysis. Finally, section 2.7 concludes.

2.2 Related Literature

2.2.1 Theoretical Background

What are private benefits of control? Although the theoretical literature has analysed the effects of the private benefits of control, there is rarely a specific analysis of the sources of the benefits. In general, benefits can be divided into two categories: pecuniary and non-pecuniary. The pecuniary benefits can be a managerial salary that is higher than the market rate or perks that can be taken, for example, an expensive company car. The non-pecuniary benefits can be even more important than the pecuniary ones. They

include the prestige and social status that comes with ownership as well as the power to decide on the business strategy of the company and independence from superiors. Non-pecuniary benefits can be especially strong if the owner is the founder of the company or if the company has been controlled by the owner's family for a long time, because then the relationship between owner and company is closer.

There are two main ways in which private benefits are modelled. One strand of the theoretical literature assumes that private benefits reduce company resources and are costly to extract, i.e. for each pound of private benefits enjoyed, the company's value decreases by more than one pound. This fits well for private benefits that are mainly pecuniary (e.g., Burkart et al. (1998); Bennedsen and Wolfenzon (2000)). A second strand models private benefits as existent *in addition to* monetary benefits. Their enjoyment is not using up company resources (e.g., Aghion and Bolton (1992); Zwiebel (1995)). This approach captures more the non-pecuniary elements of private benefits since no costly diversion strategy is required. For private companies the non-pecuniary benefits seem to be more important, since all owners typically have a significant stake and are therefore informed about the situation of the company. No owner would allow other owners to divert substantial resources for private benefit.

How do the private benefits of control affect company characteristics? In the following, some recent contributions incorporating private benefits will be discussed. The model by Anderson and Nyborg (2001) is probably most closely related to the empirical analysis in this chapter. It sheds light on how the choice of financing and growth of a company are related. The companies are characterised by a contracting inefficiency that allows insiders to divert cash flow for their private benefit, i.e. the model assumes pecuniary benefits of control. In the first stage, an entrepreneur can do R&D and start a company. In the second stage, the company can either be financed with outside equity or with debt. If debt financing is chosen, the entrepreneur may remain in the position even if an outside manager could do the job better. If equity is chosen, the entrepreneur risks being replaced by a more able outside manager. It can be seen that equity promotes higher second stage growth than debt, but this advantage must be traded off against the disadvantage of reduced incentives to do R&D in the first stage.

Cressy (1995) focuses on loss of control due to bank loans, leaving loss of control due to equity aside. It is assumed that the larger the bank loan is, the larger is the loss of control. Then, since the utility of entrepreneurs depends negatively on the size of the bank loans, companies will borrow less than is optimal. For some of the entrepreneurs

the loss aversion diminishes over time; they start to borrow more and their companies grow.

A strand of the literature that is less directly related to this chapter concerns models that analyse ownership structures after an original owner sells shares to obtain finance. Bebchuk (1999) looks at the choice between a concentrated and a dispersed ownership structure in the context of an IPO, when private benefits of control exist but are not necessarily costly to extract. He finds that larger private benefits tend to favour concentrated ownership, because by either keeping a controlling stake or by selling a controlling stake to one new owner, the original owner can enjoy the private benefits.

Bennedsen and Wolfenzon (2000) derive efficient ownership structures for the case where private benefits are costly to extract. The founder of the company can choose an ownership structure with several large shareholders. They find that for every possible constellation there is a one-share one-vote ownership structure that maximises efficiency. This is due to the alignment effect, from which it follows that the company value increases in the cash flow stake of the controlling coalition. They also derive a coalition formation effect which says that the coalition with the smallest cash flow stake wins, because it has the largest group of shareholders from whom to expropriate.

In sum, there are theoretical models that derive the implications of private benefits of control on company characteristics, but there is no model that brings out the hypotheses concerning the effect of private benefits on capital structure, equity issuance and company growth that are tested empirically in this chapter.

2.2.2 Previous Empirical Evidence

Survey evidence shows the reluctance of many owners to make use of private equity or venture capital, because they do not want to lose control over their company. In a survey of private companies in the UK, Poutziouris et al. (1998) find that 50% of the owners would not consider issuing external equity. They indicate that 'maintaining control / keeping the company in the family' is one of their main business goals. This attitude was also found in a survey of Swedish small and medium-sized companies (SMEs) in which many owners indicated that they would rather sell the whole company than take on additional owners (Cressy and Olofsson (1997)).

Indirect evidence for the existence of non-pecuniary benefits in private companies has been provided by Moskowitz and Vissing-Jørgensen (2002). They find for the

USA that equity holdings in private companies yield about the same return as equity holdings in public companies. However, the volatility of an index on private companies is, if anything, higher than the volatility of an index on public companies. Given that households are typically not well diversified in private equity, it is difficult to explain why households hold private equity at all if only the financial return is being considered. The authors suggest that non-pecuniary benefits of control might be one explanation.

So far, there is no direct evidence on the size of the private benefits of control for private companies. For public companies the importance of private benefits can be inferred from the price differential in take-over contests between voting shares and non-voting shares (e.g., Lease et al. (1983); Zingales (1994)). Another possibility is to gauge private benefits from block trades of shares by looking at the difference between the price of a share in the block and the price of a share on the stock exchange. Barclay and Holderness (1989), for example, find that equity blocks of at least 5% of common stock trade at an average premium of 20% for a sample of 63 US block trades between 1978 and 1982. This suggests that there are private benefits that only accrue to holders of large blocks.[2]

2.3 Measurement of Potential Loss of Control

It is crucial for the analysis to find a measure that describes how much influence the existing owners would lose in an equity expansion. Influence is measured by means of a probabilistic voting model; more specifically, the measure of influence is the probability of winning a vote for the largest owner in a yes-no decision that is taken with a simple majority. The measure for a decrease in influence is therefore the difference between the probability that the largest owner will win a vote given the current ownership structure and the probability that the largest owner will win a vote in a new ownership situation after a hypothetical equity increase. The difference between the two probabilities is termed 'potential loss of control'. For the calculation of the measure it is assumed that all owners vote independently of each other with equal probability for or against the largest owner. It is now possible to calculate the probability that the largest owner will win by considering all possible voting patterns. Cubbin and Leech (1983) used this probabilistic voting model to identify the influence of shareholders in UK public

[2]For more recent analyses of the private benefits of control see, for example, Nicodano and Sembenelli (2000) and Dyck and Zingales (2002).

companies.[3].

For the equity increase it is assumed that all but the largest owner increase their stake. Here the idea is that the largest owner is more likely than the others to be wealth constrained, because the largest owner has already a considerable investment in the company. First, an equity increase of 10% is considered, because this volume is the most prevalent in the sample. Second, an average loss of control measure is calculated that considers different volumes of equity increases with the relative frequency in which they occur in the sample.[4] The two measures, calculated under the assumption that each owner votes individually, are denoted by Ind_10 for the 10% increase and by Ind_avg for the average of different sizes of equity increases, respectively.[5]

A short example should help clarify the measure. Consider a company with three owners of which the largest owner holds 40% of the equity, the second largest 35%, and the smallest 25%. In a vote, the largest owner will always vote 'yes' and the other two owners vote independently of each other. There are four cases to consider. First, all three owners vote 'yes' and the largest owner wins the vote. Second and third, only one of the smaller owners votes 'yes' but the largest owner nevertheless wins the vote. Fourth, both smaller owners vote 'no' and the largest owner loses the vote. It follows that the largest owner has a 75% probability of winning a vote. The probability of winning can be calculated in the same fashion after a hypothetical change in ownership.

Because family ownership is very common for private companies, it is worth trying to incorporate family structures into the voting behaviour as a robustness check. It is possible that family members have the same opinion on company matters and therefore

[3]Cubbin and Leech (1983) developed a formula to calculate approximate probabilities in the case of many owners with this voting model. For this analysis, it is possible to calculate the exact probabilities, because the number of owners is smaller in private companies. Felsenthal and Machover (1998, p. 36; p. 171f.) discuss the interpretation of measures of voting power. The Banzhaf measure reflects voting power as the degree to which an owner's vote is able to influence the outcome of a decision; and the Shapley-Shubik measure reflects voting power as the expected payoff that an owner gets from a fixed prize that is allocated to the winning coalition. Leech (2002) finds that the Banzhaf measure reflects variations in the power of shareholders of British listed companies better than the Shapley-Shubik measure. The measure used here is a linear function of the Banzhaf measure. It was, among others, also used by Nickell et al. (1997)

[4]The relative weights are 0.71 for a 10% increase, 0.1 for a 30% increase, 0.07 for a 50% increase, 0.03 for a 70% increase and 0.09 for a 90% increase.

[5]As a robustness check the potential loss of control was calculated for the case that equity is increased by an additional owner who enters the company. The results were very similar.

vote most of the time together. However, it could also be that family quarrels lead to family members expressing opposing views. In order to model family voting behaviour, it is assumed that all owners with identical last names belong to one family and that members of one family vote as one bloc, i.e. all members of a family vote either 'yes' or 'no'. This is one of several possibilities to model family voting behaviour, but it has a specific advantage. It is possible that some owners transfer part of their ownership to their spouse for tax reasons. The decision on how to vote the shares remains, however, with the original owner, i.e. own and transferred shares are voted identically. The potential loss of control measure incorporating family structures takes this possibility into account. Again, a 10% equity increase (Fam_10) and a weighted average of different sizes of equity increases (Fam_avg) are considered.[6]

The measure of potential loss of control has specific strengths and weaknesses. An advantage of this measure is that it takes the whole distribution of ownership into account, i.e. it has different values depending on whether the remaining shares are dispersed or concentrated. For example, if the largest owner is the only one with a substantial stake and the other owners hold only a negligible investment, then the largest owner will have much more influence than when faced with only a few other owners, who also have a large number of shares.

This measure can best be viewed as a reflection of *a priori* voting power that abstracts from particular personalities and ignores affinities or disaffinities between voters. It is important to recognise that independent voting is part of the definition of the extent of control, not an assumption about how the world works.

A potential limitation of this measure is its focus on the effect of an equity expansion on the largest owner. This implicitly assumes that the largest owner is influential in decisions regarding the capital structure, equity issuance and growth. Although this need not be the case in every company, it can be regarded as a good first approximation.

Potentially, there are other measures that could be used as an approximation for loss of influence in a hypothetical equity increase. The ownership share of the largest owner is a possibility. However, for decisions taken by simple majority it does not matter whether the largest owner is marginally or significantly above 50%, a point that is not reflected by this measure. The use of the part of the largest owner's share that exceeds

[6]Restricted by the information available in the dataset, a company is defined to be in family ownership, if two or more owners have the same last name. This is the case for 44% of companies in the sample.

50% is also problematic. This could be seen as a measure for a buffer zone, reflecting how much ownership the largest owner could give up before losing influence. However, once the ownership falls below 50%, the distribution of shares among all other owners becomes of crucial importance for the amount of influence the largest owner would lose.

A measure of potential loss of control derived from hypothetical ownership changes is used in this analysis in order to mitigate the problem of endogeneity. This problem is encountered when looking at actual ownership changes. One could try to measure the loss of control afflicting the largest owner after an actual increase of equity. This could be related to company growth after the change. To the extent that companies with ownership changes grow faster than other companies with the same characteristics in the same industry, one would have a measure of the reward required for relinquishing control. However, since only companies with good growth opportunities would consider issuing new equity, a problem of reverse causality would be encountered. Of course, one could try to find instruments for the actual loss of control. It would, however, be extremely difficult to find a variable that is related to the decision of owners to give up control, but not to resulting company characteristics such as the capital structure or the company's growth. Furthermore, the use of actual ownership changes would not allow us to investigate how private benefits of control affect the leverage of a company, because, by an accounting identity, all increases in equity will lead to a reduction in leverage.

It can be argued that the potential loss of control measure does not solve the endogeneity problem completely. The measure is a function of the ownership structure, and if the ownership structure is endogenous, so will be potential loss of control. However, by analysing hypothetical and not actual ownership changes this problem is reduced. It would still be desirable to instrument potential loss of control, but no suitable instruments are available.

2.4 Institutional Details

2.4.1 Voting Rights

In order to determine the probability that the largest owner will win a vote, it is necessary to know the percentage of votes held by each owner. This task is complicated by the fact that private limited companies can have several classes of shares and voting

rights can vary according to share class. However, many companies have only one class and, in general, the smaller a company is, the fewer share classes it has.

For the calculation of voting rights, the most important distinction is between ordinary and preference shares. Ordinary shares confer voting rights and the right to obtain a dividend should one be declared. Preference shares, on the other hand, usually have no voting rights attached, and the owners are not directly involved in decisions concerning the company's affairs. To make up for this disadvantage, preference shares have the right to a fixed dividend. Owners of ordinary shares only obtain a dividend if the amount distributed is sufficient to satisfy the claims of the owners of preference shares. Preference shares are typically cumulative, which means that skipped dividends of previous years must be made up as soon as dividend payments are resumed. For example, an owner of a 7% preference share would have a right to a payment of 14% of the nominal value of the share should dividends have been skipped once. Preference shares often become voting shares should no dividend be paid over a specified number of years.

The dataset allows us to differentiate between ordinary and preference shares. For this analysis, ordinary shares are treated as voting shares and preference shares are treated as non-voting shares. In rare cases, the voting rights could be arranged differently.

One might think that the issuance of non-voting equity is a possible way to raise funding without losing control, because voting rights remain concentrated with the original owners. Although this mode of financing avoids costs related to loss of control, there are other disadvantages to be considered. It is difficult to find investors who are willing to invest money without having any influence on company strategy. If owners are willing to do it, then they will need to be compensated by higher expected dividend payments, which makes this form of financing expensive.[7] The empirical analysis will separately control for the potential loss of control and the use of preference capital.

2.4.2 Decision Making

Owners of private companies come together in annual general or extraordinary meetings to decide on company matters. Decisions are normally passed with a simple majority.

[7]The optimality of one-share one-vote was studied by Grossman and Hart (1988) and Harris and Raviv (1988) in the context of public companies faced by take-over threats.

However, the Companies Act lists a few decisions that require a 75% majority or indeed unanimity. In the Articles of Association, the owners can also agree to have stricter majority requirements for some decisions than are prescribed by the Companies Act.

Most decisions are taken by ordinary resolutions, which require a 50% majority. For example, they are used to increase share capital or to give authority to the directors to allot shares. Ordinary resolutions are used for all matters unless the Articles of Association or the Companies Act require another type of resolution. Extraordinary resolutions require a majority of 75%. These are necessary to modify the rights of classes of shareholders or for winding-up a company. Special resolutions, also requiring a 75% majority, are used for important matters such as alterations to the Memorandum or to the Articles of Association as well as for reductions of capital. There are also elective resolutions that must be passed by unanimous agreement. These resolutions are used to amend the duration of the authority of directors to allot securities or to dispense with the holding of annual general meetings.

Since ordinary resolutions are the most common type, this analysis will concentrate on them and will use a 50% majority requirement to determine the probability of winning for the largest owner. Furthermore, for a 75% majority requirement a different measure of control would be necessary. It is not sufficient to take into account that 75% of the votes are required to pass a decision. One also needs to consider that to preserve the status quo, only one vote above 25% is required.[8]

2.5 Data

The database FAME (Financial Analysis Made Easy), distributed by Bureau van Dijk, is used as the basis for the analysis. It includes all companies in the UK that satisfy *at least one* of the three following criteria: a turnover higher than £750,000, a pre-tax profit higher than £45,000, or shareholder funds greater than £750,000.

The detail of the information available in FAME depends on the publication requirements, since only publicly available information can be included. In the UK all companies with limited liability are required to deposit their accounts with Companies House, so that their trading partners and the general public can inquire. The specific publication requirements depend on the size of the company.

[8]The information on institutional details in this section are taken from the Companies Act 1985 and 1989 (Dey (1994)) and from the internet site of Companies House (www.companieshouse.gov.uk).

The database provides information on financial data from balance sheets and from profit and loss accounts for the years 1989 to 2001. However, information on owners and directors is only provided from the year 1997 onwards. This restricts the time period covered by the analysis to the years 1997 to 2001. Since the database contains only the current ownership structure and the current directors, it was necessary to extract information from older versions of the database to construct time-series for the variables relating to this information.

The dataset used for this analysis includes companies that went out of business between 1997 and 2001. Companies that changed their legal form from private with limited liability (Ltd) to public with limited liability (PLC) are, however, not covered. This is a limitation of the analysis, since companies that change the legal form have probably better than average growth opportunities.[9]

Only independent companies are included into the dataset, because a company that is 100% owned by another company has no direct owner who would care about control. Also, independent companies whose largest owner is a company or neither a company nor an individual (e.g. a trust or a fund) are excluded. These types of owners will not have an interest in control comparable to that of individuals. Companies from the financial sector, i.e. in financial intermediation and insurance, are also excluded since their capital structure will differ systematically from the capital structure of the rest of the companies. Furthermore, the 1^{st} and the 100^{th} percentile of financial ratios and growth rates have been deleted, because they contained implausibly large or small values. All reported results in this chapter relate to the trimmed sample.

Table 2.5 in the appendix provides, for easy reference, the structure of a private company's balance sheet. The definitions for all the variables used are listed in table 2.6 and 2.7, also in the appendix. Most variable names explain themselves, but some concepts should be emphasised. It is important to note that the term 'equity', as employed here, refers to the issued capital, i.e. to the nominal value of the shares. It does not include accumulated profits. Therefore, all observed equity increases are due to an issuance of additional shares.

'Preference ratio' is the ratio of preference capital to total equity capital. Preference

[9]It should be noted that merger and acquisition (M&A) activity is not important for the results. With the use of the Zephyr database, distributed by Bureau van Dijk, the companies engaging in M&A have been identified. The results are not affected when those companies are excluded from the analysis.

capital is equity capital that is not vested with voting rights. The 'capital expenditure ratio' is the ratio of capital expenditure and other investments to total assets. It is used as a proxy for growth opportunities in the analysis.

2.6 Empirical Analysis

2.6.1 Stylised Facts

This subsection provides a short overview of the main characteristics of the companies, their growth and their financing patterns. It also presents additional information on the potential loss of control measure.

Table 2.8 in the appendix presents full descriptive statistics of the companies that are included in the sample. One can see that the companies are relatively small; the median number of employees being 53, whereas the mean is 130.

In contrast to public companies, private companies are generally characterised by a limited number of owners. The average company in the sample has 2.7 owners and companies with more than ten owners are exceptional. The full distribution of the number of owners is given in figure 2.1 in the appendix.

Figure 2.2 in the appendix displays the relationship between the average share of the largest owner and the age of the company. In fact, the share first increases and then decreases. The increase, in the beginning, can be caused by some owners buying out others while the company is still relatively young and is maybe in some difficulties. For companies over 30 years old, the share of the largest owner decreases, presumably due to expansion and ownership splits after the death of previous owners.

The distribution of the share of the largest owner has two mass points. There is only one owner with 100% ownership in about 27% of the companies, and in about 18% of the companies the largest owner has exactly 50% of all shares.

The development of leverage as the companies get older gives insight into the dynamics of the capital structure. This information is presented in figure 2.3 in the appendix. Companies in the lowest age category, from one to nine years, have the highest leverage of about 70%. This number decreases continually till the companies reach the age range of 50 – 59 years and then stabilises at around 40% – 45%. This pattern shows the importance of internal finance in the growth process of companies. As companies get older, they can rely more heavily on retained profits as a source of financing, and

consequently leverage decreases. It can also be interpreted as an aversion to bank finance. Companies need bank finance to start, but they try to reduce their exposure over time.

In order to judge the implications of a possible negative effect of potential loss of control on equity increases, it is necessary to know if fast growing companies use equity more extensively as a means of finance compared to slow growing companies. Table 2.1 gives mean and median growth rates for total assets and financing choices. Internal financing refers to the sum of the profit and loss account (retained earnings), revaluation reserves and other reserves. In the sample period 1997 to 2001, companies use all three types of financing – namely increases in equity, increases in liabilities and increases in internal financing. Companies that grow faster than the median company with respect to total assets also increase their equity more, but the median equity increase is still zero. This shows that faster growing companies make more use of equity financing.

Figures 2.4 and 2.5 in the appendix allow a better understanding of the potential loss of control measures by plotting them with respect to the share of the largest owner. It can be seen that potential loss of control is especially high for medium-sized ownership shares. If the largest owner holds a share that is sufficiently above 50%, then potential loss of control is equal to zero, because the owner has full control before and after the hypothetical equity increase.

In many instances of the hypothetical ownership change the largest owner does not lose any control. If all but the largest owner increase their stake by 10% (Ind_10), then the largest owner will not lose any control in 63% of cases. The respective value for

Table 2.1: Financing Choices

	All Companies		Only Fast Growing Companies	
	Mean	Median	Mean	Median
Growth in total assets	6.4%	4.1%	19.1%	13.9%
Growth in equity	0.07%	0%	0.24%	0%
Growth in liabilities	6.1%	2.1%	23.0%	16.5%
Growth in internal financing	9.9%	7.2%	17.4%	12.3%

Note: Number of observations is 13,125. The subgroup 'only fast growing companies' contains only companies that grow faster than the median company with respect to total assets. This table is based on fewer observations than the regressions, since growth rates for all types of financing need to be observed. Annual growth rates are reported.

the measure considering an average of different volumes of equity increases (Ind_avg) is 37%.

2.6.2 Effect on Growth in Equity

This subsection presents the test of hypothesis *H1a* by relating the potential loss of control to the size of the equity increase. A negative relationship is expected, because owners who lose more control for a given equity increase find equity increases more costly. In the sample, the equity growth rate is zero for the vast majority of observations. Only 3.8% of observations have a positive growth rate, and 4.4% of observations have a negative growth rate. From a theoretical point of view there is no prediction on the relationship between potential loss of control and equity decreases. Therefore only companies with a zero or positive growth rate in equity have been chosen for this analysis. In order to get unbiased results, a tobit model with robust standard errors is used.

The dataset covers the time period 1997 to 2001, but on average a company is observed for less than three years. Some companies went into or out of business during the sample period and, over time, more companies have been covered in the ownership section of the database. Because the information on the time-series dimension is very limited, the tobit regression is done as a pooled time-series cross-section analysis. The standard errors are corrected to allow for heteroscedasticity and auto-correlation of the observations pertaining to one company. Since there is persistence in the characteristics of companies, it is likely that the error terms from observations relating to one company are correlated.

As can be seen from table 2.2, there is a clear indication that potential loss of control has a negative effect on the size of equity increases, which is consistent with hypothesis *H1a*. This table shows full regression results for the two potential loss of control measures Ind_10 and Ind_avg. The results for the measures that take the family structure into account (Fam_10 and Fam_avg) are very similar and therefore only presented in abbreviated form. Potential loss of control has a negative coefficient that is significant to at least the 5% level for the assumption of individualistic voting. For the assumption of family voting the coefficient is negative but not significant. The effect is also of high magnitude. As calculated for regression (a), the marginal effect for the unconditional expected value of equity growth (zero or positive growth rate) is

Table 2.2: Effect on Growth in Equity

Dep. Variable: Non-negative Growth Rate Equity (in %)		
	(a)	(b)
Potential loss of control	-20.48***	-19.93**
	(8.01)	(8.36)
Share largest owner	-9.17**	-9.40**
	(4.04)	(4.09)
Dummy largest owner manager	-11.14***	-11.32***
	(2.14)	(2.14)
Leverage	27.28***	27.14***
	(4.67)	(4.67)
Preference ratio	16.89**	16.99**
	(8.32)	(8.32)
First lag ROA	-15.07	-15.21
	(12.06)	(12.06)
Ln employees	3.99***	4.02***
	(0.764)	(0.764)
Ln age	-8.28***	-8.23***
	(1.53)	(1.53)
Equity	1.27	1.27
	(0.781)	(0.784)
Number of observations (companies)	25,360 (8,859)	25,360 (8,859)
Wald test, $\chi^2(58)$	493.0***	490.8***

Abbreviated further regression results:	(c)	(d)
Potential loss of control	-10.17	-5.50
	(8.67)	(8.60)

Note: ***,**,*=significant on the 1, 5 and 10 percent level. Tobit estimation considering non-negative growth rates of equity. 980 observations are uncensored (larger than zero), 24,380 observations are censored (equal to zero). The regressions differ according to the potential loss of control measure used. The regressions shown in full refer to individualistic voting; regression (a) employs Ind_10 and regression (b) Ind_avg. The abbreviated results refer to family voting; (c) employs Fam_10 and (d) Fam_avg. The regressors are expressed as ratios. Robust standard errors allowing for heteroscedasticity and autocorrelation are in parentheses. The regressions contain industry and year dummies as well as their interaction terms.

-0.64. Using this marginal effect, an increase of potential loss of control of one standard deviation leads *ceteris paribus* to a decrease in equity growth of 0.1 percentage points. This effect is larger if only companies with equity increases are considered. The marginal effect conditional on being uncensored (positive growth rate) is -2.52. This translates into a decrease of the equity growth rate of 0.4 percentage points for a one standard deviation increase of potential loss of control *ceteris paribus*.[10]

To identify the influence of the private benefits of control, it is necessary to control for other characteristics of the ownership structure that could have an influence on the dependent variable. As further control, the ownership share of the largest owner is included. Since the appropriate functional form was unknown, this variable was first included as a polynomial of order four. The highest power was then dropped, if it wasn't significant to at least the 10% level. Ultimately, only the linear term was kept.

In around three quarters of the companies, the largest owner is also a manager. In this case, the ownership share of the largest owner proxies for the incentive to exert effort in managing the company. If the largest owner is not a manager, then the ownership share proxies for the intensity of monitoring. Larger owners have a better incentive to monitor, because they reap a higher proportion of the gains from monitoring. Their decisions are less affected by the possibility of free riding. In an exploratory specification, the ownership share was interacted with the dummy for the largest owner being a manager. Since the difference of the two effects was not significant, results are shown without the interaction term.

From the negative coefficient of share of the largest owner, it can be concluded that better incentives to exert effort or better incentives to monitor lead to smaller equity increases. It could be that empire building, i.e. growing the company above a level that maximises value, can be prevented.

A dummy that equals one if the largest owner is at the same time manager is also included. The significant negative coefficient shows that equity increases are smaller, if the largest owner is at the same time manager. This could also be an indication that empire building is prevented.

Two controls for the company's capital structure are included: leverage and the preference ratio (ratio of preference capital to total equity capital). The regression shows that companies with higher leverage rely more on equity financing. The positive

[10]Conditional on positive equity growth, the mean growth rate is 20.2% and the median is 4.8%.

effect of leverage is consistent with the pecking order theory (Myers and Majluf (1984)). Companies will use debt financing until their debt capacity is reached, only then will they issue new shares. The proceeds of an equity increase can be either used to finance future growth or to reduce leverage. Pagano et al. (1998), for example, find that Italian companies used the proceeds of an initial public offering mainly to reduce leverage.

The preference ratio shows the extent of the use of preference capital. The use of preference capital gives an indication of the control aversion of owners since it allows the raising of equity without losing control. It is also an expensive form of financing since the shareholders need to be compensated for their lack of influence on company strategy through higher dividends. The positive influence of this variable on equity increases is difficult to interpret, because it is not possible to observe whether the equity increase relates to ordinary or preference stock. However, most equity increases will concern ordinary stock, since only 4.4% of the companies in the sample use preference capital.[11] The positive influence can therefore indicate that companies with a high preference ratio have exhausted their ability to issue non-voting stock and are forced to issue ordinary stock.

Past profitability has no effect on equity increases. This could be because past profitability has two conflicting effects on equity growth. First, companies that were successful in the past will have accumulated retained earnings and don't need to rely on equity finance. Second, if success if persistent, then profitable companies have more growth opportunities and require more capital to expand. Neither of the effects is dominant in the regression.

The regression also includes two controls for company size. Size measured as the natural logarithm of the number of employees has a significant positive effect on equity increases. The absolute amount of equity is also related to size. It is included to control for any level effects. This variable is not significant in the current specification, but it has a significant positive effect once the natural logarithm of the number of employees is excluded. Older companies have smaller equity increases. One reason could be that retained earnings are sufficient for the investment needs.

As a robustness check, the effect of potential loss of control on the *probability* of an equity increase was tested with a probit regression (not reported). The dependent variable is equal to one for equity increases and equal to zero for no changes in equity.

[11]The preference ratio, i.e. the ratio of preference capital to total equity capital, is quite high for companies that use preference capital. Its mean is 40.7% whereas its median is 35.7%.

Potential loss of control has a significant negative influence on the probability that an equity increase is observed. Also, the coefficients of the other regressors keep their sign and significance level. As in the tobit regression, observations with negative equity growth rates have been disregarded.

To summarise, the results of this subsection show strong evidence for the negative influence of potential loss of control on the size of equity increases. Overall, the results are consistent with hypothesis *H1a*.

2.6.3 Effect on Leverage

Table 2.3 presents the results for the leverage equation. Consistent with hypothesis *H1b*, potential loss of control has a positive influence on leverage. Owners who want to stay in control prefer to use debt more extensively than owners who are not confronted with a potential loss of control. In order to stay in control, they may accept paying a higher interest rate to obtain further loans. The results are significant to the 1% level for all potential loss of control measures. The economic significance of this effect is also not negligible. For regression (a) it has been calculated that a one standard deviation increase of potential loss of control increases leverage *ceteris paribus* by 0.96 percentage points.

This specification contains more observations than the previous one explaining equity growth. Here all companies are included, whereas the equity growth specification excluded companies for the years in which they had negative equity growth.

The share of the largest owner has a positive influence on leverage.[12] The size of the ownership share can be used to signal company quality to banks. The owner is only willing to invest a large amount of private wealth, when convinced of the quality of the company. Banks may give more loans to companies that have at least one large owner. This reasoning relates to the work of Leland and Pyle (1977) who made a similar argument about the ownership share of managers. The positive effect of the largest owner being at the same time manager can have a similar interpretation. The additional commitment of the largest owner increases the debt capacity of the company.

[12]This specification was also first estimated with the ownership share of the largest owner included up to its fourth power. The third power was significant, but since the cubic form showed a positive relationship over the relevant range, the specification with only the linear term is shown. This makes the results better comparable across the three subsections. The results of the other regressors were not affected.

Table 2.3: Effect on Leverage

Dep. Variable: Leverage (in %)		
	(a)	(b)
Potential loss of control	6.81***	6.63***
	(1.48)	(1.57)
Share largest owner	4.32***	4.39***
	(0.885)	(0.904)
Dummy largest owner manager	3.66***	3.72***
	(0.455)	(0.455)
Preference ratio	5.95***	5.90***
	(1.71)	(1.71)
Capital expenditure ratio	-6.19**	-6.21**
	(2.92)	(2.92)
First lag ROA	-64.7***	-64.6***
	(2.29)	(2.29)
Ln employees	2.80***	2.79***
	(0.177)	(0.177)
Ln age	-11.04***	-11.07***
	(0.307)	(0.306)
Number of observations (companies)	26,522 (8,964)	26,522 (8,964)
R squared	0.23	0.23

Abbreviated further regression results:	(c)	(d)
Potential loss of control	11.12***	9.66***
	(1.73)	(1.78)

Note: ***,**,*=significant on the 1, 5 and 10 per cent level. OLS estimation. The regressions differ according to the potential loss of control measure used. The regressions shown in full refer to individualistic voting; regression (a) employs Ind_10 and regression (b) Ind_avg. The abbreviated results refer to family voting; (c) employs Fam_10 and (d) Fam_avg. The regressors are expressed as ratios. Robust standard errors allowing for heteroscedasticity and autocorrelation are in parentheses. The regressions contain industry and year dummies as well as their interaction terms.

The regression also includes a control for the use of preference capital. The results show that a higher preference ratio is related to higher leverage. This is consistent with the view that more excessive use of debt finance is a means for the original owners to keep control.

In regressions explaining leverage, it is common to control for growth opportunities. It is, however, difficult to find a good measure of growth opportunities for private companies. For public companies, the market to book value is commonly used. However, it is not available for private companies, since there is no observable market value. R&D expenditure is a further frequent choice, but it is not available in the dataset. For this analysis the capital expenditure ratio (ratio of capital expenditure to total assets) is chosen. Companies with good growth opportunities will in general invest more in machinery and equipment than other companies. The coefficient of this variable shows that companies with more growth opportunities, i.e. a higher ratio, have lower leverage. This result is consistent with the theory on underinvestment as described by Myers (1977) which concludes that companies with many growth opportunities should use less leverage.

The control for past profitability shows that profits are partly used to reduce leverage. This observation is consistent with an aversion to losing control to banks.[13]

The positive influence of size on leverage can be attributed to a more stable cash flow stream and therefore a higher debt capacity for larger companies. Age has a negative effect on leverage because retained profits become more important over time, increasing shareholders funds and reducing leverage. This was already shown in figure 2.3 in the appendix.

2.6.4 Effect on Company Growth

The third specification is concerned with the explanation of company growth. In general, company growth is volatile, fluctuating from one year to the next depending on the market conditions the company is confronted with. This makes it more difficult to identify the influences on company growth. In order to reduce the noise in the dependent variable, a growth rate that is averaged over a time period of four years (1998-2001)

[13]There can also be an effect of reverse causality. If companies with high leverage need to pay higher interest rates, then profitability can be reduced. The results for the other regressors remain the same, when the first lag of return on assets is excluded.

is chosen. The regressors refer to the beginning of the period (1998).[14] Consequently, ordinary least squares with standard errors that are robust to heteroscedasticity is an appropriate method to apply to the cross-section of observations.

Table 2.4 presents results on the testing of hypothesis *H2*.[15] It can be seen that companies whose owners would lose more control in an expansion indeed grow more slowly. This is consistent with the hypothesis that owners who want to stay in control are willing to give up growth opportunities. The effect is negative and significant to at least the 5% level for all potential loss of control measures. The size of the effect, calculated for regression (a), is substantial. A one standard deviation increase in potential loss of control leads *ceteris paribus* to a 0.44 percentage points decrease in annual growth.

The share of the largest owner has a negative effect on company growth. As in the previous specifications, this variable was first included as a polynomial of order four. However, only the linear term showed ultimately a significant effect. The negative effect of the share of the largest owner is consistent with the argument that better incentives to exert effort or better incentives to monitor can prevent empire building. The dummy variable indicating whether the largest owner is a manager has no significant influence on company growth.

Leverage has a significant negative effect on growth, which is consistent with the pecking order theory (Myers and Majluf (1984)). A company with financial slack will take all profitable growth opportunities, but if only risky debt can be used, some growth opportunities will be passed up.[16] A negative relationship between leverage and growth is also found by Lang et al. (1996) for public companies. When splitting the sample into companies with high and low growth opportunities, however, they find the

[14]The results are qualitatively identical when the time period 1997-2000 is considered.

[15]The company growth regression covers fewer companies than the previous ones because not all companies are observed over this period. An estimation with a Heckman correction for attrition bias has therefore been employed. But since the error terms of the selection and the main equation have not been correlated, the results using the standard OLS technique are shown.

[16]It can be argued that leverage is endogenous in this regression. Companies in difficulties will have small growth rates and low profitability. Leverage can build up, if interest and capital cannot be serviced any more. This leads to an effect from small growth rates to high leverage. In this situation it would be appropriate to instrument leverage, but no good instruments are available. Therefore a specification without leverage was tested. The signs and significance levels of the other regressors remain the same.

Table 2.4: Effect on Company Growth

Dep. Variable: Average Annual Growth of Total Assets, 1998–2001 (in %)		
	(a)	(b)
Potential loss of control	-3.14**	-3.44**
	(1.34)	(1.45)
Share largest owner	-2.13***	-2.30***
	(0.793)	(0.826)
Dummy largest owner manager	-0.472	-0.493
	(0.491)	(0.490)
Leverage	-2.65***	-2.65***
	(0.926)	(0.926)
Preference ratio	-3.51**	-3.53**
	(1.75)	(1.75)
First lag ROA	21.94***	21.92***
	(2.56)	(2.56)
Ln employees	0.024	0.026
	(0.150)	(0.150)
Ln age	-0.862***	-0.851***
	(0.268)	(0.268)
Number of observations (companies)	4,377 (4,377)	4,377 (4,377)
R squared	0.05	0.05

Abbreviated further regression results:	(c)	(d)
Potential loss of control	-6.12***	-5.69***
	(1.76)	(1.80)

Note: ***,**,*=significant on the 1, 5 and 10 per cent level. OLS estimation. The regressions differ according to the potential loss of control measure used. The regressions shown in full refer to individualistic voting; regression (a) employs Ind_10 and regression (b) Ind_avg. The abbreviated results refer to family voting; (c) employs Fam_10 and (d) Fam_avg. The regressors are expressed as ratios and refer to the year 1998. Robust standard errors allowing for heteroscedasticity are in parentheses. The regressions contain industry dummies.

negative relationship only confirmed for companies with low growth opportunities.

This regression also includes a control for the use of preference capital. More extensive use of preference capital is related to slower growth. A high preference ratio is a sign that it is getting more difficult to issue additional preference capital. The alternative of issuing common (voting) stock is not attractive for owners who want to stay in control.

Controlling for past profitability shows that companies that were profitable in the past are likely to grow more in the future; a persistence of company success can be seen.

In addition, the size and age of companies have been controlled for. The regressions show no relationship between the size of a company and its subsequent growth. The age of a company, however, has a negative effect.

2.7 Conclusions

This chapter studies the influence of private benefits of control on the issuance of new equity, leverage and company growth. It is hypothesised that companies in which existing owners would lose more influence in an expansion have smaller equity increases, use more debt and grow more slowly. Evidence supporting the predicted effects on the size of equity increases, leverage and company growth is found. The effect of loss of control on company growth is especially important in economic terms.

Overall, these findings are consistent with the view that there are demand side constraints of finance. These results also agree with previous survey evidence that highlighted the importance that owners attach to control (Cressy and Olofsson (1997); Poutziouris et al. (1998)). This chapter takes the analysis a step further by showing that the owner's fear of losing control can affect company characteristics such as capital structure and growth.

These results have important implications for economic policy. The main implication is that it is important to differentiate between the demand and supply side constraints of finance. The UK government, for example, has started the 'Enterprise Investment Scheme' (EIS) in order to help small companies raise equity capital. This was in response to evidence that showed an equity gap for companies who want to raise moderate amounts of equity between £100,000 and £500,000. The scheme gives various tax advantages for individuals investing in a company with which they were previously unconnected (Bank of England, 2001). However, it seems that few companies are af-

fected by supply side constraints of finance. Only 1.7% of the companies mentioned 'access to finance' as their main problem in the NatWest/SBRT Quarterly Survey of Small Business in Britain (NatWest/SBRT, 2002). The caution that emanates from this chapter is that when observing companies that have growth opportunities but do not grow, one needs to be careful to consider both demand and supply side constraints. One should not immediately conclude that there is a market failure in the provision of equity capital. It is especially important to consider demand side constraints of finance when designing government programmes to support small and medium-sized companies.

The negative effect of loss of control on company growth has possible implications for the aggregate growth of economies. The fact that owners value control implies that their companies do not exploit all growth opportunities and therefore do not create as much employment and value added as they could. This can have an effect on aggregate growth, if some growth opportunities are idiosyncratic to a certain company, for example, if specific knowledge is required or if synergies with existing activities are necessary. Under such circumstances, it may not be possible for other companies to exploit the growth opportunities.

2.8 Appendix

Table 2.5: Balance Sheet of a Private Company

Assets	**Liabilities**
Fixed assets	Current liabilities
Current assets	Long-term liabilities
	Shareholders funds
	• Issued capital
	• Total reserves
	○ Share premium account
	○ Profit and loss account
	○ Revaluation reserves
	○ Other reserves
Total assets	Total liabilities

Shareholders funds represent the book value of assets that belong to the shareholders. This position can be divided into the issued capital, which corresponds to the nominal value of the shares, and the total reserves. The components of the total reserves are: the share premium account (premium that was paid in excess of the nominal value of the shares at the issuance date), the profit and loss account (the accumulation of retained profits), the revaluation reserves (the upward or downward revaluation of assets), and other reserves.

The term 'equity' in this chapter refers to the issued capital.

Table 2.6: Definition of Variables I

Variable	**Definition**
Equity (Issued capital)	Nominal value of issued shares
Share largest owner	Ownership share largest owner
Dummy largest owner manager	Dummy equal to 1 if the largest owner is manager, 0 otherwise
Leverage	Ratio of the sum of current and long-term liabilities to total assets
Preference ratio	Ratio of preference capital to total equity capital
Capital expenditure ratio	Ratio of capital expenditure and other investments to total assets
ROA	Ratio of profit before taxes to total assets
Ln employees	Natural logarithm of the number of employees
Ln age	Natural logarithm of the age of the company in years
Industry dummies	One digit level of the UK SIC code
Time dummies	Year of the observation

Table 2.7: Definition of Variables II

Variable	Definition
Several potential loss of control measures, variable names listed below	Potential loss of control incurred by the largest owner due to a hypothetical equity increase. All owners but the largest increase their stake. Overall, four measures are employed: First, it is assumed that each owner votes individually. Two measures of potential loss of control are calculated, differing in the size of the equity increase.
Ind_10	Equity is increased by 10%.
Ind_avg	Different volumes of equity increases are considered with the relative weight that they have in the sample. The relative weights are 0.71 for a 10% increase, 0.1 for a 30% increase, 0.07 for a 50% increase, 0.03 for a 70% increase and 0.09 for a 90% increase. Second, as a robustness check, the family structure of the owners is taken into account. It is assumed that members of the same family vote as a single block.
Fam_10	Equity is increased by 10%.
Fam_avg	Different volumes of equity increases are considered with the relative weights as in Ind_avg.

Table 2.8: Descriptive Statistics

Variable	Mean	Median	Stdev.	Min	Max
Number of employees	130	53	573	1	34,763
Age (in years)	27	21	20	1	145
Total assets (in m. £)	8.5	3.2	47.9	0.015	4,368
Equity (Issued capital) (in m. £)	0.246	0.025	1.52	0.000001	77.8
Growth equity (in %)	0.30	0	7.89	-35	150
Avg. annual growth of total assets 1998-2001 (in %)	5.89	4.54	13.4	-44.8	87.6
Leverage (in %)	56.6	58.5	23.5	0	119.0
Preference ratio (in %)	1.78	0	10.3	0	90.0
Capital expenditure ratio (in %)	2.54	0.70	5.10	-18.7	28.6
ROA (in %)	6.31	5.08	9.07	-25.2	49.6
Number of owners	2.74	2	2.02	1	26
Share largest owner (in %)	64.8	54.0	26.2	8.3	100
Dummy largest owner manager	0.75	1	0.43	0	1
Potential loss of control					
Ind_10	0.087	0	0.14	0	0.5
Ind_avg	0.11	0.054	0.13	0	0.5
Fam_10	0.046	0	0.11	0	0.5
Fam_avg	0.066	0	0.11	0	0.5

Note: Number of observations is 27,800-28,366.

Figure 2.1: Distribution of the Number of Owners

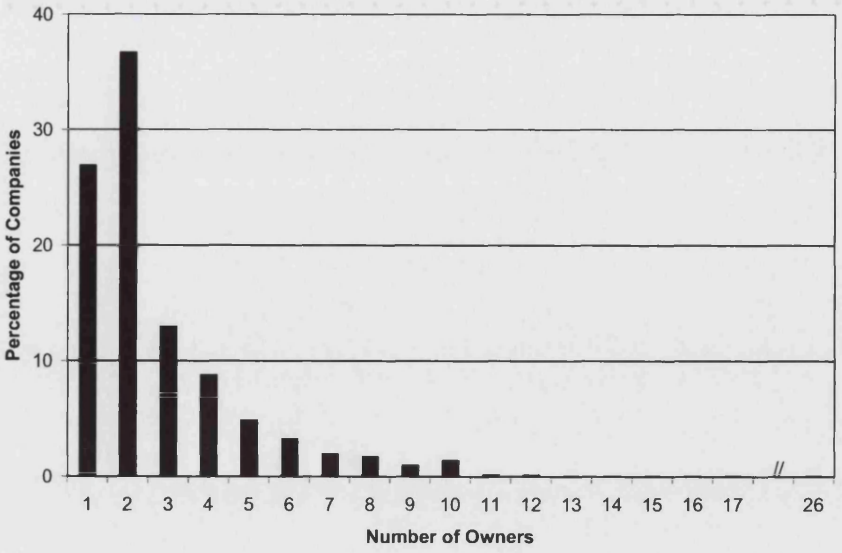


Figure 2.2: Average Share Largest Owner by Age of Company

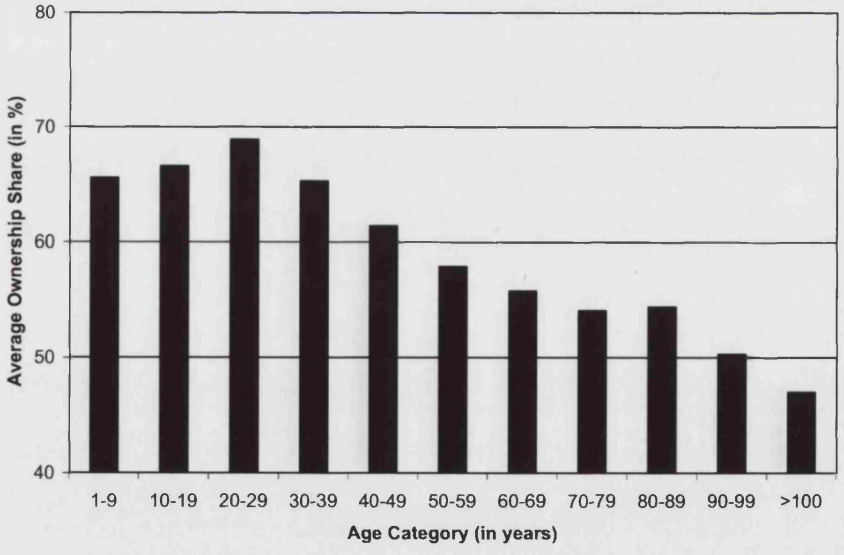


Figure 2.3: Average Leverage by Age of Company

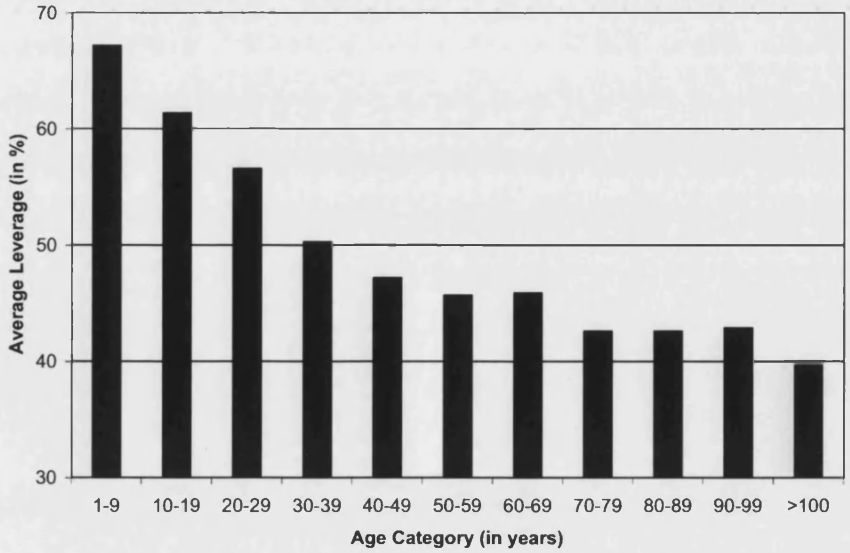


Figure 2.4: Potential Loss of Control (Ind_10) vs. Share Largest Owner

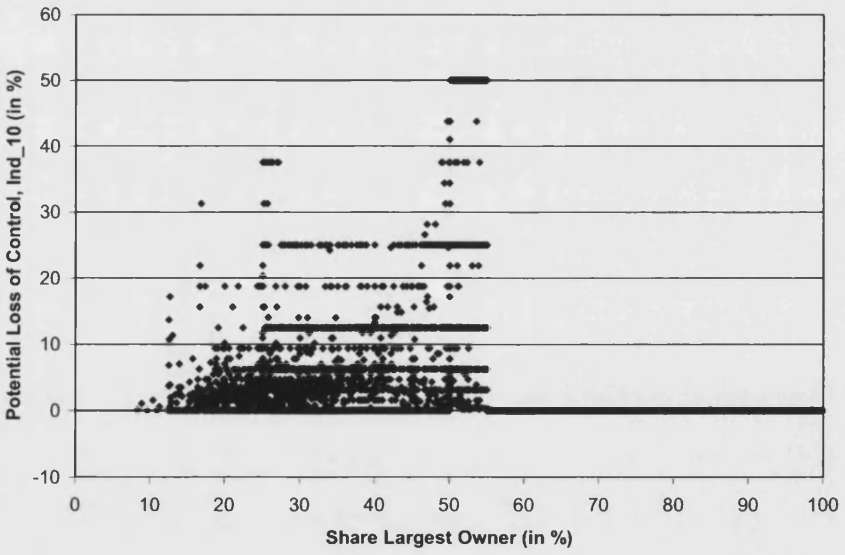
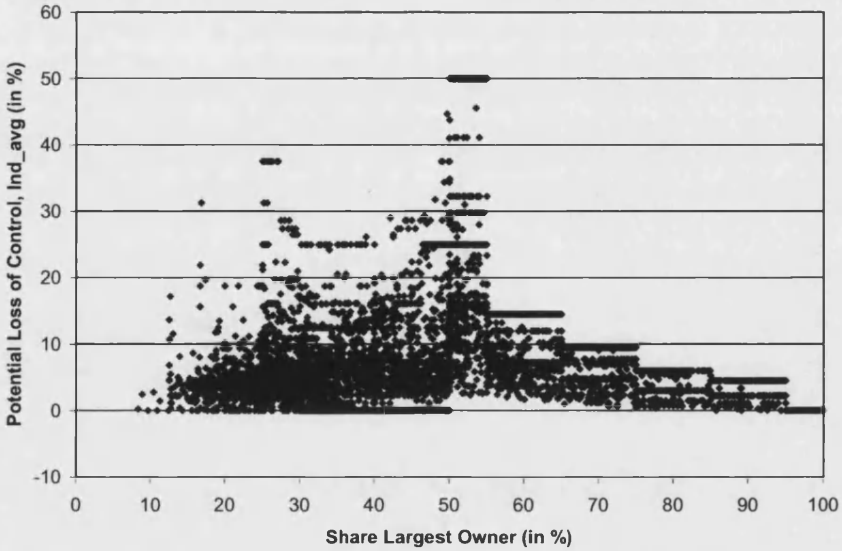


Figure 2.5: Potential Loss of Control (Ind_avg) vs. Share Largest Owner



Chapter 3

Underdiversification, Required Returns and Incentive Effects

3.1 Introduction

Private companies rely for their financing mostly on the equity investment of a limited number of owners and on bank loans (Berger and Udell (1998)). Problems of asymmetric information influence the financing, because the effort of the entrepreneur and the riskiness of projects are difficult to observe for outsiders. It follows that banks need to cope with moral hazard and adverse selection, which can lead to credit rationing (Stiglitz and Weiss (1981)). This situation is aggravated by a lack of collateral in many companies, which could be pledged to make the lending less risky. Because of the problems of asymmetric information it follows that entrepreneurs need to invest their own wealth and that non-managing owners need to invest an amount high enough to justify the monitoring costs. The required investment volume is often large in relationship to the net worth of the owners – owners are therefore often highly underdiversified. Underdiversification means that a high share of the personal wealth is invested in one company.

Moskowitz and Vissing-Jørgensen (2002) document that average returns to private equity are not higher than average returns to public equity, even though owners of private companies are often highly underdiversified. This is puzzling, since theoretical models show that underdiversification increases the cost of equity capital substantially (see Kerins et al. (2004) and Heaton and Lucas (2000*a*)). We would therefore expect that owners require a compensation for their exposure to idiosyncratic risk reflected

in higher returns to private equity. So far, it remains unclear whether owners of private companies do not require compensation for their exposure to idiosyncratic risk or whether other reasons are responsible for the relatively low returns to private equity. Or, to pose the problem differently, it is not known whether idiosyncratic risk is priced in private companies. The answer to this question has important implications for the investment decisions at private companies. If idiosyncratic risk is priced, then the selection of projects depends on the underdiversification of the owner, since the underdiversification influences the return required to make a project profitable.

We test empirically whether there is an underdiversification effect, i.e. whether underdiversification is related to higher company profitability. We investigate two ways in which owners can respond to underdiversification. First, owners can require higher returns. They can select the projects in which they invest such that the expected returns are sufficient to provide compensation for the exposure to idiosyncratic risk. Second, if owners are at the same time managers, they can work harder to ensure the success of their company. The more underdiversified they are, the more their financial well-being depends on the profitability of the company.

Two data sources from the USA are used for the analysis: the Survey of Consumer Finances (SCF, wave 1989 to wave 2001) and the Survey of Small Business Finances (SSBF, wave 1998). Both surveys were conducted by the Board of Governors of the Federal Reserve System, Washington, DC. They are well-suited for this analysis, because they provide information on private companies *and* on the wealth of their owners.[1] The SCF data has the further advantage of differentiating between owners with and without an active management interest. This allows the separate identification of the two channels of the underdiversification effect. Owners who are not at the same time managers do not influence company profitability through managerial activity. If there is a positive relationship between underdiversification and profitability it must be due to higher required returns. In contrast, for owner-managers any positive effect could also be driven by higher effort. The SCF provides information on weekly hours worked for owner-managers, which can be used as a proxy for effort. It is therefore possible directly to test the second channel of the underdiversification effect, namely whether underdiversification increases effort.

[1]These surveys have been widely used in the literature, e.g. to examine lending relationships (Petersen and Rajan (1994); Cole (1998)), agency costs (Ang et al. (2000); Bitler et al. (2004)), and returns to private equity (Moskowitz and Vissing-Jørgensen (2002)).

Empirically, we measure underdiversification as the value of the equity investment in the private company divided by the net worth of the owner. It is important to note that there is no benchmark of zero underdiversification. Every individual is exposed to some idiosyncratic risk. For example, employees typically depend on the success of one company for most of their labour income. Also, even if investments in the stock market are divided between many companies, most investors do not achieve the theoretical ideal of full diversification of idiosyncratic risk. We approach underdiversification from a relative and not from an absolute perspective. The empirical measure allows a comparison of underdiversification between owners; it determines which owner has a higher degree of underdiversification.

In our econometric analysis we find that underdiversification has a positive, significant effect on the profitability of companies, which can be either due to higher required returns or to higher effort. This effect is smaller for richer owners, which is consistent with decreasing relative risk aversion. For a sub-sample of owners who do not have an active management interest, we also find a positive relationship between underdiversification and profitability. This supports the view that underdiversified owners require higher expected returns, since higher effort can be excluded as a cause. For owners who are at the same time managers we establish a positive relationship between underdiversification and effort, measured as self-reported weekly hours worked. Owner-managers who are financially more dependent on the success of their companies have a higher incentive to work hard.

The plan of the chapter is as follows: Section 3.2 provides an overview of the related literature; Section 3.3 gives more detail on the data sets and defines the variables used in the analysis; Section 3.4 develops the hypotheses; Section 3.5 presents the results, and Section 3.6 concludes.

3.2 Related Literature

The prevalence of underdiversification 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. In addition to the concentration with respect to the asset class, there is a concentration with respect to the selected investments. 85% of the total investment in private equity is, on average, invested in one actively managed company. Owners are therefore exposed to the idiosyncratic risk

of the company. The main interest of the authors is the returns to private equity. With the SCF data they calculate value-weighted returns for the intervals between two waves that take the appreciation of the market value of equity and the retention of earnings into account. The returns are calculated under several differing assumptions and figures that range from 12.8% to 19.0% on average over the three intervals covered are obtained. The authors draw attention to the puzzle that the average return on private equity is not higher than the average return on public equity, even though the owners are underdiversified. On average there seems to be no compensation for idiosyncratic risk.

Moskowitz and Vissing-Jørgensen (2002) analyse average values, i.e. their study is at an aggregate level. It has therefore to remain as open question whether underdiversified owners do not receive a compensation for their exposure to idiosyncratic risk or whether the low returns have a different explanation, for example the existence of non-pecuniary benefits or overoptimism by the owners. With an analysis at the company level, we directly test in this chapter whether underdiversification and profitability are related.

For public equity, the Capital Asset Pricing Model (CAPM) predicts that idiosyncratic risk is not priced, since investors have the opportunity to diversify. There is only a compensation for the systemic risk component of the stock. In contrast, investors in private equity cannot diversify. Theoretical models show that underdiversification increases the cost of equity capital for private companies. Kerins et al. (2004) use the CAPM to derive the cost of capital for an underdiversified entrepreneur. In their model, the entrepreneur can choose between an investment in the own company and the market. The relative weights of the two assets determine the total risk of the portfolio. This total risk can be duplicated by leveraging an investment in the market. From the levered market investment it is possible to calculate the returns that can be achieved in the market. These returns are the opportunity cost of capital for the underdiversified portfolio. The authors use data on recent high-technology IPOs to calculate the opportunity cost of capital. Information on the betas and on the variance of returns of these companies is used. There is no information on actual underdiversification needed for this analysis – the authors calculate the cost of equity capital for different assumed levels of underdiversification. This method shows that underdiversification considerably increases the cost of equity capital. This is also the conclusion reached by the model of Heaton and Lucas (2000*a*). The theoretical models are complementary to the analysis of this chapter. The models establish that there are costs due to underdiver-

sification, but they cannot test whether owners actually demand a compensation for their exposure to idiosyncratic risk.

So far, data on underdiversification has been rarely used in the literature. Heaney and Holmen (2004) are an exception. They measure underdiversification due to concentrated investments in public companies for a sample comprised of the richest Swedes. The authors use the cost of underdiversification as a proxy for the value that controlling shareholders attach to their control.

Himmelberg et al. (2002) argue that concentrated ownership should be related to better company performance, since concentrated ownership leads to underdiversification for which a compensation is necessary. In a sample of public companies they find a positive effect of concentrated ownership, which they interpret accordingly. However, the authors do not use information on the actual underdiversification of owners. In order to clearly differentiate between a positive incentive effect from ownership and a positive effect due to underdiversification, it is necessary to separately control for the ownership share and the personal underdiversification of the owner.

This chapter analyses how exposure to idiosyncratic risk influences required returns and effort by owners. Related to this topic is the literature considering the effects of exposing risk-averse managers to idiosyncratic risk through stock or stock options. For example, managers value stock or stock options in their compensation contracts less, when they already have greater parts of their wealth correlated with the value of the company (Lambert et al. (1991), Kahl et al. (2003)). Also, risk aversion can influence the investment decisions of managers, when they are exposed to company specific risk (Parrino et al. (2002), Morellec (2003)).

3.3 Data

3.3.1 Data Sources

The analysis is based on information from two different surveys. Both the Survey of Consumer Finances (SCF) and the Survey of Small Business Finances (SSBF) provide information on the financial situation of owners and on their companies. The surveys aim to be representative for households and companies in the USA. From the SCF the waves 1989, 1992, 1995, 1998 and 2001 are used. From the SSBF only the wave 1998 is used, because this is the only wave with information on the net worth of owners.

Both surveys were conducted by the Board of Governors of the Federal Reserve System, Washington, DC.

The Survey of Consumer Finances has the household as the primary unit of interest. The main purpose of the survey is to document the amount and the composition of household wealth. It therefore includes some questions on private companies owned by households. For the purpose of this analysis two sub-samples are used. The first sub-sample selects all households with an active management interest in a private company. For households that own several private companies, only the information about the largest one is used.[2] Overall, the sub-sample contains complete information on 4,973 households with an active management interest in a private company. Of these, 4,324 companies are finally included in the analysis. Observations for companies with an equity value below US-$ 1,000 are deleted, because such small values of equity can lead to very implausible returns on equity figures. Furthermore, companies are required to have positive sales and owners are required to have positive private wealth, i.e. positive net worth not considering the equity investment. As a further measure to ensure plausible return on equity values, the smallest and largest 1% of observations of this variable are excluded. Although the ownership share of the household is known, it is not clear whether the household is the largest owner. Households are asked to give an estimate of the market value of their equity share. Since there is no quoted price available, this value may be measured with error.[3]

For the second sub-sample 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 the market value of the equity share owned and on the income that the household has received from the company. This information is given separately for companies of different legal forms. Should a household have ownership in two or more companies of the same legal form, then this information is only available as a sum for those companies. Overall, information on 1,486 households with ownership in 2,090 (partly combined) companies is available. The same selection rules as for the first sub-sample apply, with the sole difference that the minimum size of US-$ 1,000 applies to the equity share and not to the total equity. Finally, information on 1,429

[2]Of the households with an active management interest in private companies, 32% have a management interest in more than one company.

[3]See Kennickell et al. (2000) for more information on the 1998 SCF survey.

households and 1,925 companies is used.[4]

The Survey of Small Business Finances has the company as the primary unit of interest. It provides information on 3,561 private companies with up to 500 employees from the non-farm, non-financial sectors. Financial data on the company, as well as information about the largest owner, is available. Although it is known whether the company is run by a hired manager, it is not known whether the largest owner is also active in the management. The SSBF data differentiates between only 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.[5] As in the SCF sample, companies with equity values below US-$ 1,000 are not included in the analysis. This survey contains a surprisingly high share of 21% of companies with negative equity values. (This issue is explored in more detail in section 3.3.2.2.) Likewise, companies are required to have positive sales, positive assets and owners are required to have positive private wealth. Since the SSBF data has more extreme values, trimming of the return on equity variable is done to the 5% level. 2,337 companies are finally included in the analysis.[6]

Descriptive statistics for all variables can be found in tables 3.9, 3.10 and 3.11 in the appendix.

3.3.2 Variable Definitions

3.3.2.1 Measurement of Underdiversification

For the measurement of underdiversification it is important to have 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 can then be used as proxy for the underdiversification. **Net worth** is defined as the sum of all assets minus the sum of all liabilities of the owner.

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[4]35.6% households have ownership in only one company. 62.8% of households have ownership in more than one company, but each has a different legal form.

[5]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.

[6]More detailed information on the 1998 SSBF survey is available in Bitler et al. (2001).

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 with SNWI A.

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

This information is calculated for the largest owner of the company in the SSBF data, whereas in the SCF data the responding household needs not be the largest owner. An additional difference is that value of equity relates to the estimated market value in the SCF data and to the book value in the SSBF data.

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. The second measure for underdiversification, SNWI B, takes these possibilities into account. It is calculated according to the following formula:

$$\textbf{SNWI B} =$$

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

The SCF states directly the amount of loans that are guaranteed by the household, the value of household assets that are used as collateral and the volume of loans that are extended to the company by the household. The SSBF data, having the company as primary unit of interest, gives only the sum over all owners for these variables. This information is therefore multiplied by the ownership share of the largest owner to get an approximation of this owner's personal involvement.

The measures SNWI A and SNWI B document a considerable degree of underdiversification. For owners with active management interest, SNWI A is on average 33.7% (SCF) and 27.7% (SSBF). By additionally considering guarantees, collateral and loans, the average value of SNWI B is 3.6% and 5.8% higher, respectively.

If owners exhibit decreasing relative risk aversion, then, at higher levels of wealth, they will be less affected by the same degree of underdiversification. Therefore we also control for the level of private wealth. **Private wealth** is defined as net worth minus the value of the equity investment. It measures the assets that are not directly invested

in the company. The **Dummy high wealth** is equal to one, if the owner belongs to the highest third of the distribution of private wealth in the respective sample. The cut-off point is 3.3 million US-$ for the SCF and 0.6 million US-$ for the SSBF. This dummy is interacted with the measures of underdiversification in the empirical analysis. The wealth levels in the SSBF are smaller than in the SCF, since the SSBF is restricted to private companies with at most 500 employees. From the descriptive statistics in table 3.10 in the appendix it can be seen that households who hold equity without an active management interest are considerably richer than households who hold private equity with an active management interest. Private equity as a pure financial investment opportunity is especially attractive for richer households. In both the SCF and the SSBF data owners with more private wealth have on average a lower degree of underdiversification.

We now turn to the discussion of whether SNWI is a good measure for the underdiversification and the risk exposure of owners. 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 can fall. These risks certainly increase with SNWI. However, some owners have unlimited liability, i.e. they are liable for company obligations with all their private assets. In practise, even owners with unlimited liability lose only their equity investment in a bankruptcy, if their private assets are below exemption limits stipulated by the bankruptcy law. Fan and White (2003, p. 3) give evidence of the limited size of the personal losses in a bankruptcy. They state that: "they [entrepreneurs] often have no non-exempt assets". Therefore also for owners with unlimited liability, SNWI is a good proxy for the risk exposure.[7]

[7]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, but typically define an upper limit for home equity as well as for other personal assets. 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 for the support upon retirement.

3.3.2.2 Company Profitability

Return on Equity (ROE), defined as pre-tax profits divided by total equity, is used as a measure for company profitability. The SCF data measures equity with an estimated market value and the SSBF with the book value. The profit figures in both surveys are reported before the payment of corporate and income 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.[8]

The average of ROE in the SCF data is at 47.7% quite high. This is an average that gives equal weight to all observations. If one calculates an average that is weighted by the value of equity, one obtains a substantially lower number of 15.6%, comparable to the result of Moskowitz and Vissing-Jørgensen (2002).

As opposed to the SCF, where the value of equity is asked directly, the SSBF calculates the value of equity as the difference of the company's assets and liabilities. It is likely that company assets and liabilities are measured with error, because most respondents are not required by law to draw up a balance sheet. Any measurement error in assets and liabilities is passed on to the book value of equity. In the SSBF data it seems that assets are on average underreported, because a high share of 21% of companies have negative equity values. Underreporting of assets is consistent with the relatively high values for return on equity. Even the value-weighted average is, at 42.1%, quite high. 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.[9]

It is important to discuss whether there are problems in the measurement of ROE that could lead to a positive relationship between profitability and SNWI that would not be driven by higher required returns or higher effort. We first address the influence of tax evasion. Longenecker et al. (1996) find in a survey of 424 entrepreneurs that 54% of

[8]C- and S-corporations are both characterised by limited liability. C-corporations have to pay corporation tax for profits that are paid out to the shareholders. In contrast, profits of S-corporations are only charged with the personal income tax rate of 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 and, for 1994 onwards, at the home page of the American Internal Revenue Service, www.irs.gov.

[9]The analysis was also done with share of net worth invested set equal to zero for observations with negative equity or negative net worth. A dummy for negative equity and a dummy for negative net worth were included. The results are robust with respect to this modification.

them have faced the issue of underreporting taxable income. However, the survey does not contain information on the size of underreporting. The question is to what extent the survey data used in this analysis can be affected by 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 don't use tax forms as a basis. The SCF is not based on tax forms, whereas the SSBF refers respondents to tax statements for the company details but not for the wealth questions. Tax evaders will report lower values of ROE and also lower values of SNWI to the extent that they saved the gains from tax evasion. Therefore a positive relationship between SNWI and ROE can be influenced by tax evasion. However, since SNWI is a stock variable shaped by many other factors, this effect is likely to be too small to drive the results.

As the surveys provide only cross-sectional information, it is not possible to control for entry and exit. There is a higher probability that a company exits shortly after the survey has taken place, if the entrepreneur was overoptimistic when starting the company. Overoptimism likely leads to a high investment volume and to low returns, i.e. overoptimism yields a negative relationship between SNWI and ROE. This makes it more difficult to identify an underdiversification effect.

Investments of venture capitalists may reduce the underdiversification of the other owners. For venture capitalists, the capital gains from selling the company are an important source of income, whereas the profitability of the company during the investment period may be low. This could lead to a positive relationship between SNWI and ROE. However, overall less than 1% of all private equity (i.e. equity in sole proprietorships, partnerships and corporations in private ownership) in the USA is held by venture capitalists (Moskowitz and Vissing-Jørgensen, 2002). This is also reflected in the SSBF data, which provides information on equity increases. Out of the 3,561 companies covered, only 4 raised equity from a venture capital firm in the year prior to the survey.

3.3.2.3 Other Characteristics of Companies and Owners

Following are definitions for the other control variables. Most variable names speak for themselves, but there are differences in the precise definition of the variables across the two surveys.

We consider the company-related variables first.

Company size is the logarithm of the number of employees in the SCF data. The SSBF data covers only companies up to 500 employees. For this data set, company size is measured directly as the number of employees.

Company age is defined as the number of years since the company was started or acquired.

Industry dummies in the SCF data differentiate between six industries. There is no industry information if the value of the equity that the household owns is above US-$ 100 million. The SSBF data identifies nine different industries. Tables 3.12 and 3.13 in the appendix give an overview on the distribution of the companies according to industry.

Dummies legal form differentiate between sole proprietorships, partnerships, S- and C-corporations.

Dummies type of company acquisition indicate whether the company was founded, purchased or inherited.

It is important to know that the SCF data includes information on assets, such as private businesses, only at the household level, whereas education and job characteristics are included separately for the head of the household and the spouse. To be able to control for individual characteristics, we determine whether the head of the household or the spouse is the main owner according to the job characteristics. If only one person is working for the business, then this person is the main owner. If both are working for the business, then the single person being self-employed in the main job is the main owner. If both are self-employed in the main job, then the main owner is the one with the higher number of weekly hours worked in the main job. If both are working for the business, but neither is self-employed in the main job, then the single person being self-employed in the second job is the main owner. If both are self-employed in the second job, then the main owner is again the person with the higher hours of work in the second job.

The owner-related variables listed below are used in the analysis.

Value primary residence refers to the market value of the owner's primary residence in the SCF data. In the SSBF data only the equity value (i.e. market value minus mortgages) is available. The value of this variable is set to zero, if the owner is renting the primary residence.

Dummy home owner has a value of one if the owner owns the primary residence.

Experience is calculated in the SCF data from the information on the work history

of the head of the household and the spouse. Years in full-time employment are counted as such and years in part-time employment are weighted with a factor of 0.5. The variable refers to all kind of occupations. In the SSBF data experience is defined as the number of years owning or managing a company.

Hours worked is only available in the SCF data. It is the self-reported hours of work in the main job in a normal week. This information is used for the empirical analysis if, first, the owner states to be working in or participating in the operation of the company and, second, the owner states to be self-employed in the main job.

Ownership share refers to the share of equity owned. In the SCF data the household is not necessarily the largest owner, whereas the SSBF data always refers to the largest owner.

Owner age is the age of the owner measured in years.

Education dummies in the SCF data differentiate between a high school degree, a bachelor's degree, a master's degree, a PhD, or another higher degree. For the SSBF data the classification is no high school degree, a high school degree, some college but no degree, an associate degree, a vocational programme, a college degree, and a post graduate degree.

Ethnicity dummies in the SCF data set are available for White, Hispanic, African-American and Other. The SSBF data additionally covers Asian, Native Hawaiian or other Pacific Islander and American Indian or Alaska Native.

Dummy sex of owner is equal to one if the owner is female.

Year dummies are included in analyses using the SCF data. The distribution of observations according to year is given in table 3.14 in the appendix.

3.4 Development of Hypotheses

3.4.1 Influence on Required Returns

In this subsection we present a simple theoretical model in order to show how a positive relationship between underdiversification and profitability can be driven by higher required returns. This model will be also used to derive the regression specification of the empirical analysis. In the model there are two periods. Individual i invests initial wealth w_{1i} in period 1 and returns realise in period 2. Investment is possible in a safe asset and in a risky asset. The safe asset has no minimum investment requirement and

a return of r_0. The risky asset can be thought of as establishing a company. The size of the minimum investment and the expected return vary depending on the business idea. The minimum investment requirement of the risky asset for individual i is denoted by k_i. The expected return of the risky asset is denoted by $E(r_i)$, and the realised return of the risky assets is r_i. The final wealth of individual i in period 2 depends on whether investment in the risky asset was chosen and, if this is the case, on the realised return of the risky asset.

$$w_{2i} = k_i(1 + r_i) + (w_{1i} - k_i)(1 + r_0) \tag{3.1}$$

Utility is derived from consumption of w_{2i}. Individuals have a utility function with constant relative risk aversion.

$$U(w_{2i}) = w_{2i}^{(1-\rho)}; \quad \rho > 0, \ \rho \neq 1 \tag{3.2}$$

In order to compute the minimum expected return that individual i requires for an investment in the risky asset, $E(r_{imin})$, suppose the individual is indifferent to investing in the safe asset only or in the safe and the risky asset. The expected utility from both possibilities is then identical:

$$E\,U \mid only\ safe\ asset \ = \ E\,U \mid safe\ and\ risky\ asset \tag{3.3}$$

This condition can be written with the resulting wealth levels inserted into the utility function.

$$(w_{1i}(1 + r_0))^{(1-\rho)} = E(k_i(1 + r_{imin}) + (w_{1i} - k_i)(1 + r_0))^{(1-\rho)} \tag{3.4}$$

We rearrange this expression to arrive at:

$$E\left(\frac{k_i(r_{imin} - r_0)}{w_{1i}(1 + r_0)} + 1\right)^{(1-\rho)} - 1 = 0 \tag{3.5}$$

From a second-order Taylor expansion around r_0, we obtain an equation describing the determinants of the minimum expected return.

$$E(r_{imin}) = r_0 + 1/2 * 1/(1 + r_0) \ * \ k_i/w_{1i} \ * \ \rho \ * \ E(r_{imin} - r_0)^2 \tag{3.6}$$

Individual i will invest in the risky asset, if $E(r_i)$ is larger than $E(r_{imin})$. The individuals underdiversification, k_i/w_{1i}, increases the minimum expected return required for investment. If the expected returns are not high enough for the given underdiversification, then the risky asset will not be chosen – the potential entrepreneur will not

establish the company. Furthermore, the required return is increasing in the relative risk aversion, ρ, and in $E(r_{imin} - r_0)^2$. This last term can be decomposed into the variance of the returns, $E(r_{imin} - E(r_{imin}))^2$, and a bias term, $(E(r_{imin}) - r_0)^2$.

In the empirical implementation of equation (6) we use the realised return as a proxy for the required return. For this approach to be valid, it is important that realised returns and required returns are monotonically related. This can be shown as follows:

The expected return for individual i is an increasing function of the minimum expected return.

$$E(r_i) = \alpha + \beta E(r_{imin}) + \eta_i; \quad \beta > 0 \tag{3.7}$$

And the realised return for individual i is equal to the expected return plus an error term.

$$r_i = E(r_i) + \mu_i \tag{3.8}$$

The realised return, r_i, is therefore monotonically related to the minimum expected return, $E(r_{imin})$.

$$r_i = \alpha + \beta E(r_{imin}) + \eta_i + \mu_i; \quad \beta > 0 \tag{3.9}$$

To derive the regression specification we substitute the expression for $E(r_{imin})$ from equation (6) into equation (9). After linearising we obtain the following regression specification:

$$\begin{aligned} ROE \;=\; & \alpha + \beta_1 SNWI + \beta_2 dummy\ high\ wealth + \beta_3 SNWI * dummy\ high\ wealth \\ & + \beta_4 company\ size + \beta_5 company\ age + \beta_6 industry\ dummies + \epsilon \end{aligned} \tag{3.10}$$

SNWI is the empirical counterpart of k_i/w_{1i} in the model. From our theoretical model we expect a positive relationship between the underdiversification of the owner and the profitability of the company. Since it is not possible to observe the risk aversion of owners in the data, we employ the common assumption that richer owners are less risk averse. A dummy for high wealth levels allows a different treatment of richer owners. As an overall effect of high wealth, we expect that the compensation for underdiversification will be smaller. The theoretical model also gives importance to risk, but there is no measure of risk at company level available in the surveys. The included industry dummies control for risk insofar as it is the same in one industry. The controls for company size and company age also account partly for the influence of

risk. The final empirical specification includes additional controls that do not appear in the simple model, for example dummies for legal form and education of the owner-manager.

The simple theoretical model does not allow for an investment in the stock market. Investment is only possible in a save asset and in *one* risky asset. This is a simplification that should not affect the main insights of the model. Heaton and Lucas (2000*c*) show that growth in proprietary income has a high variation in its correlation with returns to the stock market. As we cannot observe this correlation on a company-basis, we cannot control for it in the empirical analysis. Insofar as it is related to the industry, the industry dummies will control for it.

3.4.2 Influence on Effort

Why can there be a positive relationship between the underdiversification of an owner with an active management interest and the effort he is exerting? By working a bit harder the owner-manager can increase company profitability and thereby reduce the probability of company failure. The more the owner-manager is financially dependent on the success of the company, the higher are the incentives for effort. The incentive to work harder is especially high if the company is in difficulties, since a company failure has a big impact on the income and wealth of the owner-manager. After bankruptcy, labour income may be lost if a period of unemployment ensues; intangible assets, such as customer relationships, are destroyed and tangible assets can often only be sold with a loss. The effort cost of working longer hours may be small compared to the financial cost of a company failure. We expect that underdiversification has a smaller effect on effort for richer owner-managers, since, in absolute value, they have more assets to fall back on.

A positive relationship between underdiversification and effort is supported by standard utility functions, but utility functions using consumption relative to a reference point are an especially good description of the situation of an owner-manager confronted with the possibility of a bankruptcy (see, for example, Kahneman and Tversky (1979)). The utility function is flatter for consumption levels above the reference point than it is for consumption below the reference point, i.e. there is a kink at the reference point which makes losses relatively more painful. The reference point can be the consumption level of the last period or an expectation about future consumption. A company failure

may have such pronounced effects on the financial situation of the owner-manager that he may be forced below the former reference point. Again, higher effort exerted to avoid this negative outcome may be worthwhile.

3.4.3 Hypotheses

This section describes the hypotheses that are tested in this chapter. The first two hypotheses concern the existence of an underdiversification effect.

Hypothesis 1: There is an underdiversification effect, i.e. there is a positive relationship between the owner's degree of underdiversification and the profitability of the company. This effect can either work through higher required returns or through increased effort.

Hypothesis 2: The underdiversification effect is smaller for owners with higher private wealth. The required returns are smaller if owners exhibit decreasing relative risk aversion and the incentive effect of underdiversification is smaller if the owner-manager is less dependent on the success of the company.

The next two hypotheses describe a specific channel through which underdiversification affects profitability. It should be noted that the channels are not mutually exclusive.

Hypothesis 3: A positive relationship between the owner's degree of underdiversification and the profitability of the company is driven by higher required returns.

Hypothesis 4: A positive relationship between the owner's degree of underdiversification and the profitability of the company is driven by increased effort.

3.5 Empirical Analysis

3.5.1 Dealing With Endogeneity

In order to identify whether there is a positive relationship between underdiversification and company profitability that is driven by higher required returns or higher effort, it is necessary to deal with the problem of endogeneity. Several regressors used in the analysis are potentially endogenous. In general, we will use instrumental variables to deal with this problem. The variable for underdiversification, SNWI, is affected by reverse causality. Owners who know that a company is of high quality are 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 higher share of a good company. Effort can also be influenced by profitability. Since the reward of working for a good company is higher, the owner-manager may work longer hours. However, an opposite effect is also possible. The owner-manager may work longer hours to keep a company of low quality alive. This could lead to a negative relationship between effort and performance in an OLS regression. In order to get consistent coefficient estimates, we instrument the potentially endogenous regressors.[10]

The following instruments are used for the endogenous regressors: the value of the primary residence, a dummy for home ownership, the age of the owner, the sex of the owner and dummies for the type of company acquisition. The instruments are only valid, if there is no relationship between them and the profitability of the company.

We discuss first the validity of the value of the primary residence. Owners with profitable companies will accumulate wealth over time, which may be used to buy a more expensive house or to pay off the mortgage faster. For example, Gersick et al. (1997, p. 157) describe that the handing down of the company from parents to children can be at a time when the parents want to move to a larger house. A high value of the house would be related to high profitability. However, as is shown in the first-stage regression for SNWI, the direction of the effect in the empirical analysis is opposite. We find that a high value of the house is related to low profitability. If there is a relationship between instrument and dependent variable, then the coefficient for SNWI will be underestimated and we obtain a lower bound on the true effect. The use of this instrument for ownership share is more problematic. The value of the primary residence is positively related to the ownership share and the ownership share is positively related to profitability. If a larger home is bought in response to good company profitability, then the instrument has a direct relationship with the dependent variable. In this case the influence of ownership share on profitability will be overestimated. This possibility cannot be excluded. However, since the number of instruments is greater than the number of endogenous regressors, it is possible to test for overidentifying restrictions. The results of this test are reported along with all regressions.[11]

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[10]Instrumenting of SNWI is important for a second reason. In the SSBF data it is likely that equity, which enters into the calculation of SNWI, is measured with error. If the instruments are not related to this measurement error, then it will cause no bias.

[11]The results of the second-stage regressions are qualitatively identical when the value of the primary residence is omitted from the instrument list.

It can be argued that age of the owner itself is unrelated with profitability. When using it as instrument, it is, however, important to include a control for work experience of the owner in the main regression, because work experience can be related to profitability. Since age is correlated with experience, age can be related to profitability, if no explicit control for experience is included.[12]

The sex of the owner should have no direct relationship with profitability. Also, the way the company was acquired, i.e. being founded, purchased or inherited, should be unrelated to profitability.

Table 3.1 presents the first stage results to determine the instrumented values.[13] The determinants for SNWI A are shown in columns (1) and (2) for the SCF and SSBF data. The natural logarithm of the value of the primary residence has a negative effect. This is as expected since home owners have part of their wealth tied up so that it is not possible to invest it in a company. The dummy for home ownership has no significant effect. Older owners have a smaller share of their total net worth invested in the company. They have had more time to accumulate other assets and may have passed on part of their stake to children or new owners. Women tend to invest a smaller share of their net worth. The dummies for the way they company was acquired show no clear pattern across the data sets. There is also no clear presumption on the sign that they should have. As can be expected, SNWI is higher for larger companies. For company age the effect differs between the data sets.

Columns (3) and (4) cover the determinants for ownership share. The value of the primary residence has a positive effect and the dummy for home ownership a negative one. Home owners have part of their assets bound in the home. They have fewer assets available to invest in a large ownership share. The age of the owner is insignificant and the sex of the owner does not have an identical effect across the data sets. Owners have the highest ownership share, if they have founded the companies themselves. 'Company founded' is the base category in the regression. Company size has a negative influence on ownership share and company age has differing effects.

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[12]Good instruments should have a higher correlation with the endogenous regressor. The finding by Heaton and Lucas (2000*b*) suggests that this is the case for age. The authors 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. This is also reflected in our first-stage regression.

[13]The SCF data includes imputations for missing values. Five different imputations are given for each missing value. The reported results are calculated for the average of the imputed values.

Table 3.1: Determining the Instrumented Values

Dep. variable:	SNWI A		Ownership share		Ln hours
	(1)	(2)	(3)	(4)	(5)
	SCF	SSBF	SCF	SSBF	SCF
Ln value primary	-3.12***	-2.91***	1.78***	1.05***	-0.026***
residence	(0.377)	(0.322)	(0.394)	(0.310)	(0.0093)
Dummy	0.360	5.09	-5.14**	-10.9***	0.096*
home owner	(2.13)	(3.24)	(2.23)	(3.12)	(0.053)
Owner age	-0.381***	-0.270***	-0.0060	-0.063	-0.023***
	(0.054)	(0.059)	(0.056)	(0.057)	(0.0015)
Dummy	-4.72***	-3.14***	1.98*	-1.12	-0.189***
sex of owner	(1.04)	(1.17)	(1.09)	(1.13)	(0.026)
Dummy purchased	-1.33	6.11***	-4.02***	-1.51	-0.042**
	(0.829)	(1.18)	(0.867)	(1.14)	(0.020)
Dummy inherited	-0.712	7.90***	-11.9***	-3.27*	-0.057
	(1.46)	(1.94)	(1.52)	(1.87)	(0.037)
Company size	4.58***	0.098***	-5.25***	-0.076***	0.034***
	(0.222)	(0.0087)	(0.232)	(0.0084)	(0.0055)
Company age	0.189***	0.051	0.235***	-0.152***	0.0020**
	(0.037)	(0.047)	(0.039)	(0.045)	(0.00094)
No. of observations	4,324	2,337	4,324	2,337	3,335
F-test of excluded instruments	49.2*** F(6, 4291)	55.7*** F(6, 2304)	17.8*** F(6, 4291)	3.10*** F(6, 2304)	63.3*** F(6, 3302)
Shea's partial R^2	0.055	0.121	0.021	0.0077	0.043
R squared	0.201	0.228	0.478	0.430	0.168

Note: *, **, *** indicate statistical significance at the 10, 5, and 1 percent level respectively. Robust standard errors are in parentheses. The regressions contain additional controls for industry, year (only SCF), education, experience, ethnicity and legal form.

In column (5) we report the results for hours worked. This information is only available for the sub sample of the SCF including owners with an active management interest. Here it is interesting to note that owner-managers with a more valuable primary residence work shorter hours. This could be due to an income effect on labour supply. In contrast, owner-managers who own their primary residence work longer hours. Here it could have also been expected that owner-managers who own their primary residence have more security and are less under pressure to work long hours in order to secure the survival of the company.

The instrumenting of SNWI controls for problems of reverse causality, but not for owner-managers with a high degree of underdiversification exerting more effort. As found in the first-stage results for SNWI, an owner-manager with a primary residence of little value has, on average, a higher share of net worth invested in the company. In this case the owner-manager is more dependent on the success of the company as there are fewer assets to resort to and may therefore work harder. Indeed, this was found in the first stage for hours worked. We therefore need to split the sample into owners with and without management interest in order to separately identify influences on profitability stemming from higher required returns and higher effort. However, the division into sub samples of owners with and without a management interest can also be endogenous, since the decision whether to be active in the management can be related to the profitability of the company. For example, if the company is very good, then the owners may have become so rich that it is not worth any more for them to work. Or, if the company is very good, owners want to work, since returns on effort are high. However, even if the selection into the group is endogenous, we can still test whether there are specific relationships within the groups that are predicted by our hypotheses.

3.5.2 Is Underdiversification Related to Company Profitability?

This subsection discusses the existence of an underdiversification effect. It is analysed whether underdiversification of owners has a positive effect on the profitability of companies. For the moment we do not try to identify separate channels of the underdiversification effect, i.e. the effect can be driven by higher required returns or by higher effort.

Table 3.2 presents the results of the test of hypothesis 1, which postulates the exis-

tence of an underdiversification effect in general. The regressors SNWI and ownership share can be endogenous and are instrumented as shown in table 3.1. There are four different specifications. Data from the SCF as well as the SSBF is used and both measures of underdiversification, SNWI A and SNWI B, are employed.

Regressions (1) and (2) use the underdiversification measure SNWI A and show results for the SCF and the SSBF data. SNWI A takes only the equity investment into account and disregards other ways in which owners' assets could be tied to the company. There is a positive relationship between SNWI A and return on equity that is significant to the 1% and 5% level, respectively.[14] This provides strong evidence for hypothesis 1. It is interesting to see whether the economic significance is of about the

Table 3.2: Underdiversification and Profitability

Dep. variable: Return on equity				
	(1)	(2)	(3)	(4)
	SCF	SSBF	SCF	SSBF
	SNWI A		SNWI B	
SNWI	1.13***	1.40**	1.05***	1.31**
	(0.260)	(0.591)	(0.244)	(0.562)
Ownership share	0.769**	5.99**	0.614	5.64**
	(0.401)	(2.63)	(0.384)	(2.54)
Company size	-2.37	0.233	-3.16	0.180
	(2.17)	(0.224)	(2.19)	(0.220)
Company age	-0.468**	0.687	-0.377**	0.776
	(0.186)	(0.594)	(0.177)	(0.589)
Number of observations	4,324	2,337	4,324	2,337
Overidentification test, χ^2 (dof, p-value)	1.88 (4, 0.76)	6.89 (4, 0.14)	2.46 (4, 0.65)	7.71 (4, 0.10)

Note: *, **, *** indicate statistical significance at the 10, 5, and 1 percent level respectively. Robust standard errors that are adjusted for the 1st step estimation are in parentheses. The regressors SNWI and ownership share are instrumented. Columns (1) and (2) refer to SNWI A and columns (3) and (4) refer to SNWI B. The regressions contain controls for industry, year (only SCF), education, experience, ethnicity and legal form.

[14]The results for SNWI remain qualitatively identical when the sample is split into companies with limited and unlimited liability.

same order in both data sets. The change in return on equity when SNWI A is increased by one standard deviation is 28.2 percentage points for regression (1) and 34.8 percentage points for regression (2). However, because one return measure refers to the market value of equity and the other to the book value of equity, it is more meaningful to examine the change in the distribution. Starting from the median of return on equity, a one standard deviation change in SNWI A brings the return on equity up to the 76th percentile in regression (1) and up to the 62th percentile in regression (2). Underdiversification has therefore a sizable effect on company profitability.[15]

The ownership share has also a significant positive effect on profitability. This is plausible, since owners who obtain a higher share of the profits have an incentive to work harder. It is remarkable that the relative size of the coefficients for SNWI A and ownership share is opposite to the finding with the SCF data. Due to the differences in variable definition it is, however, difficult to interpret this finding. In the SCF data the household is not always the largest owner, whereas the SSBF data refers only to the largest owner. With the controls for SNWI and ownership share, we are able to separately identify a positive underdiversification effect and a positive incentive effect.[16]

Company size and company age are added as further controls. The only significant effect is a negative influence of age in the SCF data. The regression also includes controls for industry, year, education, experience, ethnicity, sex, legal form and type of company acquisition included. Their coefficients are not shown for brevity.

Since there are more instruments than endogenous regressors, it is possible to test the overidentifying restrictions. The test of the statistical validity of the instruments is passed with a p-value of 76% for the SCF data and with a p-value of 14% for the SSBF data.

Columns (3) and (4) of table 3.2 show the results for SNWI B. This measure of underdiversification takes the equity investment, guarantees, private assets used as collateral and personal loans to the company into account. We do not discuss the results here, because they are very similar to the results obtained with SNWI A.

We now turn to the test of hypothesis 2. This hypothesis states that richer owners

[15]The SSBF data provides also information on total assets. When we use 'return on assets' as dependent variable, we also obtain a significant positive coefficient for SNWI.

[16]The quadratic terms of SNWI and ownership share have been included in the regression to allow for a more flexible functional form. Because the quadratic terms were not significant, we only use the linear form of SNWI and ownership share.

are less affected by underdiversification, because the absolute amount of wealth not tied up in the company is higher. We would therefore expect a smaller effect of underdiversification for richer owners. Since only a subset of the observations can be used for the identification of this effect, it will be more difficult to obtain a clear result. Indeed, when we include the dummy for high wealth and its interaction term, both coefficients are statistically not different from zero, although the results suggest lower returns for richer owners. In an attempt to obtain a sharper result from the data, we restrict the level effect to zero and work only with the interaction variable.

Table 3.3 presents the results for SNWI interacted with the dummy for high wealth. The estimates show that, indeed, the effect of underdiversification is smaller for richer owners. This is true for all four regression specifications. Again, both data sets and both measures of underdiversification are used. The coefficient on SNWI that obtains for richer owners is calculated as the sum of the coefficient for SNWI and its interaction term. It is separately displayed in table 3.3. This coefficient is only significant for regression (1). For the other specifications we observe no effect of underdiversification for richer owners. In order to test hypothesis 2 we also need to know whether there is a statistically significant difference between the effect of underdiversification for the groups of richer and poorer owners. This is not the case. Only for column (3) is the difference between the coefficient of SNWI for both groups significantly different to the 10% level.

To sum up, the underdiversification effect is not significantly smaller for richer owners, rather there is no significant influence of underdiversification at all. It is, however, difficult to judge whether there is genuinely no effect or whether it can not be identified with the limited number of observations. Overall, the evidence that richer owners are less affected by underdiversification is consistent with hypothesis 2, although the results are not significant.

Compared to the results without interaction terms, the coefficients of ownership share remain similar in size, but are generally more precisely measured. Concerning the other controls, it is sufficient to note that company size now has a marginally significant positive influence on company profitability.

Table 3.3: Controlling for Private Wealth

Dep. variable: Return on equity				
	(1)	(2)	(3)	(4)
	SCF	SSBF	SCF	SSBF
	SNWI A		SNWI B	
SNWI	1.04***	1.25**	0.918***	1.11**
	(0.274)	(0.581)	(0.250)	(0.559)
SNWI * dummy high wealth	-0.326	-1.00	-0.338**	-0.830*
	(0.206)	(0.658)	(0.173)	(0.516)
Ownership share	1.01**	5.67***	0.912**	5.58***
	(0.407)	(2.03)	(0.394)	(1.99)
Company size	0.526	0.334*	0.448	0.317*
	(2.79)	(0.185)	(2.82)	(0.190)
Company age	-0.482***	0.766	-0.403**	0.812
	(0.186)	(0.511)	(0.176)	(0.520)
Coeff. SNWI high wealth	*0.718**	*0.248*	*0.580*	*0.285*
	(0.423)	*(1.08)*	*(0.370)*	*(0.949)*
Number of observations	4,324	2,337	4,324	2,337
Overidentification test, χ^2 (dof, p-value)	10.5 (9, 0.31)	7.09 (9, 0.63)	12.4 (9, 0.19)	7.37 (9, 0.60)

Note: *, **, *** indicate statistical significance at the 10, 5, and 1 percent level respectively. Robust standard errors that are adjusted for the 1st step estimation are in parentheses. The regressor SNWI and its interaction term as well as ownership share are instrumented. Columns (1) and (2) refer to SNWI A and columns (3) and (4) refer to SNWI B. The regressions contain controls for industry, year (only SCF), education, experience, ethnicity and legal form.

In table 3.4 we additionally control for effort. This is a first attempt to test whether more underdiversified owner-managers require higher returns independently of any effect of effort. If this is not the case, then SNWI should become insignificant once effort is controlled for. The SCF data includes information on the owner-manager's self-reported hours of work in a typical week, which can be used as a proxy for effort. The variable is a noisy proxy, because effort is multi-dimensional, whereas hours worked only covers the time dimension. It is, however, plausible that owner-managers who work longer, will, for example, also acquire more information and make better decisions. Regression (1) includes only the logarithm of hours worked and does not control for

SNWI and ownership share. There is a significant positive effect of effort, but the test of overidentifying restrictions is not passed. Regressions (2) and (3) contain SNWI and the ownership share as further controls. The results now show an insignificant effect for effort, but SNWI and ownership share remain significant. This is a first indication that there is a separate channel of higher required returns, but since hours worked is only an imperfect control for effort, we cannot conclude that the remaining positive effect of SNWI is only due to higher required returns. It is possible that SNWI proxies for the parts of effort that are not covered in the time dimension.[17]

Table 3.4: Controlling for Effort

Dep. variable: Return on equity			
	(1)	(2)	(3)
	SCF	SCF	SCF
		SNWI A	SNWI B
Ln hours worked	27.4***	-2.90	-5.32
	(10.0)	(19.3)	(20.4)
SNWI		1.19**	1.18**
		(0.545)	(0.546)
Ownership share		1.57**	1.38**
		(0.678)	(0.628)
Company size	-3.14**	1.14	-0.057
	(1.39)	(3.31)	(3.34)
Company age	-0.244	-0.661**	-0.559**
	(0.194)	(0.288)	(0.267)
Number of observations	3,335	3,335	3,335
Overidentification test, χ^2 (dof, p-value)	15.4 (5, 0.009)	0.67 (3, 0.88)	0.94 (3, 0.82)

Note: *, **, *** indicate statistical significance at the 10, 5, and 1 percent level respectively. Robust standard errors that are adjusted for the 1st step estimation are in parentheses. The regressors SNWI, ownership share and hours worked are instrumented. Column (2) refers to SNWI A and column (3) refers to SNWI B. The regressions contain controls for industry, year, education, experience, ethnicity and legal form.

[17] An OLS regression with the specification from column (1) was also calculated. The coefficient on ln hours worked was positive, but insignificant. This is consistent with the potential endogeneity of hours worked. If owner-managers of companies with poor quality work more, then the relationship between effort and profitability is not necessarily positive.

3.5.3 Do Underdiversified Owners Require Higher Returns?

This subsection covers the first proposed channel of the underdiversification effect. According to hypothesis 3 we test whether owners of private companies who are more underdiversified require higher returns on their investment. The second sub-sample of the SCF, including only owners who are not at the same time managers, is used for this test. This excludes the possibility that a positive relationship between underdiversification and profitability is caused by higher effort. The SSBF data cannot be used for a test of hypothesis 3, because it does not allow a clear distinction between owners who are and who are not active in the management. Although 10.7% of the companies have a hired manager responsible for the day-to-day management, it is not possible to exclude that the largest owner is also involved in the management.

Table 3.5 shows the regression results for the SCF data. The first- and second-stage regressions contain only variables relating to the household, since it is not possible to select one member of the household as main owner. In the first-stage regression (not reported) the value of the primary residence has a negative coefficient which is significant to the 1% level, whereas the dummy for home ownership is negative, but insignificant. The tests for overidentifying restrictions indicate the statistical validity of the instruments. For this subset of the SCF data we cannot calculate SNWI B, because we have no information on the financial engagement of the household besides the equity investment.

The regression in column (1) shows a positive relationship between SNWI A and return on equity that is significant to the 5% level.[18] There is therefore evidence that more underdiversified owners require higher returns. This effect is also economically significant. A change in SNWI A of one standard deviation increases the return on equity by 18.8 percentage points, or, in an alternative representation, it increases return on equity from its median to its 83rd percentile. It is also instructive to compare the size of this effect with the effect of underdiversification calculated by Kerins et al. (2004). This comparison can only be very tentative, since both calculations rely on strong assumptions. We impose a specific functional form with our regression specification and Kerins et al. (2004) rely on the applicability of the CAPM and restrict the investment opportunities of the household to a single company and the market portfolio. Kerins

[18]We tested whether a quadratic form in SNWI A would be appropriate. Since the quadratic term was not significant, we dropped it again from the regression.

Table 3.5: Underdiversification and Required Returns

Dep. variable: Return on equity		
	(1)	(2)
	SCF	SCF
	SNWI A	
SNWI	0.917**	0.899*
	(0.430)	(0.531)
SNWI * dummy high wealth		0.173
		(0.697)
Coeff. SNWI high wealth		*1.07*
		(1.16)
Number of observations	1,925	1,925
Number of households	1,429	1,429
Overidentification test, χ^2 (dof, p-value)	0.29 (1, 0.59)	0.59 (2, 0.75)

Note: *, **, *** indicate statistical significance at the 10, 5, and 1 percent level respectively. Robust standard errors allowing for heteroscedasticity and correlation within households are in parentheses. They are adjusted for the 1st step estimation. The regressor SNWI and its interaction term are instrumented. Columns (1) and (2) refer to SNWI A. The regressions contain controls for year and legal form.

et al. (2004) calculate for companies with 26 – 100 employees that an increase of SNWI from 15% to 25% increases the cost of capital for an underdiversified entrepreneur by 9.8 percentage points. We come to a quite similar result. An increase of SNWI A by 10 percentage points is related to an increase of return on equity of 9.2 percentage points.

Two small caveats of our empirical results should be pointed out. First, it is not possible to observe the ownership share of the household for this sub-sample. A higher ownership share can be related to higher monitoring activities, which can secure higher profitability as well. Limitations of the data set prevent us from controlling for this possibility. Second, the correlation of returns from other financial assets (for example publicly traded equity) with the returns from the private equity investment can influence the required returns. Since we cannot observe these correlations, we are also not able to control for them.

The regression in column (2) allows for a different effect of underdiversification for the highest third in the distribution of private wealth. The coefficient of SNWI is larger

for richer owners, but it is not significant. A test on the sum of the coefficients for SNWI and SNWI interacted reveals that the influence of SNWI is not significant for the richer owners. This could be because only one third of the observations is used to estimate the effect, or, it could be that richer owners of private companies do indeed not require a compensation for underdiversification. There is no statistically significant difference between the coefficients of both groups.

Our finding that more underdiversified entrepreneurs require higher returns as a compensation for the exposure to idiosyncratic risk has important implications. The realisation of a business idea can 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 realised. Furthermore, the available volume of additional bank finance can also be crucial, since it allows the potential entrepreneur to employ fewer own resources. The influence of underdiversification is especially important for projects that are not scalable.

Holtz-Eakin et al. (1994*a*) observe that the probability of becoming an entrepreneur increases after an inheritance and note that this observation is consistent with the existence of liquidity constraints. Our results suggest an additional interpretation of this finding. Since the potential underdiversification decreases through the inheritance, the required rate of return on investment projects decreases and therefore more business ideas will become worthwhile. This alternative explanation does not require the existence of liquidity constraints. Holtz-Eakin et al. (1994*b*) find that an inheritance increases the probability of companies remaining in business, which again is consistent with liquidity constraints. Again, an improved company survival can also be explained by lower required returns after an inheritance.

3.5.4 Underdiversification and Effort

We now turn to the second channel of the underdiversification effect. This sub-section explores the relationship between the underdiversification of owner-managers and the effort they exert, measured as average weekly hours worked. This analysis is solely based on the SCF data, since the SSBF data does not provide information on effort. Table 3.6 presents a tabulation of hours worked according to a partition of SNWI A into the lowest, middle and highest third. A positive relationship between underdiversification and hours worked can clearly be seen. The difference between the mean of hours

Table 3.6: Tabulation of Effort With Respect to SNWI A and Private Wealth

Mean (median) of hours worked			
	SNWI A		
	Lowest third	Middle third	Highest third
All owner-managers	44.3 (45)	48.4 (50)	52.8 (50)
Lowest third private wealth	44.0 (45)	49.8 (50)	54.5 (55)
Middle third private wealth	45.8 (50)	49.9 (50)	53.8 (50)
Highest third private wealth	43.0 (40)	45.7 (49)	49.6 (50)

Note: The calculation is based on 3,335 observations. The data source is wave 1989 to wave 2001 of the Survey of Consumer Finances (SCF). Hours worked is the self-reported hours worked in a typical week. The cut-off points for SNWI A are 16.2% and 42.2%. The cut-off points for private wealth are 0.49 million US-$ and 3.3 million US-$.

worked for the lowest and the highest third of SNWI A is also statistically significant at the 1% level. In addition, table 3.6 presents this tabulation separately for owner-managers with different levels of private wealth. It is interesting to note that the difference in the average of hours worked between the lowest and the highest third of SNWI is decreasing in private wealth. This is a first indication that the pressure from underdiversification could be smaller for richer owner-managers. Here the differences in hours worked between the highest and the lowest third of SNWI are also significant at the 1% level.

The incentive effect of ownership can lead to a positive relationship between hours worked and the ownership share. Owner-managers who own a larger share of the company will benefit more from increased effort – they obtain a higher share of total profits. Table 3.7 shows a tabulation of hours worked according to four categories of ownership. The means of weekly hours worked are very similar and the median is 50 hours for each category. No pronounced pattern emerges in this univariate analysis.

Table 3.8 presents the test of hypothesis 4. It is a test for a positive relationship between underdiversification and effort. Four different specifications are employed. SNWI A and SNWI B are used as regressors with and without an interaction term for especially rich owner-managers. In these regressions we cannot instrument SNWI and ownership share, since most of our instruments are in the regression in their own right. In regression (1) we use SNWI A without an interaction term as measure of underdiversification and find that it has a positive effect, significant to the 1% level. Hypothesis 4 is therefore

Table 3.7: Tabulation of Effort With Respect to Ownership Share

Ownership share	<50%	50%	>50% and <100%	100%
Mean of hours worked	49.4	48.7	47.3	48.9
Median of hours worked	50	50	50	50
Number of observations	619	329	366	2,021

Note: The calculation is based on 3,335 observations. The data source is wave 1989 to wave 2001 of the Survey of Consumer Finances (SCF). Hours worked is the self-reported hours worked in a typical week.

confirmed. There is evidence that underdiversification increases company profitability through the channel of increased effort. Underdiversification also has a sizable effect on hours worked. If SNWI A is increasing by one percentage point, then hours worked will increase by 8.6%. Ownership share has a significant positive coefficient as well. Here an increase of the ownership share by 1 percentage point will increase hours worked by 3.1%.

The effects of SNWI and ownership merit a deeper reflection. Incentives emanate not only from ownership, but also directly from underdiversification. Owner-managers whose financial well-being depends more on the success of their companies work harder. This could cast a new light on the literature discussing the incentive effects of stock ownership and stock option programmes for employed managers. So far, it was criticised that the income of employed managers is not sensitive enough to changes in the value of the company and that therefore incentives to exert effort would be too low (Jensen and Murphy (1990). However, our results show that ownership can have incentive effects through underdiversification, even if the ownership share is quite limited. This implication should be tested specifically for a sample of managers of large companies, because they are on average richer than the owner-managers in our sample. Also, the standard principal-agent models discuss the trade-off between risk and incentives only with regard to the variability of the labour income (see, for example, Murphy (1999)). Our results suggest that the wealth situation of the manager should be taken into account as well. The same compensation scheme can provide more incentives for a manager with a lower level of wealth, because the degree of underdiversification is then higher.

Some of the other control variables have an influence on effort as well. Owner-managers of larger companies work longer hours, but the age of the company mostly

Table 3.8: Underdiversification and Effort

Dep. variable: Ln hours worked				
	(1)	(2)	(3)	(4)
	SCF	SCF	SCF	SCF
	SNWI A		SNWI B	
SNWI	0.086***	0.095***	0.084***	0.094***
	(0.013)	(0.013)	(0.012)	(0.012)
SNWI * dummy high wealth		-0.054***		-0.054***
		(0.018)		(0.016)
Ownership share	0.031***	0.034***	0.029**	0.032***
	(0.012)	(0.012)	(0.012)	(0.012)
Company size	0.973***	1.18***	0.945***	1.17***
	(0.203)	(0.213)	(0.203)	(0.213)
Company age	0.510	0.055	0.055	0.059*
	(0.344)	(0.034)	(0.034)	(0.034)
Owner-manager age	1.09***	1.11***	1.08***	1.10***
	(0.186)	(0.186)	(0.186)	(0.185)
Square of owner-manager age	-0.014***	-0.014***	-0.014***	-0.014***
	(0.0017)	(0.0017)	(0.0017)	(0.0017)
Coeff. SNWI high wealth		*0.040***		*0.040***
		(0.020)		*(0.018)*
Number of observations	3,400	3,400	3,400	3,400
R squared	0.160	0.162	0.161	0.164

Note: *, **, *** indicate statistical significance at the 10, 5, and 1 percent level respectively. Robust standard errors are in parentheses. Columns (1) and (2) refer to SNWI A and columns (3) and (4) refer to SNWI B. The regressions contain controls for industry, year, education, ethnicity, sex, legal form and type of company acquisition.

doesn't matter. The age of the owner-manager has a significant influence. Hours worked increases until the age of 39 and then declines again.

Regression (2) allows for a different effect of underdiversification for richer owner-managers. As can be seen from the negative interaction term, richer owner-managers respond less to underdiversification. The total effect for the richer owner-managers can be calculated as the coefficient of the base category plus the coefficient of the

interaction term. The sum of the coefficients is 0.04 and is significant at the 5% level. Underdiversification has also an effect on effort for richer owner-managers, but it is smaller than for poorer ones. The difference between the effects is significant at the 1% level.

Regressions (3) and (4) use SNWI B as a measure for underdiversification. Their results are very similar to the ones already discussed.

3.6 Conclusions

Owners of private companies are often underdiversified. In this chapter we study whether underdiversification of owners increases company profitability. A positive effect could be driven by two mechanisms: higher required returns and higher effort. Kerins et al. (2004) show that underdiversification increases the cost of equity capital substantially. On theoretical grounds we would therefore expect that owners require a compensation for their exposure to idiosyncratic risk. However, Moskowitz and Vissing-Jørgensen (2002) find that returns to private equity are, on average, not higher than returns to public equity. So far, it remains unclear whether owners of private companies do not require a compensation for their exposure to idiosyncratic risk or whether other reasons are responsible for the relatively low returns to private equity. The Survey of Consumer Finances (SCF, wave 1989 to wave 2001) and the Survey of Small Business Finances (SSBF, wave 1998) are used for the analysis.

In our empirical analysis we find, first, a positive, significant relationship between underdiversification and the profitability of companies. This can be either due to higher effort or to higher required returns. This effect is also economically significant. For the SCF data, a one standard deviation increase in SNWI A increases return on equity by 28 percentage points. The effect of underdiversification is smaller for richer owners, which is consistent with decreasing relative risk aversion. Second, for a sub-sample of owners without an active management interest, we also find a positive, significant relationship between underdiversification and profitability. This supports the view that underdiversified owners require higher expected returns, since higher effort can be excluded as a cause. Here the size of the effect is also substantial. A one standard deviation increase in SNWI A increases return on equity by 19 percentage points. Third, for owners who are at the same time managers we establish a positive relationship between underdiversification and effort, measured as self-reported weekly hours worked. Owner-managers

who are financially more dependent on the success of their companies have a higher incentive to work hard.

The empirical findings of this chapter have important implications for our understanding of private companies. We show that underdiversified owners require higher returns as a compensation for the exposure to idiosyncratic risk. Since idiosyncratic risk is priced in private companies, it follows that the realisation of a business opportunity depends on the scale of the required investment in relationship to the net worth of the potential entrepreneur. If underdiversification drives the required return above the expected return of the project, then the business opportunity will not be realised. There remains the question of why average returns to private equity are not higher than average returns to public equity. Two likely explanations are that owners receive nonpecuniary benefits, such as utility from being ones own boss, or that owners are overoptimistic with respect to the future success of their companies.

Our finding that more underdiversified owner-managers work longer hours has implications for the efficacy and the design of managerial remuneration schemes. It has been noted that it is difficult to align the interests of managers and shareholders, when managers have a low ownership share (Jensen and Murphy (1990). But when the ownership share is high, underdiversification is very costly for managers. The evidence from our analysis suggests that underdiversification itself may induce managers to exert more effort. The strength of the incentives from a given scheme depends on the share of net worth of the manager that is tied to company performance.

The positive relationship between underdiversification and company profitability does not imply that underdiversified owners realise a gain. It is more likely that the higher profitability is a compensation for the exposure to idiosyncratic risk and for higher effort. This observation has an interesting implication for banks extending loans to companies. Since the banks do not suffer a disutility of their own from the owner's underdiversification but gain from the higher profitability, it can be concluded that companies with more underdiversified owners should find it easier to obtain bank finance. A test of this consideration will be attempted in future research.

3.7 Appendix

Table 3.9: Descriptive Statistics SCF - Owners With Management Interest

Variable	Mean	Median	Stdev.	Min	Max
Company information					
Number of employees	113	6	459	1	5000
Company age	16.4	14	11.9	1	71
Market value total equity (in m. US-$)	22.9	0.700	394	0.001	24,740
Return on equity (in %)	47.7	14.5	106	-18.7	1071
ROE weighted with equity (in %)	15.6				
Owner information					
Net worth (in m. US-$)	15.1	2.08	41.8	0.003	586
Private wealth (in m. US-$)	8.99	1.27	24.9	0.00003	333
SNWI A (in %)	33.7	29.1	25.0	0.039	99.9
SNWI B (in %)	37.3	32.8	26.6	0.039	99.9
Ownership share (in %)	75.9	100	32.4	0.001	100
Value primary residence (in m. US-$)	0.668	0.300	1.29	0	20
Dummy home ownership	0.932	1	0.252	0	1
Experience	29.6	29	13.2	0	85
Hours worked	48.8	50	18.0	1	133
Owner age	52.1	51	12.4	19	95
Dummy sex of owner	0.173	0	0.378	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 for the US economy.

Table 3.10: Descriptive Statistics SCF - Owners Without Management Interest

Variable	Mean	Median	Stdev.	Min	Max
Company information					
Market value equity share					
(in m. US-$)	3.14	0.300	12.47	0.001	200
Return on equity (in %)	18.7	1.88	61.2	-24.0	634
ROE weighted with equity (in %)	11.1				
Owner information					
Net worth (in m. US-$)	30.6	8.54	66.8	0.009	1018
Private wealth (in m. US-$)	27.4	7.17	63.17	0.003	1018
SNWI A (in %)	12.4	4.28	18.4	0.002	99.8
Value primary residence (in m. US-$)	1.09	0.600	1.74	0	20.0
Dummy home ownership	0.95	1	0.22	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 for the US economy.

Table 3.11: Descriptive Statistics SSBF

Variable	Mean	Median	Stdev.	Min	Max
Company information					
Number of employees	29.1	5	59.1	1	482
Company age	15.7	13	12.7	1	104
Book value total equity (in m. US-$)	0.993	0.090	3.77	0.001	87.0
Return on equity (in %)	119	41.4	190	-60.0	1006
ROE weighted with equity (in %)	42.1				
Owner information					
Net worth (in m. US-$)	1.59	0.468	4.55	0.002	116
Private wealth (in m. US-$)	1.06	0.325	3.75	0	115
SNWI A (in %)	27.7	20.9	24.8	0.004	100
SNWI B (in %)	33.5	24.6	29.3	0.041	100
Ownership share largest owner (in %)	79.6	100	27.8	1	100
Equity value primary residence (in m. US-$)	0.180	0.100	0.390	0	15
Dummy home ownership	0.900	1	0.302	0	1
Experience	20.2	20	12.0	0	72
Owner age	51.3	51	11.3	21	95
Dummy sex of owner	0.21	0	0.41	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 for the US economy.

Table 3.12: Industry Distribution SCF - Owners With Management Interest

Industry	No. of companies	% of companies
Agriculture	447	10.3
Construction, mining	410	9.5
Manufacturing	477	11.0
Retail, wholesale	670	15.5
Personal and business services	2,228	51.6
Very large companies, not classified	27	0.6
Industry unknown	65	1.5
Total	4,324	100

Table 3.13: Industry Distribution SSBF

Industry	No. of companies	% of companies
Mining, construction	230	9.8
Manufacturing	280	12.0
Transportation, communication, utilities	86	3.7
Retail trade	666	28.5
Services	1,075	46.0
Total	2,337	100

Table 3.14: Observations per SCF Wave - Owners With Management Interest

Wave	Number of companies	% of companies
1989	590	13.6
1992	915	21.2
1995	928	21.5
1998	934	21.6
2001	957	22.1
Total	4,324	100

Chapter 4

Underdiversification and the Financial Structure of Companies

4.1 Introduction

Private companies are restricted in the choice of financial resources they can tap. They have to rely on two main sources for their financing. On the one hand, equity is provided by a limited number of owners; on the other hand, loans are taken out from banks (Berger and Udell (1998)). The equity investment of owners consists often of a high share of the owners' personal net worth. Hence owners of private companies are typically underdiversified (Moskowitz and Vissing-Jørgensen (2002)). Since underdiversification increases the cost of equity capital substantially (Kerins et al. (2004) and Heaton and Lucas (2000*a*)), we would expect it to have an important influence on the financial structure of the company.

In this chapter we investigate the role of bank financing for private companies with underdiversified owners. To a certain degree equity and bank financing are substitutes. Since the cost of equity capital increases with underdiversification, we hypothesise that owners with a higher degree of underdiversification have a higher demand for bank finance. As we have seen in chapter 3 that companies with more underdiversified owners are more profitable, we also expect that supply of loans is increasing in underdiversification. From these considerations it follows that underdiversification should be related to higher leverage. There is no clear prediction for the equilibrium interest rate, since demand and supply effects point in opposite directions. We also hypothesise that liquid asset holdings are lower if owners are more highly underdiversified, because the

opportunity costs for liquid assets are higher.

Understanding the basic mechanisms in the financing of private companies is important, since private companies contribute a large share to the overall economic activity, not only in developing countries but in industrialised countries as well. For example, about 50 percent of the employees in the US are on the payroll of companies with fewer than 500 employees (Small Business Administration (2003)). The overall economic performance of a country is therefore influenced by the conditions in which private companies do business. In order to be able to provide a good environment for private companies, it is important to understand how they work. This chapter is an attempt to understand the financing side better.

The empirical analysis is based on the 1998 wave of the Survey of Small Business Finances (SSBF). This is the only wave providing information on the personal wealth of owners. The survey gives not only a detailed account of the financial structure of private companies, but also information on the most recent loan application. This allows us to investigate the role of underdiversification on the demand for and the supply of bank loans, on leverage and on liquid assets holdings. Empirically, underdiversification is measured as the share of personal net worth that is invested in the company.

Our hypotheses are broadly confirmed by the data. More underdiversified owners confronted with a higher cost of equity capital have a higher demand for bank loans. Underdiversification increases not only the probability of a loan application, it also increases the loan volume applied for. With respect to the supply of loans our expectation was not confirmed. Underdiversification has no strong influence on the probability that a loan application is approved. As hypothesised, there is a significant positive and large effect of underdiversification on leverage. There is no clear prediction on the interest rate and in the empirical analysis we also find that underdiversification does not influence the interest rate. With respect to liquidity, we find a clear negative relationship between underdiversification and liquidity. This confirms that the opportunity costs of liquid asset holdings are higher for owners with a higher degree of underdiversification.

These findings add to our understanding of how underdiversification of owners affects the financial structure of private companies. Owners try to reduce their risk exposure from underdiversification with the help of additional bank finance. This also implies that the availability of bank finance is important for the scope of business activities that private companies engage in.

The remaining part of this chapter is structured as follows: Section 4.2 discusses the

related literature, Section 4.3 defines variables that are new to this chapter, Section 4.4 describes the estimation strategy and develops the hypotheses tested, Section 4.5 shows the empirical results, and Section 4.6 concludes.

4.2 Related Literature

In this chapter we analyse whether the underdiversification of owners of private companies has an effect on the demand and availability of bank loans. So far, there are no studies on the effect of underdiversification on the capital structure of private companies, but the general role of personal wealth for company performance and loan availability is discussed in the literature.

The personal wealth of owners is found to be important, first, for the decision to become an entrepreneur and, second, for the success of the company. Cressy (2000) models the decision between self employment and paid work. In a framework in which absolute risk aversion decreases with wealth, self employment becomes relatively more attractive for rich individuals, since for them the risk of self employment is a smaller burden. As further result the model shows that richer entrepreneurs optimally choose a larger self-financed capital stock for their companies.

On the empirical side, Cressy (1996*b*) analyses data on bank overdrafts from UK start up companies with respect to loan conditions and company survival. It is found that the survival probability is increased if the entrepreneur has used personal money to start up. Furthermore, banks agree to higher overdraft limits if more collateral, here measured as house equity, is available. Therefore owner wealth plays an important role. However, Cressy (1996*a*) warns that human capital needs to be taken into account when investigating the role of finance for survival. Once the human capital of the entrepreneurs is accounted for in this empirical analysis, there is no influence any more of type of financing used for start up and of home equity available as collateral on company survival.

Personal wealth also affects the availability of bank loans. This mechanism is studied by Cavalluzzo and Wolken (2002). The authors hypothesise that higher private wealth improves credit availability, since personal assets can be used as collateral for the business loans. Using the 1998 wave of the Survey of Small Business Finances, the authors find that higher personal wealth reduces the probability of a loan denial. They can therefore confirm their hypothesis.

Our analysis is also concerned with the role of underdiversification on the equilibrium interest rate on bank loans. Up to now, the price for bank loans extended to private companies has been mainly discussed by studies with a focus on lending relationships. For a sample of US companies, Berger and Udell (1995) find that the duration of a relationship reduces the interest rate charged for lines of credit. Also using data from the US, Petersen and Rajan (1994) find no significant influence for the length of the relationship, but find that borrowing from a number of banks increases the interest rate. The authors of this study took several types of credit into account. Harhoff and Körting (1998) base their analysis on a survey of German companies. They find that neither the length of the relationship nor the number of lenders has an influence on the interest rate charged for lines of credit.

4.3 Data

The Survey of Small Business Finances (SSBF) is used for the empirical analysis. This survey is well suited for our study, because it provides detailed information on the financing of small companies. Included is information on the most recent loan application and on the financial structure of the companies. The investigation is restricted to the wave from 1998, since previous waves do not include information on the net worth of owners. A detailed description of the data set can be found in chapter 3, section 3. The criteria for inclusion of an observation into the sample are the same as in chapter 3. The data source for the prime rate, the term structure spread and the default spread is the Federal Reserve Bank of St. Louis.[1] We only define the variables that are new in this chapter.

Interest rate is the original interest rate on the most recent loan. This information is available if the company obtained a new loan within the last three years prior to the survey. The lowest and highest 1% of observations is trimmed in order to eliminate implausible values.

Risk premium is the difference between the interest rate on the most recent loan and the yield of a US government security with the same maturity as the loan. The risk premium is constrained to be non-negative.

[1]The Federal Reserve Bank of St. Louis provides the FRED II database (Federal Reserve Economic Data II), which contains economic time series. The database can be accessed via http://research.stlouisfed.org/fred2/.

The **Prime rate** is defined by The Wall Street Journal as "the base rate on corporate loans posted by at least 75% of the nation's 30 largest banks". The prime rate is the risk-free rate plus the risk premium for the bank's best customers. It is used as a control for the overall level of interest rates at the time the most recent loan was applied for.

The **Term structure spread** is the difference between the yield of a US government security of the same maturity as the company loan minus the yield of a US government security with a one year maturity. This variable is set to zero for loans with a variable interest rate and for loans without fixed maturity.

The **Default spread** is the difference between the average yield on corporate bonds rated 'Baa' by Moody's and the yield on US government securities with a ten year maturity.

Leverage is the sum of all debts and liabilities divided by total assets.

Liquidity is cash divided by total assets. The following assets are included in cash: the total amount of cash on hand, in checking, savings and money market accounts, certificates of deposit, and other time deposits. For this variable, the lowest and highest 5% of entries are excluded because of implausible values. For example, 3% of companies reported 100% liquidity.

4.4 Hypotheses and Estimation Strategy

The theoretical literature suggests that underdiversification increases the cost of equity capital. Since in equilibrium the marginal cost of equity capital should be equal to the marginal cost of debt capital, we would expect that owners with a higher degree of underdiversification have a higher demand for bank loans. Bank loans can be used to reduce the own financial commitment in case the company doesn't grow or to grow the company without additional own investment. From this consideration we derive the first hypothesis:

Hypothesis 1 (demand for loans): Owners with a higher degree of underdiversification have a higher demand for bank loans.

The data set allows three possibilities to measure demand for loans. It includes the information whether an application for a new loan was made in the three years preceding the survey, whether credit was needed but no application was made because

a denial was expected, and it also includes the loan volume applied for in the most recent loan.

In chapter 3 we found that underdiversification is related to higher company profitability. The mechanisms identified are higher required returns and better incentives. Since the banks do not suffer from the underdiversification of owners but gain from the higher profitability, we would expect that banks are more willing to lend to owners with a higher degree of underdiversification. From the SSBF data we can use the information on whether the applications for new loans were successful in the last three years.

Hypothesis 2 (supply of loans): The probability of a loan denial is lower for more highly underdiversified owners.

In addition, it would be desirable to test hypotheses about the demand for leverage and the supply of leverage as a function of the interest rate. In order to do this, a structural model would be needed. However, the data set does not include variables that would shift *only* the demand or *only* the supply curve. It is therefore not possible to identify the structural model. Nevertheless, it is possible to test hypotheses concerning the reduced form for leverage and for the interest rate. We can discuss how underdiversification affects equilibrium values of leverage and of the interest rate. Furthermore, the reduced form expressed in the structural parameters can be used as a framework for the discussion of identified effects in the regressions concerning demand for and supply of loans.

In the following simplified demand and supply equation, we consider underdiversification as the only shift variable to keep notation simple. The final empirical specification is richer and controls for additional influences. The variable lev denotes any potential value of leverage that separately fulfills the demand and supply functions. It is *not* an equilibrium value.[2]

$$i^d(\mathsf{lev}) = \alpha_1 + \gamma_1 \mathsf{lev} + \beta_1 SNWI + \epsilon_1 \tag{4.1}$$

$$i^s(\mathsf{lev}) = \alpha_2 + \gamma_2 \mathsf{lev} + \beta_2 SNWI + \epsilon_2 \tag{4.2}$$

The interest rate is written as a function of any value of leverage in the demand and supply equation. The empirical analysis does not allow us to identify γ_1, β_1, γ_2 and

[2]We follow here the excellent discussion of simultaneous equations models in Wooldridge (2002, p. 209ff.).

β_2 separately. We only identify a combination of the four coefficients in the reduced form. However, it is helpful to hypothesise about the sign of each of the coefficients and from this to deduce a prediction for the sign of the coefficients in the reduced form. For standard demand and supply equations, we expect the demand for leverage to decrease with the interest rate (γ_1 negative) and the supply of leverage to increase with the interest rate (γ_2 positive). Since underdiversification increases the cost of equity capital, we expect that more underdiversified owners are willing to pay higher interest rates in order to obtain a bank loan (β_1 positive). We have seen in chapter 3 that underdiversification is positively related to company performance. We therefore expect that, in a competitive environment, banks offer cheaper interest rates to more underdiversified owners (β_2 negative).

The data set provides us only with information on the *equilibrium* interest rate, i, and the *equilibrium* leverage, lev, equating demand and supply.

$$i = i^s(lev) = i^d(lev) \tag{4.3}$$

Using this equilibrium condition, we can equate demand and supply side interest rates in (1) and (2) and solve for the reduced form of leverage.

$$lev = \frac{\alpha_2 - \alpha_1}{\gamma_1 - \gamma_2} + \frac{\beta_2 - \beta_1}{\gamma_1 - \gamma_2} SNWI + \frac{\epsilon_2 - \epsilon_1}{\gamma_1 - \gamma_2} \tag{4.4}$$

Equivalently, introducing new notation for the coefficients that can be identified, the reduced form can be written as:

$$lev = \pi_{11} + \pi_{12} SNWI + \nu_1 \tag{4.5}$$

Taking together the previous discussion on the signs of γ_1, β_1, γ_2 and β_2, it follows that π_{12} will be positive. We therefore expect a positive relationship between underdiversification and leverage in the reduced form. Both demand and supply factors work in the direction of higher leverage for higher values of SNWI.

Hypothesis 3 (leverage): In the reduced form for leverage, we expect a positive coefficient for SNWI. Influences from both the demand and the supply side promote higher leverage.

These considerations can be repeated for the reduced form of the interest rate. It will also be possible to derive the sign of the coefficients of the reduced form from

the coefficients of the structural demand and supply equation. We solve the structural forms (1) and (2) for the interest rate by multiplying equation (1) with γ_2 and (2) with γ_1. Solving both equations for $\gamma_2\gamma_1 lev$ and setting them equal, we can single out the equilibrium interest rate, i.

We thus obtain the reduced form for the interest rate:

$$i = \frac{\gamma_2\alpha_1 - \gamma_1\alpha_2}{\gamma_2 - \gamma_1} + \frac{\gamma_2\beta_1 - \gamma_1\beta_2}{\gamma_2 - \gamma_1} SNWI + \frac{\gamma_2\epsilon_1 - \gamma_1\epsilon_2}{\gamma_2 - \gamma_1} \tag{4.6}$$

Or simplified:

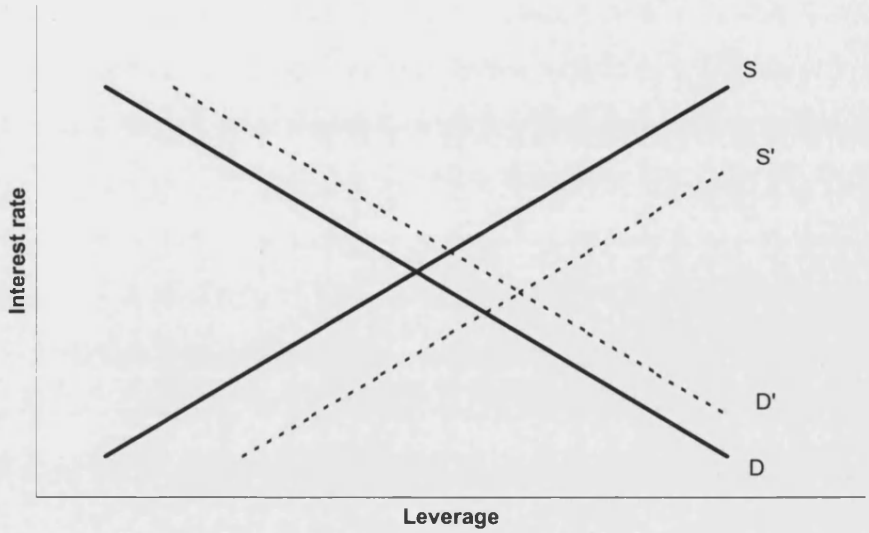
$$i = \pi_{21} + \pi_{22} SNWI + \nu_2 \tag{4.7}$$

The sign of π_{22} in the reduced form depends on the relative size of the demand and supply shifts due to SNWI. The term $\gamma_2 - \gamma_1$ is always positive. $\gamma_2\beta_1$ relates to the shift in the demand function and $\gamma_1\beta_2$ relates to the shift in the supply function. If the shift in the supply function exceeds the shift in the demand function ($\gamma_2\beta_1 - \gamma_1\beta_2$ negative), then π_{22} is negative and a lower interest rate is predicted for higher values of underdiversification. However, if the shift in the demand function exceeds the shift in the supply function ($\gamma_2\beta_1 - \gamma_1\beta_2$ positive), the relationship between underdiversification and interest rate will be positive. Intuitively, there are two counteracting influences on the interest rate. On the one hand, more highly underdiversified owners face a higher cost of capital and are therefore willing to pay a higher interest rate in order to obtain bank loans. On the other hand, underdiversification functions as a signal of company quality and therefore decreases the interest rate charged by banks.

Hypothesis 4 (interest rate): In the reduced form for the interest rate the influence of SNWI is ambiguous. The sign of the coefficient for SNWI depends on whether the demand or the supply effect dominates. We hypothesise that the shift in the demand curve is smaller than the shift in the supply curve and that therefore SNWI will have a negative effect on the interest rate.

The change in the equilibrium value of leverage and interest rate that results from a change in SNWI is illustrated in figure 4.1. The original demand and supply curves for leverage are denoted by D and S, whereas the demand and supply curves after an increase in SNWI are denoted by D' and S'.

Figure 4.1: Change in Market Equilibrium



It can be seen that leverage increases unambiguously after an increase in SNWI. The effect on the interest rate depends on the relative size of the shift in the demand and supply curve. The figure depicts a decrease in the interest rate through a relatively larger shift in the supply curve.[3]

In order to complement our understanding of the financial structure of private companies, we also consider liquid asset holdings inside the company. We expect a negative influence of SNWI on liquidity. Since owners with a higher degree of underdiversification face a higher cost of equity capital, it is more costly for them to keep liquid assets inside the company. The opportunity costs of liquidity are higher.

Hypothesis 5 (liquidity): Owners with a higher degree of underdiversification hold lower liquidity in their companies.

[3]The whole analysis is done under the ceteris paribus assumption. For example, the demand function shows how the demand for leverage changes for different interest rates with SNWI held constant. In practise, the additional loans that lead to an increase in leverage could be used to decrease equity as a result of which SNWI would decline. Alternatively, one can say the that the implicit assumption is used that additional loans are used to increase the total assets of the company and not to substitute equity capital. The shift in SNWI is also considered under the ceteris paribus assumption. Otherwise, a change in SNWI that is caused by a change in equity, would also influence leverage if total assets wouldn't change in the same proportion.

4.5 Empirical Results

4.5.1 Endogeneity of Regressors

In the empirical analysis we need to be concerned with the potential endogeneity of regressors. We discuss the reasons for potential endogeneity in turn for each specification.

When analysing the determinants of leverage we consider the possibility of reverse causality. Owners may adapt the share of net worth invested (SNWI) in response to the availability of bank loans. If we want to identify the *effect* of SNWI *on* leverage, we need to instrument the regressor. The ownership share can also be influenced by the availability of bank loans and therefore by leverage. If bank financing is not available and the original owner has not enough resources to meet to total investment requirement, it can be necessary to take on an additional owner. The ownership share of the original owner would decrease as a result.

There is a second argument for instrumenting SNWI. Most of the small companies included in the SSBF are not required by law to draw up a balance sheet. We therefore need to worry about measurement error in the variables based on total assets. Since the book value of equity is not asked explicitly but calculated as the difference between total assets and total liabilities, the measurement error is transferred to variables based on equity as well. SNWI is therefore affected by the same measurement error as is leverage. If we instrument SNWI, we control for measurement error as long as the instruments are unrelated to the measurement error. This measurement error is non-standard, because the same error is affecting both the dependent and an independent variable.

For the interest rate specification it is less clear whether instruments are required. With respect to reverse causality, it can be argued that owners who only receive bank loans with high interest rates will find it relatively more attractive to invest own money and will therefore have higher values of SNWI. The effect should, however, only be small. It is also not to be expected that the interest rate on the most recent loan will have a significant influence on the ownership share of the largest owner. There is no need to worry about non-standard measurement error in this specification, since the interest rate does not contain the variable total assets. We calculated both OLS and IV estimates, but chose to present only the IV estimates, since the results were very

similar.

When studying the influence of underdiversification on liquid asset holdings inside the company, reverse causality is a minor point. Since liquidity can be easily adjusted, at least to lower levels, we do not expect that liquidity influences either SNWI or ownership share. However, we do instrument SNWI in order to control for non-standard measurement error.

We use almost the same instruments as in chapter 3. The only difference is that we neither include the value of the primary residence nor a dummy for home ownership. Private residences can be used as collateral for business loans and can therefore influence the leverage of a company as well as the interest rate that is charged for a business loan. However, the instruments age and sex of owner as well as type of company acquisition should not be related to leverage, once company characteristics such as age of company and size of company are controlled for. These instruments should also not be related to the interest rate on the most recent loan, because we control for many loan characteristics, such as loan type, dummies for guarantee or collateral required and a dummy for a fixed interest rate. For the liquidity regression our most important concern is measurement error and not endogeneity. We expect that the instruments are unrelated to the measurement error.

Table 4.1 shows the first stage regression results. From columns (1) and (2) it can be seen that the age of the owner has a significant negative influence on underdiversification. Older owners had more time to build up wealth outside the company. Also, women are less underdiversified and owners who purchased or inherited the company are more underdiversified than owners who founded their company. The instruments are individually significant at least at the 5% level and are jointly significant at the 1% level. As can be seen from column (3), the instruments are individually significant at at least the 5% level and are jointly significant at the 1% level. As also can be seen from column (3), the instruments for ownership share are weak. The only significant effect is a reduced ownership share for companies that are inherited. From the F-test it follows that the instruments are jointly significant to only the 12 per cent level. In addition, Shea's partial R squared is very low at 0.003. From these results it can be expected that instrumented ownership share will lack significance in at least some of the second stage regressions. However, for the analysis of this chapter the regressor SNWI is of most interest.

Table 4.1: First Stage Regression Results

Dep. variable:	SNWI A	SNWI B	Ownership share
	(1)	(2)	(3)
Owner age	-.321***	-0.397***	-0.079
	(.059)	(0.068)	(0.053)
Dummy sex of owner	-3.34***	-4.67***	-1.02
	(1.18)	(1.36)	(1.07)
Dummy purchased	5.47***	6.06***	-1.14
	(1.19)	(1.37)	(1.08)
Dummy inherited	6.70***	4.81**	-3.26*
	(1.95)	(2.25)	(1.78)
Number of observations	2,595	2,595	2,595
F-test of excluded instruments	17.6*** F(4, 2564)	18.1*** F(4, 2564)	1.81 F(4, 2564)
Shea's partial R squared	0.027	0.026	0.0028
R squared	0.136	0.178	0.429

Note: *, **, *** indicate statistical significance at the 10, 5, and 1 percent level respectively. Robust standard errors are in parentheses. The regressions contain additional controls for industry, education, experience, ethnicity and legal form.

4.5.2 Demand for and Availability of Bank Loans

4.5.2.1 Demand for Bank Loans

In this subsection we present evidence that relates to hypothesis 1. We test whether owners with a higher degree of underdiversification have a higher demand for bank loans.

Table 4.2 shows the incidence of loan applications in the three years preceding the survey in relationship to the owner's underdiversification. It is important to note that the survey asks specifically for applications for *new* loans. Loan renewals are excluded. The share of companies that have applied at least once for a new loan is increasing in SNWI. The difference between the lowest and the highest category of SNWI is significant at the 1 percent level. This is a first indication that underdiversification is perceived as a burden that can be reduced with bank loans.

Table 4.2 also shows whether a need for credit existed, but the owner did not apply

Table 4.2: Tabulation – Demand for Bank Loans

Applied for New Loans in the Last Three Years			
	Yes (%)	**No (%)**	**No. of Obs.**
Lowest third SNWI A	18.9	81.1	857
Middle third SNWI A	27.2	72.8	856
Highest third SNWI A	32.4	67.6	882
Not Applied for a Loan Because Denial Expected			
	Yes (%)	**No (%)**	**No. of Obs.**
Lowest third SNWI A	14.2	85.8	857
Middle third SNWI A	18.1	81.9	856
Highest third SNWI A	21.3	78.7	882
Loan Volume Applied For			
	Mean (US-$)	**Median (US-$)**	**No. of Obs.**
Lowest third SNWI A	197,512	35,000	132
Middle third SNWI A	245,689	42,000	192
Highest third SNWI A	883,333	100,000	241

Note: SNWI A is defined as ownership share times total value of equity divided by net worth. The cut-off points for the categories of SNWI A are 9.1% and 30.6%.

for a loan because a denial was expected. The share of those companies is also increasing in SNWI. The difference between the lowest and the highest category of SNWI A is significant at the 1 percent level as well. Together with the results on loan applications it follows that a higher degree of underdiversification is related to an increased need for bank finance that manifests itself either in more loan applications or, at least, in a need for credit even if no application follows.

The loan volume applied for is a further indicator for the demand of bank loans. As can be seen in table 4.2 as well, the volume of bank loans applied for is increasing in underdiversification. The difference between the middle third and the highest third of SNWI is especially pronounced and significant at the 1 percent level. The dollar amount of granted loans is similarly increasing in SNWI (not reported).

These results on the demand for bank loans are in line with findings from the theoretical literature. The theoretical models have shown that cost of equity capital is strongly increasing in the underdiversification of owners. It can therefore be expected that more

underdiversified owners have a higher demand for bank loans as an alternative source of financing.[4] Owners with a higher degree of underdiversification have an interest in reducing their financial exposure to the company.

We now turn to the multivariate analysis of the data. Table 4.3 presents probit regressions on the demand for bank loans. Both measures of underdiversification, SNWI A and SNWI B, are used as controls.[5] Columns (1) and (2) confirm that SNWI increases the probability of loan applications. Owners with a higher degree of underdiversification approach banks more often in order to obtain additional funds. According to the regression specification in column (1), a one standard deviation increase in SNWI A leads *ceteris paribus* to an increase in the probability of a loan application of 5.8 percentage points. As in the whole data set the probability of an application for a new loan is only 26.2%, the influence of underdiversification is quite substantial. The probability of applying for a new loan is decreasing in the ownership share of the largest owner. Without further investigation it is not possible to know what drives this result. It could be that owners with a high ownership share are reluctant to share control, not only with other owners, but also with banks. Companies with higher leverage, i.e. companies who have more heavily applied for loans in the past, are more likely to apply for new loans in the present as well. As can be expected, larger and younger companies also have a higher demand for new loans.

Columns (3) and (4) report the determinants of not having applied for a loan because a denial was expected. The probability of not having applied for a loan for this reason is increasing in SNWI. Using the result from column (3), a one standard deviation increase in SNWI A leads to an increase in this probability of 4.6 percentage points. When comparing this figure to the 17.9% of companies in the overall sample that did not apply for a loan because a denial was expected, it can be seen that underdiversification has an important effect on the need for bank loans. The ownership share is not influential for the decision not to apply. The other control variables are as expected. More highly levered, smaller and younger companies have a higher probability of not applying for a loan because they expect a denial.

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[4]This last point is also reflected in a survey question about the most important business problem. Companies in the lowest third of the SNWI A distribution state financing and interest rates less often as most important business problem.

[5]SNWI A is defined as ownership share times total value of equity divided by net worth. SNWI B adds personal assets used as collateral, guarantees and loans to the company to the equity value.

Table 4.3: Probit Estimations – Demand for Bank Loans

Dep. variable	Loan Application		Not applied - denial expected	
	(1)	(2)	(3)	(4)
	SNWI A	SNWI B	SNWI A	SNWI B
SNWI	0.755***	0.607***	0.832***	0.691***
	(0.113)	(0.098)	(0.133)	(0.114)
Ownership share	-0.260**	-0.274**	0.110*	0.093
	(0.130)	(0.113)	(0.157)	(0.159)
Leverage	0.012***	0.010***	0.0067***	0.0052***
	(0.001)	(0.001)	(0.0011)	(0.0011)
Company size	0.0011**	0.0011**	-0.0063***	-0.0065***
	(0.0005)	(0.0005)	(0.0015)	(0.0015)
Company age	-0.0092***	-0.0089***	-0.014***	-0.014***
	(0.0030)	(0.0030)	(0.0049)	(0.0050)
No. of observations	2,595	2,595	2,595	2,595
Pseudo R squared	0.100	0.099	0.130	0.129

Note: *, **, *** indicate statistical significance at the 10, 5, and 1 percent level respectively. Robust standard errors are in parentheses. The dependent variable 'loan application' equals one if an application for a new loan occurred in the last three years. The dependent variable 'not applied - denial expected' equals one if a loan was needed but no application was made because a denial was expected. SNWI and ownership share are expressed as ratios. The regression also includes controls for industry, education, experience, ethnicity and legal form.

Table 4.4 presents the results of an OLS regression on the factors influencing the loan volume applied for. A higher degree of underdiversification leads to demand for loans with a higher volume. Specifically, a one standard deviation increase in SNWI A increases the loan volume applied for by US-$ 229,500. The ownership share of the largest owner has a negative effect on the loan volume. Larger companies apply for a greater volume, but the age of the company has no effect.

As a summary of the previous empirical results, it can be stated that all univariate results are confirmed by the multivariate analysis. We therefore see that the results are robust and are not driven by the inclusion of specific controls. More highly underdiversified owners have a higher demand for bank loans, which confirms hypothesis 1. All three possibilities to capture demand for loans point in the same direction. A higher degree of underdiversification leads to a higher probability of applying for a new loan,

Table 4.4: Loan Volume Applied for

Dependent variable: Loan volume		
	(1)	(2)
	SNWI A	SNWI B
SNWI	8.760***	5.353**
	(2.870)	(2.144)
Ownership share	-10.539***	-10.544***
	(3.132)	(3.103)
Company size	7.621***	7.809**
	(2.339)	(2.483)
Company age	1.774	1.596
	(9.602)	(9.810)
Number of observations	565	565
R squared	0.234	0.227

Note: *, **, *** indicate statistical significance at the 10, 5, and 1 percent level respectively. Robust standard errors are in parentheses. The regressions also include controls for industry and legal form.

a higher probability of needing credit but not applying because a denial is expected, and finally, higher loan volumes applied for.

4.5.2.2 Availability of Bank Loans

The success of loan applications can also be influenced by the underdiversification of owners. Since underdiversification increases the profitability of companies, we expect a positive effect. It is possible to differentiate between loan applications always approved, always denied, and both approved and denied. Table 4.5 shows that there is no clear pattern in the data for the relationship between SNWI and loans always approved. The percentage of loans always approved remains almost constant. The percentage of loans always denied is slightly decreasing in SNWI. The difference between the SNWI categories is rather small, however, and the variation is mostly driven by the both approved and denied case.

The multivariate analysis in table 4.6 gives a similar picture. SNWI A has a weakly negative influence on the success of loan applications, but SNWI B has no significant effect at all. There is therefore no strong relationship between underdiversification and

Table 4.5: Tabulation – Success of Loan Application

	Always approved (%)	**Always denied (%)**	**Both (%)**	**No. of Obs.**
Lowest third SNWI A	76.5	17.3	6.2	162
Middle third SNWI A	78.1	15.0	6.9	233
Highest third SNWI A	76.2	15.0	8.7	286

Note: SNWI A is defined as ownership share times total value of equity divided by net worth. The cut-off points for the categories of SNWI A are 9.1% and 30.6%.

Table 4.6: Ordered Probit – Success of Loan Application

Dep. variable	Approved	
	(1)	(2)
	SNWI A	SNWI B
SNWI	-0.838*	-0.525
	(0.437)	(0.365)
Ownership share	0.036	0.029
	(0.482)	(0.485)
Leverage	0.0052	0.0067*
	(0.0039)	(0.0038)
Company size	0.0097***	0.0093***
	(0.0034)	(0.0033)
Company age	0.040***	0.041***
	(0.015)	(0.015)
Number of observations	681	681
Pseudo R squared	0.148	0.146

Note: *, **, *** indicate statistical significance at the 10, 5, and 1 percent level respectively. Robust standard errors are in parentheses. 'Approved' is coded as three if loan applications have always been approved, as two if they have been approved and denied and as one if they have always been denied. SNWI and ownership share are expressed as ratios. The regression also includes controls for industry, education, experience, ethnicity and legal form.

loan approvals. Hypothesis 2 proposed a positive effect of underdiversification on loan approvals. This hypothesis cannot be confirmed with the data. We have already seen that underdiversification has a positive influence on the likelihood of a loan application. If owners with a higher degree of underdiversification apply more often for a loan, it is possible that their average quality is lower in ways that we cannot observe. This would explain why we do not find a positive influence of SNWI on the probability of an approval. The other control variables show that larger and older companies have a higher approval rate as could be expected.

Of the other regressors, both company size and company age have a positive influence on loan approvals.

4.5.3 Equilibrium Values of Leverage and Interest Rate

In this subsection we discuss the results for the reduced form specifications for leverage and the interest rate. The number of observations in the two reduced forms differ, because the interest rate on the most recent loan is only available, if the company has taken out a new loan in the three years preceding the survey. The leverage information, on the other hand, is available for all companies.

Table 4.7 displays the effect of share of net worth invested on leverage. SNWI has a positive, significant coefficient. Owners with a higher degree of underdiversification choose a higher level of leverage. This is to be expected, since a higher degree of underdiversification increases the cost of equity capital. Owners may be willing to pay higher interest rates in order to obtain additional bank loans. In addition, we found in chapter 3 that underdiversification increases company profitability. Banks may therefore increase their supply of loans to such companies. The influence of underdiversification 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 16.5 percentage points. These results confirm hypothesis 3.

It is of interest to discuss this result in light of the previous results on the demand for and supply of bank loans. Referring to the structural form of demand and supply of leverage (equations (1) and (2)), it is conceivable that the coefficient β_2 is zero, since we found no relationship between loan approvals and underdiversification. β_2 gives the influence of SNWI on the interest rate charged by banks. We can deduce that underdiversification may also have no influence on the interest rate. However, even if

Table 4.7: Reduced Form for Leverage

Dep. variable: Leverage		
	(1)	(2)
	SNWI A	SNWI B
SNWI	0.627***	0.562***
	(0.211)	(0.156)
Ownership share	0.895	0.529
	(0.735)	(0.644)
Company size	0.081	0.040
	(0.071)	(0.065)
Company age	-0.115	-0.111
	(0.140)	(0.117)
Number of observations	2,595	2,595
Overidentification test, χ^2 (dof, p-value)	0.974 (2, 0.61)	0.856 (2, 0.65)

Note: *, **, *** indicate statistical significance at the 10, 5, and 1 percent level respectively. Robust standard errors are in parentheses. The regressors SNWI and ownership share are instrumented. The regressions contain controls for industry, education, experience, ethnicity and legal form.

β_2 is zero, we still obtain a positive π_{12} in the reduced form (5).

Ownership share has a positive but insignificant influence on leverage. The insignificance of the coefficient can be influenced by the weakness of the instruments with respect to ownership share.[6] The controls for company size and company age have also no influence on leverage. The test of overidentifying restrictions is passed for both regressions. The instruments are therefore valid from a statistical point of view.

Table 4.8 presents a tabulation of the interest rate on the most recent loan according to the three categories of SNWI A. The univariate analysis shows an inverse relationship between underdiversification and the interest rate. The difference in the interest rate between the lowest and the highest third of SNWI A is significant at the 5 percent level. As chapter 3 has shown, underdiversification indeed increases company profitability. If banks then see high underdiversification as a signal for company quality, it is to be

[6]Ownership share has a significant negative effect on leverage, if the regressor is not instrumented. This fits well with the previous results showing a negative effect of ownership share on both the probability of a loan application and on the loan volume applied for.

expected that owners with a higher degree of underdiversification obtain cheaper loans. However, it was already shown that owners with a higher degree of underdiversification have a higher demand for loans. If they are also willing to pay a higher interest rate in order to obtain a loan, then it is a priori not clear in which direction the relationship between underdiversification and the interest rate goes.

Table 4.8: Tabulation – Interest Rate on Most Recent Loan

	Mean (%)	**Median (%)**	**No. of Obs.**
Lowest third SNWI A	9.20	9.00	132
Middle third SNWI A	8.94	8.95	192
Highest third SNWI A	8.70	8.50	241

Note: SNWI A is defined as ownership share times total value of equity divided by net worth. The cut-off points for the categories of SNWI A are 9.1% and 30.6%.

Table 4.9 shows the reduced form for the interest rate. Columns (1) and (2) use only the risk premium of the most recent loan as dependent variable, whereas columns (3) and (4) use the interest rate as a whole. The results in columns (1) and (2) are quite similar. In contrast to the univariate results, there is no significant effect from underdiversification on the interest rate. The coefficient of SNWI is, however, negative. Hypothesis 4 considers the case that the shift in the demand curve is smaller than the shift in the supply curve and that therefore SNWI will have a negative effect on the interest rate. This cannot be confirmed. The effect of SNWI on the demand for and supply of leverage leads to a new equilibrium situation where the interest rate remains largely unchanged. When taking as given from the previous discussion that β_2 is zero, then it follows that the supply curve in figure 4.1 will not be shifted by an increase in SNWI. For this to be consistent with an unchanged interest rate, we need to have a supply function that is almost flat, i.e. a value of γ_2 that is close to zero. Banks may be unwilling to increase interest rates for higher level of leverage, because this would aggravate problems of moral hazard (Stiglitz and Weiss (1981)). This in turn implies that the coefficient of SNWI in the reduced form (7) will be close to zero. We can therefore conclude that underdiversification has no strong effect on the size of the interest rate in the structural equation describing the supply side influence on the interest rate. The ownership share of the largest owner has a positive influence on the

Table 4.9: Reduced Form for Interest Rate

Dependent variable:	Risk Premium		Interest Rate	
	(1)	(2)	(3)	(4)
	SNWI A	SNWI B	SNWI A	SNWI B
Company controls				
SNWI	-0.010	-0.021	-0.003	-0.018
	(0.036)	(0.031)	(0.047)	(0.040)
Ownership share	0.062	0.070	0.097*	0.105*
	(0.047)	(0.049)	(0.059)	(0.061)
Company size	0.001	0.003	0.003	0.005
	(0.005)	(0.006)	(0.007)	(0.007)
Company age	-0.014	-0.014	-0.004	-0.004
	(0.014)	(0.015)	(0.020)	(0.020)
Interest rate controls				
Default Spread	0.607*	0.600*	0.230	0.263
	(0.320)	(0.332)	(0.576)	(0.591)
Prime Rate			1.072	1.133
			(0.692)	(0.704)
Term Structure Spread			1.026	1.151
			(0.781)	(0.808)
Number of observations	565	565	565	565
Overidentification test χ^2 (dof, p-value)	1.86 (2, 0.395)	1.32 (2, 0.518)	1.38 (2, 0.502)	1.14 (2, 0.566)

Note: *, **, *** indicate statistical significance at the 10, 5, and 1 percent level respectively. Robust standard errors are in parentheses. The regressors SNWI and ownership share are instrumented. The regression contains the following characteristics of the loan: loan type, compensating balance required, guarantee required, collateral required and loan has a fixed interest rate. The regression also includes controls for industry, education, experience, ethnicity and legal form.

interest rate, which is only marginally significant, however.[7]

As further control, the variable default spread captures the market price for risk in corporate bonds. The default spread is defined as the difference between the average yield on corporate bonds rated 'Baa' by Moody's and the yield on US government

[7]Ownership share has a marginally significant, positive effect on the interest rate, if the regressor is not instrumented.

securities with a ten year maturity. This variable has a positive effect on the risk premium that private companies have to pay for their loans. Of the company control variables neither company size nor company age has a significant effect on the risk premium.

Columns (3) and (4) show regressions with the interest rate itself as dependent variable. As in the specification with risk premium as dependent variable, there is no effect of SNWI on the interest rate of the most recent loan in these specifications. The prime rate is included as additional control for the overall level of interest rates. As expected, this variable has a positive coefficient. It is, however, only significant at the 11 to 12 percent level. The variable 'term structure spread' captures the differences in interest rates for loans of differing maturities. This variable also has a positive but insignificant effect.

The overall picture that emanates from the analysis of demand for and supply of bank loans suggests that underdiversification increases the demand for loans strongly. The banks, however, do not use this situation to increase interest rates. The higher demand for loans does result in higher leverage for the companies.

4.5.4 Underdiversification and Liquidity

To provide a more complete insight into underdiversification and the financial structure of companies, we also investigate the influence of SNWI on liquidity. Companies hold liquid assets, because they allow flexible reaction to upcoming opportunities. Also, liquid assets are needed to meet short-term expenses. The disadvantage of liquid asset holdings is their low return. If the funds are invested in company projects, they normally earn a higher return. Liquid assets have therefore high opportunity costs.

Table 4.10 shows the results with respect to liquidity. SNWI has a negative and significant influence on liquidity. The size of this effect is also non-negligible. A one standard deviation increase in SNWI A reduces liquidity *ceteris paribus* by 7.1 percentage points. The empirical results therefore confirm hypothesis 5. Since underdiversification increases the cost of equity capital and therefore the opportunity costs of liquid assets, it was expected that owners with a higher degree of underdiversification keep less liquidity in their companies.

Table 4.10: Underdiversification and Liquidity

Dep. variable: Liquidity		
	(1)	(2)
	SNWI A	SNWI B
SNWI	-0.285***	-0.253***
	(0.103)	(0.088)
Ownership share	-0.013	0.147
	(0.331)	(0.327)
Company size	-0.0050	0.013
	(0.030)	(0.032)
Company age	-0.0053	-0.011
	(0.059)	(0.058)
Number of observations	2,426	2,426
Overidentification test, χ^2 (dof, p-value)	2.62 (2, 0.270)	2.52 (2, 0.284)

Note: *, **, *** indicate statistical significance at the 10, 5, and 1 percent level respectively. Robust standard errors are in parentheses. The regressors SNWI and ownership share are instrumented. The regressions contain controls for industry, education, experience, ethnicity and legal form.

The ownership share of the largest owner has no effect on liquid asset holdings.[8] The other company characteristics, size and age, are also not influential.

4.6 Conclusions

Private companies rely on two main sources for their financing: they are typically financed with equity provided by a limited number of owners and by bank loans. The equity investment amounts often to a substantial share of the owner's total net worth, which leads to an underdiversification in the owner's overall portfolio. Since underdiversification increases the cost of equity capital substantially, it possibly has an important influence on the financial structure of private companies. Whether this is the case is tested in this chapter.

Using survey data on private companies in the US, it is found that underdiversification increases the demand for loans – both measured as the probability of a loan

[8]If the ownership share is not instrumented, it has a significant positive effect.

application and measured as the loan volume applied for. Although it was found in the previous chapter that companies are more profitable if their owners have a higher degree of underdiversification, there is no evidence that underdiversification increases the supply of bank loans. The higher demand for new loans manifests itself in the capital structure of the companies – underdiversification strongly increases leverage. A potential influence on the interest rate of the most recent loan is also investigated, but no effect is found. In order to deepen our understanding of the financial considerations in private companies, we also analyse liquid asset holdings. Liquidity is lower in companies whose owners are more highly underdiversified, which can be explained with the higher opportunity cost of liquid assets due to the higher cost of equity capital.

These findings add to our understanding of how the financial structure of private companies is determined. They provide evidence that owners try to reduce the risk exposure from underdiversification with the help of additional bank finance. Since underdiversification increases the cost of equity capital, it influences the hurdle rate that investment opportunities need to pass in order to be realised. We can therefore conclude that the underdiversification of owners of private companies has real consequences for the business activities that the companies engage in.

4.7 Appendix

Table 4.11: Descriptive Statistics

Variable	Mean	Median	Stdev.	Min	Max
Loan volume applied for (in '000 US-$)	506	50	1,698	0.1	24,000
Interest rate (in %)	8.90	8.75	2.04	2.00	16.0
Prime rate (in %)	8.22	8.25	0.332	7.75	9.00
Term structure spread (in %)	0.30	0.23	0.31	-0.16	1.40
Default spread (in %)	2.01	2.12	0.36	1.45	2.65
Risk premium (in %)	3.52	3.31	1.96	0	10.8
Leverage (in %)	33.3	27.3	30.8	0	99.8
Liquidity (in %)	17.0	8.99	19.8	0	88.2

Note: Only variables are shown that are not already reported in the appendix of chapter 3, table C.

Chapter 5

Managerial Ownership and Company Performance

5.1 Introduction

The economics profession has been interested in contract theory since the 1930s (see e.g. Williamson (1985)). One important insight of this theory is that the firm is seen as a governance structure, whereas approaches within the neoclassical framework characterise the firm by a production function. The view of the firm as a governance structure changed the whole analysis of economic organisations. Especially, the incentive literature and the transaction cost approach emphasise that *ownership matters.* This chapter is concerned with one branch of the incentive literature, the agency literature and, more precisely, with the principal-agent problem.

The main subject in the principal-agent literature is the separation of the ownership of a firm from the control rights. This separation is supposed to create agency costs because owners (principals) and managers (agents) have different objective functions. Berle and Means (1932) provide a seminal work in this context. They state that with the large size of modern firms and the diffuse ownership which often resulted, management took over effective control. As a consequence, it seems very likely that management operates the firm in its own interest. Then, the main focus of the literature is how managerial discretion could be brought under more effective control.

This chapter studies the effect of a firm's ownership structure on its performance. Specifically, we concentrate on the effect of managerial ownership on performance. We expect to find two opposing effects – the incentive and the entrenchment effect. Man-

agerial ownership is one way to align the objective functions of the owners and the managers. It is one way of *ex ante* incentive alignment that puts constraints on the managerial discretion to reduce the *ex post* misallocation of resources (e.g. Holmström (1979)). From this incentive effect we expect a positive relationship between managerial ownership and firm performance. The entrenchment effect is especially important for high shares of managerial ownership. If managers hold large shares of the equity, it becomes more difficult for outside owners to exercise control. In this case managers will probably not maximise firm value and a negative relationship between managerial ownership and firm performance is possible. We also investigate the relationship between managerial ownership and the risk exposure of a firm. In risky environments the management is reluctant to hold high ownership shares in order to diversify their assets. But the size of managerial ownership also has signalling effects, indicating firm quality.

We address these questions empirically for a sample of small and medium-sized private companies with limited liability (GmbHs) in the German business-related service sector.[1] There are only a few empirical studies so far that examine issues of corporate governance for small and medium-sized companies, in particular for private companies (see e.g. Bennedsen et al. (2000)). However, there is a large literature on small and medium-sized companies covering issues of productivity (see e.g. Aghion et al. (2004)) and venture capital financing (see e.g. Hellmann and Puri (2002)). Most empirical studies of corporate governance look at large firms that are listed on the stock market (see e.g. Jensen and Murphy (1990), Kaplan (1994*a*) and Kaplan (1994*b*)). However, the distortions caused by the separation of ownership from control are also present in private companies with limited liability. Moreover, although listed firms play a large role in the United States, their overall importance in Europe is much smaller. In Europe, incorporated firms not listed on stock markets are much more important. In Germany, for example, GmbHs accounted for 32 percent of total turnover in 1998 and their overall importance has increased steadily in the last thirty years.[2]

GmbHs are characterised by limited liability of the owners, which means that owners can lose at most the amount they contributed to the firm's equity capital. They are not

[1]The counterpart of German GmbHs are limited companies (Ltds) in the UK and close corporations in the USA.

[2]See table 5.4 in the appendix. Also see Harhoff and Stahl (1995) for a detailed description of the increasing importance of GmbHs in Germany in the seventies and eighties.

liable for the company's debt with their personal assets. In general, they share profits according to the proportion of the firm's equity capital they own. The GmbH is run by managers who can hold a stake in the firm as well. The managers have plenary power of representation to do business on behalf of the firm. Although it is not possible to limit this power of representation with respect to third parties, other arrangements can be made within the firm. The legal form of the GmbH is quite flexible. The respective rights of managers and owners are agreed upon in the company contract, for which the law stipulates only minimum requirements. For example, an owner always has the right to see the accounts of the firm and a change in the company contract always requires a minimum of three quarters of the vote. The distribution of profits is also regulated in the company contract. Usually it occurs according to ownership share, but the company contract can specify any other rule.

Due to management's unrestrictable power of representation, the agency problem associated with the separation of ownership and control can be a serious phenomenon for firms in the legal form of a GmbH. This issue may be reinforced by the relatively low audit and public announcement requirements. Disclosure rules have been intensified since 1987, but de facto they are still quite weak (see e.g. Harhoff and Stahl (1995)).

Compared to existing empirical work on ownership structure and company performance, our work has the advantage that we cover a panel of nearly 1400 companies of the business-related service sector from 1997-2000. The companies were drawn from a stratified random sample according to their distribution in the population.[3] Usually, empirical studies cover cross-sections of the biggest companies in an economy, which are in general around 500 firms. In our sample, the average firm has only 39 employees.

Our performance measure is obtained from a quarterly business survey in the business-related service sector conducted by the Centre for European Economic Research (ZEW) in Mannheim, Germany, since 1994. The companies are asked on a quarterly basis whether their profits have increased, stayed the same or decreased in the last three months. On the basis of these quarterly answers, we construct a performance measure that takes seasonal and sectoral effects into account.

We use this performance measure since there is no balance sheet information and no stock market price available for small private limited liability firms in Germany. It might be criticised for giving only the direction of change but not the size of the change.

[3]For details on the data set and on the stratification design see sub-section 5.3.1 below.

But this measure also has advantages, for example, we avoid the reliance on accounting data that is often generated with tax considerations in mind. Also, the companies have no incentive to misrepresent results since the questionnaire answers have no effect on, for example, credit decisions by banks or on their reputation. We also avoid the use of Tobin's Q.[4] This measure relies on the efficiency of financial markets. In practise, stock valuations are sometimes very volatile, and in this case, Tobin's Q can be a poor measure of company performance.

Since we use panel data, we are able to control for unobserved firm heterogeneity, e.g. manager ability.

Our main finding is that a managerial ownership share up to around 80 percent has a positive effect on firm performance and a negative effect thereafter. We conclude that the first effect is due to better incentives and that the second effect is due to entrenchment. We also find that companies that are totally owned by managers do especially well.

In the context of our analysis it is very likely that firm performance influences the size of managerial ownership. We address the question of reverse causality and of endogeneity by estimating lagged specifications as well as providing estimations using instrumental variables. These estimations confirm our previous result of an inverse U-shaped form of the influence of managerial ownership share on firm performance. Moreover, we apply the Arellano-Bond dynamic panel estimation technique in order to take effects of past firm performance into account. We find that firms that were more successful in the past tend to perform better in the future. Furthermore, this specification also confirms the inverted U-form relationship between managerial ownership share and firm performance.

Since the ownership structure of companies is a crucial question in the corporate governance literature, we also investigate the relationship between managerial ownership and the risk exposure of firms. Here we find a non-linear relationship between risk and managerial ownership share. The negative effect might reflect risk-averse managers whereas the positive effect might be due to signalling or commitment requirements.

In a last step, we take into account the fact that managerial ownership and firm performance influence each other by estimating a system of simultaneous equations. This analysis confirms qualitatively the results from the single equation estimates.

[4]Tobin's Q is equal to the ratio of the firm's market value to the replacement cost of its physical assets. It is a proxy for the firm's valuable intangible assets like, for example, management performance.

This chapter is structured as follows: In section 5.2 we describe the theoretical considerations and previous empirical results. Section 5.3 gives a data description, section 5.4 presents the estimation results, and section 5.5 concludes.

5.2 Related Literature

5.2.1 Theoretical Considerations

Managerial Ownership Share and Firm Performance

One of the major topics in corporate governance deals with the difficulties suppliers of finance to firms may have in getting returns on their investment. Of particular interest are the agency conflicts resulting from the separation of ownership and control. This separation is said to create agency costs to the extent that owners (principals) and managers (agents) have different objectives. For example, managers may invest funds in low-value projects to expand their empire instead of distributing these funds to the owners, who might have better investment opportunities. The main focus of the literature is how managerial discretion could be brought under more effective control, with special attention to difficulties caused by asymmetric information. The manager is generally better informed than the owner about the potential of a company. Incentive contracts are a way to mitigate the problems of asymmetric information. Since effort is not observable, it is not possible to contractually define how much effort the manager should expend. In this context, managerial ownership is one way of *ex ante* incentive alignment.

Jensen and Meckling (1976) distinguish between inside and outside suppliers of finance. The insiders manage the firm, and are able to augment their stream of cash-flow by consuming additional amenities of office. As noted above, managers have an incentive to adopt investment strategies that benefit them but reduce the payment to outside suppliers of funds. Thus, the performance of the firm depends on the fraction of managerial ownership. The greater this fraction, the greater the value of the firm.

According to Demsetz (1983) it is not clear whether owner managers or employed managers consume more on the job. The compensation scheme of managers who are at the same time owners has three components: pecuniary wage, profit of owners and amenities of office. The compensation scheme of employed managers consists only of pecuniary wage and amenities of office. Since the managers objective is to maximise

utility and not to maximise profits, the amenities of office may have a great importance, especially if one takes into account that managers typically spend most of their day at work. In a competitive environment the managers have to pay for their on-the-job consumption by a reduction in their pecuniary managerial compensation. That is, in a competitive world with zero monitoring costs, there is an inverse relationship between take-home wages and on-the-job consumption. As a consequence, the managers will not consume while on the job unless the cost of doing so is less than if they consumed at home. Positive monitoring costs weaken this relationship. The ownership structure of an organisation is an endogenous outcome that is an optimal response to company specific advantages and disadvantages of different ownership structures. Therefore, no relationship between ownership structure and profitability is to be expected.

The entrenchment hypothesis, on the contrary, states that there is a negative relationship between managerial ownership and profitability, especially at very high levels of managerial ownership. The higher the ownership stake of the manager, the more difficult it is for outside owners to control the management.

Taking the incentive hypothesis and the entrenchment hypothesis into account, we expect a non-linear relationship between management's ownership share and firm performance. At low levels of ownership we expect the incentive effect to be dominant, that is, we expect a positive effect. However, at very high levels of ownership the entrenchment effect might be more important and the effect of ownership could be negative.

The literature also affords special interest to the role of banks in raising funds with emphasis on the control rights attached to this. For Germany (and Japan), the financial system is often classified as bank-based. This is due to the observation that banks have close links with and a strong influence on firms they finance. Moreover, German firms are said to maintain only a few bank relationships with a great degree of reliance on one bank, the so-called 'Hausbank'.[5] One role of banks is to monitor the firms they finance. In the case of debt, banks (or creditors in general) have to pay more attention to the risks that managers take, whereas the effort level is not negatively influenced by

[5]Some studies question these distinctive features of the German and Japanese financial systems in comparison to the market-based Anglo-American system. Mayer (1990) observes, that in Germany bank finance accounted only for 20 percent of total sources, which is the same fraction as in the United States and the United Kingdom, whereas in France, Japan and Italy bank finance accounted for 40 percent of total sources.

debt. These issues are related to the question of the optimal financial structure of the firm. Every capital-structure is linked to a certain kind of governance structure.[6]

Managerial Ownership Share and Risk

Theoretical considerations about the relationship of managerial ownership and risk show two opposing effects. On the one hand, since managers are risk averse, one would expect a negative relationship between company risk and managerial ownership. The utility loss of concentrating money in one investment is higher if the investment is riskier. On the other hand, Leland and Pyle (1977) show that managerial ownership can also serve as a signal for company quality. A manager will only be willing to invest large amounts of his wealth into the company if he is convinced that the company will be successful. This is taken into account by banks when deciding on loan applications. Since banks are especially reluctant to lend to risky companies, we expect that managers of risky companies need to make more use of this signal. Therefore there can be a positive relationship between company risk and managerial ownership. This chapter attempts to analyse empirically which of the opposing effects dominates for which risk levels.

5.2.2 Previous Empirical Results

As explained in the previous subsection, economic theory reveals many counteracting mechanisms concerning the relationship between managerial ownership and firm performance, without any hint as to which effects might be dominant. As a consequence, empirical work is needed to identify the main effects. But, as will be shown in this study, the empirical evidence is also contradictory.

First of all, to the best of our knowledge there are no studies that investigate the impact of managerial ownership on firm performance for small and medium-sized German firms.[7] However, there are some interesting empirical results for firms in the United States and the UK.

Mørck et al. (1988) investigate the relationship between management ownership of

[6]Unfortunately, we do not have information about the capital structure of the firms in our sample. For this reason, we do not look at these arguments in more detail. For more information on this issue see e.g. Aghion and Bolton (1989), Aghion and Bolton (1992), Williamson (1988) and Harris and Raviv (1991).

[7]There are some studies dealing with corporate governance in Germany, see e.g. Kaplan (1994*b*), Januszewski et al. (2002) or Köke (2000), but their main focus is different.

the firm's equity and Tobin's Q in a cross-section of 371 Fortune 500 firms in 1980. They find that Tobin's Q rises as managerial ownership increases from 0 percent to 5 percent, as ownership share increases further up to 25 percent it falls, and then continues to rise again as ownership share exceeds 25 percent. The increasing Tobin's Q supports the incentive effect, whereas the decreasing Tobin's Q supports the entrenchment hypothesis. McConnell and Servaes (1990) confirm the non-linear relationship but with a different form. They find a positive relationship up to a managerial ownership share of 40 to 50 percent, and a negative relationship for higher shares.

Mehran (1995) tests the relationship between executive compensation structure, ownership and firm performance. Using 153 randomly-selected manufacturing firms in 1979-1980, he finds that managerial ownership has a positive impact on firm performance measured both by Tobin's Q and by return on assets (ROA). He also estimates regressions with various dummy variables for different levels of managerial ownership, like Mørck et al. (1988). However, the results favour a linear relationship over non-linearity.[8]

Demsetz and Lehn (1985) find no significant linear relationship between managerial ownership and firm performance as measured as accounting profit rate.

The empirical studies surveyed up to now show contradictory empirical evidence. One explanation could be that there are differences in managerial ownership data. This issue was investigated by Kole (1995), who examines three commonly used data sets in the United States and focuses especially on the results of Mørck et al. (1988) and McConnell and Servaes (1990). His study concludes that the different results on the relationship of managerial ownership and firm performance are not due to differences in ownership data. There are other variables that have to be controlled for, in particular the firm size.

Himmelberg et al. (1999) investigate the determinants of managerial ownership and the relation between managerial ownership and firm performance in a panel regression. They address the endogeneity problem associated with simple regressions of firm performance on managerial ownership share. Their result is that managerial ownership

[8]They also find a positive relationship between Tobin's Q/ROA and equity-based management compensation. But the relation between equity-based compensation and managerial ownership turned out to be negative. This last result coincides with a study by Ofek and Yermack (2000), who find that high-ownership managers tend to sell more of the shares they get from equity compensation to diversify away the idiosyncratic risk associated with ownership concentrated in a single asset.

depends on the contracting environment a firm acts in, especially on the riskiness of the firm, which determines the managers' scope for moral hazard. In a risky environment, where monitoring activities by the owners are relatively expensive and the scope for moral hazard for the managers is big, managers must have greater ownership stakes to align the respective objective functions.

Harhoff and Stahl (1995) investigate the impact of managerial ownership on firm survival and on firm employment growth in German SMEs. They find that an increasing share of managerial ownership has a positive impact on firm survival whereas there is no significant effect of managerial ownership share on employment growth.

The effect of outside shareholders is studied by Nickell et al. (1997). They investigate the impact of product market competition, financial market pressure and shareholder control on firm productivity. Using panel data from 580 UK manufacturing firms they find that dominant external shareholders have in general no positive effect on company performance. However, if the dominant shareholder is a financial institution, then a positive effect of monitoring is found.

Harhoff and Körting (1998) study the interaction between borrowers and lenders in small and medium-sized German firms. They find that firms with more concentrated borrowing and long-lasting bank relationships are able to negotiate better contract conditions in terms of collateral requirements, interest rates, and credit availability.

Ang et al. (2000) study the relationship between a firm's ownership structure and its agency costs for a sample of small US companies. Two efficiency measures proxy for agency costs: the ratio of operating expense to annual sales and the ratio of annual sales to total assets. They find that companies with an owner-manager have lower agency costs, that agency costs decrease with the managerial ownership share, and that agency costs increase with the number of outside shareholders. The results with respect to the monitoring role of banks were less clear cut.

This chapter improves on the existing literature by looking at the influence of managerial ownership on the profitability of private companies. So far only company growth and efficiency measures have been considered. This is due to limitations on data availability. Since balance sheets and profit and loss accounts are not available for German private companies, we resort to the use of survey data. The availability of panel information is also novel to the study of German private companies. This allows us to control for firm specific effects.

5.3 Data

5.3.1 Data Sources

The data basis for the estimation is derived from a business survey in the German business-related service sector carried out since 1994 by ZEW and Creditreform, Germany's largest credit rating agency. Since there is no exact definition of 'business-related services' in the literature, this industry is defined by enumerating certain sectors as done, for example, by Hass (1995). The sectors as well as their industrial classification codes are displayed in table 5.5 in the appendix.

The survey is carried out quarterly. A single page questionnaire is sent to about 4000 firms and the response rate is approximately 25 percent. In 1994, when the survey was launched, a stratified sample covering all companies included in the Creditreform database was taken. The stratification was done according to company size, region and sector affiliation. A sample refreshment takes place annually.

The questionnaire is divided into two parts. The first part contains questions on the business development of the firms in the current quarter with respect to the previous quarter and on their expectations for the next quarter. The second part is devoted to questions of current economic or political interest. The survey is conducted as a panel.[9] More precisely, in the first part, firms are asked about the development of their returns, sales, prices, demand, and number of employees. They indicate on a three point Likert scale whether these variables have decreased, stayed the same, or increased in the current quarter compared to the previous quarter. For the purpose of the current research the variable of most interest is the assessment of the firm's returns.[10]

The data derived from the survey is merged with company information from the Creditreform database. This database contains detailed information on the ownership structure of firms. It also contains the size of the stakes that managers hold in a firm and we know the identity of outside owners. Furthermore, the number of bank relationships a firm holds is displayed. Other information is the number of employees, the age of a company, and the number of business fields a company is active in. These variables have been gathered on a yearly basis since 1997.

The main estimations are based on 2797 observations referring to 1351 firms. The

[9]For more details on the sample design and the data set see Kaiser et al. (2000).

[10]The exact question is: in comparison to the last three months, have your profits increased, stayed the same or decreased?

number of observations and firms per sector is displayed in table 5.6 in the appendix. It is an unbalanced panel data set that includes observations from 1997 to 2000. The participation pattern of the firms is as follows: 5 percent of the firms participated in all 4 years, 25 percent participated in at least 3 years, and 50 percent of the firms are observed twice.

Is our dataset representative for companies in the German business-related service sector? There are several possibilities how biases could be introduced. As mentioned, the population for the questionnaire is all companies covered by Creditreform. Since Creditreform aims to include all registered companies in their database, this should not pose a problem. A second source of bias is the response pattern of the companies to the questionnaire. If the non-responses are related to the topic we want to investigate – the effect of ownership structure on performance – then our results will be biased. This seems, however, unlikely. Survivorship bias is possible in our sample since we can only observe profitability for companies that are still alive. In an annual sample refreshment all companies are deleted that haven't answered in the six preceding waves. The last source of bias is the frequency with which Creditreform updates company information. Companies for which there are more inquiries are updated more often. Again, if the updating frequency is not related to our analysis, we face no problem.

5.3.2 Variable Definitions

Our first regression explains the links between ownership characteristics and company performance. Since it is not possible to obtain balance sheet information for German private companies, we construct a performance measure on the basis of survey answers. Every quarter, participating firms indicate whether their returns decreased, stayed the same or increased in the current quarter in comparison to the previous quarter. The performance variable **(Relative performance)** is measured as the difference of the number of times a company has answered that its returns have increased and the number of times a company has reported that its returns have decreased in comparison with the average 'increased' and 'decreased' responses from its industry. The performance measure is calculated annually. The exact formula is:

Relative performance:

$$\#\text{ of 'increases' per company per year} - \#\text{ of 'decreases' per company per year}$$

$$- \frac{\#\text{ of 'increases' per sector per year} - \#\text{ of 'decreases' per sector per year}}{\#\text{ of companies in the sector}}$$

Compared to the direct use of the quarterly categorical answers of the firms, this relative performance measure has several advantages. First, it avoids the estimation of fixed-effects in panel ordered probit or logit models. Second, transforming the quarterly data into annual data eliminates seasonal effects and sector effects are eliminated by the normalisation.[11]

The relative performance measure is a continuous variable and the estimation of linear panel models is feasible. Concerning the choice of our estimation method, the question whether we want to estimate probabilities for specific outcomes or whether we are interested in average developments is important. Since our aim is to identify the latter we use linear panel models.

The definitions of the variables determining performance are as follows (descriptive statistics are displayed in table 5.7 in the appendix):

Ownership share of managers **(Share)** is the sum of ownership stakes held by the management of the firm. It is measured between 0 and 1. We expect a non-linear effect on performance due to the incentive and entrenchment effect.

We construct a dummy variable that takes the value 1 if the stake that the management holds is 100 percent **(D_sh100)**. The share of companies that are totally owned by managers varies with sectors between 31 percent and 59 percent. The average in the whole sample is 45 percent. Excluding companies that are totally owned by managers the distribution of ownership share is approximately normal, centred around 55 percent and with relatively more observations above the mean. This distribution does not vary

[11]We also work with a second performance measure constructed on the basis of the survey answers that took only the number of 'increased' answers into account. We decided to concentrate on the reported measure since the second measure may be subject to seasonality and does not take all the available information into account. Nevertheless, we estimated the specifications reported below with both performance measures with very similar results. This suggests that the results are robust to different specifications of the performance measure.

substantially across sectors. We expect a positive sign since companies that do not experience a separation of ownership and control should perform better.

The number of managers who hold ownership shares **(Owner_man)**. We expect a negative sign since for more managers it is more difficult to come to an agreement. Furthermore, the incentive for a single manager is diminished, if the ownership is divided between several managers.

The number of a firm's external equity holders **(Extern)**. Larger external equity holders have a bigger incentive to monitor. Therefore we expect a negative sign.

The number of a firm's bank relationships **(Bank)**. We expect a positive sign. If there are fewer banks, they will have a bigger loan volume to the company and therefore more incentives to monitor.

The natural log of number of employees **(Size)**. Regarding the number of employees, the firms are relatively small. 78 percent of the firms have less than 50 employees, 14 percent have between 50 and 100 employees and only 9 percent have more than 100 employees. It is not clear in which direction the relationship between profitability and size goes.

In a second regression we explain the ownership share of managers **(Share)**. The regression includes the following variables:

The standard deviation of the responses to the profitability question by company **(Risk I)**. The profitability variable takes the value two if profitability has gone up, the value one if profitability has stayed the same, and the value zero if profitability has decreased.

The forecasting error for returns by company **(Risk II)**. The absolute value of the deviation of coding of forecasted return from coding of realised return for one period, divided by the number of periods for which we have this information. We expect a non-linear relationship between risk and managerial ownership due to risk-aversion of managers and signalling of company quality.

A dummy variable that takes the value 1 for West German firms **(West)**. This is a control variable. We are not having a certain expectation with respect to its sign.

The natural log of number of employees **(Size)**. Because of wealth constraints we expect that there is a negative relationship between managerial ownership and the size of a company.

5.4 Empirical Analysis

5.4.1 Determinants of Company Performance

Our first specification estimates the relationship between relative firm performance and the ownership share of managers, a dummy for ownership exclusively by managers, the number of managers who hold ownership stakes, the number of outside owners, the number of bank relationships, and the size of the company. We also include the quadratic term for the ownership share of managers to allow for non-linearities. Due to the panel structure of the data set, we are able to control for unobserved firm-specific effects, e.g. managerial ability, by estimating fixed effect models.

The results of the first specification are displayed in table 5.1, column 1.[12]

The effect of the ownership share on performance has the form of an inverted 'U'. We find that managerial ownership has a positive effect up to an ownership share of around 50 percent, then the effect becomes negative. The positive effect might reflect higher incentives for managers. The negative effect of high ownership shares might be due to an entrenchment effect. If managerial ownership exceeds a certain share then outside owners find it more difficult to make managers accountable for their activities. These effects on firm performance are statistically significant.

We find that companies with exclusive managerial ownership perform better than companies that include outside owners. It seems to be the case that managers do better if there is no interference from outside. Moreover, firms perform better when fewer managers with ownership stakes are involved.[13]

The positive effect of exclusive managerial ownership is somewhat striking since the difference in incentives for ownership between 90 percent and 99 percent of a company compared to 100 percent are not big enough to explain the difference in performance. The difference cannot *solely* be due to incentives. There might be other effects at

[12] We also estimated random effect models. The random effect method is rejected by the Hausman test. This rejection of the random effect model indicates that the firm specific effects are correlated with the regressors.

[13] We regress the change in profits on the level of managerial ownership share. Our results do not imply that better companies will grow faster than the worse for ever. Nickell et al. (1997) find that competitive pressure has a positive influence on productivity growth. Companies that grow faster build up market share over time, but then they face less competitive pressure to innovate and hence their productivity declines.

Table 5.1: Estimation Results – Performance

Dep. Variable: Relative Performance			
	(1)	(2)	(3)
	Fixed Effect	Fixed Effect	Arellano-Bond
Share	3.54*		5.52*
	(2.16)		(2.90)
Share (lag)		7.34***	
		(2.88)	
Share squared	-3.17*		-5.86**
	(1.78)		(2.41)
Share squared (lag)		-4.32**	
		(2.16)	
Owner_man	-0.13		-0.01
	(0.11)		(0.14)
Owner_man (lag)		-0.50**	
		(0.21)	
D_sh100	0.79**		1.24**
	(0.40)		(0.57)
Extern	0.19**	0.15*	0.12
	(0.08)	(0.09)	(0.12)
Bank	-0.11*	-0.18**	-0.14
	(0.15)	(0.08)	(0.11)
Size	-0.21	-0.23	-0.43*
	(0.15)	(0.26)	(0.26)
Relative performance (lag)			0.13***
			(0.05)
Number of observations (firms)	2797 (1351)	1434 (777)	1143 (612)
F-Test (degrees of freedom)	2.06 (7, 1439)	3.10 (6, 651)	
Wald $\chi^2(8)$-test			22.06***
Arellano-Bond test for first-order autocorrelation in the first differenced residuals: -10.17***			
Arellano-Bond test for second-order autocorrelation in the first differenced residuals: 0.55			

Note: ***,**,*=significant on the 1, 5 and 10 percent level. Standard errors are in parentheses.

work. One effect could be of a psychological nature. A manager who is the sole owner might feel more involved with his company and might therefore work harder. Another explanation might be that this result is driven by reverse causality. Managers might only elect to take 100 percent ownership of the very best companies. If companies do not perform very well they might prefer shared responsibility. In the latter case, they could shift the blame for bad performance onto the influence of the other owners.

We test the appropriateness of the quadratic specification with regressions where we include dummies for every 10 percent interval (and 20 percent interval) of share ownership. This regression confirms the inverted U-shape of the influence of ownership share. It also confirms the extraordinarily good performance of companies with 100 percent managerial ownership. Figure 5.1 in the appendix illustrates these results. Figure 5.2 displays the results of a regression with dummies for every 20 percent managerial ownership share. The figures also contain 95 percent confidence bands.

The number of managers with ownership stakes has a negative influence on performance as expected, although the effect is not significant in the regression. If there are several managers it becomes more difficult to agree on the company strategy and, furthermore, the incentive due to the ownership stake is smaller for each single manager.

With regard to the effect of outside owners we find that the more outside owners, the better the performance. This finding is in contrast to corporate governance literature, which pronounces the importance of monitoring activities, best performed by concentrated ownership. In contrast, widespread ownership leads to the free rider problem since there are only weak incentives for individual investors to seek information about the managers' work. We, in turn, do not find that owners with a big share would be more effective in monitoring. In this context, this estimation result confirms the previously mentioned notion that it is better to leave the manager alone. Ownership changes through inheritance can be used to illustrate this point. For example, after the death of the founder it is often the case that family members who are not involved in the management of the company become owners. It can be harmful if these new owners try to influence important decisions.

This result might also be driven by reverse causality. It might be necessary for badly performing companies to find several owners because no one is willing to take on sole responsibility.

We find that monitoring by banks has a positive effect. The more bank relationships a company has, the worse its performance. This is compatible with the argument that

banks with a high loan volume to one company will spend more resources on monitoring than banks with a small loan volume. But it also confirms the view that companies with a poor performance need to seek loans from several banks because no bank wants to make a big commitment. It is not possible to differentiate between these two arguments.

We also include measures of market concentration and import competition in the regression to control for the effects of competitors on performance. For market concentration we calculate the Herfindahl index on a sectoral level with (partly estimated) turnover figures of the companies in our sample. For import competition we use a question from the survey on whether the company faces competition from foreign companies. However, both measures turn out to have little explanatory power. The results are not shown in the tables.

As already noted above, the regression potentially suffers from a problem of reverse causality. It is possible that the performance of a company has an influence on the size of the ownership stake a manager is willing to take. Managers tend to be very well informed about the potential of a company before they decide on the stake. This could lead to higher ownership stakes in well performing companies and lower ownership stakes in badly performing companies. But it is also necessary to take the price that managers need to pay for the stake into account. If a company is known to be good, the former owners will charge a high price and the stake the new manager is going to buy will be consequently lower. Nevertheless, if managers are better informed about the potential of a company than the owners, our results might represent an overestimate of the effect of ownership on performance.

It is also necessary to consider the managerial owners' dilemma regarding the optimal date of selling the stakes. Managers might sell when the company is doing very well because they then get a high price for the stake, but managers might also sell when the company is doing badly because they need to raise additional capital. In both cases, the share of managerial ownership will fall but the relationship to the performance of the company is undetermined.

To study the dynamic effects of managerial ownership share on performance and to address the endogeneity problem, we estimated lagged specifications. The use of fixed effect estimation helps to control for endogeneity as long as the effect is time-invariant, because in this case it will be captured by the fixed effect. The lagged specification additionally controls for endogeneity due to a correlation of the time-invariant error term with regressors of the same time period. Table 5.1, column 2, reports the estimation

results of the regression including lagged specifications of the share variables.

The specification with lagged explanatory variables confirms the inverted U-form. The maximum point increases to around 80 percent, i.e. we find a positive effect of managerial ownership share up to 80 percent, then the effect becomes negative. Taking lags increases the level of significance of the share and share-squared coefficients, moreover, the values of the coefficients increase.

Figure 5.3 in the appendix illustrates how (ceteris paribus) performance changes as managerial ownership share changes from zero to 100 percent. Firm performance increases steadily up to around 80 percent managerial ownership share. Afterwards, the performance measure decreases slightly. Nevertheless, due to the way the performance measure is constructed, it is not possible to relate these index values to growth rates.

The estimated influence of our further regressors remains unchanged. Firms with fewer managers perform better. In the lag specification this effect turns out to be significant on the 5 percent level. Widespread outside ownership has a positive effect. We also still find that firms with fewer bank relationships have a better performance. In this specification we did not include the dummy for exclusive managerial ownership because it was not significant.

Thus, the results of our first specification reported in table 5.1, column 1, seem not to be driven by reverse causality. The general effects are confirmed by the lagged specification. We can also show that the effect of managerial ownership on performance needs time to take full effect. Changes in incentives and entrenchment need some time to be reflected in the performance of the company.

Due to the panel structure of our data set we are able to investigate the impact of past firm performance on current firm performance. It is very likely that firms that were successful in the past continue to perform better.

We study the persistence of firm performance by applying a General Method of Moment (GMM) estimator that, in the context of dynamic panel estimation, is proposed by Arellano and Bond (1991). Further lags of the level and the difference of the dependent variable are used to instrument the lagged dependent variable included in a dynamic panel model. Lags of the performance measure going back to 1994, the year when the survey started, were used. Estimation results are displayed in table 5.1, column 3.

The results confirm the persistence of firm performance. Firms that were more successful in the past tend to perform better in the future. This effect is significant on the 1 percent level. Moreover, the inverted U-form specification of the influence of

managerial ownership share and firm performance is still appropriate, with a maximum point of around 50 percent of managerial ownership share. The signs of the other regressors remain unchanged compared to the fixed-effect results, although the level of significance drops considerably for some of them.

Arellano-Bond tests for first and second-order autocorrelation in the first differenced residuals are also reported. The null hypotheses of no first-order autocorrelation in the differenced residuals is rejected, but it is not possible to reject the null hypotheses of no second-order autocorrelation. Given first differences, the presence of first-order autocorrelation in the differenced residuals does not imply that the estimates are inconsistent, whereas the presence of second-order autocorrelation would imply that the estimates are inconsistent.[14]

5.4.2 Determinants of Managerial Ownership

Managerial ownership is determined by several firm characteristics of which risk exposure of a firm is especially important. Because managers are risk averse, we expect a negative relationship between risk exposure and managerial ownership. However, managers also use their ownership stake to signal firm quality to banks. Since banks are especially reluctant to lend money to risky firms, there can also be a positive relationship between risk exposure and managerial ownership. The results will show which effect dominates for which risk levels.

We use the tobit regression model to find the determinants of managerial ownership because our dependent variable – the managerial ownership share – is censored to lie between zero and one hundred percent. We do not use a fixed-effect estimator because most of our regressors do not vary much over time. Managerial ownership is explained by company risk, firm size, sector, and region. The results of the share regression are given in table 5.2 below. Column 1 shows the result of the first risk measure (Risk I); in column 2, the result of the second risk measure (Risk II) is reported.

Both risk measures indicate a polynomial functional form of the influence of risk on the managerial ownership share. We find that ownership share first decreases with risk and then increases, finally, it decreases again. The negative relationship between risk and managerial ownership share indicates that managers are risk-averse. They prefer to diversify risk by investing their financial assets elsewhere, especially as they already

[14]See Arellano and Bond (1991, p. 281f.) for a discussion on this point.

Table 5.2: Estimation Results – Ownership

Dep. Variable: Managerial Ownership Share			
	(1)	(2)	(3)
Risk measure	Risk I	Risk II	Risk II
Risk	-1.00***	-0.26*	-0.47***
	(0.20)	(0.14)	(0.20)
Risk squared	2.04***	0.34*	0.61**
	(0.41)	(0.21)	(0.30)
Risk cubed	-0.98***	-0.11	-0.20*
	(0.23)	(0.07)	(0.11)
Size	-0.03***	-0.03***	-0.02*
	(0.01)	(0.01)	(0.01)
West	0.07***	0.06**	0.02
	(0.02)	(0.03)	(0.04)
Financial restriction			0.15***
			(0.05)
Number of observations	2478	1841	792
Pseudo R^2	0.04	0.04	0.08
LR-test	139.1***	102.1***	99.3***

Note: ***,**,*=significant on the 1, 5 and 10 percent level. Standard errors are in parentheses. All equations contain industry dummies and year dummies.

have their human capital in the firm. After a certain point, banks could be reluctant to lend to risky companies because they are afraid of losing their money. The only way a manager can convince the bank that even though the company is risky it is of high quality is by holding a big personal stake. This finding is in contrast to the theory of optimal risk sharing, which predicts that risk-averse managers will hold smaller stakes in riskier companies because the advantage of aligned incentives is outweighed at a lower level of ownership by the higher cost of risk bearing. For that reason, it is not surprising that our estimation results suggest that, after a certain level of risk, the cost of risk bearing exceeds the advantage of aligned incentives, i.e. in high risk companies the relationship between risk and managerial ownership share tends to be negative again.

This functional form was also confirmed by a dummy variable regression (see fig-

ure 5.7 in the appendix).

As expected, the size of a company has a negative influence on managerial share holdings. Big companies need more outside owners because of the limited wealth of the managers.

Although not reported, there is considerable sectoral variation of managerial ownership across sectors. Five out of ten sectoral dummies are significant. The difference between East and West Germany is also significant. In West Germany ownership stakes are 5 percent higher.

In order to investigate possible reasons for the positive relationship between risk and managerial ownership, we exploit information from the survey through the question: "Have your business activities been hindered by financial restrictions?". This question was asked in the second quarter of 1995. This was before our sample starts, therefore the results must be interpreted with this limitation in mind. The answers are coded in a dummy variable with the dummy being equal to one if companies encountered problems of obtaining finance. Inclusion of the dummy in the cubic specification of the share regression shows that companies with difficulties of obtaining finance have higher managerial ownership (see column 3 of table 5.2). The higher managerial ownership might already be a reaction to overcome those difficulties.

5.4.3 Simultaneous Determination of Ownership and Performance

In the last two subsections we analysed the determinants of firm performance and managerial ownership share in single equation specifications. Concerning firm performance, we addressed the problem of reverse causality and of dynamic effects. Moreover, by estimating fixed-effect regressions, potential time-invariant correlation between regressors and the disturbance term have been eliminated.

In this subsection, we estimate the performance equation and the managerial ownership equation in a system of equations using a three-stage least squares regression method. This method is an instrumental variable approach and takes potential endogeneity of managerial ownership as well as of firm performance into account. This endogeneity is due to unobserved firm-specific forces, e.g. managerial ability or managerial motivation that influence the endogenous explanatory variable as well as the outcome variable. Compared to our fixed-effects regression in sub-section 5.4.1, which

eliminates endogeneity by controlling for unobserved firm characteristics via the fixed-effects, this instrumental variable approach also controls for endogeneity due to the time-varying component of the error term. Moreover, the three-stage least squares regression method allows for correlation of the disturbances of the two equations, which increases efficiency compared to the two-stage least squares regression method.

Table 5.3 displays the regression results. The first structural equation explains firm performance. In this equation managerial ownership is instrumented by its lag, the lag of relative performance, the number of managers holding ownership stakes, the number of external owners, the number of bank relationships, the riskiness of the firm, the size and various year dummies. We also included quadratic terms for the lagged share variable and the relative performance variable. Risk is included in a polynomial form of third order. The same holds for the instrumentation of the quadratic term of managerial ownership.

The second equation explains managerial ownership. We use the same set of instruments as in the first structural equation to instrument relative performance and its square.

For the performance equation the panel structure of the data set is taken into account by using fixed-effects (see Baltagi (1995, p. 113ff.)).[15]

These estimations with instrumental variables (IV) confirm our previously derived results although the coefficients of some regressors increase considerably.

The effect of managerial ownership on firm performance still has the form of an inverted 'U', with the maximum point lying at around 80 percent managerial ownership share. The signs of the other regressors remain unchanged.

The single equation results of the share equation are also confirmed. Relative performance in the first as well as in the second order has a positive effect on managerial ownership. This means that managers hold higher stakes in better performing companies. The effect of firm risk on managerial ownership share has a polynomial functional form, with share first decreasing with risk, then increasing and finally decreasing again. The signs of the other regressors also remain unchanged compared to the results in

[15]As is described by Baltagi (1995), one has to eliminate the fixed effects by generating deviations from firm-specific means for all variables. In the first step one regresses the mean deviation of the endogenous regressors on the mean deviation of the instruments. The second step is a regression of the mean deviation of the dependent variable on the mean deviation of the exogenous and predicted endogenous regressors.

Table 5.3: System Estimation of Ownership and Performance

Dep. Variable: Relative Performance	
Share	60.05***
	(22.45)
Share squared	-36.33***
	(13.71)
Owner_man	-0.71**
	(0.30)
Extern	1.23***
	(0.45)
Bank	-0.29***
	(0.10)
Size	-0.91**
	(0.37)
Partial R^2 for instruments in the first stage	0.25 (share) / 0.22 (share squared)
F-test for instruments in the first stage, F(8, 1087)	44.13 (share) / 33.75 (share squared)
Dep. Variable: Managerial Ownership Share	
Relative performance	0.10***
	(0.03)
Relative performance squared	0.20***
	(0.02)
Risk	-0.88***
	(0.17)
Risk squared	1.04***
	(0.25)
Risk cubed	-0.29***
	(0.09)
Size	-0.01
	(0.01)
West	0.03
	(0.03)
Partial R^2 for instruments in the first stage	0.13 (rel. perf.) / 0.04 (rel. perf. squared)
F-test for instruments in the first stage, F(8, 1087)	21.11 (rel. perf.) / 5.90 (rel. perf. squared)
Number of observations per equation	1102
Wald χ^2-test	47.96 to 6 dof (performance equ.) / 7859.44 to 20 dof (share equ.)

Note: ***,**,*=significant on the 1, 5 and 10 percent level. Standard errors are in parentheses. The performance equation accounts for the panel structure of the data set. The managerial ownership share equation contains industry dummy variables as well as year dummy variables.

table 5.2.

Although IV estimates are usually seen as the main method of dealing with endogenous explanatory variables, their application should be carried out cautiously because weak correlation of the instruments with the endogenous explanatory variables leads to inconsistency in IV estimates, even if the sample size is relatively large (Bound et al. (1995)). The authors emphasise the importance of examining the 'first stage' estimates which generated the instruments and propose the partial R^2 and the F statistic of the regressions of the first stage as useful indicators of the quality of the IV estimates.

In table 5.3, we report the partial R^2 and the F statistics of the regressions for the instruments of the first stage. Although comparable results are lacking, a partial R^2 of around 25 percent for the share instruments seems to be quite good. The reported F statistics for the share instruments are highly significant. The statistics for the performance instruments are weaker, however.

It is hard to say which of the employed estimation techniques is best suited to deal with the problem of reverse causality. However, since all methods come to the same conclusion with respect to signs and point of maximum effect, we are confident that these are correctly identified.

5.5 Conclusions

In this chapter, we investigate the relationship between managerial ownership and firm performance.

We use an unbalanced panel data set of private limited liability firms in the German business-related service sector. This is the most important legal form in Germany. Up to now, most studies on corporate governance have concentrated on companies that are listed on the stock market. However, the distortions caused by the separation of ownership and control are also present in private limited liability firms.

The main conclusion from our analysis is that ownership does influence company performance. We find a positive effect of managerial ownership share up to around 80 percent on firm performance, then the effect becomes negative. Companies that are totally owned by managers do especially well. Further results show that there is no gain from monitoring by outside owners. We also find that companies with many bank relationships do worse, which may be due to the monitoring effect.

We address the question of reverse causality and of endogeneity by estimating lagged

specifications as well as instrumental variable methods. Furthermore, we investigate the dynamic structure of the panel using the Arellano-Bond GMM estimation technique. The results of these specifications confirm the previous findings.

With respect to the determinants of managerial ownership, we find that the influence of the risk of the firm's business on managerial ownership share is non-linear. Managers in risky companies can use the ownership stake to signal the quality of their company to the market. Without this signal it would be more difficult to attract outside funding. However, the relationship is also partly negative, indicating that risk-averse managers prefer to diversify their assets.

Since company performance and managerial ownership influence each other, we also estimate a simultaneous equation system with lagged endogenous variables as instruments. The results from the single equation specifications are qualitatively confirmed.

5.6 Appendix

Table 5.4: Turnover According to Legal Form

	Turnover in % of total turnover			
Legal form	**1972**	**1986**	**1990**	**1998**
AG	19.1	21.2	20.2	21.5
GmbH	17.1	25.5	29.1	32.0
OHG		6.8	6.8	6.1
KG		24.0	23.9	22.4
Sole proprietor	23.8	15.4	14.9	13.3
Other	7.9	7.2	5.1	4.7

Note: AGs are companies that are allowed to issue shares. They may or may not be listed on a stock market. GmbHs have one or more owners with limited liability. The OHG is a private company that has several owners with unlimited liability. The KG has at least one owner with unlimited liability and at least one owner with limited liability. A sole proprietor is a single owner with unlimited liability. Other includes companies owned by the state and cooperatives. The data is obtained from Statistisches Bundesamt, 1972 to 1998.

Table 5.5: The Business-Related Service Sector

Sector	**WZ 93**
Computer Services	72100, 72201–02, 72301–04, 72601–02, 72400
Tax Consultancy & Accounting	74123, 74127, 74121–22
Management Consultancy	74131–32, 74141–42
Architecture	74201–04
Technical Advice & Planning	74205–09, 74301–04
Advertising	74844, 74401–02
Vehicle Rental	71100, 71210
Machine Rental	45500, 71320, 71330
Cargo Handling & Storage	63121, 63403, 63401
Waste and Sewage Disposal	90001–07

Note: The WZ93 industrial classification code is a classification system developed by the German Federal Statistical Office in accordance with the European NACE Rev. 1 standard.

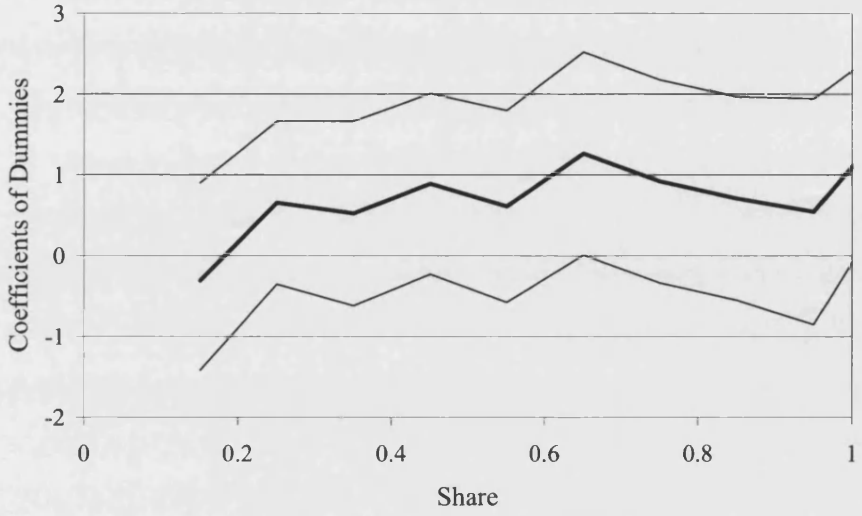
Table 5.6: Distribution of Observations

Sector	No. of Observations	No. of Companies
Computer Services	337	161
Tax Consultancy & Accounting	275	144
Management Consultancy	265	127
Architecture	420	208
Technical Advice & Planning	405	171
Advertising	263	132
Vehicle Rental	225	113
Machine Rental	211	106
Cargo Handling & Storage	185	87
Waste and Sewage Disposal	211	102
Total	2797	1351

Table 5.7: Descriptive Statistics

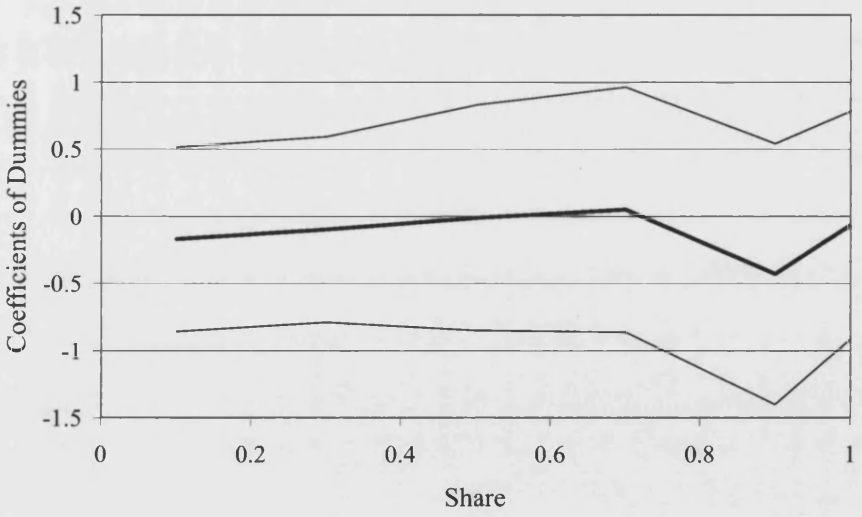
Variable	Mean	St. Dev.	Min	Max
Relative performance	-0.10	1.44	-4.75	4.50
Share	0.73	0.31	0.00	1.00
D_sh100	0.45	0.50	0.00	1.00
Owner_man	1.58	0.87	0.00	11.00
Extern	4.63	2.47	2.00	30.00
Bank	1.41	0.73	1.00	6.00
Age	11.97	8.05	1.00	87.00
Size	3.04	1.07	0.00	7.56
West	0.69	0.46	0.00	1.00
Risk I	0.54	0.30	0.00	1.41
Risk II	0.54	0.51	0.00	2.00

Figure 5.1: Functional Form of Share – Division in 10% Intervals



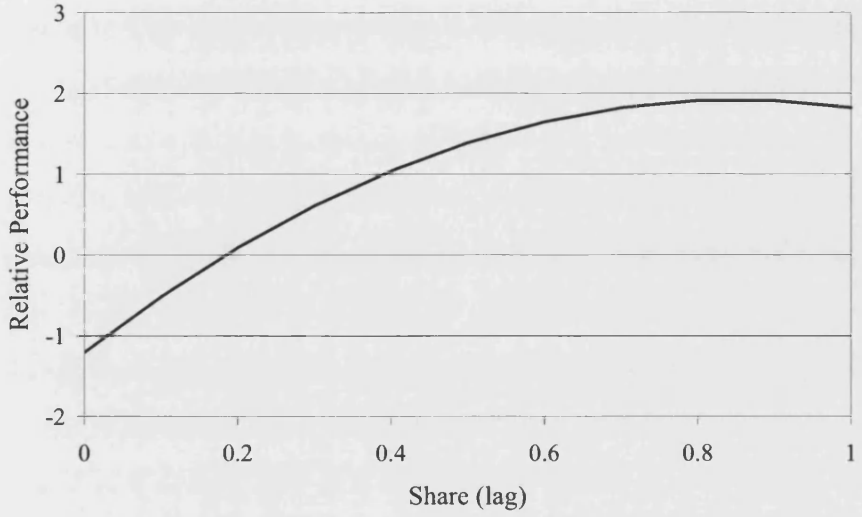
Note: The graph represents the coefficients of dummies for 10% intervals of managerial ownership share in a regression with relative performance as dependent variable. 95 percent confidence bands are indicated.

Figure 5.2: Functional Form of Share – Division in 20% Intervals



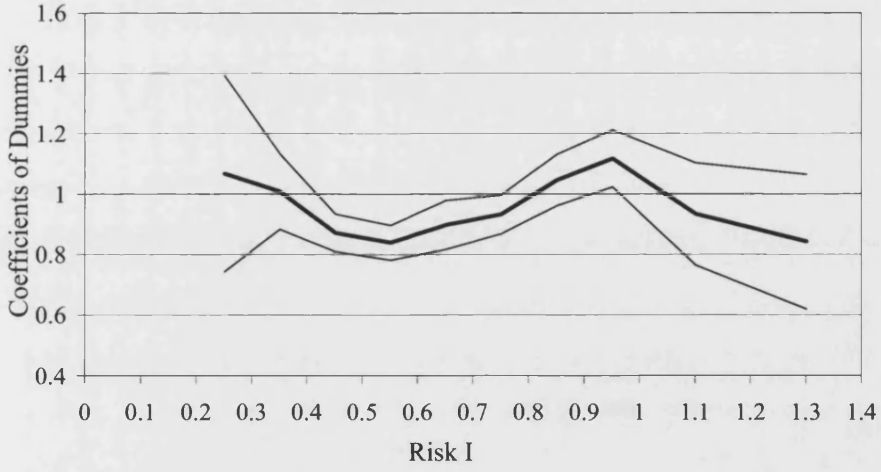
Note: The graph represents the coefficients of dummies for 20% intervals of managerial ownership share in a regression with relative performance as dependent variable. 95 percent confidence bands are indicated.

Figure 5.3: Functional Form of Share (Lag)



Note: The graph represents the functional form of share (lag) in a regression with relative performance as dependent variable.

Figure 5.4: Functional Form of Risk I



Note: The graph represents the coefficients of dummies for 10 roughly equal intervals of Risk I in a regression with managerial ownership share as dependent variable. 95 percent confidence bands are indicated.

Chapter 6

Conclusions

Private companies make an important contribution to overall economic activity in terms of both employment and turnover. They differ from public companies in many respects. It is therefore important to study them separately in order to understand their specific mechanisms. Historically, researchers have concentrated on public companies, not least because data were more easily available.

Private and public companies have both advantages and disadvantages. The managers of private companies often have significant ownership shares, which mitigates agency conflicts. On the downside, the concentrated ownership exposes managers to idiosyncratic risk. The dispersed ownership structure of public companies facilitates the raising of additional capital and allows the diversification of risk. But agency conflicts between owners and managers can be more pronounced in public companies, because managers only typically hold a small ownership share. In practise, we see both organisational forms. The choice of organisational form depends on a comparison of the advantages and disadvantages for the specific situation. For our understanding of the economy, it is important to study both organisational forms.

This thesis investigates some of the determinants of company performance specifically in the context of private companies. Since private companies are complex systems, it is not possible to discuss all interesting aspects in one thesis. The scope of the thesis is therefore restricted to the empirical analysis of issues of control, risk and incentives.

In chapter two we study the influence of the private benefits of control on the capital structure and the growth of private companies. Control is approximated by the probability that the largest owner would win a hypothetical vote. Potential loss of control is the decrease in this probability after a hypothetical equity increase. There is a

clear indication that potential loss of control has a negative effect on the size of equity increases. Concerning leverage, the influence of potential loss of control is positive. Finally, there is a negative relationship between potential loss of control and company growth. Overall, the finding is that owners try to maintain control. They are willing to give up growth opportunities for this purpose.

In chapters three and four we investigate the influence of owners' underdiversification on company characteristics. Chapter three focuses on the relationship between underdiversification and company profitability. We find a positive, significant relationship that can be ascribed to two mechanisms. First, owners require higher returns as compensation for exposure to idiosyncratic risk. They therefore select only very profitable projects for realisation. Second, owners who are at the same time managers exert more effort if they have a higher degree of underdiversification. Effort is measured as weekly hours worked. Since their financial well-being depends more on the success of the company, they have better incentives to work hard.

Chapter four studies the influence of an owner's underdiversification on the financial structure of the company. Higher underdiversification is related to a higher demand for loans and to higher leverage. Bank loans are therefore used as an alternative source of financing that reduces the exposure of the owner to company-specific risk stemming from the equity investment. Underdiversification reduces liquidity, since the opportunity costs of liquid asset holdings are higher.

Finally, chapter five analyses the effects of the share of managerial ownership on performance. Up to an ownership share of around 80%, we find a positive relationship between ownership share and performance. This result can be explained as being due to better incentives. For ownership shares exceeding 80%, the relationship becomes negative – the entrenchment effect dominates. It is difficult for outside owners to monitor, if the management holds a very high ownership stake. The determinants of the share of managerial ownership are also analysed and we find a non-linear influence of risk.

Data availability constitutes a constraint on research into private companies. In contrast to public companies, private companies have much weaker publication requirements, and, in addition, publication requirements are not always enforced. In Germany, for example, private companies with limited liability (GmbHs) are obliged by law to publish their accounts. However, in practise, many smaller GmbHs do not observe this obligation. Publication requirements are more strictly enforced in the UK. Pri-

vate companies with limited liability need to deposit their accounts with 'Companies House'. Researchers then have access to these data through commercial data bases. When no collections of published accounts are available, researchers have to rely on evidence gathered by surveys. However, the number of observations in surveys is typically smaller and the data may be more affected by measurement error.

A further complication of the research on private companies is the close relationship between company and owner. Owner characteristics, such as education and work experience, can be important for the success of a company. Personal wealth is also relevant, since it influences the amount that the owner can invest in equity, and also influences the availability of bank loans through the use of personal assets as collateral. The importance of both company *and* owner characteristics poses huge demands on data availability. Not many data sets have such a wide coverage. Typically, data sets cover either only company or only owner characteristics.

The investigation of private companies remains an interesting research area and there are still many questions open for future analysis. Supported by the availability of new data sets, it will be possible to test new hypotheses and to test the robustness of existing results by comparisons across countries.

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