

## Abstract

This paper studies the effect of managerial ownership on performance and the determinants of managerial ownership for small and medium-sized private companies. We use a panel of around 1300 firms in the German business-related service sector for the years 1997-2000. Managerial ownership up to around 80 per cent has a positive impact on firm performance (incentive effect); for higher shares the effect becomes negative (entrenchment effect). Moreover, risk-aversion of managers and signalling of firm quality leads to a non-linear relationship between managerial ownership and the risk exposure of a firm. The determinants of performance and ownership are estimated simultaneously.

JEL Classification: G32; C23

Keywords: corporate governance, managerial ownership, firm performance, small and medium-sized enterprises.

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# **Managerial Ownership and Firm Performance in German Small and Medium-Sized Enterprises**

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## Non-technical Summary

This paper studies the incentive effect and entrenchment effect of managerial ownership in a sample of small and medium-sized firms in the German business-related service sector. Moreover, the determinants of managerial ownership share are investigated.

Up to now, questions concerning corporate governance issues were mostly studied in samples of large firms that are listed on the stock market. We address these questions in a sample of private limited liability firms (GmbHs). GmbHs are the most important legal form in Germany. They are characterized by the fact that the liability of the owners is restricted to the amount of equity capital they invested in the firm. Typically, GmbHs are small and medium-sized firms. We aim to analyse whether the distortions caused by the separation of firm ownership and control are also present in GmbHs. Looking at their overall importance, neglecting these distortions might result in negative aggregate economic effects.

The analysis shows that managerial ownership is associated with incentive effects as well as entrenchment effects. Increasing managerial ownership up to around 80 per cent has a positive impact on firm performance, then the effect becomes negative. The positive effect reflects better incentives whereas the negative effect is due to an entrenchment effect.

We also find that firms perform better when fewer managers with ownership stakes are involved. With respect to outside owners, we find that companies with more outside owners perform better. Monitoring by banks has a positive effect, as the more bank relationships a firm has, the worse is its performance.

Moreover, we find a non-linear relationship between managerial ownership and the risk exposure of a firm. For low and high levels of risk the relationship is positive, for medium levels it is negative. The positive relationship between risk and managerial ownership indicates signalling of firm quality by management whereas the negative relationship points to the risk aversion of managers.

These results are robust to the use of different specifications and several estimation methods. The simultaneous determination of performance and ownership is also considered.

# 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 characterize the firm by a production function. The view of the firm as a governance structure changed the whole analysis of economic organizations. Especially, the incentive literature and the transaction cost approach emphasize that *ownership matters*. This paper 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 paper 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. Managerial 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 maximize 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 pri-

vate companies with limited liability (GmbHs) in the German business-related service sector.<sup>1</sup> 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.<sup>2</sup> 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, 1994a, 1994b). 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 per cent of total turnover in 1998 and their overall importance has increased steadily in the last thirty years.<sup>3</sup>

GmbHs are characterized 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 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

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<sup>1</sup>The counterpart of German GmbHs are limited companies (Ltds) in the UK and close corporations in the USA.

<sup>2</sup>One example is Bennedsen et al. (2000) which analyses ownership dilution for Danish closely held corporations.

<sup>3</sup>See table A1 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.

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, that were drawn from a stratified random sample according to their distribution in the population.<sup>4</sup> 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 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 criticized for giving only the direction of change but not the size of the change. 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.<sup>5</sup> 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 per cent 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

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<sup>4</sup>For details on the data set and on the stratification design see section 3.1 below.

<sup>5</sup>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.

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.

This paper is structured as follows: In section 2 we describe the theoretical underpinnings and previous empirical results. Section 3 gives a data description, section 4 presents the estimation results, and section 5 concludes.

## **2 Theoretical Underpinnings and Previous Empirical Results**

### **2.1 Theoretical Considerations on Managerial Ownership**

#### **2.1.1 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 atten-

tion 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. Employed managers compensation scheme consists only of pecuniary wage and amenities of office. Since the managers objective is to maximize utility and not to maximize 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 correlation 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 organization 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”.<sup>6</sup> 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 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.<sup>7</sup>

### **2.1.2 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) showed 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 paper attempts to analyse empirically which of the opposing effects dominates for which risk levels.

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<sup>6</sup>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 per cent 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 per cent of total sources.

<sup>7</sup>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, 1992), Williamson (1988) and Harris and Raviv (1991).

## 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.<sup>8</sup> However, there are some interesting empirical results for firms in the United States and the UK.

Morck et al. (1988) investigate the relationship between management ownership of 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 per cent to 5 per cent, as ownership share increases further up to 25 per cent it falls, and then continues to rise again as ownership share exceeds 25 per cent. 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 per cent, 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 Morck et al. (1988). However, the results favour a linear relationship over non-linearity.<sup>9</sup>

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

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<sup>8</sup>There are some studies dealing with corporate governance in Germany, see e.g. Kaplan (1994a), Januszewski et al. (1999) or Köke (2000), but their main focus is different.

<sup>9</sup>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.

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 Morck et al. and McConnell and Servaes. 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 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 found 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.

Our paper 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 private companies. This allows us to control for firm specific effects. We are the first to study the determinants of ownership for private companies. Furthermore, we are the first to study the simultaneous determination of performance and managerial ownership.

## 3 Data Description

### 3.1 Data Set

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 A2 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 per cent. 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.<sup>10</sup> More precisely, in the first part, firms are asked about the development of their returns,

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<sup>10</sup>For more details on the sample design and the data set see Kaiser et al. (2000).

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.<sup>11</sup>

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 number of observations and firms per sector is displayed in table A3 of 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 per cent of the firms participated in all 4 years, 25 per cent participated in at least 3 years, and 50 per cent of the firms are observed twice or less.

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 no-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. The survivor bias is present 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.

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<sup>11</sup>The exact question is: in comparison to the last three months, have your profits increased, stayed the same or decreased?

## 3.2 Definition of Key Variables

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:<sup>12</sup>

**Relative Performance:**

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

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 normalization.

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.

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<sup>12</sup>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.

The definitions of the variables determining performance are as follows (summary statistics are displayed in table A4 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 per cent (**d\_sh100**). The share of companies that are totally owned by managers varies with sectors between 31 per cent and 59 per cent. The average in the whole sample is 45 per cent. Excluding companies that are totally owned by managers the distribution of ownership share is approximately normal, centred around 55 per cent and with relatively more observations above the mean. This distribution does not vary 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 per cent of the firms have less than 50 employees, 14 per cent have between 50 and 100 employees and only 9 per cent 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 realized 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.

## 4 Estimation Results

### 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 1, column 1.<sup>13</sup>

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 per cent, 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

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<sup>13</sup>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.



with ownership stakes are involved.<sup>14</sup>

The positive effect of exclusive managerial ownership is somewhat striking since the difference in incentives for ownership between 90 per cent and 99 per cent of a company compared to 100 per cent are not big enough to explain the difference in performance. The difference cannot *solely* be due to incentives. There might be other effects at 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 per cent 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 per cent interval (and 20 per cent 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 per cent managerial ownership. Graph A1 in the appendix illustrates these results, graph A2 displays the results of a regression with dummies for every 20 per cent managerial ownership share. The graphs also contain 95 per cent 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

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<sup>14</sup>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.

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 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 per cent, i.e. we find a positive effect of managerial ownership share up to 80 per cent, 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.

Graph A3 in the appendix illustrates how (*ceteris paribus*) performance changes as managerial ownership share changes from zero to 100 per cent. Firm performance increases steadily up to around 80 per cent 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 per cent 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 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.

TABLE 1: ESTIMATION RESULTS OF FIXED-EFFECT AND ARELLANO-BOND REGRESSIONS

Dep. Variable: Relative Performance			
	(1) Fixed Effect	(2) Fixed Effect	(3) 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:	2797	1434	1143
Number of firms:	1351	777	612
F-Test:	2.06	3.10	
(degrees of freedom)	(7, 1439)	(6, 651)	
Wald chi2(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			

\*\*\*, \*\*, \* = significant on the 1, 5 and 10 per cent level, standard errors are in parentheses

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 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 per cent 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 per cent 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.<sup>15</sup>

## 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.

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<sup>15</sup>See Arellano-Bond (1991: 281f.) for a discussion on this point.

We use the tobit regression model to find the determinants of managerial ownership because our endogenous variable – the managerial ownership share – is censored to lie between zero and one hundred per cent. 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 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 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 graph A4 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 per cent 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 2). The higher managerial ownership might already be a reaction to overcome those difficulties.

TABLE 2: TOBIT ESTIMATION RESULTS OF THE SHARE REGRESSION

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

\*\*\*, \*\*, \* = significant on the 1, 5 and 10 per cent level, standard errors are in parentheses

All equations contain industry dummy variables as well as year dummy variables.

### 4.3 Simultaneous Determination of Managerial 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 section 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 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: 113ff.).<sup>16</sup>

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<sup>16</sup>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



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 per cent 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 table 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 emphasize 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 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 per cent 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.

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of the dependent variable on the mean deviation of the exogenous and predicted endogenous regressors.

TABLE 3: SYSTEM ESTIMATION OF MANAGERIAL 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 chi2-Test:	47.96 to 6 dof (performance equ.)/ 7859.44 to 20 dof (share equ.)
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.	

\*\*\*, \*\*, \* = significant on the 1, 5 and 10 per cent level, standard errors are in parentheses

## 5 Conclusion

In this paper, 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 per cent 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.

## 6 Appendix

TABLE A1: TURNOVER ACCOUNTED FOR BY DIFFERENT LEGAL FORMS OF ENTERPRISE (IN PER CENT OF OVERALL TURNOVER)

Type of 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 <sup>a</sup>	7.9	7.2	5.1	4.7

Notes: <sup>a</sup> Includes publicly-owned enterprises and cooperatives. AG's are companies that are allowed to issue shares. They may or may not be listed on a stock market. 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.

Source: Statistisches Bundesamt, 1972 to 1998.

TABLE A2: 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 that classifies economic units according to their sector of concentration.

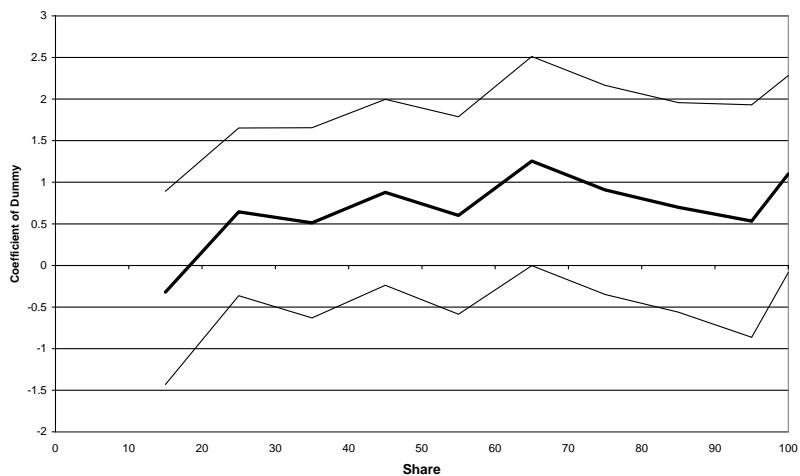
TABLE A3: DISTRIBUTION OF OBSERVATIONS AND NUMBER OF FIRMS

Sector	No. of Observations	No. of Firms
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

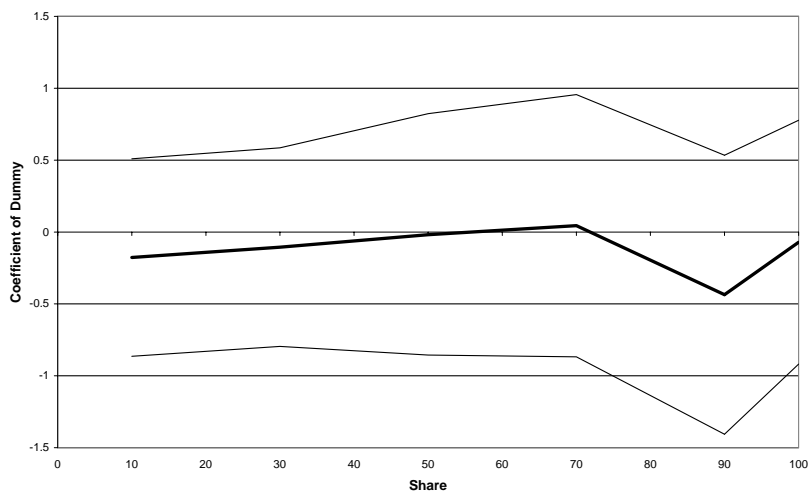
TABLE A4: SUMMARY STATISTICS OF VARIABLES

Variable	Mean	Std. Dev.	Minimum	Maximum
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

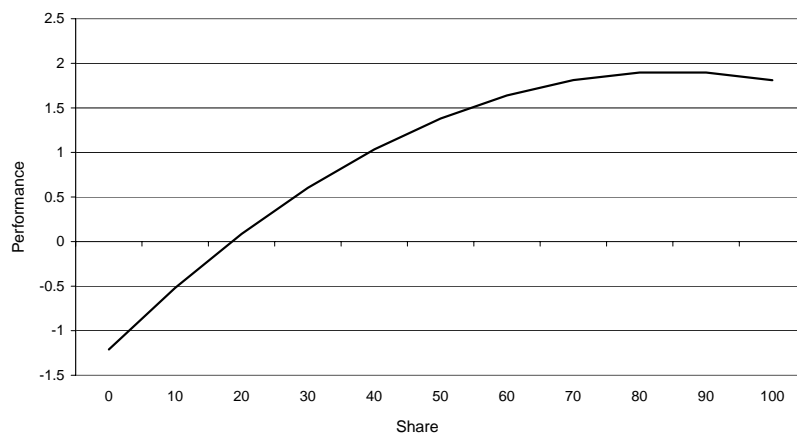
GRAPH A1: FUNCTIONAL FORM OF THE INFLUENCE OF MANAGERIAL OWNERSHIP SHARE ON PERFORMANCE (DUMMIES IN 10 PER CENT INTERVALS, 95 PER CENT CONFIDENCE BANDS INDICATED)



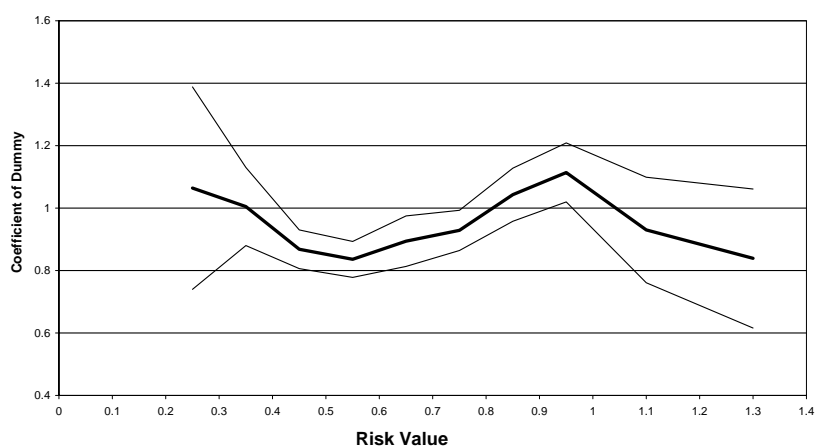
GRAPH A2: FUNCTIONAL FORM OF THE INFLUENCE OF MANAGERIAL OWNERSHIP SHARE ON PERFORMANCE (DUMMIES IN 20 PER CENT INTERVALS, 95 PER CENT CONFIDENCE BANDS INDICATED)



GRAPH A3: IMPACT OF CHANGES IN MANAGERIAL OWNERSHIP SHARE ON FIRM PERFORMANCE (LAG SPECIFICATION)



GRAPH A4: FUNCTIONAL FORM OF THE INFLUENCE OF RISK I ON MANAGERIAL OWNERSHIP SHARE (95 PER CENT CONFIDENCE BANDS INDICATED)



## References

- Aghion, P. and P. Bolton (1989), The Financial Structure of the Firm and the Problem of Control, *European Economic Review* 33, 286–293.
- Aghion, P. and P. Bolton (1992), An Incomplete Contract Approach to Financial Contracting, *Review of Economic Studies* 59, 473–494.
- Ang, J.S., R.A. Cole, and J.W. Lin (2000), Agency Costs and Ownership Structure, *Journal of Finance* 55, 81–106.
- Arellano, M. and S. Bond (1991), Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations, *Review of Economic Studies* 58, 277–297.
- Baltagi, B.H. (1995), *Econometric Analysis of Panel Data*, Chichester.
- Bennedsen, M., M. Fosgerau, and D. Wolfenzon (2000), *Control Dilution and Distribution of Ownership*, Copenhagen Business School Working Paper 16-2000, Copenhagen
- Berle, A.A. and G.C. Means (1932), *The Modern Corporation and Private Property*, New York.
- Bound, J., D.A. Jaeger, and R.M. Baker (1995), Problems with Instrumental Variables Estimation when the Correlation Between the Instruments and the Endogenous Explanatory Variable is Weak, *Journal of the American Statistical Association* 90, 443–450.
- Demsetz, H. (1983), The Structure of Ownership and the Theory of the Firm, *Journal of Law and Economics* 26, 375–391.
- Demsetz, H. and K. Lehn (1985), The Structure of Corporate Ownership: Causes and Consequences, *Journal of Political Economy* 93, 1155–1177.
- Harris, M. and A. Raviv (1991), The Theory of Capital Structure, *The Journal of Finance* 46, 297–355.
- Harhoff, D. and K. Stahl (1995), Unternehmens- und Beschäftigungsdynamik in Westdeutschland: Zum Einfluß von Haftungsregeln und Eigentümerstruktur, *ifo Studien*, 17–50.



- Harhoff, D. and T. Körting (1998), Lending Relationship in Germany—Empirical Evidence from Survey Data, *Journal of Banking and Finance* 22, 1317–1353.
- Hass, H.-J. (1995), Industrienaehe Dienstleistungen: Ökonomische Bedeutung und politische Herausforderung, *Beiträge zur Wirtschafts- und Sozialpolitik* 223, 3–39.
- Himmelberg, C.P., R.G. Hubbard, and D. Palia (1999), Understanding the Determinants of Managerial Ownership and the Link Between Ownership and Performance, *Journal of Financial Economics* 53, 353–384.
- Holmström, B. (1979), Moral Hazard and Observability, *The Bell Journal of Economics* 10, 74–91.
- Januszewski, S., F.J. Köke and J.K. Winter (1999), *Product Market Competition, Corporate Governance and Firm Performance: An Empirical Analysis for Germany*, ZEW Discussion Paper No. 99-63, Mannheim.
- Jensen, M. and W.H. Meckling (1976), Theory of the Firm: Managerial Behavior, Agency Costs, and Ownership Structure, *Journal of Financial Economics* 3, 305–360.
- Jensen, M. and K.J. Murphy (1990), Performance Pay and Top-Management Incentives, *Journal of Political Economy* 98, 225–264.
- Kaiser, U., M. Kreuter, and H. Niggemann (2000), *The ZEW/Creditreform Business Survey in the Business-Related Services Sector: Sampling Frame, Stratification, Expansion and Results*, ZEW Discussion Paper No. 00-22, Mannheim.
- Kaplan, S.N. (1994a), Top Executives, Turnover, and Firm Performance in Germany, *Journal of Law, Economics, and Organization* 10, 142–159.
- Kaplan, S.N. (1994b), Top Executive Rewards and Firm Performance: A Comparison of Japan and the United States, *Journal of Political Economy* 102, 510–546.
- Köke, J. (2000), *Control Transfer in Corporate Germany: Their Frequency, Causes and Consequences*, ZEW Discussion Paper No. 00-67, Mannheim.
- Kole, S.R. (1995), Measuring Managerial Equity Ownership: A Comparison of Sources of Ownership Data, *Journal of Corporate Finance* 1, 413–435.

- Leland, H.E. and D.H. Pyle (1977), Informational Asymmetries, Financial Structure, and Financial Intermediation, *Journal of Finance* 32, 371–387.
- Mayer, C.P. (1990), Financial Systems, Corporate Finance, and Economic Development, in: Hubbard, R.G. (ed.), *Asymmetric Information, Corporate Finance, and Investment*, Chicago, 307–332.
- McConnell, J.J. and H. Servaes (1990), Additional Evidence on Equity Ownership and Corporate Value, *Journal of Financial Economics* 27, 595–612.
- Mehran, H. (1995), Executive Compensation Structure, Ownership, and Firm Performance, *Journal of Financial Economics* 38, 163–184.
- Morck, R., A. Shleifer and R.W. Vishny (1988), Management Ownership and Market Valuation: An Empirical Analysis, *Journal of Financial Economics* 20, 293–315.
- Nickell, S., D. Nicolitsas and N. Dryden (1997), What makes Firms perform well?, *European Economic Review* 41, 783–796.
- Ofek, E. and D. Yermack (2000), Taking Stock: Equity-Based Compensation and the Evolution of Managerial Ownership, *The Journal of Finance* 55, 1367–1384.
- Statistisches Bundesamt (1998), *Finanzen und Steuern*, Fachserie 14, Reihe 8.
- Williamson, O.E. (1985), *The Economic Institutions of Capitalism*, New York.
- Williamson, O.E. (1988), Corporate Finance and Corporate Governance, *The Journal of Finance* 43, 567–591.

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