

Does portfolio manager ownership affect fund performance? Finnish evidence

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Lia Kumlin^a

Vesa Puttonen^b

Abstract

By using a unique dataset of Finnish mutual funds and fund managers, we investigate whether manager ownership is related to fund performance. When we examine manager ownership measured as a percentage of the fund's total assets, we find no relation between ownership and performance. This finding contradicts with US evidence. Further, when we employ ownership measured as a percentage of the manager's taxable wealth, higher managerial ownership is associated with inferior, not superior fund performance. Fund managers invest in riskier funds but this does not pay off since higher risks are not compensated by higher returns.

Keywords: Managerial ownership, fund managers, fund performance

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^a McKinsey & Company, Mannerheimintie 14 A, FI-00100, Helsinki, Finland.

^b Corresponding author. Helsinki School of Economics, Runeberginkatu 22-24, FI-00100 Helsinki, Finland, email: vesa.puttonen@hse.fi.

1. Introduction

As a part of the increased regulation of mutual fund companies, the SEC has lately put a lot of effort to improve the transparency of the industry in the U.S. One of the new regulations came effective on March 2005, since when all portfolio managers have been required to disclose how much of their personal wealth is invested in the funds they run. This information is published in the fund's Statement of Additional Information and is available to investors on request.

In the U.S., the new regulation was subject to a broad debate. There were a lot of discussion about whether it is useful for an investor to know the manager's stake in the fund or does the information only tell whether the fund makes sense for the manager's personal portfolio. However, according to SEC¹: "ownership provides a direct indication of manager's alignment with the interests of shareholders", and thus the new regulation was implemented although many practitioners were initially against it.

In response to the new regulation, Khorana, Servaes and Wedge (2007) studied 1,406 U.S. mutual funds and found that future risk-adjusted performance is positively related to managerial ownership. Khorana et al concluded that managerial ownership has "desirable incentive alignment attributes" for mutual fund investors and the disclosure of this information is useful in making portfolio allocation decisions.

Since the findings of Khorana et al reached the public, the conversation has remained active. One question is for example that if ownership is associated with better performance, why so few fund management companies mandate their managers to own some of the fund. Indeed, after the new disclosure requirements came effective - perhaps partially due to the public pressure - many U.S. companies have started requiring their managers to have ownership stakes in their funds².

¹ SEC Rule S7-12-04, Disclosure regarding Portfolio Managers of Registered Management Investment companies

² "Another way to assess a mutual fund; evidence mounts that performance improves when managers invest in their own portfolios", Eleanor Laise, Wall Street Journal, Jul 26, 2006

By using a unique hand-collected dataset from the Finnish market we provide further evidence on fund manager ownership and fund performance. The Finnish dataset includes the information about the manager's taxable total net wealth, not only the fund ownership measured as a percentage of the fund's total assets. This kind of information has not been available in previous studies. Our dataset also employs the exact amounts of fund ownership instead of ownership ranges. In addition, the ownership includes not only the manager's personal ownership, but also the possible ownership of his/her (investment) company. Further, our dataset includes the information regarding all managerial ownership changes.

When ownership is measured as a percentage of the fund's total assets the results suggest that no relation exists between ownership and performance in the Finnish markets. However, when ownership is measured as a percentage of the manager's taxable wealth – the primary ownership measure employed in our study – the results suggest that higher managerial ownership actually leads to inferior, not superior performance. More precisely, for every additional percent the manager's personal investment comprises of his taxable net wealth, the fund's objective-adjusted return decreases by 9-14 basis points and objective-adjusted Sharpe by 1-2 basis points, depending on the model specification.

A part of the inverse relation between ownership and performance is explained by the fact that portfolio managers tend to hold larger stakes in funds which have high volatilities. However, the additional risk-taking does not seem to pay off, since higher risks are not compensated with higher returns.

2. Fund manager performance

Very few of us – if any – are able to say which funds will perform the best in the future. First, given the large number of mutual funds available and the existence of searching costs, many investors seem to acquire little knowledge about the funds they buy [See for example Capon, Fitzsimons and Prince (1996)]. Thus, while advertising and media presence play an important role in attracting fund flows in the U.S. [See for example Sirri and Tufano (1998), Gallaher,

Kaniel and Starks (2006)], in Finland, investors value convenience and brand, which results to higher flows into bank-managed mutual funds [Knuutila, Puttonen and Smythe (2006)].

Secondly, although more sophisticated investors look for the traditional performance measures – such as fund's alpha – in selecting funds, taking into account that these measures are only indicators of the fund's past performance, it is not obvious that this strategy yields any better results than the more unsophisticated one; so far the multiple studies examining the issue of performance persistence have reached conflicting results [See for example Grinblatt and Titman (1992), Hendricks, Patel and Zeckhauser (1993), Brown and Goetzmann (1995) and Carhart (1997)].

If past performance is not a reliable proxy for the fund's future performance, is there any measure that investors could look for when selecting mutual funds? Furthermore, if no such an indicator exists, can investors even rely that the fund manager acts on their best behalf and does his best to achieve the highest possible performance for the fund? The only thing we know is that the fund manager bears the responsibility of the fund's returns and that his incentives are likely to affect his behavior.

Khorana et al (2007) were the first ones who have studied the relation between portfolio manager ownership and the performance of the fund. They studied 1,406 U.S. mutual funds and find that while over half of the managers do not own any stakes in the funds they run, the average manager holds a \$97,000 ownership stake in his fund. This in turn represents 0.04% of the fund's assets under management. Khorana et al find that for every basis point of increase in managerial ownership, the fund's performance increases between 2.4 and 5 basis points depending on the model specification.

In addition to the finding that future performance relates to managerial ownership, Khorana et al also find some factors which determine the amount of ownership. More specifically, they find that managerial ownership is higher in funds with better past performance, lower front-end loads, smaller size, longer managerial tenure and funds affiliated with smaller fund families.

Evans (2008) examined the relation between a manager's personal wealth and the performance of associated 237 US equity funds. His findings suggest that funds run by minimally invested managers have significantly lower style-adjusted returns (approximately 2.6%) than do funds where managers own more than \$100.000 of their fund. They also have higher turnover levels. The fund's expense ratio is significantly decreasing in managerial ownership. Also, fund age and manager tenure are significantly lower for managers with a low level of personal investment.

We contribute to the existing literature in many ways. A major contribution is the employment of a unique, hand-collected dataset, which has multiple advantages compared to the dataset employed by the previous study. First, the dataset employs the exact amounts of ownership, which the managers have invested in their funds, instead of ownership ranges. In addition, the ownership includes not only the manager's personal ownership, but also the possible ownership of his firm. Second, the dataset includes the information about the manager's taxable wealth, which, in estimating the magnitude of managerial incentives, makes it possible to calculate a variable that divides the manager's ownership stake by his total taxable wealth. Third, unlike the dataset employed by Servaes et al (2007) and Evans (2008), the dataset includes the information regarding managerial changes. This adds reliability especially to the regressions, in which the amount of managerial ownership at the end of the year is regressed to the fund's performance during the subsequent year. Finally, the dataset employs many years of European data instead of American.

3. Data and methodology

3.1. Income and wealth data

While citizens' wealth information is not publicly available in many countries and thus can not be gathered for research purposes, in Finland the data on many persons' taxable income and wealth³ is published annually by multiple sources. For the purposes of this study, we

³ The wealth tax was removed in Finland starting from January 1, 2006, after which the data on taxable wealth is no longer available.

gathered the information from “Veropörssi” publications, which publish the taxable income and wealth, as confirmed by the tax authorities, of most Finnish citizens⁴.

Table 1 contains summary statistics on portfolio manager taxable wealth and employment income for the full sample (combined for years 2003-2005). During the sample period, the average portfolio manager earned € 89.717 per year and possessed a taxable wealth of € 258.574, while the annual salary for the median manager was € 75.600 and taxable wealth € 16.700. However, 10% of all managers earned more than € 145.440 per year and had a taxable wealth of over € 472.800.

[Insert Table 1 here]

3.2. Fund ownership data

We collect the wealth and income data for only those portfolio managers whose fund ownership data is available. While in the U.S. the requirement to disclose a portfolio manager’s personal stake in the fund did not become effective until March 2005, in Finland portfolio manager ownership data has for many years been public information but it does not have to be disclosed in any overt reports, and is thus not easily available to investors. More precisely, every investment fund company has an obligation to maintain a register, which contains all insiders’ trades and possessions in the funds⁵. All information must be entered into the register in a way that it can not be altered once entered, and the information must be maintained in the register for at least five years. In addition, every interested person has the right to see the register information and receive prints and copies from it.

Nevertheless, although the ownership data is in principle public information, it has to be hand-collected from every mutual fund company separately.

⁴ “Veropörssi” is an annual publication which is for sale for a modest approx. 10 euro price. The information is published in case certain limits are exceeded. In 2005, the limits were: €12,000-25,000 for wages depending on the region, €12,000 for capital income and €50,000 for taxable wealth.

⁵ The Finnish mutual fund law 14, § 99-100, available at <http://www.finlex.fi/fi/laki/ajantasa/1999/19990048>

In the U.S. the ownership data has to be disclosed only by using the following ranges: \$0, \$1-\$10.000, \$10.001-\$50.000, \$50.001-\$100.000, \$100.001-\$500.000, \$500.000-\$1.000.000 and above \$1.000.000. Correspondingly, in Finland portfolio managers must report their every trade and therefore it is possible to calculate an exact ownership amount for any particular day.

According to the renewed version of the Finnish mutual fund law, which came effective in July 2005, the ownership of mutual funds is public if the person works at or for the company and has the possibility to affect the investment decisions of the mutual fund. However, according to the old version of the law, those portfolio managers, who were not working at the company (portfolio management was outsourced), did not belong to insiders and their ownership information was not public. Since a law can not be applied backwards, this posed some limitations to the information gathering, because each portfolio manager belonging to this group had to be personally asked whether his ownership information could be used for research purposes. Unfortunately all portfolio managers did not give the permission to use their past information, so the sample size was reduced by some quantity for years before 2005. This may have caused some self-selection bias to the data.

Finally, neither the old nor the new version of the law applies to foreigners, and thus also all foreign portfolio managers had to be excluded from the analysis.

To estimate the magnitude of managerial incentives we calculate one primary variable: a manager's ownership in the fund as a percentage of his total taxable wealth. To complement the analyses, we further add a second variable: a manager's ownership in the fund as a percentage of his annual taxable employment income. Finally, for the results to be comparable to the previous study we also calculate a third variable: the manager's stake as a percentage of the fund's total assets.

Table 2 contains summary statistics on portfolio manager ownership for the full sample (combined for years 2003-2005). Panel A presents the ownership figures in euros, Panel B as a percentage of the manager's taxable wealth, Panel C as a percentage of the manager's taxable employment income and Panel D as a percentage of the fund's total assets.

[Insert Table 2 here]

Only 31% of all managers hold any ownership stakes in the funds they run. In other words, the median manager does not have any personal investment in his fund. The average ownership stakes are modest; the average manager holds € 5.179 worth of shares in his fund, which in turn translates to 0.05% of the fund's size. When ownership is expressed as a percentage of the manager's taxable wealth, the average manager has invested below two (1.91) percent of his wealth in the fund he runs, or when expressed as a percentage of his taxable annual employment income, below six (5.97) percent. However, since the high ownership stakes of a small percent of managers shift the averages upwards, the percentiles give a more descriptive picture of the ownership stakes that portfolio managers in general hold in their funds.

Looking at the percentiles reveals that only 10% of all managers have invested more than € 5.137 in their funds. This in turn translates to only 0.02% of the fund's total assets, or 2.01 (2.83) percent of the manager's taxable wealth (employment income). Nevertheless, the manager with the highest ownership stake has invested almost half a million euros (€ 498.394) in his fund, which is more than six times his annual taxable employment income and over half of his taxable net wealth.

3.3. Fund characteristics

Fund family and portfolio manager characteristics is gathered from Mutual Fund Reports, which are produced by Investment Research Finland⁶ in co-operation with the Finnish Association of Mutual Funds⁷. Mutual Fund Reports are the leading neutral analyses of mutual funds marketed in Finland, and are published at the beginning of each month to document the funds' performance- and other data for the preceding month. From the reports, we gather the data about the fund's performance, volatility, expenses, loads and size, as well

⁶ For more information about Investment Research Finland, see <http://www.sijoitustutkimus.fi/eng/company.shtml>

⁷ For more information about the Finnish Association of Mutual Funds, see <http://www.sijoitusrahasot.fi/>

as the data about the tenure of the manager, the size of the fund family, the amount of minimum investment and the number of shareholders. Furthermore, we also gather the information regarding managerial changes, and set the single manager- and bank dummies based on the Mutual Fund Report data.

Since Mutual Fund Reports contain nearly all Finnish registered mutual funds, the full sample for each year consists of all those Finnish mutual funds, which are included in the reports. Combined for years 2003-2005, the original sample size is 1.101 funds.

Table 3 contains the summary statistics of fund characteristics for the full sample (combined for years 2003-2005). Panel A presents the descriptive statistics for the sample funds and compares them with the rest of the universe. Panel B compares the characteristics of the funds with positive managerial ownership to those with no ownership.

[Insert Table 3 here]

Panel A shows that while there seems to be no significant differences in performance, the number of portfolio managers, expenses, size or the amount of minimum investment between the sample funds and the rest of the universe, the funds in the sample are more likely to be from smaller, non-bank investment fund companies than their non-sample peers. In addition, the sample funds have fewer shareholders and employ lower front-end- and back-end loads. The last finding may result partially from the fact that the sample funds are more likely to belong to non-bank families; some studies suggest that Finnish bank-managed mutual funds charge higher fees from their customers than non-bank funds do [see for example Korkeamäki and Smythe (2004)].

Descriptive statistics documented in Panel B suggest that on average, funds with positive managerial ownership have performed better than funds with no ownership: the average (median) objective-adjusted return for a fund with some managerial ownership is 2.12 % (0.65%) compared to the average of -0.07% (-0.19%) of its zero-ownership peer. Furthermore, the average (median) fund with positive managerial ownership has an objective-adjusted Sharpe of 0.24 (0.10), while the comparable numbers for a zero ownership fund are 0.01 and -0.05 respectively.

In addition, the figures shown in Panel B suggest a couple of other differences between the funds, which have some amount of managerial ownership, and funds with no ownership. More precisely, positive ownership funds are more likely to belong to smaller families (average family assets of € 1.207 million compared to € 3.771 million), be of smaller size (average fund size of € 59 million compared to € 107 million), have fewer shareholders (average number of shareholders 2.472 compared to 3.977) and have lower minimum investment requirements (average minimum investment of € 24.127 compared to € 62.511). In addition, the funds with positive managerial ownership are more likely to be managed by non-bank companies than funds, which lack managerial ownership.

4. Managerial ownership and fund performance

4.1. Ownership and performance

We next investigate whether there is a relation between the amount of managerial ownership at the end of the year (years 2003-2005), and fund performance during the subsequent year (years 2004-2006). More precisely, we estimate both simple and multivariate regressions of performance as a function of managerial ownership and a set of control variables. In constructing the models we use two different measures of fund performance and three different measures of ownership. Panel A in Table 4 shows the regression results where ownership is measured as a percentage of the manager's taxable wealth and Panel B where it is measured as a percentage of the manager's taxable annual employment income. Panel C measures ownership as a percentage of the fund's total assets.

[Insert Table 4 here]

The main finding from Panel C is that *no* relation between ownership and performance exists, when ownership is measured as a percentage of the fund's size. The finding persists across different model specifications, and although the explanatory power of the models increases

when additional control variables are included in the regressions, the coefficient on ownership is not statistically significant in any of the models.

Panels B reports the regression results, where ownership is measured as a percentage of the manager's taxable employment income. The conclusion is similar to the previous finding; also when measured as a percentage of the manager's taxable income, ownership seems to have no effect on fund performance.

Finally, the Panel A reports the regression results, where ownership is measured as a percentage of the manager's taxable wealth – the primary variable for the purposes of our study. One result clearly stands out. While the US findings lead us to expect a positive relation between ownership and performance, our empirical findings indicate the opposite. The effect of ownership on performance is negative, and in most models, the result is statistically significant at least on 10% level⁸. In general, the results suggest that for every basis point of increased managerial ownership, the fund's objective-adjusted return decreases by 9-14 basis points and the objective-adjusted Sharpe by 1-2 basis points. The economic significance of the result is the highest when the fund's objective-adjusted Sharpe is used to measure the excess performance. Thus, especially when the risks of the fund are taken into account – despite the possibly higher incentives – the managers, who have invested their own money in the funds they run, fail to generate superior returns.

Table 4 also reports the relation between a number of control variables and fund performance. First, in all models, the effect of the size of the fund family on performance is negative, and most models it is statistically significant. In other words, the larger the fund family the worse the fund performance.

Second, the funds managed by a single manager perform worse than funds managed by multiple managers. More precisely, the objective-adjusted return for a fund run by a single manager is 2-19% lower than for a fund run by multiple managers, and the objective-adjusted Sharpe 30-90 basis points lower, depending on the model specification.

⁸ We also run the regression with all funds (also without manager ownership). The results are qualitatively the same.

Third, the results suggest that the larger the fund the better the performance, while the impact of the number of shareholders on performance is negative. In other words, large funds with few shareholders – which refer to funds intended for high net worth individuals and institutions – tend to perform better than smaller funds with multiple shareholders. One explanation for this is that mutual fund companies may tend to favor funds, which are the most important to them in terms of revenue, at the expense of other funds [For more information on favoritism in fund families, see for example Gaspar, Massa and Matos (2006)].

Finally, while some of the models suggest a negative relation between back-end loads and performance as well as between the amount of minimum investment and performance, and a positive relation between expenses and performance as well as between front-end loads and performance, these results are not consistent across different models.

4.2. Determinants of managerial ownership

We also examine whether it is possible to find factors which explain the amount of managerial ownership. Table 5 reports the ordinary least squared regression results, in which the amount of managerial ownership is the dependent variable. Panel A documents the results, in which all sample funds are included in the regressions, while Panel B shows the results when only funds with positive managerial ownership are included. Model (i) measures ownership as a percentage of the manager's taxable *wealth*, Model (ii) as a percentage of the manager's taxable employment *income* and Model (iii) as a percentage of the fund's total assets.

[Insert Table 5 here]

First, when measured as a percentage of the fund's total assets managerial ownership seems to be higher in smaller funds. This is a result consistent with previous findings and is unsurprising, since in smaller funds, the same euro ownership comprises a larger ownership stake. However, when other ownership measures are employed, fund size seems to have no

effect on the amount of ownership. Thus, the perceived correlation is more likely to be a result of the ownership measure employed and not an evidence of a relation between fund size and managerial ownership per se.

Second, consistent with the findings of Khorana et al (2007) and Evans (2008), our results suggest that a positive relation, if any, exists between the tenure of the manager and the amount of ownership. However, since the findings from the alternative specifications indicate no evidence of such a relation, it is more probable that the tenure of the manager is related to the size of the fund and not to the amount of ownership.

Third, while Khorana et al (2007) and Evans (2008) find that managerial ownership is higher in US funds with lower front-end loads and better past performance, we find no evidence of such relations. Instead, the results suggest that in Finland, portfolio managers own a larger share of funds, which belong to larger, but non-bank fund families.

When the two variables of our primary interest – ownership as a percentage of the manager’s taxable wealth and as a percentage of the manager’s taxable employment income – are employed, one result clearly stands out: the managers invest a higher share of their own money in funds which have higher risks. More precisely, for every additional percent, which the manager’s own investment comprises of his taxable wealth, the fund volatility increases by 16-45 basis points. Moreover, for every additional percent, which the manager’s own investment comprises of his annual taxable employment income, the fund volatility increases by 13-91 basis points. In other words, in the hope for higher returns, portfolio managers invest a larger share of their own money in funds, which have high risks. However, the risk taking does not pay off, since the funds with positive managerial ownership fail to generate superior returns compared to their peer group, and on a risk-adjusted basis the finding becomes even more significant.

5. Summary and conclusions

In exploring the relation between ownership and performance of mutual funds, we end up with results which are somewhat controversial with prior research. When we measure ownership as a percentage of the fund's total assets our results suggest that no relation exists between ownership of a fund manager and fund performance. However, when we employ the primary variable of our interest – ownership measured as a percentage of the manager's taxable wealth – the results suggest that higher managerial ownership actually leads to inferior, not superior fund performance. This means that the US findings cannot necessarily be generalized to other markets.

An examination of the determinants of managerial ownership points to a couple of factors, which help to explain the amount of ownership. First, managerial ownership is higher in more volatile funds, suggesting that portfolio managers are risk-takers in nature. This, on the other hand, explains at least a part of the inverse relation between ownership and performance, since despite higher risks, the funds with positive managerial ownership do not exhibit higher returns.

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**Table 1 Descriptive statistics on portfolio manager taxable net wealth and income
– all sample funds**

This table documents the portfolio managers' taxable net wealth and taxable employment income during the period 2003-2005. The data is reported only for those managers, whose ownership data was disclosed, and is as confirmed by the tax authorities. The mean, 50th, 75th, 90th and 100th percentiles of taxable wealth and income figures are reported.

	N	Mean	50th	75th	90th	100th
Taxable wealth	119	258.574	16.700	127.950	472.800	4.517.200
Taxable employment income	119	89.717	75.600	98.650	145.440	409.300

Table 2 Descriptive statistics on portfolio manager ownership – all sample funds

This table documents the amount of ownership that portfolio managers have in the funds they run as of December 31, 2003-2005. The ownership includes the manager's personal ownership as well as the possible ownership of his firm. The mean, 50th, 75th, 90th and 100th percentiles of ownership figures are reported. Panel A documents the amount of ownership in euros and Panel B as a percentage of the manager's total taxable net wealth. Panel C documents the ownership as a percentage of the manager's annual taxable employment income and Panel D as a percent of the fund's total assets.

Panel A Managerial ownership (€)

Fund type	N	% of funds with positive ownership	Mean	50th	75th	90th	100th
All funds	460	31	5.179	0	324	5.137	498.394
Balanced	100	31	3.513	0	718	3.419	68.141
Domestic equity	54	30	2.915	0	425	5.831	47.103
International equity	183	34	8.114	0	361	6.576	498.394
Bond	39	13	299	0	0	675	8.615
Corporate bond	28	29	196	0	10	626	2.519
Money market	48	33	2.983	0	205	6.586	31.943
Other	8	63	29.002	10.205	35.660	84.288	117.300

Panel B Managerial ownership (% of the manager's taxable wealth)

Fund type	N	% of funds with positive ownership	Mean	50th	75th	90th	100th
All funds	380	16	1.91	0.00	0.00	2.01	60.22
Balanced	82	16	1.95	0.00	0.00	4.37	37.05
Domestic equity	49	22	0.90	0.00	0.00	1.96	17.73
International equity	150	19	1.85	0.00	0.00	2.11	60.22
Bond	36	6	1.31	0.00	0.00	0.00	44.64
Corporate bond	20	0	0.00	0.00	0.00	0.00	0.00
Money market	39	18	5.08	0.00	0.00	28.86	56.13
Other	3	0	0.00	0.00	0.00	0.00	0.00

Panel C Managerial ownership (% of the manager's taxable income)

Fund type	N	% of funds with positive ownership	Mean	50th	75th	90th	100th
All funds	397	20	5.97	0.00	0.00	2.83	658.79
Balanced	82	16	0.39	0.00	0.00	1.16	9.13
Domestic equity	50	24	1.71	0.00	0.00	4.25	39.39
International equity	155	22	11.53	0.00	0.00	3.33	658.79
Bond	36	6	0.46	0.00	0.00	0.00	14.80
Corporate bond	25	25	0.26	0.00	0.00	0.07	4.56
Money market	43	26	2.90	0.00	0.00	8.87	28.88
Other	5	40	63.18	0.00	143.14	160.91	172.75

Panel D Managerial ownership (% of the fund's total assets)

Fund type	N	% of funds with positive ownership	Mean	50th	75th	90th	100th
All funds	460	31	0.05	0.00	0.00	0.02	4.71
Balanced	100	31	0.04	0.00	0.00	0.04	1.26
Domestic equity	54	30	0.01	0.00	0.00	0.03	0.31
International equity	183	34	0.08	0.00	0.00	0.02	4.71
Bond	39	13	0.00	0.00	0.00	0.00	0.02
Corporate bond	28	29	0.00	0.00	0.00	0.01	0.02
Money market	48	33	0.02	0.00	0.00	0.01	0.80
Other	8	63	0.32	0.02	0.29	1.11	1.46

Table 3 Descriptive statistics of fund characteristics

Summary statistics of fund characteristics for the full sample. The objective-adjusted return and objective-adjusted Sharpe are measured during year $k + 1$ (years 2004-2006), family assets, fund size, and the number of shareholders at the end of year k (years 2003-2005) and all other variables during year k (years 2003-2005). The following variables are expressed in percent: objective-adjusted return, expenses, front-end load and back-end load. Family assets and fund size are expressed in millions of euros, and the amount of minimum investment in euros. The objective-adjusted return (Sharpe) is calculated by subtracting the median return (Sharpe) for the funds with the same investment objective from the fund's return (Sharpe). The single manager dummy is 1, if the fund is run by a single manager and otherwise 0. The bank dummy is 1, if the fund is bank-managed, and otherwise 0. The mean and median figures are reported and a t-test is conducted for the differences in means. The asterisks (*, ** and ***) indicate whether the differences in means are statistically significant at 10%, 5% and 1% levels respectively. Panel A compares the sample funds with the rest of the universe while in Panel B, the comparison is done between the funds with positive managerial ownership and funds with zero ownership.

Panel A Comparing sample funds with the rest of the universe

Variable	Sample funds			Rest of the universe		
	N	Mean	Median	N	Mean	Median
Objective-adjusted return	380	0,59	-0,01	406	0,52	0,00
Objective-adjusted sharpe	362	0,08	0,00	406	0,09	0,00
Single manager dummy	462	0,86	1,00	330	0,91	1,00
Bank dummy	462	0,49***	0,00	570	0,64***	1,00
Family assets	462	2.983***	1.317	562	4.406***	3.332
Expenses	461	1,19	1,07	575	2,92	1,10
Fund size	461	92	34	575	89	37
Front-end load	458	0,69***	1,00	575	0,77***	1,00
Back-end load	423	0,72***	1,00	551	0,82***	1,00
Number of shareholders	460	3.500**	688	575	4.948**	700
Minimum investment	462	50.721	1.000	565	46.802	500

Panel B Comparing funds with positive managerial ownership to those with no ownership

Variable	With ownership			No ownership		
	N	Mean	Median	N	Mean	Median
Objective-adjusted return	116	2,12**	0,65	257	-0,07**	-0,19
Objective-adjusted sharpe	114	0,24***	0,10	246	0,01***	-0,05
Single manager dummy	142	0,88	1,00	320	0,85	1,00
Bank dummy	142	0,44*	0,00	320	0,52*	1,00
Family assets	142	1.207***	750	320	3.771***	1.619
Expenses	142	1,22	1,10	319	1,16	1,00
Fund size	142	59**	30	319	107**	38
Front-end load	142	0,69	1,00	316	0,70	1,00
Back-end load	130	0,70	1,00	293	0,73	1,00
Number of shareholders	142	2.472*	424	318	3.977*	767
Minimum investment	142	24.127**	500	320	62.511**	1.000

Table 4 The ownership and performance – funds with fund manager ownership

The ordinary least squares (OLS) regression results, in which the fund performance (measured as the fund's objective-adjusted return and objective-adjusted Sharpe) is the dependent variable, for funds with positive managerial ownership. The objective-adjusted return is calculated by subtracting the return of the median fund with the matched investment objective from the fund's return and the objective-adjusted Sharpe by subtracting the median Sharpe from the fund's Sharpe. The following control variables are in percent: expenses, front-end load and back-end load, while the log is taken from the following variables: family assets, fund size, number of shareholders and the amount of minimum investment. The single manager dummy is 1, if the fund is run by a single manager and otherwise 0. The bank dummy is 1, if the fund is bank-managed, and otherwise 0. The amount of ownership, the size of fund family, the size of the fund and the number of shareholders are measured at the end of the year k (2003-2005), fund performance during year $k + 1$ (2004-2006), and all other control variables during year k (2003-2005). In Panel A, ownership is measured as a percent of the manager's taxable wealth, in Panel B as a percent of the manager's taxable income and in Panel C as a percent of the fund's total assets. The numbers in parentheses are P-values and the asterisks (*, **, ***) indicate whether the coefficients are significant at conventional levels (10%, 5% and 1% respectively).

Panel A. Regression results when ownership is measured as a percent of the manager's taxable wealth

Variable	Objective-adjusted return			Objective-adjusted Sharpe		
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Ownership	-0.11 (0.03)**	-0.14 (0.15)	-0.09 (0.22)	-0.01 (0.09)*	-0.02 (0.01)***	-0.01 (0.01)***
Family assets		-1.23 (0.25)	-0.24 (0.84)		-0.15 (0.07)*	-0.08 (0.39)
Expenses		0.21 (0.92)	1.46 (0.47)		-0.08 (0.58)	0.04 (0.80)
Fund size		2.06 (0.04)**	2.73 (0.01)***		0.20 (0.01)***	0.29 (0.00)***
Front-end load		2.34 (0.49)	3.93 (0.23)		0.26 (0.30)	0.38 (0.14)
Back-end load		-1.74 (0.55)	-4.31 (0.11)		-0.20 (0.35)	-0.32 (0.13)
Single manager dummy			-19.33 (0.00)***			-0.87 (0.02)**
Bank dummy			0.72 (0.80)			0.22 (0.30)
Number of shareholders			-2.32 (0.01)***			-0.21 (0.00)***
Minimum investment			-0.85 (0.03)**			-0.07 (0.03)**
N	60	52	52	60	52	52
Adjusted R ²	0.06	0.10	0.46	0.03	0.26	0.52

Panel B. Regression results when ownership is measured as a percent of the manager's taxable income

Variable	Objective-adjusted return			Objective-adjusted Sharpe		
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Ownership	0.01 (0.57)	-0.05 (0.46)	0.03 (0.67)	0.00 (0.94)	-0.01 (0.12)	-0.01 (0.50)
Family assets		-1.29 (0.17)	-1.21 (0.29)		-0.26 (0.01)***	-0.19 (0.17)
Expenses		0.59 (0.72)	3.56 (0.06)*		-0.13 (0.44)	0.08 (0.71)
Fund size		2.09 (0.03)**	3.65 (0.00)***		0.30 (0.00)***	0.44 (0.00)***
Front-end load		2.67 (0.35)	2.82 (0.36)		0.51 (0.10)*	0.58 (0.11)
Back-end load		-2.15 (0.44)	-3.62 (0.17)		-0.28 (0.34)	-0.45 (0.16)
Single manager dummy			-17.63 (0.00)***			-0.59 (0.35)
Bank dummy			4.11 (0.13)			0.18 (0.59)
Number of shareholders			-2.62 (0.00)***			-0.22 (0.02)**
Minimum investment			-0.32 (0.40)			-0.03 (0.47)
N	73	70		73	70	70
Adjusted R ²	-0.01	0.05		-0.01	0.16	0.21

Panel C. Regression results when ownership is measured as a percent of the fund's total assets

Variable	Objective-adjusted return			Objective-adjusted Sharpe		
	(i)	(ii)	(iii)	(iv)	(v)	(vi)
Ownership	-0.38 (0.39)	-4.76 (0.31)	-4.44 (0.35)	0.00 (0.95)	-0.33 (0.49)	-0.17 (0.72)
Family assets		-1.81 (0.01)***	-1.21 (0.16)		-0.26 (0.00)***	-0.23 (0.01)***
Expenses		1.07 (0.39)	3.74 (0.01)***		-0.14 (0.28)	0.19 (0.19)
Fund size		1.77 (0.02)**	3.46 (0.00)***		0.24 (0.00)***	0.45 (0.00)***
Front-end load		0.30 (0.88)	0.62 (0.80)		0.23 (0.29)	0.16 (0.52)
Back-end load		0.31 (0.89)	-2.28 (0.32)		0.15 (0.52)	-0.11 (0.63)
Single manager dummy			-1.97 (0.32)			-0.21 (0.32)
Bank dummy			1.31 (0.47)			0.33 (0.08)*
Number of shareholders			-2.18 (0.00)***			-0.25 (0.00)***
Minimum investment			0.02 (0.93)			0.01 (0.72)
N	128	120	120	126	118	118
Adjusted R ²	0.00	0.10	0.17	-0.01	0.14	0.25

Table 5 The determinants of managerial ownership

The OLS regression results, in which the managerial ownership at the end of year k (2003-2005) is the dependent variable. In model (i), ownership is measured as a percentage of the manager's taxable wealth, in model (ii) as a percentage of the manager's taxable income and in model (iii) as a percentage of the fund's total assets. The objective-adjusted Sharpe is calculated by subtracting the Sharpe of the median fund with the matched investment objective from the fund's Sharpe. The following control variables are in percent: volatility, expenses, front-end load and back-end load, while the log is taken from the following variables: family assets, fund size, number of shareholders and the amount of minimum investment. The tenure of the manager is measured in years. The single manager dummy is 1, if the fund is run by a single manager and otherwise 0. The bank dummy is 1, if the fund is bank-managed, and otherwise 0. The size of the fund family, the size of the fund, the number of shareholders and the tenure of the manager are measured at the end of the year k (2003-2005), objective-adjusted Sharpe both during year k + 1 (2004-2006) as well as during year k (2003-2005), and all other control variables during year k (2003-2005). Numbers in parentheses are P-values and the asterisks (*, **, ***) indicate whether the values are significant at conventional levels (10%, 5% and 1% respectively).

Panel A Regression results when all sample funds are included in the regressions

Variable	Ownership (% of the	Ownership (% of the	Ownership (% of the
	manager's taxable wealth)	manager's taxable income)	fund's total assets)
	(i)	(ii)	(iii)
Objective-adjusted sharpe (contemporaneous)	-0.16 (0.80)	-0.47 (0.38)	0.00 (0.53)
Objective-adjusted sharpe (lagged)	-0.98 (0.13)	-0.23 (0.69)	-0.01 (0.28)
Volatility	0.16 (0.06)*	0.13 (0.10)*	0.00 (0.42)
Family assets	-0.43 (0.30)	-0.61 (0.12)	0.01 (0.09)*
Expenses	-1.29 (0.12)	-0.21 (0.80)	0.01 (0.65)
Fund size	0.13 (0.80)	0.14 (0.78)	-0.01 (0.03)**
Front-end load	-0.29 (0.81)	-0.15 (0.90)	-0.02 (0.16)
Back-end load	0.84 (0.55)	-0.43 (0.75)	0.02 (0.34)
Tenure of the manager	0.04 (0.85)	-0.06 (0.77)	0.00 (0.03)**
Single manager dummy	1.08 (0.40)	1.43 (0.26)	0.01 (0.39)
Bank dummy	0.71 (0.55)	-1.79 (0.11)	-0.03 (0.06)*
Number of shareholders	-0.29 (0.53)	0.49 (0.27)	-0.01 (0.34)
Minimum investment	0.04 (0.81)	0.24 (0.09)*	0.00 (0.95)
N	262	277	325
Adjusted R ²	0.01	0.04	0.06

Panel B Regression results when only funds with positive ownership are included in the regressions

Variable	Ownership (% of the manager's taxable wealth)	Ownership (% of the manager's taxable income)	Ownership (% of the fund's total assets)
	(i)	(ii)	(iii)
Objective-adjusted sharpe (contemporaneous)	2.43 (0.49)	0.16 (0.92)	0.00 (0.81)
Objective-adjusted sharpe (lagged)	-7.76 (0.09)*	0.74 (0.73)	-0.01 (0.65)
Volatility	0.45 (0.32)	0.91 (0.01)***	0.00 (0.62)
Family assets	2.22 (0.41)	0.55 (0.81)	0.05 (0.00)***
Expenses	-11.36 (0.02)**	-5.68 (0.16)	0.00 (0.89)
Fund size	1.45 (0.60)	-1.67 (0.49)	-0.05 (0.03)**
Front-end load	2.23 (0.77)	-6.93 (0.29)	-0.01 (0.80)
Back-end load	-2.85 (0.63)	2.19 (0.68)	0.03 (0.53)
Tenure of the manager	-0.92 (0.45)	0.25 (0.80)	0.01 (0.10)*
Single manager dummy	-5.40 (0.66)	2.37 (0.82)	0.05 (0.23)
Bank dummy	-6.03 (0.34)	-9.69 (0.08)*	-0.10 0.01***
Number of shareholders	-0.61 (0.77)	2.05 (0.24)	0.00 (0.79)
Minimum investment	-1.40 (0.21)	0.80 (0.36)	0.00 (0.55)
N	49	64	111
Adjusted R ²	0.32	0.19	0.18