The Impact of Team Diversity on Mutual Fund Performance*

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Abstract

This paper investigates the impact of team diversity on mutual fund performance. Analyzing management teams from the U.S. mutual fund industry we show that the impact of diversity on fund performance depends on a trade off between information gains and communication costs. We find that information gains dominate in tenure and educational diverse teams which leads to higher fund performance. Communication costs dominate in gender diverse teams which leads to lower fund performance. Our results are consistent with the diversity theory developed in Lazear (1999).

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1 Introduction

Over the past decades, the workforce in industrialized countries has become increasingly heterogenous and team production greatly gained in popularity. At the same time, many firms face large difficulties in efficiently managing their diverse workforce. One very salient indication of such difficulties are the billions of dollars that had to be paid in discrimination lawsuits (see, e.g., Hersch (1991)).
Team production has become particularly prominent in the mutual fund industry, where more than half of all funds are now managed by a team (see, e.g., Baer, Kempf, and Ruenzi (2008)). Thus, it is important to understand whether the composition of a fund management team has an impact on fund performance. This paper is the first to investigate the impact of several important diversity dimensions like tenure diversity, educational diversity, gender diversity, and age diversity on fund performance.

In the empirical literature, there is still no agreement on whether diversity has a positive or negative impact on team performance (see, e.g., Siciliano (1996), and Jehn, Northcraft, and Neale (1999)). While some studies show that diverse teams outperform homogenous teams (see, e.g., Nemeth (1986), Jackson (1992), and Richard (2000)) other studies provide the opposite finding (see, e.g., Ancona and Caldwell (1992) and Timmerman (2000)).
The contradicting findings from this literature can be reconciled based on a theoretical model of Lazear (1999). His model shows that a positive impact of diversity on performance hinges on three main determinants. First, information and skills of the team members have to be disjoint so that the total information set increases with the addition of team members. Second, the information has to be relevant for the task that has to be solved. Third, communication costs have to be small so that they do not offset potential benefits gained by the additional information. Thus, the Lazear (1999) model predicts that diverse fund management teams outperform homogenous teams if information gains that are useful to manage an equity fund outweigh the communication costs within diverse teams, and vice versa.

To measure the trade off between information gains and communication costs we rely on proxies developed in the social psychology literature. Specifically, we follow Jehn, Northcraft, and Neale (1999) and use their concept of informational diversity (social category diversity) to measure information gains (communication costs) in diverse fund management teams.

According to Jehn, Northcraft, and Neale (1999), *informational diversity* arises if team members differ in knowledge bases, skills or perspectives. If informational diversity is high, the information set available to the team is large and different alternatives will be evaluated and criticized intensively. Every team member–based on her or his information set–might have a different opinion on how to solve a specific task. Such task-oriented conflicts enhance problem solving abilities and creativity and eventually lead to high-quality solutions and a better performance (see, e.g., Schwenk and Valacich (1994)). Informational diversity increases due to a different education or work experience of the team members (see, e.g., Jehn, Northcraft, and Neale (1999)). Thus, in our empirical analysis we proxy for information gains in diverse fund management teams based on the team members' diversity with respect to their industry tenure and education.

Social category diversity arises if team members differ in demographical dimensions like gender, age or different ethnic groups. According to the similarity attraction effect (see, e.g., Byrne (1969)), people tend to interact more with others they perceive to be more similar to themselves on dimensions such as interest or attitudes. Thus, people prefer to communicate with others that belong to the same social category. If team members only communicate with those other team members that belong to the same social category, this can result in reduced within-group communication, lower levels of cohesiveness, and a lower level of satisfaction with the team.[1] If teams fail to manage these communication problems, relationship-oriented conflicts arise with negative effects on performance (see, e.g., Williams and O'Reilly (1998), Tjosvold (1991)). We measure communication costs in di-

[1]Based on data from the American Civil War, Costa and Kahn (2003) show that soldiers' primary motivation for fighting, to the point of self-sacrifice, was intense loyalty to a small group of comrades. Loyalty was significantly higher when the group was more homogeneous in ethnicity, occupation, and age.

verse fund management teams based on the team members' diversity with respect to their gender and age.

Overall, the theoretical arguments of Lazear (1999) and the proxies for information gains and communication costs that can be developed based on the social psychology literature give rise to the following hypotheses: (1) Informational Diversity is positively related to fund performance, i.e. (1a) tenure diversity is positively related to fund performance and (1b) educational diversity is positively related to fund performance. (2) Social Category Diversity is negatively related to fund performance, i.e. (2a) gender diversity is negatively related to fund performance and (2b) age diversity is negatively related to fund performance. We will test these hypotheses in the remainder of this paper.

Our analysis of 2,260 U.S. equity fund management teams from 1996 to 2003 broadly supports the model of Lazear (1999). We show that diverse teams significantly outperform homogenous teams when information gains in diverse teams are expected to be larger than communication costs, i.e. when teams are tenure or educational diverse. Diverse teams underperform homogenous teams when communication costs in diverse teams are expected to be larger than information gains, i.e. when teams are gender diverse. However, we do not find a strong impact of age diversity. Our results are stable over time and hold irrespective of the specific market segment or performance measure we analyze. They are robust if we include fund, manager, and team characteristics that might be related to fund performance. Our findings are also economically significant. In our sample period it would have been possible to earn an abnormal risk-adjusted return of about 2% p.a. with a hypothetical investment strategy based on diversity information about management teams.

Our paper contributes to three main strands of the literature. First, it contributes to the literature on the determinants of fund performance. There are several papers on the impact of single managers' characteristics like age or gender and of the status of a fund as being single- or team-managed on fund performance (see, e.g., Chevalier and Ellison (1999b), Niessen and Ruenzi (2007), Prather and Middleton (2002) and Baer, Kempf, and

Ruenzi (2008)). However, ours is the first study to look at the impact of diversity within fund management teams on fund performance.

Second, we contribute to the broad empirical literature on team diversity (see, e.g., Hambrick, Cho, and Chen (1996), Pelled, Eisenhardt, and Xin (1999), and Groysberg, Polzer, and Elfenbein (2007)).[2] Most of these studies are experimental studies or are based on a very small number of observations. Looking at the mutual fund industry allows us to overcome major shortcomings of existing studies. First, the decisions made by fund management teams matter for the promotion and remuneration of fund managers (see, e.g., Khorana (1996)) which ensures that the teams exert real effort to achieve a high fund performance. Additionally, they make repeated decisions over an extended period of time, typically working together for several years. Thus, our findings are not biased by weakly incentivised, artificial and short-lived groups like the ones typically examined in experiments. Second, we are the first to investigate team diversity within a whole industry. This makes our results independent from priming effects of the organizational culture in a specific company (see, e.g, Chatman, Polzer, Barsade, and Neale (1998)). Third, the performance of fund management teams is objectively quantifiable based on fund returns which overcomes problems of previous studies on diversity which often have to rely on qualitative performance measures like team leaders' ratings that depend on self-perceptions or subjective judgements (see, e.g., Pelled, Eisenhardt, and Xin (1999)). Finally, analyzing fund performance allows us to quantify the effects of diversity on performance in monetary terms. Thus, ours is the first paper that is able to analyze whether the impact of diversity on performance is economically significant at all.

Third, we also contribute to the recent but still very small corporate finance literature on top management team diversity (see, e.g., Carter, Simkins, and Simpson (2003), Erhardt, Werbel, and Shrader (2003), and Adams and Ferreira (2004)). This literature has mainly focused on the consequences of diversity within corporate boards with the focus on one single diversity dimension. Furthermore, corporate boards face a very heterogenous task design

[2]For comprehensive overviews see, e.g., Milliken and Martins (1996), Williams and O'Reilly (1998), and Jackson, Joshi, and Erhardt (2003).

across companies. Thus, our paper extends this literature by investigating fund management teams that work in a relatively homogenous environment with clearly defined tasks, i.e., every team in our sample has to manage an equity fund. These teams can be easily compared and our results are not influenced by different degrees of task difficulty or complexity.

The paper proceeds as follows. Section 2 contains a description of our database and methodology. Results of our empirical study are presented in Section 3. Section 4 concludes.

2 Methodology

2.1 Data and Summary Statistics

Our empirical analysis is based on data from the CRSP Survivor Bias Free Mutual Fund Database[3] as well as the Morningstar Principa Database CDs. The CRSP database covers virtually all U.S. open-end mutual funds and provides information on fund returns, investment objectives, fund managers and other fund characteristics. Since this database does not include detailed information about fund managers, we obtain the fund managers' age and degree from the fund manager profiles provided by the Morningstar database. Age is not explicitly reported in the manager profiles. Following the method suggested in Chevalier and Ellison (1999a), we calculate a proxy for manager age based on information about the year a manager finished her degree.

We focus on actively managed, well-diversified equity funds which invest more than 50% of their assets in U.S. stocks. ICDI objective codes as provided by Standard and Poor's Fund Services are used to define the market segment in which a fund operates. Our sample consists of funds of the following three standard segments: *Aggressive Growth*, *Growth and Income*, and *Long Term Growth*. We exclude index, sector, bond, money market, balanced, and international funds since the management of these funds might require specific abilities

[3]Source: CRSP, Center for Research in Security Prices. Graduate School of Business, The University of Chicago. Used with permission. All rights reserved.

which make management teams of these funds less comparable. Furthermore, fund performance is not easily comparable across these market segments due to different benchmarks. Since we need to identify individual characteristics of fund managers, we only include funds managed by more than one manager where the names of all members are explicitly given in the CRSP database.[4] Single managed funds are also excluded since the minimum number of team members to investigate diversity effects is by definition two.

Our data on manager characteristics from Morningstar begins in January 1996. Overall, our sample covers the time period from January 1996 to December 2003 and contains 2,260 yearly observations of team managed funds. We follow the approach in Daniel, Grinblatt, Titman, and Wermers (1997) and match share classes of a fund to avoid multiple counting. Although multiple share classes are listed as separate entries in the CRSP database, they are backed by the same portfolio of assets and have the same portfolio managers. Summary statistics for our sample are presented in Table 1.

— Please insert TABLE 1 approximately here —

The funds in our sample have an average age of 11.3 years and an average size of 942.04 Million USD. The mean turnover ratio is 96.02% with a large variation ranging from 0.01% up to 684%. Expense ratios are distributed between 0.01% and 3.87% with a mean of 1.32%. The mean (median) fund management team consists of 3.11 (3) team members, while the minimum number of team members is (by definition) 2 and the maximum number of team members is 15. The large variation in fund characteristics like age, size and turnover mandates that we control for them when investigating the impact of diversity on performance in a regression framework.

[4]Some fund companies provide no information on the identity of team members. These observations are excluded.

2.2 Diversity Measures

To investigate the trade off between information gains and communication costs suggested in Lazear (1999), we develop four diversity measures.

Information gains are likely to arise as a function of differences among group members in terms of work experience and education (see, e.g., Jehn, Northcraft, and Neale (1999)). Thus, we construct measures based on team members' variations in industry tenure and degree-level. Tenure diversity within a fund management team is measured by the coefficient of variation of industry tenure among team members. The industry tenure of each manager is captured by that person's first appearance in the Morningstar database. This method might lead to some noise in our proxy as it is possible that some managers worked for an anonymous team earlier in their career and thus the starting date would not be correctly computed. Furthermore, the manager might have gained some experience in another area of fund management, e.g., in hedge funds. However, we do not expect this to be a very regular case or to systematically bias our results. Looking at the educational background of fund managers we find that managers vary in particular with respect to their level of degree (B.A., M.A., PhD (or equivalent)). Following Smith, Smith, Olian, Sims, O'Bannon, and Scully (1994), we transform the highest degree achieved by a team member into years of formal education. Educational diversity is then captured by the team's coefficient of variation of the team members' length of formal education.[5]

Communication costs arise from differences in social category membership among team members with essential social categories being gender, age, race, and ethnicity (see, e.g., Jehn, Northcraft, and Neale (1999)). Unfortunately, we can not examine the impact of the latter two diversity dimensions due to a lack of data availability. Thus, we define social category diversity measures based on age and gender. Age diversity is measured by the team's coefficient of variation of team members' age. In line with previous studies (see, e.g.,

[5]It would also be interesting to study the impact of diversity with respect to the field in which team members got their degree. Unfortunately, our data do not include this information.

Jehn, Northcraft, and Neale (1999) and Pelled, Eisenhardt, and Xin (1999)) we use the Teachman (1980) entropy-based index to measure gender diversity:

$$GenderDiversity = \sum_{i} -p_i \cdot ln(p_i). \tag{1}$$

There are $i = 2$ categories a team member can belong to, female or male. The proportion of team members belonging to one category, p_i, is computed to obtain the gender diversity measure. For example, if there are three males and one female within a team, the gender diversity index equals 0.56. Summary statistics as well as correlations of our diversity measures are given in Table 2.

— Please insert TABLE 2 approximately here —

Correlations between the diversity dimensions are generally low. They range from -0.01 to 0.17. This indicates that a team that is, for example, gender diverse is not necessarily also diverse in terms of age, tenure or education. The highest correlation of 0.17 and 0.13 is between gender diversity and educational diversity and age diversity and tenure diversity, respectively.

2.3 Performance Measures

To investigate the influence of diversity within the fund management team on fund performance we analyze three performance measures. First, we compute the net of expenses return of fund i in year t over the risk-free rate, $Ret_{i,t}$. This measure allows us to directly assess how the value of fund shares develops relative to a risk-free account. However, it does not take into account the riskiness of a fund's strategy. It is possible that diversity affects the riskiness of the decisions teams make. For example, Adams and Ferreira (2004) find a negative correlation between firm risk and gender diversity within corporate boards. Therefore, we additionally measure the risk adjusted fund performance by calculating each

fund's Jensen (1968) Alpha. This measure adjusts returns by the amount of systematic risk a fund is taking. It is obtained by running the following regression for each fund i and each year t:

$$R_{i,m,t} - R_{f,m,t} = \alpha_{i,t}^{Jen} + \beta_{i,M,t}(R_{M,m,t} - R_{f,m,t}) + \varepsilon_{i,m,t}^{Jen}. \quad (2)$$

$R_{i,m,t} - R_{f,m,t}$ denotes fund i's excess return over the risk-free rate in month m of year t and $R_{M,m,t} - R_{f,m,t}$ denotes the excess return of the market segment the fund belongs to over the risk-free rate. The estimated alpha, $\hat{\alpha}_{i,t}^{Jen}$, is our second performance measure for fund i in year t.[6]

As a third performance measure, we compute the yearly Carhart (1997) Four Factor Alpha. This measure also controls for systematic market risk, but additionally adjusts returns for the influence of investment styles a fund management team is following:

$$\begin{aligned} R_{i,m,t} - R_{f,m,t} = {} & \alpha_{i,t}^{FF} + \beta_{i,M,t}(R_{M,m,t} - R_{f,m,t}) + \beta_{i,S,t}SMB_{m,t} \\ & + \beta_{i,H,t}HML_{m,t} + \beta_{i,MO,t}MOM_{m,t} + \varepsilon_{i,m,t}^{FF}. \end{aligned} \quad (3)$$

$SMB_{m,t}$ is the return difference between small and large capitalization stocks, $HML_{m,t}$ denotes the return difference between high and low book-to-market stocks and $MOM_{m,t}$ is the return difference between stocks with high and low returns in the previous year for month m of year t.[7] High loadings mean that the fund follows a small-cap (SMB), value (HML), or momentum (MOM) strategy, respectively. Thus, the Carhart (1997) Four Factor Alpha allows us to directly compare the performance of fund management teams independent of differences in risk taking and investment styles.

[6] These yearly alpha estimates are based on 12 monthly observations and will thus be noisy. However, we are not interested in a precise measure of a specific fund's performance, but in differences across a large cross-section of funds.

[7] The market, the size, and the value portfolio returns were taken from Kenneth French's website `http://mba.tuck.dartmouth.edu/pages/faculty/ken.french`, while the momentum factor was kindly provided by Mark Carhart.

3 Results

3.1 Impact of Diversity on Performance

We start our empirical investigation by relating fund performance to various dimensions of diversity as well as other potentially relevant drivers of fund performance:

$$\begin{aligned} Perf_{i,t} &= \alpha + \beta_1 \cdot TenureDiv_{i,t-1} + \beta_2 \cdot EducDiv_{i,t-1} + \beta_3 \cdot GenderDiv_{i,t-1} \\ &\quad + \beta_4 \cdot AgeDiv_{i,t-1} + \beta_5 \cdot Perf_{i,t-1} + \beta_6 \cdot FundAge_{i,t-1} \\ &\quad + \beta_7 \cdot FundSize_{i,t-1} + \beta_8 \cdot Turnover_{i,t-1} + \beta_9 \cdot Expenses_{i,t-1} + \varepsilon_{i,t}. \end{aligned} \quad (4)$$

Here, $Perf_{i,t}$ denotes one of our performance measures, the excess return of fund i in year t over the risk free rate, the Jensen (1968) Alpha or the Carhart (1997) Four Factor Alpha, respectively. Tenure diversity, $TenureDiv_{i,t-1}$, and educational diversity, $EducDiv_{i,t-1}$, of the management team of fund i at the end of year $t-1$ are our proxies for information gains (see Section 2). Communication costs are proxied by social category diversity measures, e.g. gender diversity, $GenderDiv_{i,t-1}$, and age diversity, $AgeDiv_{i,t-1}$, of fund i's team members at the end of year $t-1$, respectively. As some of our diversity measures are significantly correlated (see Table 2), we examine the impact of information gains and communication costs on fund returns in one joint regression to avoid potential misspecification due to cross correlation effects. According to hypothesis one, we expect a positive estimate for the impact of tenure diversity ($\beta_1 > 0$) and educational diversity ($\beta_2 > 0$). According to hypothesis two, we expect a negative estimate for the impact gender diversity ($\beta_1 < 0$) and age diversity ($\beta_4 < 0$).

We control for previous performance, $Perf_{i,t-1}$, the logarithm of fund i's age in years, $FundAge_{i,t-1}$, the logarithm of its total net-assets in million USD, $FundSize_{i,t-1}$, its yearly turnover ratio, $Turnover_{i,t-1}$, and its expense ratio, $Expenses_{i,t-1}$. Previous studies show that these variables can impact fund performance (see, e.g., Chen, Hong, Huang, and Kubik

(2004), Barber and Odean (2000), and Brown and Goetzmann (1995)). We lag our explanatory variables by one year to mitigate potential endogeneity problems. To ensure that we only compare funds that are operating within the same market segment, we estimate all our regressions with segment-fixed effects. We add time fixed effects to account for differences over our sample period. The simplest approach to estimate Model (4) is to run pooled regressions. However, this approach assumes independent error terms over time and across observations. To allow for possible violations of this assumption, we take advantage of the panel structure of our data and estimate our model with panel corrected standard errors (PCSE). Using a PCSE specification allows us to accommodate panel data with autocorrelation and cross-correlation of the error terms and heteroscedasticity (see Beck and Katz (1995)). Results are presented in Table 3.

— Please insert TABLE 3 approximately here —

Column 1 contains results where we use excess fund returns over the risk free rate as performance measure. In line with the theoretical reasoning of Lazear (1999) regarding information gains, we find that tenure diversity and educational diversity are significantly positive related to performance. This supports hypothesis 1a and 1b, respectively. The effects we find are also economically significant. The coefficient of 0.0018 for the impact of educational diversity indicates that, for example, a fund team on which two members have a Bachelor's degree and one member has a PhD degree (educational diversity index of 0.53) outperforms a fund with team members of identical education by 1.15% p.a. Regarding the impact of communication costs, we find a significantly negative impact of gender diversity on performance. This supports hypothesis 2a. Again, the effect is also economically significant. For example, a team consisting of three males and one female (gender diversity index of 0.56) underperforms a single-gender team by 1.22% p.a. In contrast, age diversity has no significant impact on performance, i.e. we find no support for hypothesis 2b.

Column 2 contains results for risk-adjusted fund performance measured by the Jensen (1968) Alpha and Column 3 contains results for style-adjusted fund performance measured by the Carhart (1997) Four Factor alpha. Results are similar to those obtained using excess fund returns: we find a significant positive influence of tenure and educational diversity and a significant negative influence of gender diversity, while age diversity has no significant influence. Again, the results are also economically significant. Findings from the Jensen (1968) Alpha regression indicate that a fund where two members have a Bachelor degree and one member has a PhD degree (educational diversity index of 0.53) outperforms a fund with team members of identical education by 1.22% p.a. Also as above, risk adjusted fund performance deteriorates by 1.11% p.a. if the fund is managed by a gender-diverse team consisting of, e.g., one female and three males (gender diversity index of 0.56) as compared to a fund managed by a single-gender team. Results for the Carhart (1997) Four Factor alpha are similar.
Overall, these results broadly support our hypotheses 1 (a and b) and 2 (only a) and clearly show that the impact of diversity crucially hinges on the dimension of diversity analyzed.

3.2 Influence of Team Characteristics

It is possible that characteristics of the team or its members influence performance. For example, Simons, Pelled, and Smith (1999) argue that team size can influence decision making and group outcomes. Furthermore, Bedeian and Mossholder (2000) emphasize the need to control for team size to avoid measurement artifacts due to a positive correlation between team size and diversity measures when teams are small. Thus, we add team size, measured as the logarithm of the number of team members, as an additional explanatory variable in our regressions.

It is also possible that our diversity measures partly capture the influence of the average characteristics of the team members. For example, Chevalier and Ellison (1999b) show that managers with a higher degree level obtain a better performance. To control for the

average characteristics of the team members, we add the average age of all managers in fund i's management team at the end of year $t-1$, $MgerAge_{i,t-1}$, their average tenure, $MgerTenure_{i,t-1}$, and dummy variables indicating whether any of the team members has an MBA ($MgerMBA_{i,t-1}$) and a PhD ($MgerPhD_{i,t-1}$), respectively, as additional explanatory variables.[8]

— Please insert TABLE 4 approximately here —

Results for all performance measures are presented in Table 4. They show that diversity dimensions with high expected information gains again lead to a higher performance while diversity dimensions with high expected communication costs still have a negative impact on performance after controlling for team size and average team characteristics. Team size itself has no significant impact on fund returns. Overall, the impact of the team member characteristics on fund returns is small. This shows that our main results do not change if we control for the influence of team size and average team characteristics.

3.3 Further Robustness Checks

Pelled, Eisenhardt, and Xin (1997) and Ancona and Caldwell (1992) show that the impact of diversity on performance can depend on the specific task design. Although the task of managing a fund should be similar across market segments, we nevertheless test whether our findings hold universally for all three market segments (i.e., Growth, Aggressive Growth, Long-Term Growth) or whether they are driven by the funds from one specific segment. Therefore, we estimate all previous regressions for subsamples of funds belonging to the Aggressive Growth, Growth and Income and Long-Term Growth segment, respectively. Results (not reported) are stable for all three market segments.

[8] We do not include the share of females in a fund management team as control variable, since it is highly correlated (0.84) with our entropy measure. Thus, adding the share of females would lead to multi-collinearity problems. However, Niessen and Ruenzi (2007) find no difference between the performance of female and male fund managers.

We also investigate the temporal stability of our results and split up our sample into two subperiods covering the years from 1996 to 1999 and from 2000 to 2003, respectively. Instead of splitting our sample in the middle, we also analyze subsamples consisting of bull and bear market years, and subsamples consisting of volatile and calm years, respectively. Results (not reported) in all subperiods are in line with the findings from the full sample.

As a final robustness check, we use alternative performance and diversity measures. We use the Fama and French (1993) Three Factor Alpha as alternative performance measure. As alternative tenure and age diversity measures we use the difference between the longest and shortest time a team member served in the mutual fund industry and the difference between the oldest and youngest team member, respectively. Educational and gender diversity are alternatively defined as a dummy variables: the dummy for educational diversity is one if team members have different levels of degrees, and zero otherwise; the dummy for gender diversity is one if the team consists of male and female managers and zero if only male or only female managers are in the team. Our results (not reported) remain stable and do not depend on a specific performance or diversity measure.

3.4 Profitability of Investment Strategies based on Group Diversity

Finally, we investigate whether it would have been possible to earn abnormal returns with an investment strategy that is solely based on information about team diversity and does not take into account other fund or manager characteristics. We construct a *High_InfoGains/Low_CommunicationCosts* portfolio as well as a *Low_InfoGains/High_CommunicationCosts* portfolio. The first portfolio consists of all funds with a below-median value of gender diversity and at the same time an above-median value of tenure and educational diversity in a given year.[9] The second portfolio consists of all funds with an above-median value of gender diversity, and at the same time a below-median value

[9]Since age diversity has no significant impact on performance we do not include this dimension in our further analysis.

of tenure and educational diversity in a given year.[10] These portfolios are re-balanced on a yearly basis. We calculate equal-weighted yearly returns of these portfolios as well as the respective difference between these equal weighted portfolio returns over our sample period.[11]

In line with our findings hitherto we find that the *High_InfoGains/Low_CommunicationCosts* portfolio outperforms the *Low_InfoGains/High_CommunicationCosts* portfolio by a statistically significant and economically meaningful 1.55% p.a. based on raw returns, by 1.38% p.a. based on Jensen (1968) Alphas, and by 1.23% p.a. based on Carhart (1997) Four Factor Alphas, respectively. Overall, these results show that information about the degree and the dimension of diversity within a fund management team is important and valuable for fund investors.

3.5 Discussion

Our results support the theoretical reasoning in Lazear (1999). He suggests that diversity has a negative impact on performance if communication costs within the diverse team are larger than information gains. In fund management teams, where all members are supposed to contribute to a common task, relationship-oriented conflicts arising from different social categories the team members belong to increase communication costs and can cause deterioration in group interaction and eventually performance (see, e.g., Jackson (1992)). Joshi, Liao, and Jackson (2006) suggest that gender diversity is more likely to lead to conflicts and underperformance if the numerical distinctiveness of gender group composition is high, i.e., if there is a clear dominance of one of the sexes. The mutual fund industry is a clearly male-

[10] Furthermore, we compare strategies that are solely based on one dimension of diversity. Results (not reported) indicate that portfolios consisting of informational diverse fund teams significantly outperform portfolios consisting of informational homogenous fund teams while portfolios consisting of social category homogenous fund teams significantly outperform portfolios consisting of social category diverse fund teams, respectively.

[11] All portfolio strategies are also evaluated based on value weighted portfolios. Results (not reported) remain similar.

dominated environment.[12] Thus, conflicts caused by gender diversity are likely to arise and negatively influence performance. This is consistent with our findings of a strong negative influence of gender diversity on performance.

A possible reason why we find no effect of age diversity is the less pronounced numerical distinctiveness between younger and older fund managers as compared to the numerical distinctiveness between female and male fund managers. Thus, age is probably less salient than gender and consequently age diversity has a less pronounced negative influence (see, e.g., Pelled (1993)).

With respect to information gains, our findings also support the Lazear (1999) model by showing that the diversity dimensions we expect to increase the task relevant information set available to the fund management team (proxied by tenure and educational diversity) are positively related to fund performance. A mixture of managers with a different educational background as well as of experienced managers and managers who just entered the industry seems to be an optimal combination to generate superior performance.[13] Interestingly, the fund industry shows some tendency to move towards optimal diversity structures of fund management teams in recent years.

— Please insert FIGURE 1 approximately here —

Figure 1 suggests that fund companies seem to be aware of the differences in the relation between diversity and performance. While gender diversity and age diversity have decreased in recent years (Panel A and C in Figure 1), there is a pronounced trend towards more tenure diverse teams over most of our sample period (Panel D in Figure 1). Thus, especially

[12] Niessen and Ruenzi (2007) report a share of about 10% females in the U.S. mutual fund industry from 1994 to 2003.

[13] Informal discussions with industry professionals indicate that the top management in fund companies often actively sets up teams where more experienced team members work together with younger managers. Besides offering the opportunity for the inexperienced managers to learn from the more experienced managers, the main advantage of tenure diversity they mention is that older managers might have more oversight, while younger managers are more active and dedicated.

those team compositions that seem to be more successful, i.e. tenure diverse and gender homogenous teams, became more prominent in recent years.

4 Conclusion

This paper is the first to investigate how diversity within fund management teams affects fund performance. Using data from the U.S. mutual fund industry we transfer the controversial literature on the effect of group diversity on performance to the mutual fund industry. Our analysis of 2,260 management teams of U.S. equity funds from 1996 to 2003 shows that the impact of diversity on performance depends on the dimension of diversity that is investigated. In line with the theoretical model of Lazear (1999) we show that increased communication costs within a diverse team (proxied by gender diversity) is generally negatively related to performance. Information gains due to tenure or educational diversity are positively related to performance. Our results are stable over time and robust with respect to fund, manager, and team characteristics that might be related to fund performance.

Our findings have important implications for the optimal composition of teams. Teams with members of different industry tenure and with members of different education outperform teams that are homogenous in terms of industry tenure and education. Furthermore, single-gender teams outperform mixed-gender teams. Age diversity has no significant effect on performance. Thus, to benefit from the increased creativity and innovation that is often attributed to diverse teams, it is important to ensure that communication costs do not increase to a level where they offset information gains.

An efficient implementation of diversity is particulary important in the mutual fund industry, since the number of management teams employed by fund companies has risen strongly during the past years and many investors rely on mutual funds for their retirement provisions. Therefore, the impact of diversity on performance is especially important for fund investors, fund-of-fund managers, as well as financial advisors, financial planners and

401(k) plan sponsors. Since 2004, with the adoption of amendments to Forms N-1A and N-2, the SEC has required fund companies to mention by name each member of a fund management team in their prospectuses. This allows investors to identify the members of fund management teams and get an idea about the diversity within each team. Our results show that this information is relevant for fund investors: a portfolio consisting of funds managed by teams that are characterized by high informational diversity and low social category diversity outperformed a portfolio consisting of funds with low informational diversity and high social category diversity by more than 1.5% in our sample period.

While we think the mutual fund industry is ideally suited to test diversity issues, one still has to be careful in transferring our results to other settings. Specifically, our finding of a negative impact of gender diversity could be driven by the fact that the numerical distinctiveness between male and female managers makes gender a salient social category in the clearly male dominated mutual fund industry. Thus, our results are transferable to organizations that are male dominated. In contrast, in a female-dominated sample, O'Reilly, Williams, and Barsade (1997) find no impact of gender diversity on performance. This shows that the conclusion not to employ females in fund management teams based on the findings in this paper might be premature. In contrast, the negative effect of gender diversity might vanish if the share of women employed actually rises to a level where women are not a salient minority anymore.

References

Adams, R., and D. Ferreira, 2004, "Gender Diversity in the Boardroom," ECGI Working Paper Series in Finance, Stockholm.

Ancona, D., and D. Caldwell, 1992, "Demography and Design: Predictors of New Product Team Performance," *Organization Science*, 3, 321–341.

Baer, M., A. Kempf, and S. Ruenzi, 2008, "Is a Team Different from the Sum of its Parts? Evidence from Mutual Fund Managers," Working Paper.

Barber, B. M., and T. Odean, 2000, "Trading Is Hazardous to Your Wealth: The Common Stock Investment Performance of Individual Investors," *The Journal of Finance*, 55, 773–806.

Beck, and Katz, 1995, "What to Do (and Not to Do) with Time-Series Cross-Section Data," *American Political Science Review*, 89, 634–647.

Bedeian, A. G., and K. W. Mossholder, 2000, "On the Use of the Coefficient of Variation as a Measure of Diversity," *Organizational Research Methods*, 3, 285–297.

Brown, S. J., and W. N. Goetzmann, 1995, "Performance Persistence," *Journal of Finance*, 50, 679–698.

Byrne, D., 1969, "Attitudes and Attraction," *Advances in Experimental Social Psychology*, 4, 35–89.

Carhart, M. M., 1997, "On Persistence in Mutual Fund Performance," *Journal of Finance*, 52, 57–82.

Carter, D. A., B. J. Simkins, and W. G. Simpson, 2003, "Corporate Governance, Board Diversity, and Firm Value," *The Financial Review*, 38, 33–53.

Chatman, J. A., J. T. Polzer, S. G. Barsade, and M. A. Neale, 1998, "Being Different Yet Feeling Similar: The Influence of Demographic Composition and Organizational Culture on Work Processes and Outcomes," *Administrative Science Quarterly*, 43, 749–780.

Chen, J., H. Hong, M. Huang, and J. D. Kubik, 2004, "Does Fund Size Erode Performance? Liquidity, Organizational Diseconomies and Active Money Management," *American Economic Review*, 94, 1276–1302.

Chevalier, J., and G. Ellison, 1999a, "Are Some Mutual Fund Managers Better Than Others? Cross-Sectional Patterns in Behavior and Performance," *Journal of Finance*, 54, 875–899.

Chevalier, J., and G. Ellison, 1999b, "Career Concerns of Mutual Fund Managers," *Quarterly Journal of Economics*, 114, 389–432.

Costa, D. L., and M. E. Kahn, 2003, "Cowards and Heroes: Group Loyalty in the American Civil War," *Quarterly Journal of Economics*, 118, 519–548.

Daniel, K., M. Grinblatt, S. Titman, and R. Wermers, 1997, "Measuring Mutual Fund Performance With Characteristic-Based Benchmarks," *Journal of Finance*, 52, 1035–1058.

Erhardt, N. L., J. D. Werbel, and C. B. Shrader, 2003, "Board of Director Diversity and Firm Financial Performance," *Corporate Governance*, 11, 102–111.

Fama, E. F., and K. R. French, 1993, "Common Risk Factors in the Return on Bonds and Stocks," *Journal of Financial Economics*, 33, 3–53.

Groysberg, B., J. T. Polzer, and H. A. Elfenbein, 2007, "Too Many Cooks Spoil the Broth: How High Status Individuals Decrease Group Effectiveness," Working Paper.

Hambrick, D. C., T. S. Cho, and M.-E. Chen, 1996, "The Influence of Top Management Team Heterogeneity on Firms' Competitive Moves," *Administrative Science Quarterly*, 41, 659–684.

Hersch, J., 1991, "Equal Employment Opportunity Law and Firm Profitability," *Journal of Human Resources*, 26, 139–153.

Jackson, S. E., 1992, "Team Composition in Organizational Settings: Issues in Managing an Increasingly Diverse Workforce.," in S. Worchel, W. Wood, and J. Simpson (ed.), *Group Processes and Productivity*, Sage.

Jackson, S. E., A. Joshi, and N. L. Erhardt, 2003, "Recent Research on Team and Organizational Diversity: SWOT Analysis and Implications," *Journal of Management*, 29, 801–830.

Jehn, K. A., G. B. Northcraft, and M. A. Neale, 1999, "Why Differences Make a Difference: A Field Study of Diversity, Conflict and Performance in Workgroups," *Administrative Science Quarterly*, 44, 741–763.

Jensen, M. C., 1968, "The Performance of Mutual Funds in the Period 1955-1964," *Journal of Finance*, 23, 389–416.

Joshi, A., H. Liao, and S. E. Jackson, 2006, "Cross-Level Effects of Workplace Diversity on Sales Performance and Pay," *Academy of Management Journal*, 49, 459–481.

Khorana, A., 1996, "Top Management Turnover: An Empirical Investigation of Mutual Fund Managers," *Journal of Financial Economics*, 40, 403–426.

Lazear, E. P., 1999, "Globalisation and the Market for Team-Mates," *The Economic Journal*, 109, C15–C40.

Milliken, F. J., and L. L. Martins, 1996, "Searching for Common Threads: Understanding the Multiple Effects of Diversity in Organizational Groups," *Academy of Management Review*, 21, 402–433.

Nemeth, C., 1986, "Differential Contributions of Majority and Minority Influence," *Psychological Review*, 93, 23–32.

Niessen, A., and S. Ruenzi, 2007, "Sex Matters: Gender Differences in a Professional Setting," Working Paper, University of Cologne, Germany.

O'Reilly, C. A., K. Y. Williams, and S. G. Barsade, 1997, "Group Demography and Innovation: Does Diversity Help?," in E. Mannix, and M. Neale (ed.), *Research in the Management of Groups and Teams*, Greenwich, CT: JAI Press.

Pelled, L. H., 1993, "Team Diversity and Conflict: A Multivariate Analysis," Working Paper.

Pelled, L. H., K. M. Eisenhardt, and K. R. Xin, 1997, "Demographic Diversity in Work Groups: An Empirical Assessment of Linkages to Intragroup Conflict and Performance," Working Paper, School of Business, University of Southern California.

Pelled, L. H., K. M. Eisenhardt, and K. R. Xin, 1999, "Exploring the Black Box: An Analysis of Work Group Diversity, Conflict and Performance," *Administrative Science Quarterly*, 44, 1–28.

Prather, L. J., and K. L. Middleton, 2002, "Are N+1 Heads Better Than One? - The Case of Mutual Fund Managers," *Journal of Economic Behavior and Organization*, 47, 103–120.

Richard, O. C., 2000, "Racial Diversity, Business Strategy, and Firm Performance: A Resource-Based View," *Academy of Management Journal*, 43, 164–177.

Schwenk, C., and J. S. Valacich, 1994, "Effects of Devil's Advocacy and Dialectical Inquiry on Individuals versus Groups," *Organizational Behavior and Human Decision Processes*, 59, 210–222.

Siciliano, J. I., 1996, "The Relationship of Board Member Diversity to Organizational Performance," *Journal of Business Ethics*, 15.

Simons, T., L. H. Pelled, and K. A. Smith, 1999, "Making Use of Difference: Diversity, Debate and Decision Comprehensiveness in Top Management Teams," *Academy of Management Journal*, 42, 662–673.

Smith, K. G., K. A. Smith, J. D. Olian, H. P. Sims, D. P. O'Bannon, and J. A. Scully, 1994, "Top Management Team Demography and Process: The Role of Social Integration and Communication," *Administrative Science Quarterly*, 39, 412–438.

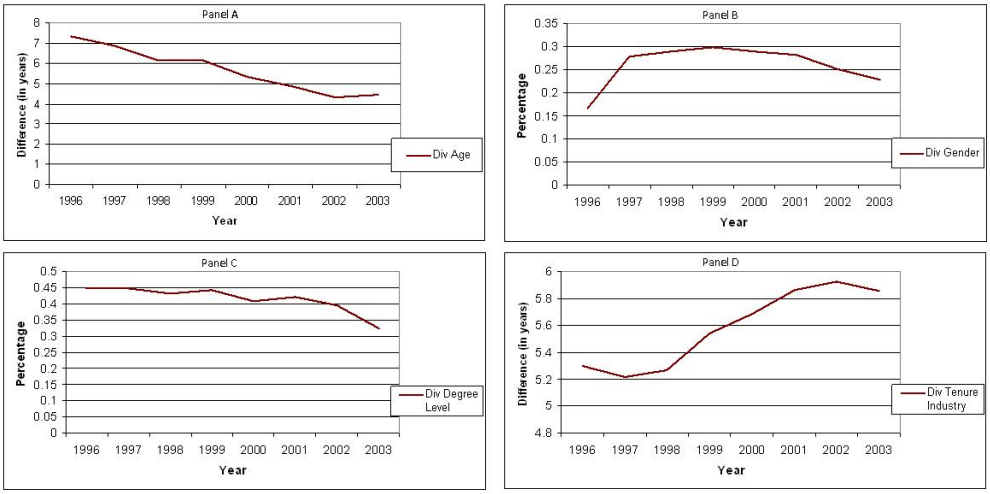
Teachman, J. D., 1980, "Analysis of Population Diversity," *Sociological Methods and Research*, 8, 341–362.

Timmerman, T. A., 2000, "Racial Diversity, Age Diversity, Interdependence, and Team Performance," *Small Group Research*, 31, 592–606.

Tjosvold, D., 1991, *The Conflict-Positive Organisation*, Addison Wesley.

Williams, K., and C. A. O'Reilly, 1998, "Demography and Diversity in Organizations," in Barry M. Staw, and Robert M. Sutton (ed.), *Research in Organizational Behavior* . pp. 77–140, JAI Press.

Figure 1: Fund Management Team Diversity over Time



This figure contains the development of the diversity measures over our sample period from 1996-2003.

Table 1: Descriptive Statistics of Mutual Funds.

	Mean	*Median*	*Minimum*	*Maximum*
Fund Age (in years)	11.30	7.00	1.00	79.00
Fund Size (in Millions)	942.04	262.20	1.00	52,837.00
Turnover Ratio (in percent)	96.02	76.00	0.01	684.00
Expenses (in percent)	1.32	1.25	0.01	3.87
Number of Team Members	3.11	3.00	2.00	15.00

The number of yearly observations is 2,260. The time period is from January 1996 to December 2003.

Table 2: Diversity Measures

	Gender	*Age*	*Tenure*	*Education*
Gender	1.00			
Age	0.07***	1.00		
Tenure	−0.00	0.13***	1.00	
Education	0.17***	−0.01	0.03*	1.00
Mean	0.27	0.18	0.80	0.17
Median	0.00	0.12	0.75	0.21
Minimum	0.00	0.00	0.00	0.00
Maximum	1.00	0.88	3.11	1.11

The number of observations is 2,260. The observed time period is from January 1996 to December 2003. *** 1% significance, ** 5% significance, * 10% significance.

Table 3: Team Diversity and Performance

	Excess Fund Returns	*Jensen Alpha*	*Four Factor Alpha*
Tenure Diversity	0.0002^{*}	0.0001^{*}	0.0001^{*}
Education Diversity	0.0018^{*}	0.0019^{*}	0.0013^{*}
Gender Diversity	-0.0018^{**}	-0.0011^{**}	-0.0007^{**}
Age Diversity	0.0012	0.0005	0.0021
Lagged Performance	0.0132^{***}	0.0188^{***}	0.0115^{***}
Fund Age	0.0013^{***}	0.0013^{***}	-0.0001
Fund Size	-0.0013^{***}	-0.0010^{***}	-0.0005^{***}
Turnover	-0.0001	0.0008	-0.0002
Expenses	0.0111	0.0109	-0.0021
$adj.R^2$	0.6455	0.2429	0.1832

All regressions are estimated with time and segment fixed effects. Significance is based on panel corrected standard errors. *** 1% significance, ** 5% significance, * 10% significance.

Table 4: Influence of Team Characteristics

	Excess Fund Returns	*Jensen Alpha*	*Four Factor Alpha*
Tenure Diversity	0.0003^{*}	0.0003^{*}	0.0004^{*}
Education Diversity	0.0054^{**}	0.0059^{***}	0.0031^{**}
Gender Diversity	-0.0015^{**}	-0.0009^{*}	-0.0007^{*}
Age Diversity	0.0001	0.0008	0.0024
Lagged Performance	0.0191^{***}	0.0164^{***}	0.0120^{***}
Fund Age	0.0010^{**}	0.0007^{**}	-0.0001
Fund Size	-0.0011^{***}	-0.0009^{***}	-0.0005^{***}
Turnover	-0.0002	0.0005	-0.0001
Expenses	-0.0056	0.0021	-0.0026
Team Size	0.0005	0.0004	-0.0003
Mger Age	-0.0021	-0.0039	-0.0014
Mger Tenure	0.0008	0.0012^{*}	0.0004
Mger MBA	0.0029^{**}	0.0020^{*}	0.0013
Mger PhD	-0.0028	-0.0062^{*}	-0.0036
$adj.R^2$	0.6572	0.2530	0.1896

All regressions are estimated with time and segment fixed effects. Significance is based on panel corrected standard errors. *** 1% significance, ** 5% significance, * 10% significance.