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**The impact of work group diversity
on performance:
Large sample evidence from the
mutual fund industry**

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Comments Welcome

JEL-Classification Codes: G23, J21, L22

Keywords: Diversity; Teams; Gender; Mutual Funds; Performance

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The Impact of Work Group Diversity on Performance: Large Sample Evidence from the Mutual Fund Industry

Abstract

This paper investigates the impact of work group diversity on performance. Analyzing a uniquely large sample of management teams from the U.S. mutual fund industry we find that the influence of diversity on performance depends on the dimension of diversity that is analyzed. Informational diversity has a positive impact on performance, which is driven by tenure diversity as well as educational diversity. Social category diversity has a negative impact on performance, which is mainly driven by gender diversity while age diversity has no strong impact. Our results have important implications for the optimal composition of work groups and for investment strategies of fund investors.

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1 Introduction

Over the past decades, the workforce in all industrialized countries has become increasingly heterogenous. At the same time, corporate America has paid billions of dollars due to discrimination lawsuits (see, e.g., Hersch (1991)). Obviously, successful diversity management is an important challenge for modern corporations. To efficiently manage a diverse workforce, it is important to understand how work group composition influences team performance (see, e.g., Williams and O'Reilly (1998)).¹ However, it is still controversial whether diversity has a positive or negative impact on team performance (see, e.g., Siciliano (1996), Jehn, Northcraft, and Neale (1999), and Kochan, Bezrukova, Ely, Jackson, Joshi, Jehn, Leonard, Levine, and Thomas (2003)). 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)). Thus, a clear indication for the optimal composition of work groups is still missing. This paper investigates the impact of several important diversity dimensions on performance in a uniquely large sample from the mutual fund industry. We examine the joint impact of tenure diversity, educational diversity, gender diversity, and age diversity.

In the literature, there are three main theories that describe possible effects of diversity on team performance: social categorization, similarity/attraction, and information and decision making (see Williams and O'Reilly (1998)). The first two theories focus on the emergence of subgroups within the team. These subgroups are either defined by salient social categories like age or gender, or they consist of team members that perceive themselves to be similar on dimensions such as interest or attitudes. According to these theories, diversity in teams leads to decreased within-group communication and team performance is eventually negatively affected. In contrast, the information and decision making theory takes on a resource based view. It argues that diverse team members are

¹In this paper, we use "work group" and "team" as synonyms.

part of different networks, and that eventually increases the information set available to the team. Thus, a positive effect of diversity on performance is predicted, because the decision making process is based on a larger information set. Overall, the impact of diversity on performance depends on the relative strength of the effects described by those theories.

Jehn, Northcraft, and Neale (1999) offer a convincing approach to reconcile these opposing predictions. They focus on diversity dimensions in which the relative impact of the effects is clearly predictable: informational diversity and social category diversity.² *Informational diversity* is defined as differences in knowledge bases, skills or perspectives of team members. These differences can arise if team members are heterogeneous in terms of education or work experience. 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 information set—might have a different opinion on how to solve a specific task (see, e.g., Pelled (1993)). 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)). *Social category diversity* is defined as differences in social category membership. It can arise, for example, if team members differ in terms of gender or age or if they belong to different ethnic groups (see, e.g., Jackson (1992)). These differences can lead to reduced within-group communication, lower levels of cohesiveness, and a lower level of satisfaction with the team.³ If teams fail to manage these disagreements, relationship-oriented conflicts arise with negative effects on performance (see, e.g., Williams and O'Reilly (1998), Tjosvold (1991)). Overall, Jehn, Northcraft, and Neale (1999) expect that informational diversity is positively related to performance while social category diversity is negatively related to performance. However, they find only

²Jehn, Northcraft, and Neale (1999) also look at a third dimension: value diversity. It measures the difference of group members' opinion on the group's real task or mission. Increased value diversity can cause task-related conflicts or relationship conflicts. As our data does not allow us to measure value diversity, we will not focus on this diversity dimension in our investigation.

³Based 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.

partial empirical support for these predictions. Based on a survey conducted in a household goods company, they find evidence for a positive impact of informational diversity on performance, but they do not find the expected negative impact of social category diversity on performance. However, it is not clear whether their findings can be generalized. They are based on a relatively small sample of work groups from one single company, rely on subjective survey data and could be driven by the priming effect of the organizational culture in that specific firm.

To circumvent these drawbacks, we use data from management teams in the equity mutual fund industry. Looking at this industry allows us to overcome major shortcomings of existing studies for several reasons. First, the decisions made by fund management teams matter for promotion and remuneration (see, e.g., Khorana (1996)) which ensures that the teams exert 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, findings are not biased by weakly incentivised, artificial and short-lived groups without sustained interdependence like the ones typically examined in experiments. Second, our data offers a uniquely large number of observations obtained from different companies covering the whole mutual fund industry. We are aware of no study that investigates a comparably large number of management teams from so many different companies. In their overviews, Milliken and Martins (1996) and Williams and O'Reilly (1998) cite studies on diversity and performance which are mostly based on small samples of up to about 100 teams from one or a small number of firms. Our large database is a major advantage since we can investigate diversity over different organizational frameworks across the whole mutual fund industry. This allows us to examine diversity effects separately from the effects of the organizational culture in a specific company (see, e.g, Chatman, Polzer, Barsade, and Neale (1998)). Third, fund management teams work in a relatively homogenous environment with clearly defined tasks, i.e., every team in our sample has to manage an equity fund. Thus, they can be easily compared and our results are not influenced by different degrees of task difficulty or complexity that might affect team

outcomes (see, e.g., Jackson, Joshi, and Erhardt (2003)). Furthermore, the performance of fund management teams is easily quantifiable based on fund returns. Williams and O'Reilly (1998) mention the difficulty of measuring performance as one of the main problems of existing studies on diversity. The finance literature has developed several metrics to capture the performance of funds (see, e.g., Jensen (1968), Fama and French (1993), and Carhart (1997)). We use these performance measures to rank fund management team outcomes objectively. This is a major advantage compared to studies relying on qualitative performance measures like team leaders' ratings that depend on self-perceptions or subjective judgements (see, e.g., Pelled, Eisenhardt, and Xin (1999)). Overall, the fund management teams in our sample fit the Hackman (1987) definition of work groups very well in the sense that team members see themselves and are perceived by others as an independent social entity within the broader organizational context of the mutual fund company.

This paper contributes to two main strands of the literature. First, it contributes to the broad empirical literature on work group diversity (see, e.g., Milliken and Martins (1996), Hambrick, Cho, and Chen (1996), Pelled, Eisenhardt, and Xin (1999), Kilduff, Angelmar, and Mehra (2000), and Groysberg, Polzer, and Elfenbein (2007); for comprehensive overviews, see Milliken and Martins (1996), Williams and O'Reilly (1998), and Jackson, Joshi, and Erhardt (2003)). We extend this literature by jointly examining various dimensions of diversity within a uniquely large sample. Our results allow us to quantify the effects of diversity on fund performance across several diversity dimensions. Second, our paper 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 or 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 (2006)). However, ours is the first study to look at the impact of group diversity within fund management teams on fund performance.

2 Methodology

2.1 Data and Summary Statistics

Our empirical analysis is based on data from the CRSP Survivor Bias Free Mutual Fund Database⁴ 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 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.⁵ Single managed funds are excluded to isolate diversity effects from

⁴Source: CRSP, Center for Research in Security Prices. Graduate School of Business, The University of Chicago. Used with permission. All rights reserved.

⁵Some fund companies provide no information on the identity of team members. These observations are excluded.

the impact of the management structure (single vs. team managed) on the behavior of fund managers.⁶

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.

Table 1: Descriptive Statistics of Mutual Funds.

	<i>Mean</i>	<i>Median</i>	<i>Minimum</i>	<i>Maximum</i>
<i>Fund Age (in years)</i>	11.30	7.00	1.00	79.00
<i>Fund Size (in Millions)</i>	942.04	262.20	1.00	52,837.00
<i>Turnover Ratio (in percent)</i>	96.02	76.00	0.01	684.00
<i>Expenses (in percent)</i>	1.32	1.25	0.01	3.87
<i>Number of Team Members</i>	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.

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 man-

⁶For differences between single and team managed funds, see Baer, Kempf, and Ruenzi (2006) and Massa, Reuter, and Zitzewitz (2006).

dates that we control for them when investigating the impact of diversity on performance in a regression framework.

2.2 Diversity Measures

To capture team diversity with respect to informational diversity and social category diversity we develop four different diversity measures.

Informational diversity is likely to arise as a function of differences among group members in 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.⁷

Social category diversity arises from explicit differences in social category membership among group members (see, e.g., Jackson (1992)). According to Jehn, Northcraft, and Neale (1999), essential social categories are gender, age, race, and ethnicity. Unfortunately, we

⁷It 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.

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

$$GenderDiversity = \sum_i -p_i \cdot \ln(p_i). \quad (1)$$

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.

Table 2: Diversity Measures

	<i>Gender</i>	<i>Age</i>	<i>Tenure</i>	<i>Education</i>
<i>Gender</i>	1.00			
<i>Age</i>	0.07***	1.00		
<i>Tenure</i>	-0.00	0.13***	1.00	
<i>Education</i>	0.17***	-0.01	0.03*	1.00
<i>Mean</i>	0.27	0.18	0.80	0.17
<i>Median</i>	0.00	0.12	0.75	0.21
<i>Minimum</i>	0.00	0.00	0.00	0.00
<i>Maximum</i>	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.

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 common performance measures. First, we compute the net of expenses return of fund i in year t over the risk-free, $Ret_{i,t}$. This measure allows us to directly assess how the value of fund shares develops relative to the 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) show 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 .⁸

⁸These 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.

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:

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

$SMB_{m,t}$ 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 .⁹ 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.

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:

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

⁹The 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.

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 informational diversity (see Section 2). Social category diversity is proxied by 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 informational and social category diversity on fund returns in one joint regression to avoid potential misspecification due to cross correlation effects.

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.

Column 1 contains results where we use excess fund returns over the risk free rate as performance measure. In line with the theoretical reasoning regarding informational diversity,

Table 3: Team Diversity and Performance

	<i>Excess Fund Returns</i>	<i>Jensen Alpha</i>	<i>Four Factor Alpha</i>
<i>Tenure Diversity</i>	0.0002*	0.0001*	0.0001*
<i>Education Diversity</i>	0.0018*	0.0019*	0.0013*
<i>Gender Diversity</i>	-0.0018**	-0.0011**	-0.0007**
<i>Age Diversity</i>	0.0012	0.0005	0.0021
<i>Lagged Performance</i>	0.0132***	0.0188***	0.0115***
<i>Fund Age</i>	0.0013***	0.0013***	-0.0001
<i>Fund Size</i>	-0.0013***	-0.0010***	-0.0005***
<i>Turnover</i>	-0.0001	0.0008	-0.0002
<i>Expenses</i>	0.0111	0.0109	-0.0021
<i>adj.R</i> 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.

tenure diversity and educational diversity are significantly positive related to performance. Regarding the impact of our social category diversity measures, we find a significantly negative impact of gender diversity on performance while age diversity has no significant impact on performance. All statistically significant effects 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. Furthermore, a team consisting of, for example, three males and one female (gender diversity index of 0.56) underperforms a single-gender team by 1.22% p.a.

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. They 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 style-adjusted performance are similar. Overall, our findings suggest that the impact of diversity on performance depends on the dimension of diversity we focus on. While informational diversity generally improves performance, social category diversity has a negative impact on performance. This supports the reasoning of Jehn, Northcraft, and Neale (1999).

3.2 Influence of Team Characteristics

It is possible that characteristics of the team or its members influence performance. For example, Simons, Pellet, 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.¹⁰

Results for all performance measures are presented in Table 4. They show that informational diversity is again positively related to performance while social category diversity still has 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.

¹⁰We 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.

Table 4: Influence of Team Characteristics

	<i>Excess Fund Returns</i>	<i>Jensen Alpha</i>	<i>Four Factor Alpha</i>
<i>Tenure Diversity</i>	0.0003*	0.0003*	0.0004*
<i>Education Diversity</i>	0.0054**	0.0059***	0.0031**
<i>Gender Diversity</i>	-0.0015**	-0.0009*	-0.0007*
<i>Age Diversity</i>	0.0001	0.0008	0.0024
<i>Lagged Performance</i>	0.0191***	0.0164***	0.0120***
<i>Fund Age</i>	0.0010**	0.0007**	-0.0001
<i>Fund Size</i>	-0.0011***	-0.0009***	-0.0005***
<i>Turnover</i>	-0.0002	0.0005	-0.0001
<i>Expenses</i>	-0.0056	0.0021	-0.0026
<i>Team Size</i>	0.0005	0.0004	-0.0003
<i>Mger Age</i>	-0.0021	-0.0039	-0.0014
<i>Mger Tenure</i>	0.0008	0.0012*	0.0004
<i>Mger MBA</i>	0.0029**	0.0020*	0.0013
<i>Mger PhD</i>	-0.0028	-0.0062*	-0.0036
<i>adj.R²</i>	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.

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 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.

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 since there is some disagreement among finance scholars about which model is the most suitable to measure mutual fund performance. 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 *SocialHomogeneity/InfoDiversity* portfolio as well as a *SocialDiversity/InfoHomogeneity* 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.¹¹ The second portfolio consists of all funds with an above-median value of gender diversity, and at the same time a below-median value of tenure and educational diversity in a given year.¹² These portfolios are re-balanced on a yearly basis. We calculate equally-weighted yearly returns of these portfolios as well as the respective difference between these equally weighted portfolio returns over our sample period.¹³

In line with our findings hitherto we find that the *SocialHomogeneity/InfoDiversity* portfolio outperforms the *SocialDiversity/InfoHomogeneity* 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 the degree and the dimension of diversity within a fund management team is an important and valuable piece of information for fund investors.

¹¹Since age diversity has no significant impact on performance we do not include this dimension in our further analysis.

¹²Furthermore, we compare strategies that are solely based on one dimension of diversity. Results (not reported) indicate that portfolios consisting of informational diverse funds significantly outperform portfolios consisting of informational homogenous funds while portfolios consisting of social category homogenous funds significantly outperform portfolios consisting of social category diverse funds, respectively.

¹³All portfolio strategies are also evaluated based on value weighted portfolios. Results (not reported) remain similar.

3.5 Discussion and Caveats

Our results support the theoretical reasoning in Jehn, Northcraft, and Neale (1999). They suggest that social category diversity is negatively related to team performance. This is consistent with the view that social-category diversity leads to relationship-oriented conflicts in work groups. In a work group like a fund management team, where all members are supposed to contribute to a common task, relationship-oriented conflicts can cause deterioration in group interaction, communication and eventually performance (see, e.g., Jackson (1992)).

Kanter (1977) argues that characteristics that are possessed by a small fraction of the relevant population are more important in the creation of social categories than characteristics that are possessed by a larger fraction. Based on this finding, Randel (2002) and 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-dominated environment.¹⁴ 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.

Age is also regularly viewed as one dimension of social category diversity (see, e.g., Jehn, Northcraft, and Neale (1999), Simons, Pelled, and Smith (1999), and Pelled, Eisenhardt, and Xin (1999)). However, we find no negative influence of age diversity on performance, which agrees to the findings of the empirical studies reviewed in Williams and O'Reilly (1998) and Jackson, Joshi, and Erhardt (2003). A possible reason why we find no effect of age diversity is the less pronounced numerical distinctiveness between younger and older managers as compared to the numerical distinctiveness between female and male managers. Thus, age is probably less salient than gender and consequently age diversity has a less pronounced

¹⁴Niessen and Ruenzi (2007) report a share of about 10% females in the U.S. mutual fund industry from 1994 to 2003.

negative influence (see, e.g., Pelled (1993)). These results are also consistent with Blau (1977). Blau's Paradox posits that only moderate levels of diversity with a clear numerical distinctiveness between the diversity categories hurt performance. A further increase in group heterogeneity with the extreme case of an equal number of team members in each diversity category mitigates this effect. Furthermore, in our sample, age might also be a proxy for experience or status rather than for social category. Young and old managers are likely to have varied status-seeking tendencies. Overbeck, Correll, and Park (2005) and Groysberg, Polzer, and Elfenbein (2007) show that teams with too many individuals seeking for high status do not collaborate well since their attempt to gain status disrupts information sharing.

With respect to informational diversity, our findings indicate that this diversity dimension is positively related to performance. Jehn, Northcraft, and Neale (1999) argue that informational diversity leads to task-related conflicts and increases the probability of reaching the optimal solution (see, e.g., Schwenk and Valacich (1994)). Consistent with this, our findings indicate that educational diverse as well as tenure diverse teams outperform teams that are less diverse with respect to these dimensions. 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.¹⁵ This finding is in line with Ancona and Caldwell (1992) who argue that teams consisting of members that differ with respect to their tenure know a different set of people, have different technical skills, and have a different perspective on the organization's history. This provides tenure diverse teams with a broader range of contacts and knowledge and eventually improves decision quality. In contrast, Pfeffer (1985), Katz (1980), and Roberts and O'Reilly (1979) argue that team members who entered at the same time have more shared experiences and have developed networks which new members might find difficult to

¹⁵Informal 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.

enter. Based on this latter reasoning, we would expect tenure homogenous teams to perform better. Our findings provide no support for this idea.

Besides supporting the predictions of Jehn, Northcraft, and Neale (1999), the results of our paper can also be well explained by a related economic model developed by Lazear (1999). This model concludes that a potentially 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. Transferred to our findings, informational diversity has a positive impact on performance since team members with different educational and professional backgrounds increase the set of relevant and (at least partially) disjoint information the team can use to solve its task. In contrast, social category diversity increases communication costs. Thus, it is negatively related to performance.

While our sample has several important advantages, one important drawback of our study is that we only observe team outcomes and not the decision process or the behavior of individual group members. We cannot take a look into the 'black box' of dynamic group processes and decision making in teams (see, e.g., Pelled, Eisenhardt, and Xin (1997) and Kilduff, Angelmar, and Mehra (2000)). Our study also neither includes an analysis of worker morale or commitment of team members to their team nor an analysis of personal well-being and satisfaction of team members. Furthermore, while we have a rich data set at hand which contains many demographic variables as well as fund characteristics, there are still variables that might influence performance that we can not observe. Most importantly, the behavior and performance of team members might depend on their remuneration contracts. We can not observe these contracts. However, we have no reason to assume that they are systematically different between the members of diverse and homogenous teams. Another limitation of our study is that our data does not allow for an investigation of other important

diversity categories like race and ethnicity. However, as long as such diversity categories are not highly correlated with the diversity dimensions we examine, our results should still be valid.

4 Implications and Conclusion

This paper is the first to investigate how diversity within fund management teams affects fund performance. Using a uniquely large database of U.S. team managed equity funds 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. While social category diversity is generally negatively related to performance, informational diversity is 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. These findings suggest that diversity is not a good per se. They also help to explain some of the seemingly contradictory evidence regarding the impact of group diversity on performance reported in earlier studies.

Our findings have important implications for the optimal composition of work groups. 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 work groups, it is important to consider the dimension of diversity that is incorporated.

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 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.

An efficient implementation of diversity is particularly important in the mutual fund industry, since the number of management teams employed by fund companies has risen strongly during the past years (see, e.g., Baer, Kempf, and Ruenzi (2006)). Furthermore, fund assets soared to 7.5 trillion USD in 2004 with a compound annual growth rate of 16 percent (see, e.g., Bogle (2005)) 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 about 1.55% in our sample period.

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