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To Group or Not to Group? Evidence from Mutual Fund Databases

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Abstract

Despite the overwhelming trend in mutual funds toward team management, empirical studies find no performance benefits for this phenomenon. We show it is caused by large discrepancies in reported managerial structures in Center for Research in Security Prices and Morningstar Principia data sets versus U.S. Securities and Exchange Commission records, resulting in up to 50-basis-points underestimation of the team impact on fund returns. Using more accurate Morningstar Direct data, we find that team-managed funds outperform single-managed funds across various performance metrics. The relation between team size and fund performance is nonlinear. Also, team-managed funds take on no more risk than single-managed funds. Overall, team management benefits fund industry performance.

I. Introduction

> Mutual fund star managers have gone the way of the vinyl record: They're cool to have, expensive to get, and sometimes, not the best quality. In their place, fund companies . . . are moving in favor of a team-oriented approach . . . —Toonkel (2011)

Over the past 2 decades, team-based portfolio management has become very popular in the U.S. mutual fund industry. For example, in 2010, more than 70% of all U.S. domestic equity mutual funds were managed by "teams" of portfolio

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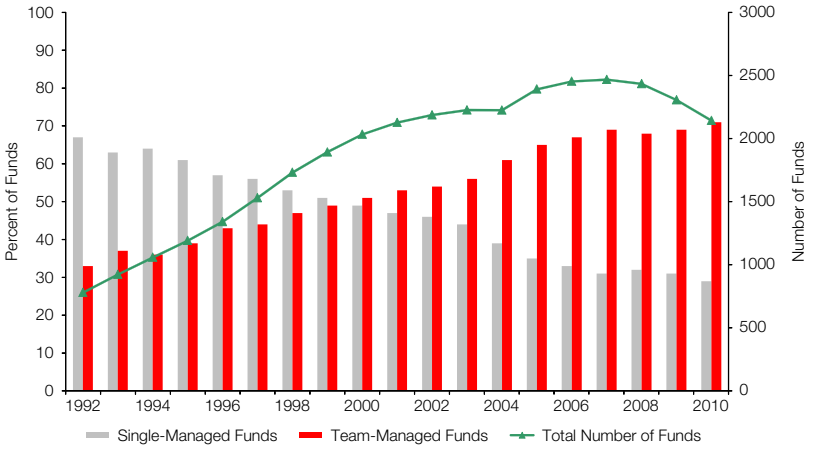
managers compared to only 30% in 1992 (see Figure 1). Industry professionals explain this trend predominantly from the fund performance viewpoint. For example, Stephen Oristaglio, a deputy head at Putnam Investments, argues that "[A]n overriding reason is performance.... [A]s investing becomes more complicated with so many new opportunities arising from new industries, markets and companies, team-managed funds make more sense" (Kovaleski (2000)). With a growing universe and complexity of assets, a team of managers should be better suited to handle the sheer volume of information relevant to investment decisions than a single manager.

The extant academic literature also highlights the benefits of group decision making. For instance, Sharpe (1981), Barry and Starks (1984), and Sah and Stiglitz (1991) argue that teams in the fund management industry achieve a diversification of style and judgment that reduces portfolio risk, thus inducing better performance.[1] However, in stark contrast to both theoretical and real-world evidence, empirical studies find little evidence of performance benefits of teamwork in the fund industry. For instance, Prather and Middleton (2002), Chen, Hong, Huang, and Kubik (2004), Bliss, Porter, and Schwarz (2008), Massa, Reuter, and Zitzewitz (2010), Bar, Kempf, and Ruenzi (2011), and others, using largely Center for Research in Security Prices (CRSP) or Morningstar Principia (MP) data, find that teams provide no overall gains over single-managed funds and even lead

FIGURE 1
Evolution of Mutual Fund Management Structure from 1992 to 2010

Figure 1 shows the percentage of single- and team-managed funds along with the total number of funds in our sample from Morningstar Direct from 1992 to 2010. The left-hand-side vertical axis represents the percentage of single- and team-managed funds out of the total funds in our sample each year. The right-hand-side vertical axis represents the total number of funds in our sample each year. The horizontal axis represents each year included in our sample.



[1]Experimental evidence implies that inferior choices are made more within groups than among individuals (see Bone, Hey, and Suckling (1999), Barber, Heath, and Odean (2003)). In economics, the negative effect of groups is often linked to possible productivity losses caused by free riding by some team members (see Alchian and Demsetz (1972), Holmstrom (1982), and Nalbantian and Schotter (1997)).

to lower performance. Table 1 reports for each relevant reference, the type of examined mutual funds, the data source, the sample period, and the resulting risk-adjusted return difference between team- and single-managed funds. This outcome seems puzzling. Hence, the goal of this article is to understand the source of this puzzle and reexamine the effect of teams on fund performance.

We use the relatively new Morningstar Direct (MD) mutual fund database. We first show that it is far more accurate than both CRSP and MP in reporting fund manager data, and illustrate the impact of this discrepancy on fund performance analysis. In the Appendix, we highlight the discrepancies among CRSP, MP, and MD data related to the managerial structure of U.S. domestic equity funds and show that often CRSP and MP misclassify funds into single- or team-managed compared with MD and U.S. Securities and Exchange Commission (SEC) filings. To compute the accuracy rate of the reported managerial structure of funds in CRSP, MP, and MD relative to SEC records, we obtain detailed managerial data from 100 randomly chosen U.S. domestic equity funds in 2004. We find that the accuracy rate of CRSP and MP compared with SEC is only 77% and 83%, respectively, but that of MD is 96%. The reporting accuracy is even lower for team size and manager names within a team. These large discrepancies can affect the results of prior studies that use manager-specific information from CRSP or MP.[2] The underestimation of team impact on fund returns based on manager data from these 2 databases ranges from 40 to 50 basis points (bps) per year for risk-adjusted returns from the Carhart (1997) model.

We evaluate the team impact on fund performance using a full MD data set of U.S. domestic equity funds from 1992 to 2010 while controlling for fund and managerial characteristics. On average, team-managed funds have higher risk-adjusted returns than their single-managed peers. With the full set of fund and manager controls, teams add up to 30–40 bps per year to gross fund performance.[3] This outcome is based on the alphas from the Carhart (1997) model as well as the 5-factor alphas, computed from the model that includes Carhart's 4 factors and the liquidity factor of Pastor and Stambaugh (2003), and it holds irrespective of

TABLE 1

Past Empirical Studies on Performance Benefits of Teamwork in the Fund Industry

Table 1 reports representative past studies that examine performance differences between team-managed and single-managed funds, alongside with the type of mutual funds analyzed, the data source, and the sample period. Diff (Team–Single) indicates the observed performance difference between team-managed and single-managed funds.

Reference	Mutual Fund Types	Source	Period	Diff (Team–Single)
Chen, Hong, Huang, and Kubik (2004)	U.S. diversified equity	CRSP	1992–1999	Negative
Bar, Kempf, and Ruenzi (2011)	U.S. diversified equity	CRSP	1994–2003	Negative
Prather and Middleton (2002)	U.S. diversified equity	Pre-MP	1981–1994	No difference
Bliss, Porter, and Schwarz (2008)	All U.S. funds	MP	1993–2003	No difference
Massa, Reuter, and Zitzewitz (2010)	U.S. diversified equity	MP	1994–2004	No difference

[2]The noninclusive list of studies that use CRSP data on fund management structure includes Cici (2012), Dass, Nanda, and Wang (2013), Deuskar, Pollet, Wang, and Zheng (2011), Kempf and Ruenzi (2007), and Nohel, Wang, and Zheng (2010). The studies that use MP fund manager data include Chen, Goldstein, and Jiang (2008), Karagiannidis (2010), and Kostovetsky and Warner (2015).

[3]We conduct our tests with gross returns, as we are interested in knowing how much additional investing skill management teams bring to their respective funds. Our results are qualitatively similar for net fund returns as well.

12- or 36-month return estimation windows. We consistently record the outperformance of team-managed funds across various fund investment objectives, especially outside the aggressive growth category. Yet, despite the outperformance of team-managed funds, we find no evidence that their exposure to any risk proxy is higher than that of their single-managed peers. On the contrary, team-managed funds appear to have substantially lower idiosyncratic volatility.

We also examine the relation between team size and performance. The intuition is that any group work always leads to a trade-off between the benefits of a larger intrinsic knowledge base of the group and coordination costs, especially under time constraints present in the portfolio management industry. We find a nonlinear relation between team size and fund performance. In particular, we find that 3-member teams generate the highest returns relative to single-managed funds that are also supported in statistical terms. Large teams also exhibit substantial performance gains, but this result is based on much smaller samples and is mainly insignificant statistically. The average risk-adjusted gains with a complete set of control variables based on the 5-factor model are 32 bps, 58 bps, 25 bps, and 57 bps per year for funds with 2, 3, 4, and 5 or more managers, respectively, relative to single-managed funds. This result generally supports the notion of increasing potential for free-riding problems and decreasing cooperation effectiveness in larger groups (see, e.g., Alchian and Demsetz (1972), Holmstrom (1982), Laughlin, Hatch, Silver, and Boh (2006), and Mueller (2012)).

Finally, we look at the relations among managerial structure, portfolio holdings, and fund performance. Team-managed funds hold significantly more securities in their portfolios than do single-managed funds. However, this is largely driven by teams with 4 and 5 or more managers. We also find that team-managed funds hold on average more concentrated portfolios than do single-managed funds, especially in the top 2 sectors: communication services and consumer defensives. In addition, team-based funds that are managed by 3 portfolio managers invest a significantly larger fraction of their stock holdings in short positions; funds with other team sizes exhibit significantly less preference for holdings in short positions than do single-managed funds. These results support the findings of Kacperczyk, Sialm, and Zheng (2004) and Engelberg, Reed, and Ringgenberg (2012), who show, respectively, that funds with concentrated holdings and investors with short-selling preferences outperform their counterparts. Consistent with this, we find the outperformance of team-managed funds using such holdings-based performance measures as the return gap in Kacperczyk et al. and characteristic selectivity in Daniel, Grinblatt, Titman, and Wermers (1997). These and other alternative evaluation methods also support the outperformance of team-managed funds.

Our study makes 2 broad contributions. First, it raises a warning signal to researchers who use CRSP and MP mutual fund data in evaluating manager-specific information.[4] Second, our findings add to the large cross-disciplinary literature

[4]Some studies compare the accuracy of CRSP and MP databases. Elton, Gruber, and Blake (2001) document an omission bias in CRSP returns related to older data and smaller funds, but they do not examine manager records. Massa et al. (2010) observe an accuracy rate for MP higher than CRSP only in reporting named funds in relation to anonymous funds.

on the relation of organizational structure to performance. The only empirical study of which we are aware that detects general productivity gains in teams is by Hamilton, Nickerson, and Owan (2003), but it is based on limited data from the textile industry. Other evidence in favor of teams is based on experimental studies that employ signaling games (e.g., Cooper and Kagel (2004), Blinder and Morgan (2005)). The mutual fund data are unique in this respect as they have the longest time series and the largest cross-sectional span among all existing occupational data sets.

The rest of the article is organized as follows: Section II describes the fund and manager data. Section III compares the managerial structures reported in CRSP and MP with MD and SEC records, and conducts tests on the importance of team management for fund performance using a matched sample of CRSP, MP, and MD data sets. Section IV presents the main empirical findings based on the full sample of MD data. Section V is devoted to the relation between managerial structure and fund holdings and returns. Section VI examines the effect of team management on fund risk-taking behavior and on a range of alternative performance evaluation benchmarks. Section VII concludes.

II. Data

A. Main Data Source of Fund and Manager Data

Our primary data source is MD, a relatively new survivorship-bias-free institutional research product offered by Morningstar Inc. It provides some of the most comprehensive and in-depth coverage of open-ended mutual funds across the globe, including the United States. Our sample covers actively managed U.S. diversified domestic equity funds with the following investment objectives: aggressive growth, growth, growth and income, and equity income from 1992 to 2010. We exclude all sector and index funds. MD reports all data at the fund share class level, including the names of the fund managers. Therefore, we aggregate mutual-fund-share-class-level observations to one fund-level observation using a unique fund identifier in MD. To determine whether a fund is sole managed or team managed at the end of a calendar year, we use detailed fund manager data, which include fund manager names and the date a fund manager joins and leaves a particular fund. We classify a fund as sole or team managed based on the number of fund managers with the fund at the end of the calendar year. When only 1 fund manager is named at the end of the calendar year, we classify that fund as sole managed for that year. Similarly, when 2 or more fund managers are named with the fund, we classify the fund as team managed. We also classify funds as team managed if funds use phrases such as "management teams," "team managed," or "multiple managers" under their fund manager names. We remove from our sample all fund-years that have missing fund manager structure or tenure dates. Our final sample covers 3,935 unique funds with 35,440 manager-fund-year observations.

For each fund, we also obtain fund characteristics that are well known in the literature to affect individual fund performance. These characteristics typically include fund size, measured by the total net assets under the management of the fund at the end of the calendar year; fund age, defined as the difference between

the fund's inception year and the current year; expenses, measured by the annual net expense ratio of the fund; turnover, measured by the turnover ratio of the fund; fund family size, measured by the total net assets under the management of the fund complex to which the fund belongs at the end of the calendar year; and fund return volatility, measured by the standard deviation of raw returns of funds over the past year. We also include net fund flows, defined as the net growth in total net assets of funds, as a percentage of their total net assets, adjusted for prior-year returns. To minimize the effect of outliers on our analysis, we winsorize expense ratios, turnover, and annual fund flow variables at the 1% and 99% levels.

Chevalier and Ellison (1999) show that managerial characteristics play an important role in fund performance. Therefore, any study that examines the potential impact of group decision making on fund performance should control for manager's demographic characteristics.[5] Following Chevalier and Ellison, we create two manager characteristic variables: manager tenure and Master of Business Administration (MBA). Manager tenure is the difference between the year a fund manager started as the portfolio manager for a given fund and the current year. We define the MBA variable as the proportion of fund managers on a team with an MBA degree.[6] We add to this list the proportion of females on a team, given some evidence of trading and performance differences between males and females (e.g., Barber and Odean (2001)). Creating manager variables for fund manager teams is somewhat problematic. Ideally, one might be able to create team characteristics based on detailed information of the contribution of each team member, but we do not possess such data. Hence, for us, manager tenure is the equal-weighted average of manager tenures of all fund managers on the team.

B. Fund Performance Measures

To compute fund performance measures, we use each fund's monthly gross fund returns from MD. We use 3 performance metrics. Two of them are based on the Carhart (1997) model: unconditional 4-factor alpha, $\alpha(4U)$, and conditional 4-factor alpha, $\alpha(4C)$, following Ferson and Schadt (1996). The third one is the 5-factor model that includes the 4 factors from Carhart and the liquidity factor from Pastor and Stambaugh (2003).[7] Thus, we estimate each fund's alpha using the following 3 evaluation models:

$$(1) \quad r_{i,t} = \alpha(4U)_i + \beta_i r_{m,t} + s_i \mathrm{SMB}_t + h_i \mathrm{HML}_t + m_i \mathrm{MOM}_t + e_{i,t},$$

$$(2) \quad r_{i,t} = \alpha(4C)_i + \beta_i r_{m,t} + s_i \mathrm{SMB}_t + h_i \mathrm{HML}_t + m_i \mathrm{MOM}_t + b_i^{\mathrm{TBILL}} r_{m,t} Z_{t-1}^{\mathrm{TBILL}} + b_i^{\mathrm{TERM}} r_{m,t} Z_{t-1}^{\mathrm{TERM}} + e_{i,t},$$

[5] This has not been the case in many studies that attempt to determine the impact of team management on fund performance (e.g., Massa et al. (2010)).

[6] We have considered the Scholastic Assessment Test (SAT) score of matriculates of the fund manager's undergraduate institution divided by 1,000 as in Chevalier and Ellison (1999), but these data are limited and reduce our sample significantly. Our main results, however, are not affected by the inclusion of this variable and are available from the authors. Also, Chevalier and Ellison use an MBA dummy.

[7] Many recent studies use the Pastor and Stambaugh (2003) 5-factor alphas to evaluate managerial skill (see, e.g., Kacperczyk, Sialm, and Zheng (2008), Wermers, Yao, and Zhao (2012), Chuprinin, Massa, and Schumacher (2015), and Agarwal, Mullally, Tang, and Yang (2015)).

and

$$(3) \quad r_{i,t} = \alpha(5\text{F})_i + \beta_i r_{m,t} + s_i \text{SMB}_t + h_i \text{HML}_t + m_i \text{MOM}_t + l_i \text{LIQ}_t + e_{i,t},$$

respectively, where $r_{i,t}$ is the monthly gross fund return less the risk-free rate (the 1-month U.S. Treasury bill (T-bill) rate) and $r_{m,t}$ is the monthly return on the CRSP value-weighted composite index less the 1-month T-bill rate. SMB_t, HML_t, MOM_t, and LIQ_t are returns on the size, book-to-market, momentum, and liquidity portfolios, respectively. In equation (2), Z_{t-1}^{TBILL} and Z_{t-1}^{TERM} are the lagged (demeaned) information variables: the 1-month T-bill rate (TBILL) and the term-structure spread (TERM), defined as the difference in yields on the 10-year U.S. government bond and 3-month T-bill.

We consider the standard Carhart (1997) model as our main performance evaluation benchmark for the following reasons. First, Fama and French (2010) advocate using Carhart alphas for testing fund managers' skills instead of the capital asset pricing model (CAPM) alphas or the Fama–French 3-factor alphas. Second, Linnainmaa (2013) points out that fund alphas obtained from the CAPM are higher and more volatile than those coming from the 4-factor model. This is why the standard Carhart model is used most widely in previous research including studies that attempt to determine the collective managerial decision impact on fund performance (see Chen et al. (2004)). Therefore, we use $\alpha(4\text{U})$ in all our tests involving fund returns as dependent or independent variables, and we use all 3 alternative fund alphas only in the main tests.[8]

Funds change the number of fund managers from year to year. Therefore, we remove all fund-years that have fewer than 12 monthly fund return observations in a given calendar year and estimate fund alphas using their prior 12 monthly returns. Although the 12-month horizon provides fewer data points for the estimation than we may want, given the high frequency of fund manager turnover, the longer (greater than 1 year) estimation horizons will introduce bias in our analysis by incorrectly attributing fund performance to a certain type of management structure. Importantly, our methodology is immune to the reverse survivorship bias of Linnainmaa (2013). Also, his study implies that discarding funds that survive only a few months within a year is useful, because this underperformance may be driven not by the luck of investing skills but by negative idiosyncratic shocks. Finally, to reduce the influence of outliers coming from our short fund performance estimation windows, we trim fund alphas at the top and bottom 1% of the distribution.[9]

[8]Consistent with the reasons above, we also obtain economically large and positive point estimates for team management impact on fund returns if they are computed based on the market model, the CAPM, or the Fama–French (2010) 3-factor model. However, because of the larger variability of these estimates on one side, and the less appropriateness of relating managerial skills to these performance measures on the other, they are usually statistically insignificant. These test results are available from the authors.

[9]Similar 12-month fund return windows are used in many studies (e.g., Massa et al. (2010), Wermers et al. (2012)). Smoothing (winsorization or trimming) of 12-month fund returns is also common in the literature (e.g., Cassar and Gerakos (2011), Aiken, Clifford, and Ellis (2013), and Chen, Hong, Jiang, and Kubik (2013)).

C. Summary Statistics

In Figure 1, we show the evolution of the mutual fund management structure from 1992 to 2010. The figure depicts the percentage of single- and team-managed funds along with the total number of funds in each year of our sample. The total number of funds increased from around 750 in 1992 to more than 2,000 by 2010, peaking in 2007 with close to 2,500 funds. Consistent with other studies, the proportion of single-managed funds has dropped significantly from almost 70% in 1992 to around 30% in 2010.

Table 2 reports the summary statistics of mutual funds by the fund management structure, with the data on team-managed funds divided into funds with 2 managers, 3 managers, 4 managers, and 5 or more managers. Panel A reports the distribution (number and percentage) of single- and team-managed funds for each year in our sample. Although all team-managed funds have increased their presence in the industry, multiple-manager funds (4 and 5 or more) have experienced the largest relative and absolute gains in representation, that is, more than fourfold from 6% in 1992 to 25% in 2010. However, throughout our sample period, team-managed funds directed by 2 managers constitute the largest proportion. Panel B reports mutual fund characteristics other than performance measures: fund size, fund age, fund family size, turnover, expenses, and fund return volatility. Among these fund characteristics, the notable differences across managerial structures are in turnover and expenses. Both these measures decrease with an increase in the number of fund managers (and expenses decrease monotonically). In addition, fund size tends to increase with team size. No obvious differences, however, emerge in fund return volatility and fund age. Panel C reports fund manager characteristics for different managerial structure groups. The average tenure with the same fund is the highest among single-managed funds, which also have the highest average SAT scores. The percentage of managers with an MBA degree is about 50% in both single- and team-managed funds. Females constitute about 10% of all fund managers irrespective of the size of the managerial team.

Panel D of Table 2 reports three fund performance measures, $\alpha(4U)$, $\alpha(4C)$, and $\alpha(5F)$, for single- and team-managed funds. It also contains information about the difference test in mean performance measures between each group of team-managed funds and single-managed funds. We can see that team-managed funds show higher alphas. For example, the difference in $\alpha(4U)$ between 2-manager and single-manager funds is about 1 bp per month, or about 12 bps per year, and that between 5-plus-manager- and single-manager funds is almost 32 bps per year, which is marginally significant. However, all 3 fund alphas show that 3-manager funds gain the most relative to funds managed by a single person. For 3-manager funds, the differences in $\alpha(4U)$, $\alpha(4C)$, and $\alpha(5F)$ are 35 bps, 29 bps, and 48 bps per year, respectively.

D. Determinants of Managerial Structure

In this subsection, we determine fund and managerial characteristics that affect the managerial structure of U.S. equity mutual funds. To achieve this goal, we use 2 probit models, in which the dependent variable is the change in fund organization either from single to team management or from team to single management, and the independent variables are fund and manager characteristics.

TABLE 2
Summary Statistics of Mutual Funds Management Structure

Table 2 gives the summary statistics of domestic equity mutual funds in the United States from 1992 to 2010. Panel A reports the number and percentage of funds managed by 1, 2, 3, 4, and 5 or more fund managers each year. Panel B reports the mean and standard deviation (S.D.) of different fund variables over the entire sample period. FUND_SIZE (billions of dollars) is total net assets under management of a fund in a given year. FUND_AGE (years) is the difference between a fund's inception year and the current year. FAMILY_SIZE (billions of dollars) is measured by the total net assets under management of the fund complex to which the fund belongs at the end of the calendar year. EXPENSES (percent) is the annual total expense ratio of the fund. TURNOVER is the minimum of aggregated sales or aggregated purchases of securities of the year divided by the average 12-month total net assets of the fund. VOLATILITY (percent) is the S.D. of monthly fund returns over the past 12 months. FLOWS is defined as the net growth in the total net assets of funds, as a percentage of their total net assets, adjusted for prior-year returns. EXPENSES, TURNOVER, and FLOWS are winsorized at the 1% and 99% levels. Panel C reports fund manager variables. TENURE (years) is the number of years the fund manager remains with the fund. MBA is defined as the proportion of managers in a fund with a master of business administration degree. FEMALE is defined as the proportion of female managers in a fund. In the case of teams, the average tenure of team members is taken. Panel D reports the mean and S.D. of 3 fund performance measures: α(4U) and α(4C) are the monthly risk-adjusted gross fund returns computed each year over 12 monthly observations using unconditional and conditional versions of the Carhart (1997) 4-factor model, respectively, and α(5F) is the similarly computed risk-adjusted return from the 5-factor model, which includes the liquidity factor of Pastor and Stambaugh (2003) added to the Carhart (1997) model. The panel also reports the difference in performance test results between each group of team-managed funds and single-managed funds. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Distribution of Single-Managed and Team-Managed Funds

	1 Manager		2 Managers		3 Managers		4 Managers		5+ Managers	
Year	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1992	519	67	145	19	70	9	17	2	29	4
1993	584	63	202	22	78	8	20	2	39	4
1994	672	64	243	23	85	8	23	2	35	3
1995	729	61	273	23	115	10	30	3	45	4
1996	767	57	350	26	121	9	57	4	46	4
1997	859	56	399	26	161	11	63	4	48	3
1998	921	53	449	26	210	12	67	4	84	5
1999	961	51	494	26	258	14	81	5	99	6
2000	987	49	587	29	253	12	90	5	116	6
2001	1,004	47	602	28	272	13	115	6	134	7
2002	1,000	46	647	30	283	13	120	6	137	7
2003	971	44	662	30	287	13	145	7	161	8
2004	876	39	659	30	320	14	174	9	196	10
2005	832	35	698	29	335	14	226	11	300	14
2006	802	33	731	30	352	14	222	11	346	16
2007	776	31	748	30	363	15	247	12	333	16
2008	776	32	732	30	356	15	243	12	327	16
2009	719	31	691	30	392	17	189	9	315	16
2010	622	29	666	31	398	19	164	9	293	16
Total	15,377	43	9,978	28	4,709	13	2,293	7	3,083	10

	1 Manager		2 Managers		3 Managers		4 Managers		5+ Managers	
Variable	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
Panel B. Fund Variables of Single-Managed and Team-Managed Funds										
FUND_SIZE	0.986	4.011	0.732	2.169	0.952	2.854	1.059	3.683	2.401	10.588
FUND_AGE	10.24	12.57	10.21	12.18	10.20	12.21	9.19	10.51	10.62	11.45
FAMILY_SIZE	33.76	87.04	15.94	28.23	16.18	27.62	20.11	34.92	24.55	60.32
EXPENSES	1.316	0.475	1.292	0.437	1.270	0.424	1.244	0.410	1.178	0.407
TURNOVER	0.913	0.843	0.856	0.698	0.906	0.745	0.828	0.630	0.807	0.627
VOLATILITY	4.728	2.567	4.820	2.647	4.981	2.638	4.756	2.701	4.715	2.262
FLOWS	0.484	2.141	0.451	2.136	0.495	2.207	0.521	2.324	0.398	2.010
Panel C. Fund Manager Variables of Single-Managed and Team-Managed Funds										
TENURE	4.422	4.802	4.127	3.630	3.930	3.200	3.789	3.251	3.603	2.934
MBA	0.522	0.498	0.472	0.366	0.456	0.314	0.473	0.280	0.496	0.256
FEMALE	0.087	0.281	0.076	0.187	0.098	0.173	0.107	0.152	0.105	0.124
Panel D. Fund Performance of Single-Managed and Team-Managed Funds										
α(4U)	0.0551	0.6618	0.0648	0.6184	0.0845	0.6178	0.0607	0.5932	0.0821	0.5618
Diff.			0.0097		0.0294**		0.0056		0.0270*	
p-value			(0.322)		(0.020)		(0.740)		(0.061)	
α(4C)	0.0884	0.7110	0.0987	0.6783	0.1126	0.6632	0.0936	0.6417	0.1102	0.6027
Diff.			0.0103		0.0242*		0.0052		0.0218	
p-value			(0.329)		(0.076)		(0.773)		(0.159)	
α(5F)	0.0592	0.7113	0.0720	0.6771	0.0990	0.6745	0.0694	0.6427	0.0811	0.5936
Diff.			0.0128		0.0398***		0.0102		0.0219	
p-value			(0.244)		(0.005)		(0.581)		(0.166)	

To avoid the contemporaneous effect of fund characteristics on the change in managerial structure, these characteristics are lagged. Our model, therefore, is

$$\begin{aligned}(4)\qquad \Pr\left(\Delta\text{MGR\_STR}_{i,t}=1\right) &= \delta_0+\boldsymbol{\delta}_1\text{FUND\_CHAR}_{i,t-1}\\ &\quad+\boldsymbol{\delta}_2\text{MGR\_CHAR}_{i,t-1}+\boldsymbol{\delta}_3\text{FE}_{i,t}+e_{i,t},\end{aligned}$$

where $\Pr(\Delta\text{MGR\_STR}_{i,t}=1)$ is either the probability that the management structure of fund i at time t switches to being team managed or the probability that the management structure of fund i at time t switches to being single managed. $\text{FUND\_CHAR}_{i,t-1}$ and $\text{MGR\_CHAR}_{i,t-1}$ are the sets of fund- and manager-specific characteristics, respectively, that may be relevant to the propensity of team formation and deformation. They include one fund performance measure, the unconditional Carhart (1997) alpha, $\alpha(4\text{U})$; fund size; fund age; fund family size; and fund flows, as well as all managerial characteristics from Table 2. All fund and manager controls are lagged to exclude their contemporaneous effect on the managerial structure. In all estimations, the standard errors are clustered by fund and year.

The decision to use a team of portfolio managers or to manage specific funds within the same fund family is usually determined by the fund management company. Berk, Van Binsbergen, and Liu (2017) find that reallocation of capital among mutual fund managers within the same fund family increases future value added. Therefore, better returns observed among team-managed funds may reflect the decision of fund companies to assign groups of managers to more successful funds. To account for this possibility, the fixed effects, $\text{FE}_{i,t}$, include not only the year and fund investment objectives effects but also fund family effects.[10]

Table 3 reports the test results. The first 2 columns report the results for the transition probability from single to team management; there are 1,410 fund-year observations of such switches in our sample. The last 2 columns present the results for the transition probability from team to single management; there are 951 fund-year observations of such switches, which is substantially lower than transitions from single- to team-managed funds. We estimate the model for the whole sample period under 2 econometric specifications. The first setting (columns 1 and 3) matches equation (4) exactly. In the second setting, we replace the first lags of fund alpha, fund size, and fund flows with their longer lags, namely: $\alpha(4\text{U})_{i,t-1,t-4}$, $\text{FUND\_SIZE}_{i,t-4}$, and $\text{FLOWS}_{i,t-1,t-1}$ (columns 2 and 4). This allows us to decouple in time the compounding effect of past fund returns from its size and flows, both of which are known to be related to performance.

First, the lagged fund returns show a negative and marginally significant relation with the change in management toward a team-based structure only in column 2 of Table 3, where we use the longer lagged controls. However, the sign and point estimate of $\alpha(4\text{U})_{i,t-1,t-4}$, in column 4 is almost the same as that in column 2, implying that longer term past fund performance has equal chances of affecting the changes in managerial structure from single to team management or vice versa. Second, across other fund controls only fund size and flows affect the

[10] We note that a probit model with fixed effects could potentially suffer from the incidental parameters problem. In unreported tests available on request, we also use a probit model without fixed effects, but it produces qualitatively similar results.

TABLE 3

Probit Model of the Determinants of Team Management

Table 3 reports probit tests of the determinants of team management structure using the Morningstar Direct U.S. domestic equity mutual fund sample from 1992 to 2010. The dependent variable is the probability that the management structure of fund i at time t switches to being team managed (columns 1 and 2) or the probability that the management structure of fund i at time t switches to being single managed (columns 3 and 4). The performance measure is the unconditional Carhart (1997) alpha, α(4U). All fund variables are defined in Table 2, but fund SIZE, FUND_AGE, and FAMILY_SIZE are taken in log form. All fund manager variables are also defined in Table 2 but all are taken in log form. All regressions include time by investment objective fixed effects (FE) and fund family FE, and standard errors are clustered by fund and year. p-values are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	From Single to Team Managed		From Team to Single Managed	
Variable	1	2	3	4
$PERFORMANCE_{i,t-1}$	−0.0352		0.0177	
	(0.157)		(0.594)	
$PERFORMANCE_{i,t-1,t-4}$		−0.0993**		−0.0963
		(0.047)		(0.146)
$FUND\_SIZE_{i,t-1}$	−0.0172*		−0.0211*	
	(0.068)		(0.064)	
$FUND\_SIZE_{i,t-4}$		−0.0168		−0.0058
		(0.300)		(0.703)
$FUND\_AGE_{i,t-1}$	−0.0110	0.0254	0.0362	0.0253
	(0.657)	(0.547)	(0.270)	(0.599)
$FAMILY\_SIZE_{i,t-1}$	−0.0057	0.0062	−0.0305	−0.1143**
	(0.877)	(0.910)	(0.565)	(0.030)
$FLOWS_{i,t-1}$	−0.0184**		−0.0107	
	(0.033)		(0.405)	
$FLOWS_{i,t-1,t-4}$		−0.0154		0.0010
		(0.412)		(0.938)
$TENURE_{i,t-1}$	0.0830***	0.0794***	−0.0621**	−0.0484*
	(0.001)	(0.008)	(0.012)	(0.083)
$MBA_{i,t-1}$	0.0453	0.0110	−0.1240	−0.0949
	(0.613)	(0.914)	(0.145)	(0.397)
$FEMALE_{i,t-1}$	−0.2591**	−0.1761	0.0941	0.1003
	(0.027)	(0.115)	(0.353)	(0.479)
Constant	Yes	Yes	Yes	Yes
Time × Objective FE	Yes	Yes	Yes	Yes
Fund family FE	Yes	Yes	Yes	Yes
No. of obs.	18,598	12,768	17,120	11,586

probability of switching to team management and only at the first lag. Because fund size and flows are related to fund returns, part of this relation may be the result of the lagged fund performance. Third, among managerial characteristics, only average tenure has a strong and positive (negative) impact on the likelihood of team formation (deformation) for managing mutual funds. Funds with managers with higher than average tenure are more likely to move to team-based portfolio management and, at the same time, are less likely to revert to single-manager structure. Thus, Table 3 reports that although a limited number of fund characteristics may affect the managerial structure of funds, the general industry trend toward team management may be driven by fund performance.

III. Management Structure Differences across Databases

In this section, we determine the accuracy rates of funds' management structure provided by CRSP, MP, and MD and compare them with SEC records. To achieve this, we need to construct matched samples between all 3 databases. We create a matched sample between CRSP and MD. Like MD, the unit of

observation in CRSP is the fund share class and the fund tickers are uniquely assigned to share classes. To avoid double-counting of fund's management structure, we aggregate share-class-level information to the fund level for each fund. We match each fund in our MD sample to CRSP using individual fund tickers and date of inception. In cases in which the fund ticker information is missing, we use fund names along with their date of inception for matching purposes. We carefully do this matching by hand because differences exist in fund naming conventions in both MD and CRSP. MD reports only the most recent name adopted by the fund, and CRSP reports different names adopted by the fund over its active life. To ensure the accuracy of the matching, we double-check each matched fund by hand. At the end, we are able to match 92.78% of our MD sample funds to CRSP (3,651 out of 3,935 funds) between 1992 and 2010. We also classify the CRSP sample into single- or team-managed funds. We classify a fund as single managed if only 1 manager name is listed and as team managed if 2 or more managers are listed (or phrases such as "team managed" or "investment committee" are used). We remove funds that report the name of the fund company or their adviser(s) under the manager name variable. We also remove fund-year observations for which the manager name is unavailable. We end up with 29,918 manager-fund-year observations in CRSP, which represents an 84.42% match with our main MD sample.

In a similar vein, we construct a matched sample between the MP and MD databases. Our MP sample is from 1993 to 2010 and contains 1996–2010 data from Morningstar Inc. and 1993–1995 data from Massa et al. (2010).[11] We follow the same matching procedure as with the CRSP database using fund names along with their inception date for matching purposes. We are able to match 3,489 funds in MP with 24,630 manager-fund-year observations in the MD database for the same period. This represents a 98.5% match with MD funds and an 87.4% match with fund-year observations.

To evaluate the extent of mismatches in fund managerial structure among CRSP, MP, and MD data, as well as between these 3 databases and SEC filings, we randomly select 100 funds in 2004 and compare the recorded number of managers and their names across all 3 data sources.[12] The results of this exercise are reported in Table 4. Panel A compares all 4 databases based

[11] We thank Jonathan Reuter for sharing his MP data set with us.

[12] Creating the number of fund managers variable based on SEC filings is complex. We start by hand-collecting for each year the fund's prospectus (Form N-1A), annual report (Form N-30D), and post-effective amendments (Forms POS AM, 497, 485APOS, and 485BPOS) available on the SEC Electronic Data Gathering, Analysis, and Retrieval (EDGAR) database. Funds are legally required to include the full name, title, length of service, and business experiences of the individuals, including all members of the portfolio management team who are primarily responsible for the day-to-day management of the fund in these filings. In cases in which a fund employs a large portfolio team, the SEC requires the fund to provide information on at least 5 members of the team who are most responsible for the day-to-day management of the fund's portfolio, for example, the managers with the largest percentages of assets under management. Funds are also required to disclose any change in fund manager(s) and provide information about the new manager(s) under the Securities Act of 1933 through these filings. Each of these filings contains a filing date, which refers to the date the information was made public, and an effectiveness date, which refers to the date the information took effect. We then sort these filings based on their effectiveness date for each calendar year. To determine the number of fund manager(s) in the fund, we count the name(s) of the fund manager(s) in the last SEC filing at the end of the calendar year.

TABLE 4

Random Sample Mismatches in the Fund Management Structure Reported by CRSP, MP, and MD

Table 4 reports the extent of managerial structure mismatches in Center for Research in Security Prices (CRSP), Morningstar Principia (MP), and Morningstar Direct (MD) versus U.S. Securities and Exchange Commission (SEC) reports for a random sample of 100 U.S. domestic equity funds in 2004. Panel A reports the mismatches based on the single versus team manager classification. Panel B reports mismatches in the reported number of managers in a fund and their explicit names. FM = fund managers.

Panel A. Comparison of CRSP, MP, MD, and SEC Records of Team versus Single Manager Classification

		Reported Specification			True Specification		Misspecified Funds		Accuracy (%)		
Database	Sample	Team	Single	Anonymous	Team	Single	Team	Single	Team	Single	Total
SEC	100	67	33	0	67	33	0	0	100	100	100
MD	100	63	37	0	63	33	0	4	94	100	96
MP	100	52	48	5	51	32	1	16	76	97	83
CRSP	100	56	44	18	50	27	6	17	75	82	77

Panel B. Comparison of CRSP, MP, MD, and SEC Records Based on the Number and Names of Fund Managers

			Funds with the Number of Managers Mismatched with SEC				Funds with Name of Managers Mismatched with SEC			
Database	Funds with FM names	Max # FM Names	Underestimated # of FMs	Overestimated # of FMs	Total	Accuracy (%)	1 Name Mismatch	2+Name Mismatch	Total	Accuracy (%)
SEC	100	14	0	0	0	100	0	0	0	100
MD	100	8	9	5	14	86	11	4	15	85
MP	95	5	26	3	29	69	19	15	34	64
CRSP	82	3	19	7	26	68	17	11	28	66

on single- or team-management classification. CRSP and MP regard 18 and 5 funds as anonymous, respectively, but MD has no anonymous funds. Furthermore, a huge discrepancy is revealed when classifying funds as single- or team-managed in CRSP and MP databases. In CRSP, out of 82 non-anonymous funds, 17 are classified as single managed, when in fact, they are team managed. Also, 6 funds are classified as team managed, but they are shown as single managed in SEC records. This gives a total of 23 misspecified funds, implying an accuracy rate of only 77% in reported basic managerial structure in CRSP. Similarly, in MP, out of 83 non-anonymous funds, 16 are misclassified as single managed, and 1 is misclassified as team managed. This results in 17 total misspecifications, implying an accuracy rate of 83% for MP. The number of similar misspecifications in MD is only 4, yielding a reporting accuracy of 96%.

Panel B of Table 4 compares 3 databases based on the number of fund managers and their names. For the remaining 82 funds with names in the sample, CRSP misreports 26 funds, a third of all fund managerial data. This gives an accuracy rate of 68%. Surprisingly, although the number of named funds in MP is 95 out of 100, the mismatch in the number of managers is even higher than in CRSP, totaling 29. This leads to a similarly low accuracy rate of 69%. Things become even worse for CRSP and especially MP data with the identification of specific manager names. They misreport them for 28 and 34 funds out of 82 and 95, respectively. This yields an accuracy rate of 66% for CRSP and 64% for MP. The correctness rates for the number of managers and manager names in the MD database are 86% and 85%, respectively. The maximum number of fund managers reported by CRSP and MP is very low (3 and 5, respectively), when in reality, it is 14. MD reports up to 8 managers per fund when appropriate.[13] Thus, Table 4 illustrates that the reporting of managerial structure by both CRSP and MP is severely inaccurate. Importantly, because MP data are not updated over time, newly issued compact discs of MP data are exactly the same as those used in earlier studies and, therefore, suffer from the same inaccuracy problem in managerial structure records.

IV. Team Management and Fund Performance: Empirical Tests

A. Differences in Team-Managed Fund Performance across CRSP, MP, and MD Databases

Now we compare the effect of teams on fund performance using CRSP, MP, and MD data. The regression model uses the following general form:

$$\text{PERF}_{i,t} = c_o + c_1\text{TEAM}_{i,t-1} + \boldsymbol{\delta}_1\text{FUND\_CHAR}_{i,t-1} + \boldsymbol{\delta}_2\text{MGR\_CHAR}_{i,t-1} + \boldsymbol{\delta}_3\text{FE}_{i,t} + e_{i,t}, \tag{5}$$

[13]Note that not only does MD report team sizes correctly more often than does CRSP, but also the average misspecification in MD occurs with larger team sizes than in CRSP (4.25-member team in MD vs. 1.75 in CRSP). This means that the fewer instances of misspecification of managerial structure in MD occur among larger team sizes than in CRSP. As a result, MD becomes the only viable option in investigating the team size effect on fund performance.

where $PERF_{i,t}$ is the unconditional Carhart alpha, $\alpha(4U)_{i,t}$; $TEAM_{i,t-1}$ is the dummy for multiple-manager funds; $FUND\_CHAR_{i,t-1}$ and $MGR\_CHAR_{i,t-1}$ are the sets of fund- and manager-specific characteristics from Table 2; and $FE_{i,t}$ includes the year times fund investment objective fixed effects, as well as fund family fixed effects. All fund and manager controls are lagged by 1 period to exclude their potentially concurrent effect on fund performance.

Table 5 compares the effect of management structure on fund unconditional Carhart alphas across the CRSP, MP, and MD databases using a panel regression approach on matched samples from 1992 (CRSP) and 1993 (MP) to 2010. In this table, we again use our matched samples between CRSP and MD and between MP and MD. The independent variable of interest is TEAM, defined as a dummy that equals 1 if the fund has 2 or more fund managers, and 0 if it has only 1 fund

TABLE 5

Effect of Team Management on Fund Performance: CRSP, MP, and MD

Table 5 compares the effect of management structure on fund performance across Center for Research in Security Prices (CRSP), Morningstar Principia (MP), and Morningstar Direct (MD) databases using a panel regression approach on a matched sample from 1992 to 2010. It reports regression estimates of the matched funds across the full sample period using fully matched CRSP, MP, and MD databases. The dependent variable is the fund performance measure, $\alpha(4U)$, defined in Table 2. The independent variable of interest is TEAM, defined as a dummy variable that equals 1 if the fund has 2 or more fund managers, and 0 if the fund has only 1 fund manager at the end of the calendar year. All fund variables are defined in Table 2, but FUND SIZE, FUND_AGE, and FAMILY_SIZE are taken in log form. All fund manager variables are also defined in Table 2 but all are taken in log form. Each regression includes time by investment objective fixed effects (FE) and fund family FE, and standard errors are clustered by fund and year. *p*-values are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	CRSP		MP		MD	
Variable	1	2	3	4	5	6
$TEAM_{i,t-1}$	−0.0148 (0.170)	−0.0164* (0.066)	−0.0077 (0.587)	−0.0089 (0.526)	0.0260* (0.100)	0.0263* (0.097)
$FUND\_SIZE_{i,t-1}$	−0.0203*** (0.006)	−0.0203*** (0.005)	−0.0195** (0.013)	−0.0204*** (0.010)	−0.0206*** (0.005)	−0.0208*** (0.004)
$FUND\_AGE_{i,t-1}$	−0.0181* (0.065)	−0.0155 (0.132)	−0.0161 (0.147)	−0.0137 (0.216)	−0.0172* (0.084)	−0.0149 (0.151)
$FAMILY\_SIZE_{i,t-1}$	−0.0813*** (0.000)	−0.0812*** (0.000)	−0.0858*** (0.000)	−0.0853*** (0.000)	−0.0818*** (0.000)	−0.0817*** (0.000)
$EXPENSES_{i,t-1}$	0.0342 (0.155)	0.0368 (0.114)	0.0401* (0.097)	0.0404* (0.076)	0.0343 (0.153)	0.0368 (0.112)
$TURNOVER_{i,t-1}$	−0.0111 (0.529)	−0.0118 (0.491)	−0.0229 (0.387)	−0.0158 (0.345)	−0.0111 (0.534)	−0.0114 (0.510)
$VOLATILITY_{i,t-1}$	−0.0253 (0.689)	−0.0260 (0.679)	−0.0060 (0.927)	−0.0070 (0.911)	−0.0248 (0.694)	−0.0255 (0.683)
$FLOWS_{i,t-1}$	−0.0024 (0.605)	−0.0023 (0.612)	−0.0018 (0.693)	−0.0020 (0.694)	−0.0024 (0.610)	−0.0023 (0.623)
$TENURE_{i,t-1}$		−0.0076 (0.250)		−0.0063 (0.373)		−0.0059 (0.369)
$MBA_{i,t-1}$		0.0200 (0.286)		0.0191 (0.311)		0.0207 (0.282)
$FEMALE_{i,t-1}$		−0.1001*** (0.004)		−0.0915*** (0.008)		−0.1009*** (0.004)
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Time × Obj. FE	Yes	Yes	Yes	Yes	Yes	Yes
Fund family FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	17,402	17,359	16,358	16,329	17,402	17,359
Diff: Team (MD – CRSP)					0.0408** (0.034)	0.0427** (0.024)
Diff: Team (MD – MP)					0.0337 (0.116)	0.0352* (0.096)

manager at the end of the calendar year. Most of the other independent variables are defined in Table 2. To reduce the influence of outliers, we take the natural logs of fund size, fund age, turnover, volatility, average tenure, as well as the proportions of MBA holders and females in the management team. The regression specification without manager controls that we use in this table is similar to Chen et al. (2004). This helps us benchmark our study against theirs.[14]

There are more than 16,000 fund-year observations. Columns 1 and 2 of Table 5 report the estimation output using CRSP data without and with fund manager controls, respectively. In these regressions, the coefficient estimate on TEAM is negative but not statistically significant. This result could explain the conclusions in many studies that use CRSP data and that find team management does not add any positive value for fund performance (see, e.g., Chen et al. (2004), Bar et al. (2011)). Columns 3 and 4 report the estimation results with MP data. The TEAM coefficient in these estimations is again negative but not statistically significant. Columns 5 and 6 report the estimation output using MD data. Now, the results are substantially different. The coefficient on TEAM is not only consistently positive but also significant at the 10% level in both estimations. As can be seen from the bottom 2 rows of the table, the underestimation of the team management impact on fund returns ranges between 40 and 50 bps per year for the MP and CRSP data sets, respectively. This underestimation is largely statistically significant as well. Among all the control variables, 3 deserve additional attention. Consistent with other studies (e.g., Berk and Green (2004), Chen et al. (2004)), we find a negative relation between fund size and performance. We observe a similar relation for fund family size and fund returns. Also, the female variable is negative and highly significant in all regressions irrespective of the mutual fund database.

Thus, Tables 4 and 5 report that large discrepancies in management structure records between CRSP and MP on one side and SEC and MD on the other can translate into significant differences in team management impact on fund performance. Ceteris paribus, MD data are able to provide much more support for the benefits of group decision making in the mutual fund industry.

B. The Effect of Teams on Fund Performance: Full MD Sample Evidence

Having established the accuracy of MD managerial data over the CRSP and MP databases, we now examine in detail the extent of team impact on fund performance by using our full MD sample. Note that the sample we use for the reminder of the article is larger than the one used in the CRSP, MP, and MD matching tests in Table 5, as hereafter we account for all non-matched funds in the MD database.

Table 6 reports test results on the impact of team management on our 3 measures of fund performance: α(4U), α(4C), and α(5F). We report test results with

[14]Unlike Chen et al. (2004), we do not include a load variable in our regressions because over the past decade most U.S. mutual funds are no-load funds. Also, we do not include the lagged fund alphas in the set of independent variables because of the controversy regarding the inclusion of lagged dependent variable in panel tests (e.g., Maddala and Rao (1973), Grubb and Symons (1987)). Our results do not materially change from these alterations.

TABLE 6

Effect of Team Management on Fund Performance

Table 6 reports the effect of management structure on fund performance using the Morningstar Direct U.S. domestic equity mutual fund sample from 1992 to 2010. The dependent variable contains 3 performance measures, α(4U), α(4C), and α(5F), defined in Table 2. Independent variables are various fund and manager controls as defined in Table 5. Each regression model also reports the *p*-values of coefficients and the number of observations. All regression specifications include time by investment objective fixed effects (FE) as well as fund family FE, and standard errors are clustered by fund and year. *p*-values are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

	α(4U)		α(4C)		α(5F)	
Variable	1	2	3	4	5	6
$TEAM_{i,t-1}$	0.0238*	0.0244*	0.0195	0.0202	0.0312**	0.0319**
	(0.095)	(0.081)	(0.159)	(0.140)	(0.028)	(0.022)
$FUND\_SIZE_{i,t-1}$	−0.0183***	−0.0180**	−0.0224***	−0.0218***	−0.0174**	−0.0180***
	(0.007)	(0.007)	(0.000)	(0.000)	(0.014)	(0.011)
$FUND\_AGE_{i,t-1}$	−0.0169*	−0.0149	−0.0082	−0.0067	−0.0128	−0.0122
	(0.072)	(0.129)	(0.253)	(0.376)	(0.238)	(0.257)
$FAMILY\_SIZE_{i,t-1}$	−0.0826***	−0.0832***	−0.0792***	−0.0804***	−0.0723***	−0.0725***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
$EXPENSES_{i,t-1}$	0.0447**	0.0471**	0.0350*	0.0377*	0.0493**	0.0501*
	(0.021)	(0.012)	(0.089)	(0.061)	(0.019)	(0.014)
$TURNOVER_{i,t-1}$	−0.0120	−0.0128	0.0011	0.0003	−0.0217	−0.0215
	(0.470)	(0.428)	(0.939)	(0.979)	(0.286)	(0.287)
$VOLATILITY_{i,t-1}$	−0.0147	−0.0045	0.0964	0.0972	−0.0386	−0.0382
	(0.936)	(0.938)	(0.232)	(0.229)	(0.225)	(0.531)
$FLOWS_{i,t-1}$	−0.0007	−0.0007	−0.0026	−0.0027	−0.0004	−0.0003
	(0.852)	(0.855)	(0.474)	(0.470)	(0.921)	(0.927)
$TENURE_{i,t-1}$		−0.0068		−0.0076		−0.0006
		(0.199)		(0.228)		(0.912)
$MBA_{i,t-1}$		0.0259		0.0339		0.0390*
		(0.178)		(0.143)		(0.044)
$FEMALE_{i,t-1}$		−0.0820***		−0.0674**		−0.0582**
		(0.008)		(0.046)		(0.018)
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Time × Obj. FE	Yes	Yes	Yes	Yes	Yes	Yes
Fund family FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	19,191	19,134	19,187	19,132	19,207	19,151

gross (expense-unadjusted) returns.[15] As in Table 5, all regression specifications include time by investment objective fixed effects and fund family fixed effects, and the standard errors are clustered by fund and year. Again, the variable of interest is the TEAM dummy. Our set of controls is the same as in Table 5.

In columns 1 and 2 of Table 6, the dependent variable is the unconditional 4-factor alpha. We report the results without and with fund and manager controls. The TEAM dummy comes up positive in both regressions and is significant at the 10% level. The economic impact of team management on α(4U) is 31 bps per year in column 2. In columns 3 and 4, the dependent variable is conditional alpha. The TEAM coefficient is again positive, but insignificant, in both specifications. The economic impact of team management on α(4C) after accounting for all fund and manager characteristics is 24 bps per year. Finally, in columns 5 and 6, the dependent variable is the 5-factor alpha. The importance of the TEAM coefficient in these regressions increases in both economic and statistical terms. It is now significant at the 5% level and its economic impact on returns reaches 39 bps

[15]The test results with net returns are similar to those with gross returns. These results are available from the authors.

per year. The slopes on most control variables are in line with those reported in Table 5.[16] The only exception is that the FEMALE variable is insignificant in regressions involving conditional alpha.

Next, we explore whether teams benefit all funds across different investment categories. Different funds deal with different types of information based on their investment objectives. For example, funds with an aggressive growth investment objective primarily invest in small and risky stocks with long-term capital growth potential, and therefore, they deal with "soft" information, which is difficult to verify. At the same time, funds with a growth or growth and income objective invest in large dividend-paying stocks with "hard" and verifiable information. Stein (2002) argues that single-manger structures are preferable in situations where managers are confronted with soft information that is difficult to credibly transmit. Consistent with this argument, we should expect little or no performance gains for team-managed funds in an aggressive growth objective, whereas growth (or growth and income) funds should benefit from team management.

Table 7 reports the impact of teams on fund alphas, similar to Table 6, across 3 fund investment objectives: aggressive growth, growth, and growth and equity income. Growth and income and equity income funds are combined into one category, growth and equity income, because of the small number of observations for equity income funds (only around 800). The characteristics of regression models are the same as before. In accordance with the Stein (2002) arguments, the economic importance of team management is the lowest for aggressive growth funds and highest for growth and equity income funds. The average point estimate across 3 alphas for these funds is only 21 bps per year. In contrast, the average

TABLE 7

Effect of Team Management on Fund Performance by Investment Objective

Table 7 reports the effect of management structure on fund performance using the Morningstar Direct U.S. domestic equity mutual fund sample from 1992 to 2010 across 3 investment objective categories: aggressive growth, growth, and growth and equity income (combining growth and income with equity income funds). The dependent variable contains 3 performance measures, α(4U), α(4C), and α(5F), which are the unconditional and conditional Carhart (1997) alphas, and the 5-factor alpha, respectively, defined in Table 2. The independent variable of interest is TEAM, defined in Table 5. Other independent variables are various fund and manager characteristics as in Table 5. All regression specifications include time and fund family fixed effects (FE), and standard errors are clustered by fund and year. *p*-values are in parentheses. ** and * indicate significance at the 5% and 10% levels, respectively.

	Aggressive Growth			Growth			Growth and Equity Income		
Variable	α(4U)	α(4C)	α(5F)	α(4U)	α(4C)	α(5F)	α(4U)	α(4C)	α(5F)
$TEAM_{i,t-1}$	0.0180	0.0232	0.0108	0.0214	0.0123	0.0420**	0.0476**	0.0518*	0.0408
	(0.590)	(0.449)	(0.722)	(0.261)	(0.610)	(0.029)	(0.045)	(0.086)	(0.159)
Fund and manager controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time × Obj. FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fund family FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of obs.	3,885	3,869	3,882	11,476	11,488	11,499	3,773	3,775	3,770

[16]Note that the strongest results for the TEAM dummy are obtained with manager controls, although they markedly reduce the sample size. In unreported tests, which are available from the authors, we also run regressions (3) and (6) without managerial controls but on the same samples as in those regressions and observe that point estimates on the TEAM dummy are close to those in the corresponding regressions with only fund controls. This implies that managerial controls are essential in singling out the managerial structure effect on fund performance.

estimated economic impact of team management for growth funds is 30 bps per year, whereas that for growth and equity income funds reaches almost 56 bps per year. Thus, with MD data we consistently record the outperformance of team-managed funds, especially outside the aggressive growth category.

C. Team Size and Fund Performance

Our previous analysis shows that on average team-managed funds perform better than single-managed funds, and this result holds across most fund investment objectives. A subsequent and relevant question then is: Are all teams better? That is, is there any relation between team size and fund performance? For instance, research shows that larger teams may often perform worse than small teams (see, e.g., Mueller (2012)). Although the literature has no clear answer for the optimal number of people in a group (the average varies between 5 and 10), the ideal team size should depend on the tasks performed by individuals within a group. It appears that the more diluted the tasks are, the smaller should be the optimal group size. In this respect, Mueller (2012) argues that if companies deal with various coordination and motivational issues, any group composed of 4 or more individuals will see significant increases in coordination costs within the group and diminishing motivation across members of the group. Other evidence of nonlinear benefits of team size is present in Hamilton et al. (2003), who find the largest increases in productivity of workers when they join the teams at the early stages of team formation. Therefore, we expect a nonlinear relation between fund performance and team size. Finally, in an experimental study, Laughlin et al. (2006) find that when dealing with highly intellective problems, 3-person groups are necessary and sufficient to perform better than the best individuals and that groups with more members do not add extra performance gains.

Recall from Panel D of Table 2 that team size appears to be important to fund returns and that the largest gains in risk-adjusted performance are observed among funds with 3 managers followed by those with 5 or more managers. Now we examine whether this pattern persists after controlling for the usual sets of fund and manager characteristics. Therefore, we run the following regression model:

$$\begin{aligned}(6)\quad \mathrm{PERF}_{i,t} &= c_0 + c_1 2\mathrm{FM}_{i,t} + c_2 3\mathrm{FM}_{i,t} + c_3 4\mathrm{FM}_{i,t} + c_4 5\mathrm{FM}_{i,t} \\ &\quad + \boldsymbol{\delta}_1 \mathrm{FUND\_CHAR}_{i,t-1} + \boldsymbol{\delta}_2 \mathrm{MGR\_CHAR}_{i,t-1} + \boldsymbol{\delta}_3 \mathrm{FE}_{i,t} + e_{i,t},\end{aligned}$$

where $2\mathrm{FM}_{i,t}$, $3\mathrm{FM}_{i,t}$, $4\mathrm{FM}_{i,t}$, and $5\mathrm{FM}_{i,t}$ are dummies that equal 1 if the fund has 2 managers, 3 managers, 4 managers, and 5 or more managers, respectively, at the end of the calendar year and 0 otherwise. Other variables are defined as before.

Table 8 reports the estimation results of fund management team size on α(4U), α(4C), and α(5F). Consistent with results of the simple difference tests in Panel D of Table 2, the 3- and 5-plus manager funds add the most performance gains vis-à-vis single-managed funds irrespective of the type of risk-adjusted return. Yet, partly because of the large sample size differences across team sizes (see Table 2), the strongest statistical support for the outperformance of team-managed funds is seen with 3-manager funds. In economic terms, 3-manager funds show the best performance based on α(4C) and α(5F). Larger member funds (5 or more) post the highest gains in terms of α(4U). For example, 3-manager funds add 58 bps per year to risk-adjusted returns computed from the 5-factor model. The teams

TABLE 8
Effect of Team Size on Fund Performance

Table 8 reports the effect of team size on fund performance using the Morningstar Direct U.S. domestic equity mutual fund sample from 1992 to 2010. It reports the estimates from panel regressions of fund performance on team size and other controls. The dependent variable contains 3 performance measures, α(4U), α(4C), and α(5F). α(4U) and α(4C) are the monthly risk-adjusted gross fund returns using unconditional and conditional versions of the Carhart (1997) 4-factor model, respectively, and α(5F) is the similarly computed risk-adjusted return from the 5-factor model, which adds the liquidity factor of Pastor and Stambaugh (2003) to the Carhart model. 2FM is a dummy variable that equals 1 if the fund has 2 fund managers at the end of the calendar year, and 0 otherwise. 3FM is a dummy variable that equals 1 if the fund has 3 fund managers at the end of the calendar year, and z0 otherwise. 4FM is a dummy variable that equals 1 if the fund has 4 fund managers at the end of the calendar year, and 0 otherwise. 5+FM is a dummy variable that equals 1 if the fund has 5 or more fund managers at the end of the calendar year, and 0 otherwise. Other independent variables are various fund and manager controls as in Table 5. All regression specifications include time by investment objective fixed effects (FE) and fund family FE, and the standard errors are clustered by fund and year. *p*-values are in parentheses. *** and * indicate significance at the 1% and 10% levels, respectively.

	α(4U)		α(4C)		α(5F)	
Variable	1	2	3	4	5	6
$2FM_{i,t-1}$	0.0203	0.0202	0.0100	0.0099	0.0267*	0.0268*
	(0.175)	(0.180)	(0.397)	(0.391)	(0.094)	(0.091)
$3FM_{i,t-1}$	0.0321	0.0334*	0.0316	0.0328	0.0473***	0.0483***
	(0.110)	(0.089)	(0.153)	(0.140)	(0.002)	(0.001)
$4FM_{i,t-1}$	0.0121	0.0135	0.0198	0.0211	0.0197	0.0210
	(0.667)	(0.620)	(0.363)	(0.306)	(0.477)	(0.444)
$5+FM_{i,t-1}$	0.0414	0.0429	0.0234	0.0234	0.0467*	0.0471*
	(0.164)	(0.145)	(0.364)	(0.357)	(0.090)	(0.086)
Fund controls	Yes	Yes	Yes	Yes	Yes	Yes
Manager controls		Yes		Yes		Yes
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Time × Obj. FE	Yes	Yes	Yes	Yes	Yes	Yes
Fund family FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	18,927	18,872	18,923	18,870	18,914	18,890

with 2 and especially 4 managers add generally less performance gains relative to single-managed funds, irrespective of regression specification. However, the economic value of team management for funds managed by 2 and managers is still sizable.

Thus, Table 8 reports that team size is nonlinearly related to fund performance. Intuitively, the number of team members determines the trade-off between the larger knowledge base of more people and the coordination costs among multiple individuals, as indicated by Mueller (2012) and others. This result is also consistent with Hamilton et al. (2003) and Laughlin et al. (2006). Each group member brings his or her specific skills and talents, but large cohorts of people with various views on the subject may reduce productivity because of greater difficulty of arriving at unanimous conclusions.

V. Mutual Fund Holdings, Managerial Structure, and Performance

In this section, we examine the nature of portfolio holdings of team-managed funds. To achieve this, we use Morningstar portfolio holding data from 1992 to 2010. We are able to collect portfolio holding data for 3,172 funds with 31,351 fund-year observations. These data contain the number of total holdings (long and short); percentage of stocks, bonds, preferred and convertible securities held, and cash; and the percentage of stocks held in sectors. We trim the data at the 99% level and account only for holdings that do not exceed 100%.

A. Fund Holdings and Managerial Structure

On average, single-managed and 2-manager funds hold 98 securities. The number of securities increases to 103 for 3-manager funds and an average of 163 for funds with 5 or more managers. This trend seems intuitive as larger teams are able to collect and process information on a more extensive set of financial assets. However, to properly determine the incremental effect of team management on portfolio holdings, we need to control for only relevant fund characteristics and fixed effects. The control variables are fund size, fund age, and fund family size. Also, in the regressions, we account for time by investment objective fixed effects and the standard errors are clustered by fund and year. Our test results are in Table 9. Panel A reports the estimations, where the dependent variable is the

TABLE 9
Fund Holdings and Managerial Structure

Table 9 reports the effect of management structure on fund holdings using the Morningstar holdings data of U.S. domestic equity mutual funds from 1992 to 2010. Panel A reports the estimates from panel regressions of the natural log of the number of fund holdings on management structure. Panel B reports the estimates from panel regressions of the natural log of the fund long and short stock holdings on management structure and fund and manager controls. The independent variable of interest is TEAM or the number of managers as defined in Tables 5 and 8. Other independent variables are 3 fund characteristics: FUND SIZE, FUND_AGE, and FAMILY_SIZE. All regressions include time by investment objective fixed effects (FE), and standard errors are clustered by fund and year. *p*-values are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Number of Fund Holdings

Variable	1	2	3	4
$TEAM_{i,t-1}$	0.0560***	0.0303		
	(0.009)	(0.120)		
$2FM_{i,t-1}$			−0.0029	−0.0177
			(0.900)	(0.386)
$3FM_{i,t-1}$			0.0112	−0.0027
			(0.730)	(0.921)
$4FM_{i,t-1}$			0.1543***	0.0870**
			(0.000)	(0.017)
$5+ FM_{i,t-1}$			0.2763***	0.2094***
			(0.000)	(0.000)
Fund controls		Yes		Yes
Constant	Yes	Yes	Yes	Yes
Time × Obj. FE	Yes	Yes	Yes	Yes
No. of obs.	25,042	22,846	22,378	22,081

Panel B. Percent of Stock Holdings

	Long Stock Holdings		Short Stock Holdings	
Variable	1	2	3	4
$TEAM_{i,t-1}$	0.0080		0.0010	
	(0.354)		(0.860)	
$2FM_{i,t-1}$		0.0180**		−0.0068*
		(0.017)		(0.077)
$3FM_{i,t-1}$		−0.0148		0.0322*
		(0.335)		(0.055)
$4FM_{i,t-1}$		0.0243		−0.0095
		(0.106)		(0.190)
$5+ FM_{i,t-1}$		0.0014		−0.0145***
		(0.947)		(0.010)
Fund controls	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes
Time × Obj. FE	Yes	Yes	Yes	Yes
No. of obs.	22,733	21,964	23,071	22,296

natural log of the number of fund holdings. We observe that without controls (column 1), the TEAM coefficient is positive and significant at the 1% level. After accounting for fund characteristics in column 2, the TEAM coefficient decreases and loses its statistical significance. In the last 2 columns of Panel A, we replace the TEAM dummy with the number of managers. Without fund controls, we find no significant contribution of teams to the number of holdings for 2- and 3-manager funds. Only funds with 4 and 5 or more managers have significantly larger number of securities in their portfolios. The addition of fund controls, once again, lowers the incremental positive impact of team-managed funds on the average number of holdings. However, even in this specification, larger teams of 4 and 5 or more members are able to operate with a significantly larger number of various holdings than single-managed funds.

In Panel B of Table 9, we examine the relation between stock holdings and managerial structure. This is motivated by the fact that in our study we deal exclusively with equity mutual funds and that among various holdings data stock holdings are represented the most comprehensively. We look at both long stock holdings (columns 1 and 2) and short stock holdings (columns 3 and 4). All control variables and regression specifications are similar to those in Panel A. From the first 2 regressions, we conclude that 2-manager funds invest significantly more in long equities than do single-managed funds and 3-manager funds. A more interesting outcome is observed with short stock holdings. Three-manager funds have a significantly larger fraction of their holdings invested in short-equity positions than do funds with all other managerial structures. This result, taken together with our earlier finding on the highest outperformance of 3-manager funds, is consistent with Engelberg et al. (2012) who show that short sellers are skilled at information processing.

Kacperczyk et al. (2004) show that funds with more concentrated portfolio holdings outperform their counterparts with more diversified investments. If team-managed funds outperform single-managed funds because they possess a better knowledge set and superior skills for managing investments, systematic differences should be evident in portfolio concentrations across funds with different managerial structures. We address this point in Table 10. Panel A reports the median portfolio concentration (in percent) for each of the top 5 sectoral holdings classified by Morningstar (communication services, consumer defensives, industrials, health care, and consumer cyclicals) for single-managed funds, team-managed funds, and funds with various team sizes. For each sector, we also report the results of the nonparametric equality-of-medians χ^2 test between team-managed and single-managed funds. Most important, from Panel A, is that team-based funds have significantly higher median holdings for the top sectors, especially communication services and consumer defensives. For these 2 sectors, team-managed funds post higher holdings than do single-managed funds irrespective of team size.

It is still possible that part of the evidence presented in Panel A of Table 10 is linked not so much to the managerial structure but to some fund characteristics. To account for this possibility, Panel B reports regressions of the natural log of holdings in each of the top 5 sectors on TEAM and fund controls, which again include fund size, fund age, and fund family size. Other specifications are

TABLE 10

Portfolio Concentration and Managerial Structure

Table 10 reports the effect of management structure on fund portfolio concentration (in percent) in the top 5 sectors (out of 11) using the Morningstar holdings data of U.S. domestic equity mutual funds from 1992 to 2010. The top 5 sectoral holdings are: communication services (Communications), consumer defensives (Defensives), industrials, healthcare, and consumer cyclicals (Cyclicals). Panel A reports the median portfolio concentration for different sectors and managerial structures. SINGLE and TEAM denote single- and team-managed funds, respectively. 2FM, 3FM, 4FM, and 5+FM denote various team sizes as defined in Table 8. Table 10 also reports the difference in the median χ^2 test in holding concentrations between team- and single-managed funds, Diff (T – S), with the corresponding *p*-value. Panel B reports regression estimations of the log of holdings in each sector on the TEAM dummy variable and fund controls: FUND SIZE, FUND_AGE, and FAMILY_SIZE. All regression specifications include time by investment objective fixed effects (FE), and standard errors are clustered by fund and year. *p*-values are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Variable	Communications	Defensives	Industrials	Healthcare	Cyclicals
Panel A. Median Portfolio Concentration in the Top 5 Sectors					
SINGLE	13.48	11.50	10.84	8.41	8.27
2FM	14.18	11.98	11.11	8.55	8.33
3FM	13.57	11.96	10.63	8.78	8.24
4FM	14.85	11.78	11.29	8.57	7.38
5+FM	14.98	11.57	11.06	8.61	7.43
TEAM	14.23	11.86	11.02	8.59	8.00
Diff (T – S)	0.75***	0.36***	0.18*	0.18***	–0.27***
p-value	0.000	0.000	0.056	0.007	0.000
Panel B. Team Impact on Portfolio Holdings in the Top 5 Sectors					
$TEAM_{i,t-1}$	0.0515**	0.0377**	–0.0005	0.0363**	0.0013
	(0.016)	(0.044)	(0.978)	(0.023)	(0.949)
Fund controls	Yes	Yes	Yes	Yes	Yes
Constant	Yes	Yes	Yes	Yes	Yes
Time × Obj. FE	Yes	Yes	Yes	Yes	Yes
No. of obs.	23,081	23,073	23,084	23,081	23,076

the same as before. We observe that despite accounting for fund characteristics, time by investment objective fixed effects, the coefficient on TEAM is positive in all 5 regressions. Moreover, it is positive and significant at least at the 5% level in 3 estimations. Again, as in Panel A, the largest economic value of the TEAM coefficient is observed for the top sector, communication services. Therefore, our findings in Table 10 report that the outperforming team-managed funds hold more concentrated portfolios and some of those funds also take significantly larger short-selling positions than single-managed funds.

VI. Team Management, Risk Taking, and Alternative Performance Measures

A. Team Management and Risk Taking

In this subsection, we examine whether systematic differences exist in risk taking and other fund characteristics that can be distinctly attributed to group decision making in the mutual fund industry. The literature is unclear about the impact of team management on risk taking. Some studies, such as Wallach and Kogan (1965), Stoner (1968), Sunstein (2002), and others, find that groups could act more aggressively and undertake more risk. Other studies, however, such as Sah and Stiglitz (1986), (1991), Sharpe (1981), Barry and Starks (1984), and Adams and Ferreira (2010), provide theoretical and some empirical evidence that groups may reduce risk. We investigate the impact of team-based management on risk

taking using the following model:

$$\text{RISK}_{i,t} = d_0 + d_1\text{TEAM}_{i,t-1} + \boldsymbol{\delta}_1\text{FUND\_CHAR}_{i,t-1} + \boldsymbol{\delta}_2\text{MGR\_CHAR}_{i,t-1} + \boldsymbol{\delta}_3\text{FE}_{i,t} + e_{i,t}, \tag{7}$$

where $\text{RISK}_{i,t}$ is one of fund i's risk measures at time t. Our risk measures include the total volatility of the fund and the set of risk factor benchmarks from the Carhart (1997) model. They include market beta; the loadings on size, book-to-market, and momentum portfolios; and the idiosyncratic residual volatility from this model.

Table 11 reports the results of the estimation of the impact of team management on various risk measures based on the standard Carhart (1997) model. Each regression specification includes a full set of fund and manager controls with the exception of fund family size and net flows. Overall, we find the risk-taking behavior of team-managed funds is not different from single-managed funds by a large margin. Teams do not increase funds' exposure to any proxy for systematic risk factors embedded in the Carhart model, including market risk and total risk. On the contrary, the last column of the table reports that team-managed funds post substantially lower idiosyncratic risk, $\sigma(e)$, than do their single-managed peers. This difference is statistically significant at the 1% level.

TABLE 11
Effect of Teams on Risk-Taking Behavior

Table 11 reports the effect of management structure on the risk-taking behavior of mutual funds using the Morningstar Direct U.S. domestic equity mutual fund sample from 1992 to 2010. The table reports estimates from panel regressions of fund risk taking on Team (Panel A), team sizes (Panel B), and other controls. The dependent variable includes different measures of risks. TOTAL_RISK is defined as the natural log of standard deviation of monthly gross fund returns over the past 12 months. β, SMB, HML, and MOM are the coefficients on market, size, book-to-market ratio, and momentum portfolios based on the Carhart (1997) 4-factor model. $\sigma(e)$ is the natural log of the standard deviation of the fund's residual return from the Carhart model. The independent variable of interest is TEAM or the number of managers as defined in Tables 4 and 7. Other independent variables are fund and manager characteristics as controls as defined in Table 6. All regression specifications include time by investment objective fixed effects (FE) and fund family FE, and standard errors are clustered by fund and year. *p*-values are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

		Unconditional Carhart Model				
Variable	TOTAL_RISK	β	SMB	HML	MOM	$\sigma(e)$
$\text{TEAM}_{i,t-1}$	−0.0145	−0.0090	−0.0013	0.0100	0.0023	−0.0403***
	(0.162)	(0.370)	(0.899)	(0.459)	(0.734)	(0.004)
$\text{FUND\_SIZE}_{i,t-1}$	0.0128***	0.0072*	0.0039	−0.0046	−0.0007	−0.0063
	(0.004)	(0.057)	(0.424)	(0.482)	(0.751)	(0.150)
$\text{FUND\_AGE}_{i,t-1}$	−0.0223**	−0.0039	−0.0116*	−0.0345***	0.0122***	−0.0231*
	(0.017)	(0.522)	(0.095)	(0.001)	(0.001)	(0.019)
$\text{EXPENSES}_{i,t-1}$	0.0602***	0.0063	0.1266***	−0.0336*	0.0195**	0.1664***
	(0.002)	(0.511)	(0.000)	(0.054)	(0.015)	(0.000)
$\text{TURNOVER}_{i,t-1}$	0.0397***	0.0207***	0.0646***	−0.0327***	0.0418***	0.0403***
	(0.001)	(0.005)	(0.000)	(0.001)	(0.000)	(0.000)
$\text{TENURE}_{i,t-1}$	−0.0032	−0.0025	0.0067	0.0200***	0.0020	0.0214**
	(0.670)	(0.568)	(0.265)	(0.009)	(0.532)	(0.021)
$\text{MBA}_{i,t-1}$	−0.0166	−0.0227*	−0.0133	0.0257	−0.0122	−0.0276
	(0.375)	(0.085)	(0.380)	(0.117)	(0.221)	(0.287)
$\text{FEMALE}_{i,t-1}$	−0.0280	−0.0173	−0.0165	0.0424	0.0243	−0.1198***
	(0.242)	(0.273)	(0.492)	(0.120)	(0.171)	(0.000)
Constant	Yes	Yes	Yes	Yes	Yes	Yes
Time × Obj. FE	Yes	Yes	Yes	Yes	Yes	Yes
Fund family FE	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	20,964	19,701	19,701	19,701	19,701	19,701

B. Alternative Performance Measures and Team Management

In this subsection, we examine whether our main results on the positive role of team management for mutual fund returns hold against alternative performance evaluation benchmarks. Table 12 reports the test results. We present the results for the full fund sample (All Funds) and the sample without aggressive growth funds (GGE Funds). As before, each regression includes fund and manager controls, time by investment objective fixed effects, and fund family fixed effects, and the standard errors are clustered by fund and year. We also note that we do not trim any of our alternative performance metrics.

Panel A of Table 12 reports the estimation outcome for our 3 risk-adjusted returns computed based on the 36-month window rather than the 12-month window. These are 36-month unconditional and conditional Carhart (1997) alphas,

TABLE 12

Effect of Team Management on Fund Performance with Alternative Performance Measures

Table 12 reports the effect of team size on fund performance using the Morningstar Direct U.S. domestic equity mutual fund sample from 1992 to 2010 for alternative performance benchmarks. The sample of GGE Funds includes growth, growth and income, and equity income categories, but excludes aggressive growth funds. Panel A reports the results for 36-month alphas computed based on the unconditional Carhart (1997) model, α(4U-36); conditional Carhart model, α(4C-36); and the 5-factor model with liquidity risk, α(5F-36), which includes the liquidity factor of Pastor and Stambaugh (2003) added to the Carhart model. Panel B reports the team impact on fund performance for 3 holdings-based performance measures. Return Gap is the measure in Kacperczyk et al. (2008), and Characteristic Selectivity and Characteristic Timing are the measures in Daniel et al. (1997). The independent variable of interest is TEAM as defined in Table 5. The controls are fund and manager controls also defined in Table 5. All regression specifications include time by investment objective fixed effects and fund family fixed effects, and standard errors are clustered by fund and year. Panel C reports the calendar time approach (CTA) estimation of 3 fund alphas. *p*-values are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% levels, respectively.

Panel A. 36-Month Return-Based Performance Measures

	α(4U-36)		α(4C-36)		α(5F-36)	
Variable	All Funds	GGE Funds	All Funds	GGE Funds	All Funds	GGE Funds
$TEAM_{i,t-1}$	0.0204*	0.0236*	0.0189	0.0271**	0.0238**	0.0276**
	(0.095)	(0.081)	(0.120)	(0.044)	(0.039)	(0.037)
Constant and controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	16,816	13,364	16,816	13,364	16,816	13,364

Panel B. Portfolio Holdings-Based Performance Measures

	Return Gap		Characteristic Selectivity		Characteristic Timing	
Variable	All Funds	GGE Funds	All Funds	GGE Funds	All Funds	GGE Funds
$TEAM_{i,t-1}$	0.0820**	0.0781**	0.0428	0.0603	−0.0092	−0.0027
	(0.022)	(0.050)	(0.463)	(0.348)	(0.721)	(0.926)
Constant and controls	Yes	Yes	Yes	Yes	Yes	Yes
Fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
No. of obs.	19,512	15,494	13,720	10,705	13,429	10,477

Panel C. Calendar Time Approach

	α(4U-CTA)		α(4C-CTA)		α(5F-CTA)	
Variable	All Funds	GGE Funds	All Funds	GGE Funds	All Funds	GGE Funds
α(Team)	0.0221***	0.0258***	0.0197***	0.0230***	0.0222***	0.0254***
	(0.006)	(0.004)	(0.002)	(0.002)	(0.007)	(0.006)
α(Single)	0.0140***	0.0171***	0.0131***	0.0156***	0.0138***	0.0166***
	(0.004)	(0.003)	(0.003)	(0.002)	(0.005)	(0.004)
α(Team–Single)	0.0081*	0.0087*	0.0066**	0.0074**	0.0084*	0.0088*
	(0.055)	(0.056)	(0.042)	(0.037)	(0.053)	(0.060)
No. of obs.	216	216	216	216	216	216

α(4U-36) and α(4C-36), respectively, as well as the 5-factor alpha, α(5F-36).[17] Each such risk-adjusted return is computed every year ending in December using the data from the previous 36 months. Funds with fewer than 36 months of observations are omitted from these estimations. All controls are the same as before. The TEAM dummy is again positive and statistically significant at least at the 10% level across all 6 regressions. Even though the point estimates of the TEAM dummy, expectedly, are lower than those in Table 6, they still imply that the average contribution of team management to the risk-adjusted fund performance is more than 25 bps per year.

Panel B of Table 12 reports the effect of team management on fund performance using 3 holdings-based performance measures. The first measure is the return gap of Kacperczyk et al. (2008). The second and third measures are characteristic selectivity (CS) and characteristic timing (CT) of Daniel et al. (1997). As in Table 9, for each of the 3 new performance measures, we provide results for the full fund sample and for the sample without aggressive growth funds, as well as results with team size conducted on the full sample. All fund and manager controls are included in each regression, but their estimates are not reported.

The first estimation set (columns 1 and 2 in Panel B of Table 12) report the return gap. We can see that the coefficient on TEAM is large and significant at the 5% level. In economic terms, the contribution of team management to fund returns exceeds 98 bps per year for the whole sample of funds and 94 bps for the sample that excludes aggressive growth funds. The second estimation set (columns 3 and 4) reports that the CS measure behaves qualitatively similar to our 12-month risk-adjusted returns in Table 8. For the full sample of funds in column 3, the TEAM coefficient adds 51 bps per year to fund performance. The exclusion of aggressive growth funds spurs the TEAM coefficient to 73 bps in annual terms. Finally, the last estimate set (columns 5 and 6) reports the CT measure. We can see that team-managed funds do not have any better timing ability than their single-managed counterparts. This result is consistent with the general evidence in the profession that successful funds beat the benchmarks not because of their superior timing skills but because of their better security selection ability (e.g., see Daniel et al. (1997), Kacperczyk and Seru (2007)).

Finally, Panel C of Table 12 reports the difference between team- and single-managed funds using the calendar time approach (e.g., see Fama (1998)). Each month of the sample we aggregate the returns of funds into 2 portfolios, team managed and single managed, based on the managerial structure information of funds at the end of December of the previous calendar year. This yields 2 time series of portfolio fund returns with 216 observations each. Then we obtain the average fund alphas for each of the 2 samples of funds by using our 3 fund performance models: unconditional and conditional Carhart (1997) models and the

[17] This methodology has its pros and cons. Long estimation windows produce more reliable measures of risk-adjusted performance. However, the disadvantage is that now the contribution of team management to fund returns cannot be properly decoupled from the fund's past returns. The management structure of a fund changes from year to year, so with a longer estimation window (more than 1 year), we run the risk of incorrectly attributing the previous year's performance to the current fund manager(s). Therefore, ceteris paribus, one could expect lower point estimates for the TEAM coefficient in tests with 36-month alphas than in those with 12-month alphas.

5-factor model. This method is robust to the presence of cross-sectional dependence in fund returns, but its biggest drawback is the difficulty in controlling for fund and manager characteristics. Our results reveal that fund alphas are positive and significant for both team-managed and single-managed funds across all 3 performance evaluation benchmarks. Importantly, even without accounting for any fund and manager controls, we observe that point estimates of alphas of team-managed funds are significantly larger than those of their single-managed counterparts. In addition, this difference is slightly larger for funds outside the aggressive growth category. Thus, Table 12 illustrates once again that teams provide substantial performance gains to mutual funds.

VII. Conclusions

In this article, we revisit the question regarding the benefits of group decision making and team management as a form of organization. Using detailed managerial-level data from mutual funds allows us to directly observe any differences in aspects of performance and other characteristics between single- and team-managed funds. However, prior research has largely relied on CRSP and MP, and the prevailing conclusion has been that on average multiple-manager funds perform no better, if not worse, than single-manager funds.

We use mutual fund data from MD, which has a 96% match with SEC records, and show that large discrepancies exist in managerial structure reporting between this database and both CRSP and MP. This misspecification leads to a substantial underestimation (about 40–50 bps per year) of team-managed fund returns in studies based on CRSP and MP data. Using the MD database and various performance evaluation models, we provide compelling evidence that team management has a positive impact on mutual fund returns, especially outside the aggressive growth category, where the gain from collective decision making exceeds 55 bps per year. In these tests, we control for a wide range of fund-level and manager-specific characteristics.

We further show that the relation between team size and fund performance is nonlinear. Funds appear to benefit the most from teams of 3 portfolio managers. This may indicate the potential trade-off between the benefits of collective wisdom and increasing coordination costs in large groups. Larger teams of 5 or more managers are successful as well, but they comprise a substantially smaller sample, and investment responsibilities among multiple portfolio managers could also be concentrated among only few members.

Finally, team-managed funds hold more securities, but they also have more concentrated portfolios than single-managed funds. The 3-manager funds, in addition, take larger short stock positions than funds with all other managerial structures. The holdings-based performance measures reveal that the outperformance of team-managed funds in general is driven not by their market-timing ability but by their better stock-selection skills. Despite their outperformance, team-managed funds are not exposed to any more risk than their single-managed peers; they even post lower idiosyncratic return volatility. Our findings, therefore, offer a possible explanation as to why team management has become so popular in the fund

industry in the last decades but its performance benefits remained undetected for a long time in the academic literature.

Appendix. Managerial Structure Differences among CRSP, MP, and MB Databases

1. Management Structure Differences between CRSP and MD

In Table A1, we report the full extent of misspecification in the management structure between CRSP and MD data sets for each year in our matched sample. Column 2 reports the number of matched funds. The overlap in funds between the 2 databases is large in each year of our sample, roughly following the same trend as the overall number of funds in our sample reported in Table 2. Columns 3 and 4 report the percentage of single-managed funds in CRSP and MD databases, respectively. We can observe that for the 1990s, especially at the beginning of this period, CRSP reports much more single-managed funds than does MD. Columns 5–10 report misspecification statistics. Columns 5 and 6 report, respectively, the number of funds and their proportion identified as single-managed funds in CRSP but team-managed funds in MD. Columns 7 and 8 report, respectively, the number and proportion of funds recorded as single-managed funds in CRSP but team-managed funds in MD. Finally, columns 9 and 10 report the total number and proportion of misspecified funds between the 2 matched databases, respectively.

Columns 5–10 of Table A1 reveal that the largest misspecification in managerial structure reporting between the 2 databases occurs in the early part of the sample. The total misspecification is higher than 20% of the matched sample for most of the 1990s. However, even in the 2000s, when both CRSP and MD report about the same proportion of single- and team-managed funds (see columns 4 and 6), there is still significant misreporting in fund management structure, which never goes below 10% of the sample. The average misspecification over the whole sample period is almost 20%. Taking into account the fact that we were not able to match about 16% of the MD sample with the CRSP database, the actual misspecification in the reports on the number of managers between the 2 databases is in excess of 20% during the last 2 decades. The range of misspecification in CRSP is 17% to 29% for single-managed funds and 6% to 23% for team-managed funds. Thus, Table A1 illustrates that the extent of differences in management structure reporting between CRSP and MD databases is very large and persistent and is likely to have a direct impact on studies using CRSP data.

2. Management Structure Differences between MP and MD

Table A2 reports the full extent of misspecification in management structure between MP and MD data sets for each year in our matched sample. Column 2 reports the number of matched funds. Columns 3 and 4 report the percentage of single-managed funds in the MP and MD databases, respectively. Similar to CRSP, and again especially at the beginning of the sample period, MP reports much more single-managed funds than does MD. Columns 5–10 report misspecification statistics. Columns 5 and 6 report, respectively, the number of funds and their proportion identified as single-managed funds in MP but team-managed funds in MD. Columns 7 and 8 report, respectively, the number and proportion of funds recorded as single-managed funds in MP but team-managed funds in MD. Finally, columns 9 and 10 report the total number and proportion of misspecified funds between the 2 matched databases, respectively.

Columns 5–10 of Table A2 reveal that the largest misspecification in managerial structure reporting between the 2 databases occurs, as in Table A1, in the early part of the sample. The range of misspecification in MP is 1.3% to 25.5% for single-managed

TABLE A1

Misspecification in Management Structure between CRSP and MD

Table A1 describes the nature and extent of misspecification in the management structure of U.S. domestic equity mutual funds from 1992 to 2010. The sample for each year is matched between Center for Research in Security Prices (CRSP) and Morningstar Direct (MD) mutual fund databases. Columns 3 and 4 report the percentage of mutual funds classified as reporting 1 manager (Single) in CRSP and MD databases by year, respectively. The unit of observation is a fund, not a fund share class. Columns 5–10 report the extent of management structure misspecification in the matched sample by year. Column 5 reports the number of funds classified as single managed in CRSP but team managed in MD in the same calendar year. Column 6 reports these misspecified funds as a percentage of all funds classified as single managed in CRSP. Similarly, column 7 reports the number of funds identified as team managed in CRSP but single managed in MD. Column 8 reports these misspecified funds as a percentage of all funds classified as team managed in CRSP. Columns 9 and 10 report the total number of misspecified funds and express it as a percentage of total matched sample each year, respectively.

				Misspecification					
		% Single Managed		Single (CRSP) – Team (MD)		Team (CRSP) – Single (MD)			
Year	No. of Matched Funds	CRSP	MD	No. of Funds	% Single (CRSP)	No. of Funds	% Team (CRSP)	No. of Misspecified Funds	% Matched Sample
1992	582	80.8	67.9	89	18.9	14	12.5	103	17.7
1993	720	81.9	64.6	147	24.9	22	16.9	169	23.5
1994	835	79.6	63.4	176	26.5	40	23.5	216	25.9
1995	946	78.2	61.4	196	26.5	37	18.0	233	24.6
1996	1,040	69.0	58.2	173	24.1	60	18.6	233	22.4
1997	1,238	63.3	56.5	166	21.2	83	18.2	249	20.1
1998	1,560	60.9	54.2	222	23.4	117	19.2	339	21.7
1999	1,668	54.0	50.8	177	19.6	124	16.2	301	18.1
2000	1,678	52.3	48.6	197	22.5	136	17.0	333	19.9
2001	1,798	50.2	47.9	183	20.3	143	16.0	326	18.1
2002	1,864	47.6	46.5	190	21.4	169	17.3	359	19.3
2003	1,933	42.4	44.3	145	17.7	181	16.3	326	16.9
2004	1,940	33.0	40.2	116	18.1	255	19.6	371	19.1
2005	2,015	33.2	35.3	184	27.5	227	16.9	411	20.4
2006	2,068	33.7	33.5	203	29.1	198	14.4	401	19.4
2007	2,129	31.4	31.8	122	18.3	130	8.9	252	11.8
2008	2,110	30.2	32.7	122	19.2	174	11.8	296	14.0
2009	1,928	30.4	31.6	116	19.8	140	10.4	256	13.3
2010	1,866	31.0	29.8	105	18.2	83	6.4	188	10.1

TABLE A2

Misspecification in Management Structure between MP and MD

Table A2 describes the nature and extent of misspecification in the management structure of U.S. domestic equity mutual funds from 1993 to 2010 based on the Morningstar Principia (MP) data sample. The sample for each year is matched between MP and Morningstar Direct (MD) mutual fund databases (column 2). Columns 3 and 4 report the percentage of mutual funds classified as reporting 1 manager (Single) in the MP and MD databases by year, respectively. The unit of observation is a fund, not a fund share class. Columns 5–10 report the extent of management structure misspecification in the matched sample by year. Column 5 reports the number of funds classified as single managed in MP but team managed in MD in the same calendar year. Column 6 reports these misspecified funds as a percentage of all funds classified as single managed in MP. Similarly, column 7 reports the number of funds identified as team managed in MP but single managed in MD. Column 8 reports these misspecified funds as a percentage of all funds classified as team managed in MP. Columns 9 and 10 report the total number of misspecified funds and express it as a percentage of total matched sample each year, respectively.

				Misspecification					
		% Single Managed		Single (MP) – Team (MD)		Team (MP) – Single (MD)			
Year	No. of Matched Funds	MP	MD	No. of Funds	% Single (MP)	No. of Funds	% Team (MP)	No. of Misspecified Funds	% Matched Sample
1993	520	82.5	68.7	79	18.4	7	7.7	86	16.5
1994	645	80.6	66.7	105	20.2	15	12.0	120	18.6
1995	740	80.3	66.6	118	19.9	17	11.6	135	18.2
1996	896	68.8	57.8	157	25.5	59	21.1	216	24.1
1997	1,081	57.7	56.5	79	12.7	66	14.4	145	13.4
1998	1,316	55.0	54.6	93	12.8	87	14.7	180	13.7
1999	1,432	49.4	51.4	78	11.0	106	14.6	184	12.8
2000	1,359	49.5	49.6	145	21.5	146	21.3	291	21.4
2001	1,675	47.0	47.2	115	14.6	119	13.4	234	14.0
2002	1,665	47.9	45.5	140	17.5	99	11.4	239	14.4
2003	1,723	43.8	43.7	121	16.0	119	12.3	240	13.9
2004	1,788	42.8	40.2	143	18.7	95	9.3	238	13.3
2005	1,916	37.2	35.4	119	16.7	85	7.1	204	10.6
2006	1,961	34.7	33.6	60	8.8	38	3.0	98	5.0
2007	2,067	32.7	32.0	36	5.3	22	1.6	58	2.8
2008	2,074	32.3	32.1	31	4.6	27	1.9	58	2.8
2009	1,873	32.0	31.6	23	3.8	15	1.2	38	2.0
2010	1,804	29.3	29.3	7	1.3	7	0.5	14	0.8

funds and 0.5% to 21.3% for team-managed funds. The total misspecification for MP is on average around 12%, but this relatively lower than CRSP average inaccuracy is achieved only with the post-2006 data. This means that MP data are only about 40% more accurate than CRSP data in reporting the general fund management structure. Thus, Tables A1 and A2 indicate that gross misreporting in managerial structure of mutual funds is not a unique problem of the CRSP data set but also of the MP data.

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