

Summer Research 2016: Risk Levels and Performance of Mutual Funds: The Effect of Gender and Managerial Structure

Jitka Hilliard¹ and Yanfei Sun¹

¹Auburn University

June 7, 2018

Background

We investigate the importance of managerial structure on mutual fund metrics. More specifically, using solo- and team- managed funds, we examine the role of gender on return performance and risk levels. The motivation for our study comes from the literature on gender related differences in risk taking behavior, investment strategies, and financial decision making. This paper relates to the summer research paper of finance Ph.D. student Yanfei Sun who examined the effect of management structure and team size on the performance of mutual funds (Hilliard and Sun, 2016). In the following paragraphs we give a brief overview of current research in finance and psychology and develop our hypothesis. At the end of 2015, the assets under management in the mutual fund industry reached almost 16 trillion dollars (2016 Investment Company Fact Book). Large amount of these assets are managed by funds with active management. Managers of these funds make decisions about asset allocation and security selections. The results of these decisions are reflected in fund performance. Before 2000, the majority of actively managed mutual funds were managed by solo-managers. In recent years more and more funds have shifted toward a team-managed structure. In fact, in the first quarter of 2016 more than 77 percent of actively managed funds were team-managed funds accounting for more than 80 percent of assets under management. One may argue that the team-managed funds are more suitable for large funds but funds size does not seem to be the most important determinant of management structure. The average fund size of the solo-managed funds is higher than the average fund size of funds with up to five managers. Solo-managed funds and team managed funds seem to differ in their realized returns as well as in their risk levels. A large body of literature has been devoted to the study of mutual fund performance with different managerial structures. However, empirical evidence on the benefits of team-managed funds is not conclusive. Some researchers argue that team-managed funds perform better because of their ability to better aggregate and evaluate information. This view is consistent with research on small groups indicating that group performance is quantitatively and qualitatively superior to the performance of an individual. Teams benefit from broader knowledge resources as well as from mutual correction of errors introduced by individual members. (Sharpe 1981, Shaw 1932). Studies confirming better performance of team-managed funds include, for example, those of Patel and Sarkissian (2016) and Adams, Nishikawa, and Rao (2015). There is some evidence that team decisions reflect a compromise among the opinions of all members (Sah and Stiglitz 1984) and are less extreme than decisions of individual members (Bar, Kempf, and Ruenzi 2010). Therefore solo- and team-managed funds may differ not only in their absolute performance but also in their level of risk. Some empirical evidence is provided, for example by Bliss, Potter, and Schwarz (2008) and Patel and Sarkissian (2016). There are other well documented theories. For example, the group shift hypothesis (Moscovici and Zavalloni 1969, Hogg, Turner, and Davidson 1990, Kerr 1992) suggests that the opinion of members of the team shifts toward the opinion of the dominant member. This makes the final decision of the team identical to the decision of the dominant person. Consistent

with this view, Prather, Middleton, and Cusack (2001) find no difference between the outcomes of team- and solo-managed funds. Yet others argue that team-managed funds may suffer from a free rider problem. The performance of an individual in a team-managed fund cannot be separately observed and therefore a team member may become a free-rider. This may lead to the underperformance of the team-managed funds as empirically documented by Chen et al. (2004), Massa, Reuter, and Zitzewitz (2010), Stein (2002), Goldman, Sun, and Zhou (2016), and (Bar, Kempf, and Ruenzi (2010)). The empirical evidence on gender-related differences between the investment strategies of males and females points to higher risk aversion in women (Powell and Ansic 1997). Women tend to exhibit lower confidence about their investment decisions than men (Estes and Hosseini 1988, Barber and Odean 2001). Contrary to this view, Atkinson, Baird and Frye (2003) do not find any significant differences in performance or risk-levels between male and female managers of taxable fixed income mutual funds. They conclude that differences in investment behavior that are attributed to gender may be related to other constraints such as investment knowledge and wealth. Yet another study of actively managed funds finds that female fund managers take less risk than male managers (Niessen-Ruenzi and Ruenzi 2015). Other studies that directly link to our proposed study are studies on corporate board gender diversity. These studies suggest that presence of females on the board may have a positive effect on firm value (e.g., Carter, Simkins and Simpson 2003, Adams and Funk 2012, Berger, Kick and Schaeck 2014). Contrary to the generally accepted view of higher risk aversion in females, the presence of a female on the board does not necessary translate to more risk-averse corporate decisions (Adams and Funk 2012, Berger, Kick and Schaeck 2014). Psychological literature also suggests that males and females differ in their competitiveness and cooperation within the group. For example, men more frequently engage in competitive between-group interactions (Pemberton, Insko and Schopler 1996) but are also more likely to engage in intergroup rivalry than women. On the other hand women are more interpersonally oriented (Baumeister and Sommer 1997) and their cooperation is relatively unaffected by intergroup competition (Vugt et al. 2007).

Proposal

Based on the previous literature we expect that there are gender-related differences in risk-taking behavior. We also expect that the significance of these differences will not be the same in solo-managed versus team managed mutual funds. Patel and Sarkissian (2016) argue that differences in the empirical findings on managerial structure of mutual funds may be largely attributed to discrepancies in managerial data reported in some databases. We, however, presume that these differences may be also a result of gender-related differences in risk-taking behavior and group cooperation. Therefore we propose to examine the effect of manager's gender on the risk levels and performance of solo and team-managed mutual funds.

Data

We use Morningstar Direct and CRSP-mutual fund databases. Both databases are free of survivorship bias. In addition, the Morningstar Direct database is generally considered to be Gold Star source of data on the personal characteristics of managers. In our sample, we include only actively managed mutual funds whose stated objectives are "Aggressive Growth", "Growth", "Growth & Income", or "Equity Growth". We do not include passively managed index funds because the decision making process of these funds is not crucial in portfolio selection. We use data from the years 1992 to 2016 covering some 12,300 mutual funds. Morningstar Direct collects data on managers but does not directly state whether the manager is a male or a female. Therefore we will assign the gender to each manager's using unambiguous given names, suffixes and hyphenated names. Ambiguous gender will be resolved using additional sources on a name-by-name basis. From previous research we expect about 10 percent of managers will be female (Niessen-Ruenzi and Ruenzi 2015).

Methods

To measure the risk of the fund, we follow the Bar, Kempf, and Ruenzi (2010) and use three different measures of risk: total risk, defined as standard deviation of the past 12 months' returns, systematic risk, defined as the beta from the CAPM model, and idiosyncratic risk, defined as the standard deviation of fund i's residual fund returns from the same model. We evaluate the effect of managerial structure on fund performance using following model:

$$Risk_{i,t} = \beta_0 + \beta_1 FS_{i,t-6} + \beta_2 Gender_{i,t-6} + \beta_3 FChar_{i,t-6} + \beta_4 MT_{i,t-6} + YD + e_{i,t},$$

where *Gender* is a dummy variable that takes the value of one if the manager is female. For the Fund structure (*FS*) we construct two sets of measures: (1) solo- versus team-managed, and (2) the number of fund managers. The fund characteristics (*FChar*) variables include fund age, size, expense ratio, turnover ratio, family size, and objective dummy. To account for non-linearities, we use the natural logarithm of fund size, family size, fund age and manager tenure (*MT*) variables. In the regression, we also include the year xed (*YD*) effect. To avoid a contemporaneous effect, we take 6-month lags for all independent variables. The psychology literature documents gender-related differences in cooperativeness and competitiveness within the group. Therefore, we also allow for the interaction between the manager's gender and fund structure:

$$Risk_{i,t} = \beta_0 + \beta_1 FS_{i,t-6} + \beta_2 Gender_{i,t-6} + \beta_3 Gender_{i,t-6} FS_{i,t-6} + \beta_4 FChar_{i,t-6} + \beta_5 MT_{i,t-6} + YD + e_{i,t}.$$

To measure fund performance, we estimate α for each fund using the Fama French (1993) three-factor and Carhart (1997) four-factor model. To evaluate the effect of variables of interest on fund performance, we run the regressions:

$$\alpha_{i,t} = \beta_0 + \beta_1 FS_{i,t-6} + \beta_2 Gender_{i,t-6} + \beta_3 FChar_{i,t-6} + \beta_4 MT_{i,t-6} + YD + e_{i,t}$$

and

$$\alpha_{i,t} = \beta_0 + \beta_1 FS_{i,t-6} + \beta_2 Gender_{i,t-6} + \beta_3 Gender_{i,t-6} FS_{i,t-6} + \beta_4 FChar_{i,t-6} + \beta_5 MT_{i,t-6} + YD + e_{i,t}.$$

Our null hypothesis is that gender coefficients, interaction coefficients, and selected fund characteristics are not significantly different from zero. Our alternative hypothesis is that the interaction coefficient on gender and fund structure is positive and significant, indicating that females on the managerial team improve performance. We also expect a negative and significant interaction coefficient on fund risk that is consistent with higher risk aversion of females.

References

Adams, John C. , Takeshi Nishikawa, Ramesh P. Rao (2015): Mutual Fund Performance Management Teams, and Boards. SSRN Electronic Journal. Adams, Renée B. , Patricia Funk (2012): Beyond the Glass Ceiling: Does Gender Matter? *Management Science* 58, 219-235. Atkinson, Stanley M. , Samantha Boyce Baird, Melissa B. Frye (2003): Do Female Mutual Fund Managers Manage Differently? *Journal Financial Research* 26, 1-18. Bar, Michaela, Alexander Kempf, and Stefan Ruenzi (2011): Is a team different from the sum of its parts? *Team management in the mutual fund industry. Review of Finance* 15, 359-396. Barber B. M. , T. Odean (2001): Boys will be Boys: Gender Overconfidence, and Common Stock Investment. *The Quarterly Journal of Economics* 116, 261-292 (2001). Baumeister, Roy F. , Kristin L. Sommer (1997): What do men want? Gender differences and two spheres of belongingness: Comment on Cross and Madson (1997). *Psychological Bulletin* 122, 38-44. Berger, Allen N. , Thomas Kick, Klaus Schaeck (2014): Executive board composition and bank risk taking. *Journal of Corporate Finance* 28, 48-65. Bliss, Richard T., Mark E. Potter, and Christopher Schwarz (2008): Performance characteristics of individually-managed versus team-managed mutual funds. *Journal of Portfolio Management* 34, 110-119. Carter, David A. Betty J. Simkins, and W. Gary Simpson (2003). Corporate governance, board diversity, and firm value, *Financial Review* 38, 33-53. Chen, Joseph, Harrison Hong, Ming Huang, and Jeffrey D. Kubik (2004). Does Fund Size

Erode Mutual Fund Performance? The Role of Liquidity and Organization, *American Economic Review* 94, 1276-1302. Estes, Ralph and Jinoos Hosseini (1988): The Gender Gap on Wall Street: An Empirical Analysis of Confidence in Investment Decision Making. *The Journal of Psychology* 122, 577-590. Goldman, Eitan, Zhenzhen Sun, Xiyu (Thomas) Zhou (2016): The Effect of Management Design on the Portfolio Concentration and Performance of Mutual Funds. *Financial Analysts Journal* 72, 49-61. Hilliard, Jitka, and Yanfei Sun, (2016): 1+1=2? Evidence from Solo- and Team-Managed Mutual Funds. Working paper. Hogg, Michael A. , John C. Turner, Barbara Davidson (1990): Polarized Norms and Social Frames of Reference: A Test of the Self-Categorization Theory of Group Polarization. *Basic and Applied Social Psychology* 11, 77-100. Kerr, Norbert L.: (1992): Group decision making at a multialternative task: Extremity interfacation distance, pluralities, and issue importance. *Organizational Behavior and Human Decision Processes* 52, 64-95. Massa, Massimo , Jonathan Reuter, Eric Zitzewitz (2010): When should firms share credit with employees? Evidence from anonymously managed mutual funds. *Journal of Financial Economics* 95, 400-424. Moscovici, Serge and Marisa Zavalloni (1969): The group as a polarizer of attitudes. *Journal of Personality and Social Psychology* 12, 125-135. Niessen-Ruenzi, Alexandra, and Stefan Ruenzi (2015): Sex matters: Gender bias in the mutual fund industry. *SSRN Electronic Journal*. Patel, Saurin and Sergei Sarkissian (2016): To Group or Not to Group? Evidence from Mutual Funds Databases. *The Journal of Financial and Quantitative Analysis*, forthcoming. Pemberton, Michael B., Chester A. Insko, John Schopler (1996): Memory for and experience of differential competitive behavior of individuals and groups. *Journal of Personality and Social Psychology* 71, 953-966. Powell, Melanie and David Ansic (1997): Gender differences in risk behaviour in financial decision-making: An experimental analysis. *Journal of Economic Psychology* 18, 605-628. Prather, Larry J , Karen L Middleton, Antony J Cusack (2001): Are N+1 heads better than one? The timing and selectivity of Australian-managed investment funds. *Pacific-Basin Finance Journal* 9, 379-400. Sharpe, W. F. (1981): Decentralized Investment Management. *The Journal of Finance* 36, 217-234. Sah, Raaj Kumar and Joseph Stiglitz (1984): The Architecture of Economic Systems: Hierarchies and Polyarchies. Shaw, Marjorie E. (1932): A Comparison of Individuals and Small Groups in the Rational Solution of Complex Problems. *The American Journal of Psychology* 44, 491-504. Stein, Jeremy C. (2002): Information Production and Capital Allocation: Decentralized versus Hierarchical Firms. *The Journal of Finance* 57, 1891-1921. Vugt, M. Van , D. De Cremer, and D. P. Janssen (2007): Gender Differences in Cooperation and Competition: The Male-Warrior Hypothesis. *Psychological Science* 18, 19-23.

Summer 2017

Psychology literature suggests gender differences in collaboration. These differences were shaped by evolutionary pressures that modulated human behavior over the ancestral history. This does not mean that women or men are more likely to collaborate but that they respond differently to different stimuli. As men were more likely to engage in intergroup rivalry, they are more likely to cooperate under the group threat. This threat can be seen also in context of intergroup competition. This idea of male cooperation under the group threat is referred to as the *male-warrior hypothesis*. Consistently with this hypothesis, [Vugt et al. \(2007\)](#) finds that men cooperate within the group more strongly in presence of intergroup competition than in its absence. Women, on the other hand, are rather unaffected by the intergroup competition.

Psychology literature also suggests gender differences in collaboration within the group itself. For example [Simpson \(2003\)](#) examine the effect of fear and greed on outcomes of prisoners dilemmas in social situations. He claims that females are more likely to defect out of fear while males out of greed. He explains this difference in behavior based on evolutionary pressure on male competitiveness. [Simpson \(2003\)](#) studies the cooperation in experimental trust game. They do not find any gender differences in cooperation but they find more cooperative behavior in mixed-gender-pairings than in same-gender pairing.

In this paper we investigate the gender differences in cooperation among the mutual managers.

Summer ideas

Possible venues of impact of gender differences:

- **Performance**
- **Risk:**

- Very good discussion in [Croson and Gneezy \(2009\)](#): “*Men and women differ in their emotional reaction to uncertain situations and this differential emotional reaction results in differences in risk taking.*” Therefore examine differences in risk taking under recession compared to non-recession.
- ([Croson 2009](#)): No differences are generally found among managers and professionals: selection and adaptive behavior. Therefore no differences may be found in the test above.

- **Collaboration:**

Performance and risk were investigated extensively before. Results are not consistent but findings more less support a notion that there are no significant differences, especially after taking into consideration wealth and other factors that may affect risk-taking behavior. I think that **Collaboration** may be the interesting topic to investigate. Psychology literature suggests gender differences in collaboration. This does not mean that women or men are more likely to collaborate but that they respond differently to different stimuli. For example [Simpson \(2003\)](#) examine the effect of fear and greed on outcomes of prisoners dilemmas in social situations. He claims that females are more likely to defect out of fear while males out of greed. He explains this difference in behavior based on evolutionary pressure on male competitiveness. [Simpson \(2003\)](#) studies the cooperation in experimental trust game. They do not find any gender differences in cooperation but they find more cooperative behavior in mixed-gender-parings than in same-gender pairing. I think that could explore these topics.

From literature review in ([Croson 2009](#)): ([Frank et al., 1993](#)) finds that women are significantly more cooperative than men in prisoner’s dilemma games with economic content. [Ortmann and Tichy \(1999\)](#) find the same but the differences are disappearing over time. In addition, they find that males and females act differently in mixed groups. Males act same in all males or mixed group. Females are more cooperative in mixed-sex groups than in all-female groups.

- **Competitive behavior:**

- Men are more responsive to competition (([Gneezy et al., 2003](#)), ([Gneezy and Rustichini, 2004](#)))
- ([Vandegrift and Brown, 2005](#)), ([GUPTA et al., 2011](#)): women are less likely to choose to compete than men but those who choose competitive environment compete as well as men in those settings.

- **The critical mass theory:**

- Minority gender members are not as productive as they could be when they represent under 35% of the team
- [Schwartz-Ziv \(2017\)](#) studies whether gender-balanced boards are more effective than non balanced boards. He finds that boards with at least three directors of each gender are more active at board meetings (measured as minutes of board meetings). Possible implication for larger mutual fund teams: Are there any changes in performance or risk for boards for gender-balanced boards (35-65% of women)

Based on SFA paper: [More than 12b-1 fees: the impact of method of sales on return salience through brokerage channel](#) : Mutual funds are sold and marketed through a variety of distribution channels. Although the underlying portfolio is the same, fees tend to vary across sales channel. We suspect that the distribution channel that caters to the retail investor is likely to charge higher fees and emphasize less sophisticated method of performance. Our results confirm our expectation that mutual fund flows vary by distribution channel and methods of sale. Our analysis of the distribution channels reveals that return-chasing behavior is evident among retail investors and is influenced by brokers. These findings are consistent both distribution channels measurements, share classes and ICI's method of sales. This study contributes to the literature by exploring new measurements to be used to capture investment distribution channels. Also, supportive evidence on naïve investment behavior from retail investors is confirmed and quantified among different channels.

For start, these are my suggestions:

1. Compare proportion of female managers in passively *versus* actively managed mutual funds:
 - Are there any significant differences?
 - What if you separate the funds by solo versus multi-managed teams?
 - Are there any differences?
 - Are females more likely to be part of certain team size?
 - We should look closely at descriptive statistics.
1. Run a regressions with female dummy on performance and risk.
2. Then run the same regression using interaction dummy with fund structure (team versus solo-managed) or team size.
 - Are there any benefits to performance or risk?
 - I would run passively and actively managed funds separately. For passively managed funds, use tracking error as a measure of performance.
1. I like the paper of Atkinson et al. (2003). I do not think that we should do fund flows but we may look at how the paper is organized.
2. Gender-differences in risk taking under recession compared to non-recession” male versus female risk taking during recession and non-recession (recession dummy)
3. Critical mass theory: For larger fund teams, use dummy for those funds that have 35 to 65% of women on the board
 - Are there any differences in performance or risk?

References

- Rachel Croson and Uri Gneezy. Gender Differences in Preferences. *Journal of Economic Literature*, 47(2): 448–474, may 2009. doi: 10.1257/jel.47.2.448. URL <https://doi.org/10.1257%2Fjel.47.2.448>.
- Robert H Frank, Thomas Gilovich, and Dennis T Regan. Does Studying Economics Inhibit Cooperation? *Journal of Economic Perspectives*, 7(2):159–171, may 1993. doi: 10.1257/jep.7.2.159. URL <https://doi.org/10.1257%2Fjep.7.2.159>.
- U. Gneezy, M. Niederle, and A. Rustichini. Performance in Competitive Environments: Gender Differences. *The Quarterly Journal of Economics*, 118(3):1049–1074, aug 2003. doi: 10.1162/00335530360698496. URL <https://doi.org/10.1162%2F00335530360698496>.
- Uri Gneezy and Aldo Rustichini. Gender and Competition at a Young Age. *American Economic Review*, 94(2):377–381, apr 2004. doi: 10.1257/0002828041301821. URL <https://doi.org/10.1257%2F0002828041301821>.
- NABANITA DATTA GUPTA, ANDERS POULSEN, and MARIE CLAIRE VILLEVAL. GENDER MATCHING AND COMPETITIVENESS: EXPERIMENTAL EVIDENCE. *Economic Inquiry*, 51(1): 816–835, apr 2011. doi: 10.1111/j.1465-7295.2011.00378.x. URL <https://doi.org/10.1111%2Fj.1465-7295.2011.00378.x>.
- Andreas Ortmann and Lisa K. Tichy. Gender differences in the laboratory: evidence from prisoner’s dilemma games. *Journal of Economic Behavior & Organization*, 39(3):327–339, jul 1999. doi: 10.1016/s0167-2681(99)00038-4. URL <https://doi.org/10.1016%2Fs0167-2681%2899%2900038-4>.
- Miriam Schwartz-Ziv. Gender and Board Activeness: The Role of a Critical Mass. *Journal of Financial and Quantitative Analysis*, 52(02):751–780, mar 2017. doi: 10.1017/s0022109017000059. URL <https://doi.org/10.1017%2Fs0022109017000059>.
- B. Simpson. Sex Fear, and Greed: A Social Dilemma Analysis of Gender and Cooperation. *Social Forces*, 82(1):35–52, sep 2003. doi: 10.1353/sof.2003.0081. URL <https://doi.org/10.1353%2Fsof.2003.0081>.
- Donald Vandegrift and Paul Brown. Gender differences in the use of high-variance strategies in tournament competition. *The Journal of Socio-Economics*, 34(6):834–849, dec 2005. doi: 10.1016/j.socec.2005.07.028. URL <https://doi.org/10.1016%2Fj.socec.2005.07.028>.
- Mark Van Vugt, David De Cremer, and Dirk P. Janssen. Gender Differences in Cooperation and Competition. *Psychological Science*, 18(1):19–23, jan 2007. doi: 10.1111/j.1467-9280.2007.01842.x. URL <https://doi.org/10.1111%2Fj.1467-9280.2007.01842.x>.