# The Influence of Manager Characteristics on Mutual Fund Performance: Does Gender Play a Role?

Anna Zsofia Csiky [*] Stefan Pichler [†]

April 28, 2025

We investigate the impact of manager characteristics, particularly gender, on mutual fund performance. We find that controlling for only such attributes suggests the underperformance of female managers. However, accounting also for fund-specific variables reveals no statistically significant difference in mutual fund excess returns across genders. Our analysis shows that having a graduate degree from an Ivy League university and possessing an MBA both imply enhanced mutual fund performance. Furthermore, we provide evidence on how the performance of female fund managers compares to their male counterparts during the four recent recession periods and amid various market conditions, as well as an analysis of their risk-taking behavior and investment styles.

**JEL-Classification:** G11, G23
**Keywords:** mutual funds, manager characteristics, gender finance

[*] WU (Vienna University of Economics and Business), anna.zsofia.csiky@wu.ac.at.
[†] WU (Vienna University of Economics and Business) & VGSF, stefan.pichler@wu.ac.at.

# 1 Introduction

The determinants of which institutional asset managers are capable of achieving superior performance compared to their peers has long been a subject of dispute. As more than three quarters of the total net assets in U.S. investment companies are overseen by mutual funds (Investment Company Institute, 2024), it is of key significance to comprehend how their performance is affected by their managers' attributes. These characteristics could range from the level, type or reputation of their education, to their experience, as well as a feature that can easily become a base for investor bias: gender. It remains a recurring topic of interest in both academic and everyday context whether this attribute has an effect on investment performance. To illustrate, a Goldman Sachs report concluding that female fund managers outperformed their male counterparts by one percentage point in the first eight months of 2020, made headlines in media outlets.[1] Such finding is controversial to popular beliefs as well as studies on the comparative abilities of male and female investors. Most research representative of the population finds women to be less overconfident (see, e.g. Barber and Odean, 2001), more risk-averse (see, for instance Byrnes et al., 1999) and hence achieve inferior returns compared to males (see, e.g. Jianakoplos and Bernasek, 1998). However, in the highly competitive fund industry, requiring female fund managers to be at least as qualified as their male colleagues, such differences among genders could be diminished or fictitious (Atkinson et al., 2003). The mixed evidence on such matters calls for a comprehensive analysis on how mutual fund managers' performance is affected by their personal characteristics, with an accentuated focus on gender.

Therefore, we investigate the influence of managers' gender, education and experience on mutual fund performance using a unique, partially hand-collected set of data covering U.S. equity mutual funds that had a single manager for at least six consecutive months during the time period between January 1984 and December 2022. Our univariate analysis on the effect of gender on performance, measured by the excess return over the S&P 500 confirms the anecdotal evidence, indicating that female mutual fund managers statistically significantly underperform their male colleagues by 0.73% annually[2] on average. Controlling for personal characteristics, such as the quality and level of academic degrees, CFA or similar designation, and experience confirms the univariate results and indicate that female mutual fund managers lag behind their male counterparts by up to 0.83% yearly. However,

[1] See, for instance, Flood (2020) for Financial Times, Fallor (2020) for S&P Global, and Stevens (2020) for CNBC.

[2] We calculate annual values with the simplification of a month being equal to 1/12 of a year.

incorporating fund-specific variables such as size, net expense ratio and age into the models shows that there is no statistically significant difference between the performance of male and female managers. We present that similar proportions of the two groups have Ivy League[3] undergraduate and graduate degrees, CFA or likewise designations, an MBA and PhD. We discover deviations only in the percentage of graduate degrees from universities that are not Ivy League and in average manager tenure, both in favor of males. Therefore, the presumptive drivers of the negative gender bias shown in our univariate and manager-specific estimations are the attributes of the mutual funds, and not the features of the fund managers.

We also report that although having any type of higher education has a positive influence on excess returns, this effect is only consistently statistically significant for the Ivy League graduate degree. In line with Golec (1996), Gottesman and Morey (2006), and Poole et al. (2006), we present that having an MBA also implies substantially higher mutual fund performance. However, the significantly positive impact of possessing a CFA or similar designation diminishes after controlling for fund characteristics, which is comparable to the findings of Gottesman and Morey (2006) and Clare et al. (2022). Similarly to Gottesman and Morey (2006), we find that having a PhD has a positive, but insignificant relation to mutual fund excess return.

The Goldman Sachs analysis concluding female investors outperformed males by providing -0.57% return relative to their benchmarks compared to the -1.64% achieved by males was conducted in the first eight months of 2020, a time when financial markets experienced major swings amid the COVID pandemic. Consequently, it poses the question whether female fund managers - possibly due to their different risk tolerance and confidence-level or unique investment decision process - outperform their male colleagues during times of crises or specific market conditions. Our sample includes four recession periods, as determined by the Federal Reserve Economic Data (FRED). These periods of economic slowdown include the 1990 Recession, the Dot Com Recession in 2001, the Great Recession starting in 2007, and the Recession of 2020, also known as the COVID Crisis. Including an aggregate recession dummy interaction term with the gender variable in our model provides a result contrary to what the Goldman Sachs analysis might suggest. We observe that females lag behind their colleagues by 14.44 basis points (bp) monthly on average during the combined recession periods. However, accounting for these turbulent times separately shows that it is driven

[3]Ivy League universities include Brown University, Columbia University, Cornell University, Dartmouth College, Harvard University, University of Pennsylvania, Princeton University and Yale University.

by the Dot Com Bubble aftermath, during which female managers significantly fared behind their counterparts, by nearly 60 bp monthly. The Recessions of 1990 and 2007 did not disclose statistically significant differences in performance based on gender. Nevertheless, our results for the COVID Crisis align with the Goldman Sachs report from 2020. Ceteris paribus female mutual fund managers indeed outperformed their colleagues, by more than 0.67% per month during the pandemic-induced recession.

In order to obtain a more granular understanding of how female fund managers perform during varying market conditions, and how effectively they can profitably time them, we construct corresponding measures based on the S&P 500 level movements. In particular, we define Peaks (Valleys) as the month of local maxima (minima) of the S&P 500's price. We determine time periods leading up to a Peak (Valley) as increasing (decreasing) market. We observe that female mutual fund managers significantly (by nearly 17 bp on average) exceed their counterparts during the extremely good months of the market, although they do not fare worse than males in the months of poorest market performance. Such an asymmetric effect allows us to deduce that female fund managers are more successful during extreme market movements on aggregate. Nevertheless, they appear to lag behind males in performance during times of decreasing markets by 18.19 bp monthly, and achieve similar return to them when the price levels of the S&P 500 exhibit an upward trend. Such comparative deviations in performance of male and female mutual fund managers during various market conditions seem to offset each others on the long run, resulting in comparable mean returns. Furthermore, it provides insight into the reasons behind the mixed evidence in the literature regarding the role of manager gender in investment vehicle performance.

An inevitable progression from the discussion of how manager characteristics affect mutual fund performance is analyzing their relationship with the risk attributes and managing style of these investment vehicles. Deviating from popular beliefs, yet consistent with Niessen-Ruenzi and Ruenzi (2019) we find that the volatility of female-managed mutual funds is not statistically significantly different from their peers. Additionally, we report a similar pattern in their downside risk, measured by the semi-deviation. However, we observe that female managers tend to take on significantly higher systematic risk in our sample: their beta exceeds that of male-led funds on average. They also exhibit lower selectivity, assessed by their higher $R^2$, that is they deviate less from the market in their portfolio allocation. As reported by Barber and Odean (2001), Dwyer et al. (2002) and Niessen-Ruenzi and Ruenzi (2019) among others, women are less overconfident, which is reflected in fewer executed trades.

Using the turnover ratio as a proxy, we confirm this by finding that males substantially surpass their colleagues in trading activity. We also conclude that net assets of female-managed funds are characterized by more symmetric, less peaked and tailed distributions, as measured by skewness and kurtosis, however these results are not statistically significant.

To gain a more comprehensive overview, we deem it is essential to also explore how other managerial characteristics are linked with measures of risk and managing styles. We find undergraduates of Ivy League universities to be associated with indifferent risk measures and investment styles, except having higher skewness than their peers holding a bachelor's degree from other institutions. However, regardless of the affiliation of graduate degrees, their holders tend to have more conservatively dispersed mutual fund returns, with mitigated downside risk, yet a portfolio allocation resembling more the S&P 500. Notably, the longer the time a manager has served at a given fund, the lower the volatility and the below-mean fluctuations of their returns, while keeping their funds less exposed to systematic risk, and deviate more from the market in their holdings. According to our analysis, having a CFA or similar designation, as well as higher tenure implies a significantly lower turnover ratio of the manager. That is, specialized knowledge and experience diminishes the level of mutual fund managers' overconfidence.

We contribute to the literature on the impact of managerial attributes on fund performance. The earliest works in this realm did not consider gender in their analysis. As a pioneer of this branch of literature, Golec (1996) investigates how mutual fund manager characteristics affect performance, risk, and fees using a sample of 530 funds, covering the time period 1988-1990. He reports that better risk-adjusted performance can be expected from managers that are younger, have MBA degrees, and longer tenure, besides from funds that have lower fees, and more diversified portfolios. Using a sample of growth and growth and income mutual funds from the U.S., encompassing 1989-1994, Chevalier and Ellison (1999) analyze how the performance is affected by managers' age, tenure, selectiveness of their undergraduate institution, having an MBA degree, as well as fund-specific variables. They report that managers with undergraduate degrees from institutions that have higher average composite SAT scores, along with younger managers tend to achieve superior excess returns. Gottesman and Morey (2006) study the link between manager education and performance of U.S. mutual funds between 2000 and 2003. They conclude that having an MBA from one of the 30 best programs based on their mean GMAT score implies outperformance compared to both managers with a less prestigeous MBA degree and ones without such qualification.

Nevertheless, they find CFA, non-MBA master's degree and PhD to be unrelated to fund performance. Poole et al. (2006) proclaim no distinction in performance between managers with graduate and undergraduate degrees, or between managers with and without Ivy League education. Nevertheless, they find top MBA program graduates to outperform MBAs from less well-listed institutions, along with a positive relationship between tenure and Sharpe ratio. Studying Indian mutual funds Kaur (2017) also report that fund managers with premier management degrees exceed the performance of those that had CA/CFA/ICMA qualification, while following a more extreme investment strategy. Moreover, she presents that this effect was particularly outstanding in crisis periods.

We also contribute to the literature on manager characteristics that considers, or even puts forward gender as a component in the determinants of fund performance and risk. Bliss and Potter (2002) break down popular beliefs about women fund managers using a sample of U.S. domestic and international equity mutual funds with a decade long sample leading up to 2000. They find that females are characterized by superior raw returns, however after controlling for risk and other potential influences, this difference vanishes. Moreover, females appear to have marginally riskier portfolios, and similar turnover magnitude, dissipating the myths of higher risk-aversion and milder overconfidence of women. Atkinson et al. (2003) conclude that although neither the investment behaviour, nor the managed fixed income funds' performance, risk, or other attributes of males and females do not differ significantly, gender affects the decision making of investors, resulting in lower inflows to female-managed funds. Aggarwal and Boyson (2016) report an affine pattern in case of hedge funds: those managed by all females and all males have similar risk and return profiles. However, all-female managed hedge funds experience higher failure rates due to difficulty raising capital. They present that conditioning on survival, female-managed funds even outperform male-managed ones, as the former is required to be outstandingly strong, whereas average return of the latter is enough to abide. Nevertheless, female-managed funds do not only tend to be smaller due to difficulty raising capital, but also receive less media attention (Aggarwal and Boyson, 2016). Similarly, based on a 1992-2009 U.S. open-end fund sample, Niessen-Ruenzi and Ruenzi (2019) observe no gender-based performance difference. Yet, investor inflows to female-managed mutual funds are reported be inferior, with a growth rate of a mere third of their male colleagues'. It happens despite that female fund managers appear to have more persistent performance, as well as more stable investment style attributes, that all else equal, are desirable for mutual fund investors. Niessen-Ruenzi and Ruenzi (2019) propose that such gender bias on investment decision could be a source of the minor fraction of females in the

mutual fund industry. Rau and Wang (2022) reveals that the flow-performance relationship is significantly weaker for female-managed funds, implying lower investor reactivity for the performance of female fund managers. The findings of Atkinson et al. (2003), Aggarwal and Boyson (2016), Niessen-Ruenzi and Ruenzi (2019), and Rau and Wang (2022) highlight a crucial aspect of this branch of literature: even in case of similar attributes to males, female fund managers tend to be prejudiced, making it vital to provide a comprehensive overview of their performance and risk patterns. Nevertheless, Welch and Wang (2013) report indications of lower female risk tolerance and some evidence of an inverse relationship between the percentage of female managers in a fund and performance, though the absolute return difference among genders is modest. Babalos et al. (2015) on the other hand presents marginally higher, albeit not significantly different female-managed mutual fund alphas for 2006-2011, with similar risk metrics, yet inferior market timing, which places female-managed mutual funds on the left tail of the return distribution. Likewise, Clare et al. (2022) find female managers to obtain higher, but not statistically different alphas, using a U.S. equity mutual fund sample covering the time period between January 1990 and July 2015. Tolikas and Callonnec (2023) show that although in the raw data female-overseen mutual funds on average have slightly higher return and risk, gender is not significantly related to mutual funds' risk-adjusted performance. That is, they confirm that the gender-related risk and return patterns reported by Bliss and Potter (2002), Atkinson et al. (2003), Aggarwal and Boyson (2016), Niessen-Ruenzi and Ruenzi (2019), Babalos et al. (2015) and Clare et al. (2022) among others, also hold in case of Eurozone equity mutual funds. Nevertheless, the mixed nature of results in this field of literature, along with the Goldman Sachs research defying common perceptions on the skills of female fund managers, calls for a thorough study on the relation between managerial features and mutual fund attributes.

Our work provides a multifaceted contribution to the existing body of knowledge and the implications of our findings are far-reaching. We enrich the literature on the impact of manager characteristics on mutual fund performance, risk and managing style, with an emphasis on whether gender plays a role. We attain this by a comprehensive study, covering - to the extent of our knowledge - the longest time period within this research area. Although our goal is not predicting returns, but identifying cross-sectional relationships between mutual fund and manager attributes, we inherently also contribute to the performance evaluation literature. We present that assessing gender univariately, or solely among manager characteristics indicates that mutual funds overseen by females - consistent with popular beliefs and research conducted with non-finance-professionals - indeed exhibit significantly

lower excess returns. However, controlling for mutual fund attributes abolishes this difference and reveals that while manager gender does not significantly affect mutual fund performance, the features of the investment vehicle do so. This sequence of results suggest that a negative gender bias in mutual fund performance could be the outcome of strategic placement of female professionals within fund families. Therefore, our findings also offer implications for the fund stewardship literature. Moreover, we identify that there is variation in which gender exceeds the performance of the other in distinct recession periods, with males "winning" following the Dot-Com Bubble, but females outshining them during the COVID Crisis. We also present that whereas in months of peak market performance, females significantly outrun their male colleagues in terms of excess returns, in decreasing market months they fall behind them. In addition, we show that while female-managed mutual funds tend to have lower volatility and less extreme negative returns, they are exposed to more systematic risk. Confirming the notion of lower overconfidence exhibited by females (see, e.g. Barber and Odean, 2001), we find that they indeed trade significantly less. Additionally, we provide a synopsis on how certain levels and qualities of education affect the excess return and risk of mutual funds. We demonstrate that, although consistent with popular beliefs several fund manager attributes influence performance, the case of gender is not as clear-cut. Therefore, our results suggest that investor bias based on such matters might not be statistically supported.

# 2 Data

Our unique dataset consists of mutual fund-specific and manager characteristic fund-month observations covering the time period from January 1984 to December 2022. The source of our mutual fund data is Morningstar Direct, from which we obtain a sample of equity open-end funds that are domiciled in the U.S. with the base currency USD. Our goal with this selection is to focus on the major subset of the largest mutual fund market[4] that is fairly homogeneous in terms of investment and foreign exchange risk. In pursuance of uniformity and preventing the exclusion of funds, we screen the oldest share class to enter our sample. To preclude distorted performance, we eliminate index funds from our dataset, as by construction, the return of these financial vehicles are not likely to reflect any managerial ability. Several studies have presented that funds with poor return are more probable to become liquidated, hence excluding them could augment aggregate performance measures.[5] Therefore, we ensure that our sample is free of survivorship bias, i.e. it includes all funds that meet our selection criteria and ever existed during the period, even those that did not remain alive.

We obtain the history of managers from Morningstar Direct for our open-end funds selected according to the description above. As we have no information about the involvement of the individual members in management teams, we screen for single-managed fund-months[6] and collect the name of the responsible managers, the fund(s) they managed and the time period of their involvement alone, as well as in teams, to promote better identification of them. We proceed to download and aggregate the most popular female and male baby names by decade files from the United States Social Security Administration's (SSA) website[7]. With the help of this list, we match the gender based on the first name of the managers. In case we can not identify a manager's gender based on their first given name, we proceed to their second name, allowing us to determine the gender of over 80% of the managers in our sample. Then we hand-collect additional characteristics of the managers: their undergraduate and graduate institutions, whether they have an MBA, PhD or a CFA or similar designation[8], and the

[4] According to the Investment Company Institute (2024), with USD 25.5 trillion total net assets the U.S. mutual fund industry remained the greatest in the world at the end of 2023. Its most substantial proportion, 52%, consisted of equity funds.

[5] See, for instance, Brown et al. (1992), Brown and Goetzmann (1995) , Elton et al. (1996), Carhart et al. (2002).

[6] We exclude time periods that are named with reference for team management or lack of managers, then we remove all observations when more than one manager is in charge of a fund.

[7] https://www.ssa.gov

[8] We consider CFA, CPA, CFP, CMT, CAIA, CIC, CTFA, CPFA, ChFC, CPCU, FRM and AIF as "CFA or similar".

gender for the cases where we could not determine it based on the SSA's data. Morningstar provides short biographies of some fund managers on their website, that is our primary source of manager attributes. However, it is often short, incomplete or non-existent, thus we also use SEC filings, prospectuses, Bloomberg biographies, yearbooks, reunion documents, university journals, legal documents, obituaries and LinkedIn profiles - nearly all available on the internet - to build a comprehensive dataset about mutual fund managers. Next we construct our manager characteristics variables, that capture the education and experience of the managers. In particular, we create an Ivy League undergraduate degree dummy, that takes the value 1 if the manager completed their undergraduate studies in an Ivy-League university, 0 otherwise. Similarly, we create an Ivy-League (Non-Ivy League) graduate degree dummy that is 1 if the manager finished graduate studies in an Ivy League (not an Ivy League) university, 0 else. Such construction of graduate and undergraduate degrees allows us to test whether Ivy League universities and/or graduate studies indeed suggest higher performance either due to superior education quality or enhanced social connections that could allow graduates to secure manager positions at certain fund firms, as well as an information flow among them.[9] We construct a CFA or similar dummy variable that is 1 when the manager has such designation and 0 otherwise. The MBA dummy is 1 if the manager completed an MBA program, 0 in other cases. Similarly, the PhD dummy variable takes the value 1 if the manager has a PhD, 0 otherwise. The latter three variables aim to measure in our analysis how certain additional levels of education affect the performance of managers. Notably, we construct our education-related variables such that the 0 includes both those managers who do not have the given degree or certificate and those for whom we could not find such information. The motivation behind this decision is that during the hand-collecting process we observed that mutual fund managers prefer to put their education on display on all possible platforms, conceivably to reassure their knowledge for their (potential) investors. That is, we conjecture that this approach measures with fairly high precision whether the manager possesses certain levels of education, while keeping as many observations as possible in the analysis. We calculate manager tenure as the time passed in years since the manager began being in charge of the given mutual fund and it is a proxy of their experience.

We gather discrete fund-specific variables and monthly time series variables for 1984-2022, including return and net assets, as well as yearly net expense ratio and turnover ratio. We calculate the funds' age as the years passed since their inception. Then, we merge all the

[9]The baseline in this setup is the category of non-Ivy League undergraduates, as all managers in our sample have some sort of undergraduate degree.

mutual fund- and manager-specific data into one panel dataset. To calculate market excess return and identify market movements, we extend the dataset with the monthly price index of the S&P 500, obtained from Eikon Datastream, and we compute its return. Finally, in order to estimate the market model for our risk measures, we download the one-month treasury rate from the website of Kenneth R. French[10].

To facilitate that we are not including brief transitory periods between changes in the management teams and foster that the performance observed is indeed mainly attributable to a given manager, as well as to account for that some of our explanatory variables are annual, we excluded those fund-month observations where the manager did not spend at least six consecutive months of the year alone in the position. Given the nature of our research question, we also exclude observations for which no return is available. This leaves us with a sample consisting of 2,796 managers overseeing 2,878 funds. The gender representation is far from equal: while 2,535 of the managers are male, only 261 females are in the dataset. Although in the first half of the 2000s there was a hike in the ratio of single female mutual fund managers, they never exceeded 11.3% of the sample[11], as depicted in Figure 1. However, females manage 1.44 funds alone on average, as opposed to the 1.08 funds in case of males, reinforcing the idea that females in such competitive positions are highly educated and are perceivably not lacking skills compared to their male colleagues (see, e.g., Welch and Wang, 2013).

To understand whether there are systematic deviations in the education and experience of mutual fund managers with the opposite gender, we compare the mean percentage of females and males with certain qualifications as well as tenure in Table 1. As confirmed by both the $t$-tests and Wilcoxon rank-sum tests, there is no statistically significant difference in the proportion of female and male managers with an Ivy League undergraduate or an Ivy League graduate degree. However, 8% less females have Non-Ivy League graduate degrees, thus fewer of them possess graduate degrees of any institutions. We find no significant differences in the percentage of females and males with a CFA or similar designation, an MBA or PhD. Nonetheless, while the average tenure of males is 5.75 years, this number for females is only 4.32 years. It indicates that females indeed possess similar levels of education to their male

[10]https://mba.tuck.dartmouth.edu/pages/faculty/ken.french, the original source of the one-month treasury rate is Ibbotson Associates.

[11]This pattern stands in stark contrast to the representation of females in other professions in the United States. For context, in 2021, 29.1% of chief executives, 62% of accountants and auditors, 40.2% of financial and investment analysts, 37.9% of lawyers and 27.7% of surgeons were women (U.S. Bureau of Labor Statistics, 2022).

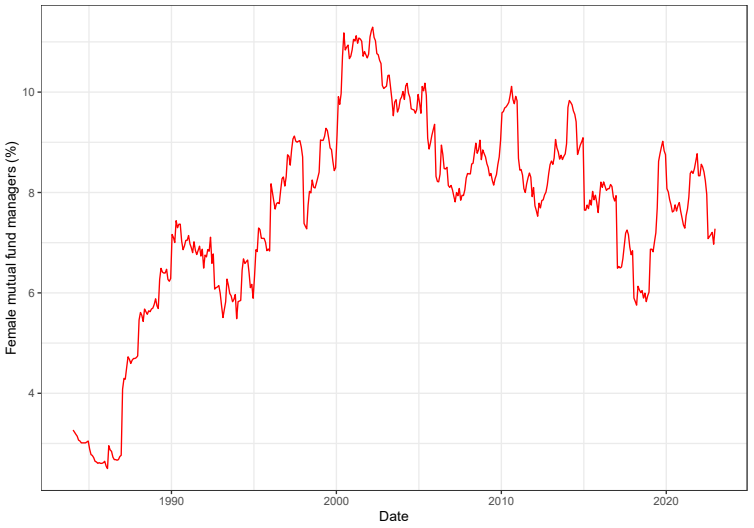



**Figure 1: The Proportion of Female Mutual Fund Managers Over Time**
This figure displays the evolution of the monthly percentage of female mutual fund managers in our sample, covering the time period from January 1984 to December 2022.

**Table 1: Univariate Tests of Manager-Specific Characteristics by Gender**
This table shows the $p$-values from $t$-tests and Wilcoxon Rank-Sum tests on manager characteristics among male and female fund managers in our sample, with the null hypothesis that the the mean of each attribute is not significantly different among genders. The education-related manager attributes denote the percentage of males and females with such qualification in the sample, whereas manager tenure is measured in years. Ivy League undergraduate is a dummy variable that is 1 if the manager completed undergraduate studies in an Ivy League university, 0 if not. Ivy League graduate is a dummy variable that takes the value 1 if the manager completed graduate studies in an Ivy League university, 0 else. Non-Ivy League graduate is a dummy variable that is 1 if the manager completed graduate studies in a non-Ivy League university, 0 otherwise. CFA or similar is a dummy variable that is 1 if the manager obtained the CFA or similar designation, 0 if not. MBA is a dummy variable that is 1 if the manager has an MBA, 0 otherwise. PhD is a dummy variable that takes the value 1 if the manager has a PhD, 0 else. Manager tenure measures the years passed since the manager began managing a given fund.

| Variable | Female | Male | # Obs. Female | # Obs. Male | $p$-value$_t$ | $p$-value$_{WRS}$ |
|---|---|---|---|---|---|---|
| Ivy League undergraduate (%) | 11 | 11 | 261 | 2535 | 0.87 | 0.87 |
| Non-Ivy League graduate (%) | 36 | 44 | 261 | 2535 | 0.01 | 0.01 |
| Ivy League graduate (%) | 14 | 14 | 261 | 2535 | 1.00 | 0.99 |
| CFA or similar (%) | 48 | 46 | 261 | 2535 | 0.54 | 0.54 |
| MBA (%) | 43 | 47 | 261 | 2535 | 0.18 | 0.18 |
| PhD (%) | 3 | 3 | 261 | 2535 | 0.77 | 0.78 |
| Manager tenure (years) | 4.32 | 5.75 | 22097 | 244015 | 0.00 | 0.00 |

colleagues, making them comparably competitive finance professionals, however, they slightly fall behind in experience.

# 3 Results

Inspired by Chevalier and Ellison (1999), our core investigation of the role of managerial characteristics on performance follows a sequential pattern. We begin our analysis with estimating an ordinary least squares (OLS) regression of excess return on our primary variable of interest: gender. We proceed by extending the independent variables with managerial characteristics. Then, we augment the selection of covariates with fund-specific variables, as depicted in Equation (1).

$$\text{ExcessReturn}_{i,t} = \alpha_t + \beta \text{Gender}_{i,t} + \gamma M_{i,t} + \delta F_{i,t} + \epsilon_{i,t}, \tag{1}$$

where $\text{ExcessReturn}_{i,t}$ is the return of fund $i$ at time $t$ over the return of the S&P 500 at time $t$. $\text{Gender}_{i,t}$ is the dummy variable being 1 if the manager of fund $i$ at time $t$ is female, 0 else, $M_{i,t}$ denotes manager-specific controls of the manager of fund $i$ at time $t$, and $F_{i,t}$ represents fund-specific controls for the manager of fund $i$ at time $t$. All regressions of this incremental analysis are ran with date fixed effects to account for time-specific factors over the long sample period and we report heteroskedasticity-robust standard errors. To obtain a more comprehensive picture of the ability of managers with certain attributes over time, we explore how it varied with the last four major recession periods, as well as during high and low months of the market and the phases in between. We also discuss the role of missing education variables, and conclude with an overview of how gender and managerial attributes are related to risk and managing style measures.

## 3.1 The Influence of Manager Characteristics on Fund Performance

We begin our study on the role of managerial attributes on performance with a univariate regression including gender as an independent variable. These results are analogous with widespread expectations as we observe a significant 6.06 bp monthly underperformance of females, which translates to a 0.73% yearly lag in their excess returns, as presented in Table 1. Although this specification clearly suffers from omitted variable bias, it is necessary to have a first view on the relation between excess return and gender.

**Table 2: Univariate Test of Performance Difference Across Gender**
This table shows the estimates of mutual fund excess return over the market (proxied by the S&P 500) regressed on manager characteristics, measured in percentage points. Gender is a dummy variable that is 1 if the manager is female, 0 if male. Observations are fund-months and time fixed effects are included in the estimation.

| | Excess return<br>(1) |
|---|---|
| Gender | -0.0606*** |
| | (0.0187) |
| *Time fixed effects* | Yes |
| Observations | 266,112 |
| $R^2$ | 0.21063 |

*Heteroskedasticity-robust standard errors in parentheses*
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

We proceed with incorporating additional fund manager characteristics in our regression framework in a stepwise manner, as shown in Table 3. The initial batch of such attributes included are dummy-variables accounting for the quality of undergraduate and graduate institutions of the mutual fund managers. In particular, as all managers in our sample possess an undergraduate degree, we set that as our baseline, and incorporate an Ivy League undergraduate degree dummy, accounting for those who received this level of their education from distinguished universities. We also differentiate among those managers in our sample, who finished their graduate level studies in Ivy League or Non-Ivy League institutions. The rationale behind this approach is the following. Regardless of the superior education quality, reputational reasons, gaining access to jobs and hence funds or fund families which (under)graduates of less distinguished universities could hardly do, or even flow of information among eminent alumni, it is straightforward to hypothesize that studying in Ivy League institutions could be associated with outperformance as fund managers. The goal of further distinction between Ivy League graduates and undergraduates is not only enhanced precision, but also to test whether an additional level of studies is indeed reflected in higher returns, and to assess whether receiving Ivy League level education at a later stage is indeed associated with higher achieved excess fund return.

Model 1 in Table 3 reveals that controlling for the prestige of graduate and undergraduate

**Table 3: Manager Characteristics and Mutual Fund Performance**
This table shows the estimates of mutual fund excess return over the market (proxied by the S&P 500) regressed on manager characteristics, measured in percentage points, in a sequential manner. Gender is a dummy variable that is 1 if the manager is female, 0 if male. Ivy League undergraduate is a dummy variable that takes the value 1 if the manager completed undergraduate studies in an Ivy League university, 0 if not. Ivy League graduate is a dummy variable that is 1 if the manager completed graduate studies in an Ivy League university, 0 else. Non-Ivy League graduate is a dummy variable that is 1 if the manager completed graduate studies in a non-Ivy League university, 0 otherwise. CFA or similar is a dummy variable that is 1 if the manager obtained the Chartered Financial Analyst (CFA) or similar designation, 0 if not. MBA is a dummy variable that is 1 if the manager has an MBA, 0 otherwise. PhD is a dummy variable that takes the value 1 if the manager has a PhD, 0 else. Manager tenure measures the years passed since the manager began managing a given fund. Observations are fund-months. In each estimation time fixed effects are included.

| | Excess return | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| Gender | -0.0563*** | -0.0616*** | -0.0691*** |
| | (0.0187) | (0.0188) | (0.0188) |
| Ivy League undergraduate | 0.0149 | 0.0160 | 0.0191 |
| | (0.0145) | (0.0145) | (0.0145) |
| Non-Ivy League graduate | 0.0706*** | 0.0241 | 0.0244 |
| | (0.0124) | (0.0193) | (0.0193) |
| Ivy League graduate | 0.1361*** | 0.0885*** | 0.0930*** |
| | (0.0151) | (0.0223) | (0.0223) |
| CFA or similar | | 0.0329*** | 0.0306*** |
| | | (0.0110) | (0.0110) |
| MBA | | 0.0492*** | 0.0454** |
| | | (0.0179) | (0.0179) |
| PhD | | 0.0195 | 0.0159 |
| | | (0.0309) | (0.0309) |
| Manager tenure | | | -0.0056*** |
| | | | (0.0009) |
| *Time fixed effects* | Yes | Yes | Yes |
| Observations | 266,112 | 266,112 | 266,112 |
| $R^2$ | 0.21090 | 0.21096 | 0.21106 |

*Heteroskedasticity-robust standard errors in parentheses*
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

studies of mutual fund managers slightly reduces the magnitude of the negative gender coefficient to indicate a 67.35 bp annual underperformance, nonetheless it remains significant. We also observe that undergraduate Ivy League studies are not associated with significantly positive returns. However, having a graduate degree appears to pay off in terms of significantly higher mutual fund performance. Whereas Non-Ivy league graduates exhibit an additional 0.85% annual excess return, managers with Ivy league graduate degrees surpass their colleagues by 1.64% yearly.

To obtain a more granular overview on how education affects mutual fund performance, we incorporate dummies of the types of academic degrees and other qualifications. In particular, we extend the analysis with a CFA or similar, an MBA, and a PhD dummy. As displayed in Model 2 of Table 1, having a CFA or similar title or an MBA are both associated with significantly higher annual excess returns of 39.55 bp and 59.2 bp respectively. Nevertheless, similar to the findings of Gottesman and Morey (2006) having a PhD does not indicate significantly superior mutual fund performance. Notably, accounting for the type of academic achievements results in diminishing the magnitude and eliminating the significance of the Non-Ivy League graduate coefficient.

Then we proceed with controlling for the time a manager spent at a given fund, by including their tenure as an independent variable. However, the effect of experience on performance in case of mutual fund managers could be adverse. Although more years worked in a position is likely accompanied by a vast amount of knowledge collected, with expanded number of contacts and hence more access to information, it could also lead to a form of inertia in management. In addition, as tenure is likely correlated with age, fund managers getting closer to their retirement could be less concerned about their careers, as well as the top managers tend to exit the industry earlier (Chevalier and Ellison, 1999). Our findings shown in Model 3 of Table 3 correspond to the latter explanations. With each additional year spent overseeing a fund, the performance of managers reduces by 6.72 bp on average. Such result diverges from that of Bliss and Potter (2002), Poole et al. (2006) and Clare et al. (2022). The education-related variables in Model 3, seem to remain similar in both significance and magnitude to Model 2. The documented outperformance of managers with an MBA is resembling the findings of Golec (1996), Gottesman and Morey (2006) and Poole et al. (2006), but go against the results of Chevalier and Ellison (1999). The positive relation between return and CFA are analogous to the conclusions of Poole et al. (2006) and Clare et al. (2022) but not to Gottesman and Morey (2006), whereas the lack of effect of possessing a PhD

on fund managers' achievement is comparable to Gottesman and Morey (2006). Strikingly, the gender coefficient remains negative, significant, and of similar magnitude in all three specification including manager-specific dependent variables, presented in Table 3, suggesting a general underperformance of female fund managers.

## 3.2 The Influence of Manager and Fund Characteristics on Mutual Fund Performance

Subsequently, we incorporate fund-specific variables into our specifications. In particular, we extend the three models discussed above with the logarithm of net assets, the net expense ratio and fund age to account for fund features, demonstrated in Table 4. As a result, the significance of the gender coefficients disappear, moreover their magnitude shrinks to the third of the ones observed in Table 1 and Table 3. That is, controlling for fund attributes reveals that female mutual fund managers do not perform statistically significantly differently from their male colleagues. This observation poses the question, whether single female fund managers are strategically assigned to certain funds with lower return potential within their family. In addition, we report that in all three models in Table 4, the logarithm of net assets is significantly positively, whereas the net expense ratio is significantly negatively related to excess fund returns, holding all else equal. With each additional year of a fund's existence, its excess return appears to drop by 4.2 bp on average. Extending the independent variables with fund-specific attributes also reduces the magnitude of all manager-related characteristics with the exception of the MBA coefficient, and the CFA or similar coefficient loses its statistical significance. These developments allow us to conjecture that the features of funds have stronger effect on their performance than the qualities of their managers do, which could be rooted in the robust regulatory framework and strict guidelines within mutual funds have to operate.

**Table 4: Manager and Fund Characteristics and Mutual Fund Performance**
This table shows the estimates of mutual fund excess return over the market (proxied by the S&P 500) regressed on manager characteristics, measured in percentage points, in a sequential manner. Gender is a dummy variable that is 1 if the manager is female, 0 if male. Ivy League undergraduate is a dummy variable that takes the value 1 if the manager completed undergraduate studies in an Ivy League university, 0 if not. Ivy League graduate is a dummy variable that is 1 if the manager completed graduate studies in an Ivy League university, 0 else. Non-Ivy League graduate is a dummy variable that is 1 if the manager completed graduate studies in a non-Ivy League university, 0 otherwise. CFA or similar is a dummy variable that is 1 if the manager obtained the Chartered Financial Analyst (CFA) or similar designation, 0 if not. MBA is a dummy variable that is 1 if the manager has an MBA, 0 otherwise. PhD is a dummy variable that is 1 if the manager has a PhD, 0 else. Manager tenure measures the years passed since the manager began managing a given fund. Observations are fund-months. In each estimation time fixed effects are included.

| | Excess return | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| Gender | -0.0192 | -0.0216 | -0.0253 |
| | (0.0193) | (0.0194) | (0.0194) |
| Ivy League undergraduate | 0.0068 | 0.0071 | 0.0079 |
| | (0.0155) | (0.0155) | (0.0155) |
| Non-Ivy League graduate | 0.0393*** | 0.0049 | 0.0046 |
| | (0.0130) | (0.0200) | (0.0200) |
| Ivy League graduate | 0.0925*** | 0.0552** | 0.0561** |
| | (0.0165) | (0.0236) | (0.0236) |
| CFA or similar | | 0.0075 | 0.0067 |
| | | (0.0116) | (0.0115) |
| MBA | | 0.0408** | 0.0398** |
| | | (0.0187) | (0.0187) |
| PhD | | 0.0065 | 0.0054 |
| | | (0.0320) | (0.0320) |
| Manager tenure | | | -0.0023** |
| | | | (0.0011) |
| Log of net assets | 0.0144*** | 0.0142*** | 0.0148*** |
| | (0.0034) | (0.0034) | (0.0034) |
| Net expense ratio | -0.0737*** | -0.0734*** | -0.0724*** |
| | (0.0195) | (0.0195) | (0.0196) |
| Fund age | -0.0038*** | -0.0038*** | -0.0035*** |
| | (0.0005) | (0.0005) | (0.0005) |
| *Time fixed effects* | Yes | Yes | Yes |
| Observations | 221,743 | 221,743 | 221,743 |
| $R^2$ | 0.22786 | 0.22788 | 0.22789 |

*Heteroskedasticity-robust standard errors in parentheses*
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

## 3.3 Gender Differences in Mutual Fund Manager Performance During Recessions

The Goldman Sachs analysis, which reported female fund managers outperforming males, was conducted in the first two-thirds of 2020, a period when financial markets and the economy were severely affected by the COVID pandemic. Therefore, it is inevitable to test how the excess return of female mutual fund managers compare to that of their colleagues during times of recession. We address this by extending Equation (1) with an interaction term between recession period and gender dummies, as depicted in Equation (2).

$$\begin{aligned} \text{ExcessReturn}_{i,t} = \alpha + \beta \text{Gender}_{i,t} + \kappa(\text{Gender}_{i,t} \times \text{Recession}_t) + \eta \text{Recession}_t \\ + \gamma M_{i,t} + \delta F_{i,t} + \epsilon_{i,t}, \end{aligned} \tag{2}$$

where $\text{ExcessReturn}_{i,t}$ is the return of fund $i$ at time $t$ over the return of the S&P 500 at time $t$. $\text{Gender}_{i,t}$ is the dummy variable being 1 if the manager of fund $i$ at time $t$ is female, 0 else. $\text{Recession}_t$ is a dummy variable that is 1 if time $t$ is a recession period, 0 else. $M_{i,t}$ denotes manager-specific controls of the manager of fund $i$ at time $t$, and $F_{i,t}$ represents fund-specific controls of fund $i$ at time $t$.

Our sample covers four recessions as defined by the FRED, from which we obtain their exact duration.[12] These economic downturns include the 1990 Recession, the Recession of 2001 which is an an outcome of the Dot Com Bubble, the Great Recession beginning in 2007, and the Recession of 2020, mainly referred to as the COVID Crisis. As an initial test to account for the potentially diverse performance of female mutual fund managers during such periods, we create an aggregate dummy called Recessions, incorporating all of these periods of economic slowdown and we interact it with the gender dummy. Model 1 in Table 5 reveals the outcome of this specification. Even though it appears that during recession periods female fund managers fare worse by 14.44 bp monthly in terms of performance, the gender coefficient becomes positive, yet not statistically significant. However, including the four recessions as separate dummies interacted with the gender variable provides a more nuanced picture. Model 2 in Table 5 presents that although in the Recession of 1990 and the Great

[12]The duration of these recessions are the following. Recession 1990: October 1989 - March 1991, Recession 2001: January 2001 - September 2001, Recession 2007: October 2007 - June 2009, Recession 2020: January 2020 - June 2020.

Recession, the performance of female and male fund managers did not significantly differ, the latter group exceeded the former in terms of return over the market, by nearly 60 bp monthly during the economic aftermath of the Dot Com Bubble. This is likely steering the results on female fund managers' underperformance during recessions on aggregate. Pivoting to the COVID Crisis, as displayed in Table 5, female fund managers indeed surpassed the excess return of their male colleagues by more than 67 bp monthly on average during this recession period. This finding is accordant with the Goldman Sachs study, even in magnitude.

**Table 5: Manager Performance by Gender during Recessions**

This table shows the estimates of mutual fund excess return over the market (proxied by the S&P 500) regressed on manager and fund characteristics, measured in percentage points, including recession-based variables and interaction terms. Gender is a dummy variable that is 1 if the manager is female, 0 if male. Ivy League undergraduate is a dummy variable that takes the value 1 if the manager completed undergraduate studies in an Ivy League university, 0 if not. Ivy League graduate is a dummy variable that takes the value 1 if the manager completed graduate studies in an Ivy League university, 0 else. Non-Ivy League graduate is a dummy variable that is 1 if the manager completed graduate studies in a non-Ivy League university, 0 otherwise. CFA or similar is a dummy variable that is 1 if the manager obtained the Chartered Financial Analyst (CFA) or similar designation, 0 if not. MBA is a dummy variable that is 1 if the manager has an MBA, 0 otherwise. PhD is a dummy variable that is 1 if the manager has a PhD, 0 else. Manager tenure measures the years passed since the manager began managing a given fund. Log of net assets denotes the natural logarithm of the net assets of the fund's oldest share class. Net expense ratio stands for annual report net expense ratio of the fund's oldest share class. Fund age is the years since inception of the mutual fund. The variables Recession 1990, Recession 2001, Recession 2007, Recession 2020, refer to their respective recession periods, as reported by the FRED. Recessions aggregates these time periods into a single variable. Observations are fund-months.

| | Excess return | |
|---|---|---|
| | (1) | (2) |
| Gender | 0.0083 | 0.0081 |
| | (0.0238) | (0.0238) |
| Gender × Recessions | -0.1444* | |
| | (0.0753) | |
| Gender × Recession 1990 | | -0.0712 |
| | | (0.1084) |
| Gender × Recession 2001 | | -0.5951*** |
| | | (0.1782) |
| Gender × Recession 2007 | | 0.0212 |
| | | (0.0894) |
| Gender × Recession 2020 | | 0.6749** |
| | | (0.3244) |
| Recessions | 0.0658*** | |
| | (0.0233) | |
| Recession 1990 | | 0.0059 |
| | | (0.0362) |
| Recession 2001 | | -0.0582 |
| | | (0.0595) |
| Recession 2007 | | 0.1868*** |
| | | (0.0307) |
| Recession 2020 | | -0.2120** |
| | | (0.0941) |
| Constant | -0.0590 | -0.0662 |
| | (0.0817) | (0.0816) |
| *Controls* | | |
| Manager characteristics | Yes | Yes |
| Fund characteristics | Yes | Yes |
| *Fixed effects* | No | No |
| Observations | 221,743 | 221,743 |
| $R^2$ | 0.00133 | 0.00172 |

*Heteroskedasticity-robust standard errors in parentheses*
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

## 3.4 Gender Differences in Mutual Fund Manager Performance During Diverse Market Circumstances

In order to acquire a more detailed understanding of how female fund managers perform during specific market conditions, and whether they can "time" them, we construct measures based on the level movements of the S&P 500 and illustrate them on Figure 2. To identify extremely good (bad) months of the market, we define Peaks (Valleys) as the month of local maxima (minima) of the S&P 500's price. We specify time periods leading up to a Peak (Valley), but without including the extrema, as Increasing (Decreasing) market and create dummy variables indicating the presence of each of the described market movements. Similarly to Equation (2), we interact these dummies accounting for these specific months with the gender variable. The output of these specifications are summarized in Table 6. In Model 1, we incorporate only the Peak and Valley measures and observe that female fund managers have significantly higher performance of nearly 17 bp during the outstandingly good months of the S&P 500. However, their excess returns do not deviate from that of males during the lowest months of the market. On the other hand, during increasing periods of the market females deliver excess returns that are indifferent from that of males. In the course of downward market tendencies female fund managers even significantly lag behind their male counterparts, by 18.19 bp monthly on average. This result intuitively contradicts the perception of female risk-aversion. The gender coefficient remains insignificantly different from zero in case of both specifications, supporting our previous results that the performance of female fund managers do not deviate from that of males after controlling for fund characteristics.

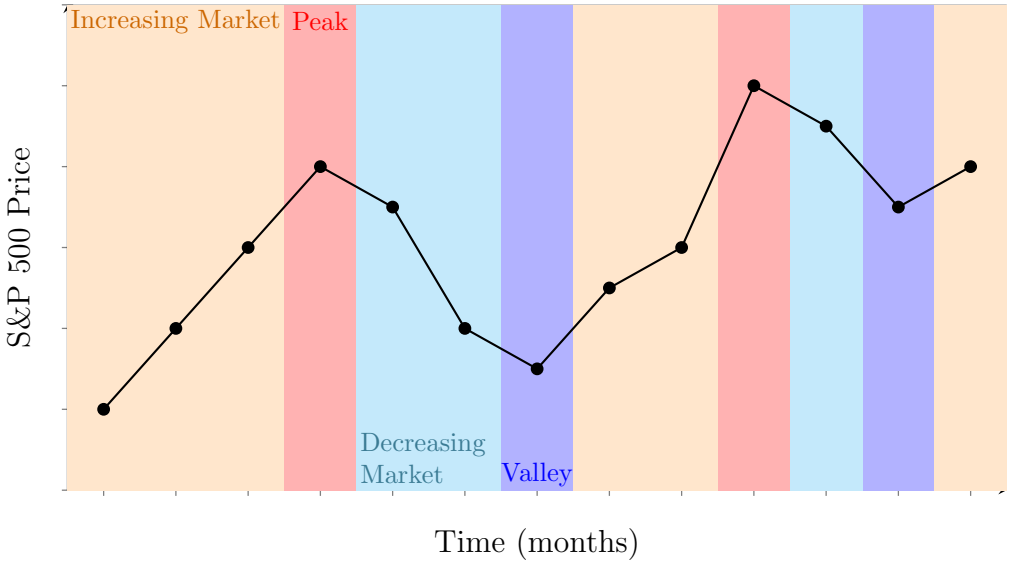
**Table 6: Gender Differences in Manager Performance During Diverse Market Circumstances**

This table shows the estimates of mutual fund excess return over the market (proxied by the S&P 500) regressed on manager and fund characteristics, measured in percentage points, including variables based on the market circumstances and interaction terms. Gender is a dummy variable that is 1 if the manager is female, 0 if male. Ivy League undergraduate is a dummy variable that takes the value 1 if the manager completed undergraduate studies in an Ivy League university, 0 if not. Ivy League graduate is a dummy variable that is 1 if the manager completed graduate studies in an Ivy League university, 0 else. Non-Ivy League graduate is a dummy variable that is 1 if the manager completed graduate studies in a non-Ivy League university, 0 otherwise. CFA or similar is a dummy variable that is 1 if the manager obtained the Chartered Financial Analyst (CFA) or similar designation, 0 if not. MBA is a dummy variable that is 1 if the manager has an MBA, 0 otherwise. PhD is a dummy variable that is 1 if the manager has a PhD, 0 else. Manager tenure measures the years passed since the manager began managing a given fund. Log of net assets denotes the natural logarithm of the net assets of the fund's oldest share class. Net expense ratio stands for annual report net expense ratio of the fund's oldest share class. Fund age is the years since inception of the mutual fund. Peaks and valleys are the local extrema of the S&P500's returns. Increasing market (Decreasing market) refers to times between a Valley and a Peak (Peak and a Valley). Observations are fund-months.

| | Excess return | |
|---|---|---|
| | (1) | (2) |
| Gender | -0.0394 | 0.0431 |
| | (0.0253) | (0.0453) |
| Peak × Gender | 0.1697** | |
| | (0.0663) | |
| Valley × Gender | -0.0065 | |
| | (0.0711) | |
| Increasing market × Gender | | -0.0042 |
| | | (0.0551) |
| Decreasing market × Gender | | -0.1819*** |
| | | (0.0612) |
| Peak | 0.2034*** | |
| | (0.0199) | |
| Valley | 0.0032 | |
| | (0.0210) | |
| Increasing market | | -0.0876*** |
| | | (0.0164) |
| Decreasing market | | -0.1250*** |
| | | (0.0182) |
| Constant | -0.0689 | 0.0281 |
| | (0.0818) | (0.0822) |
| *Controls* | | |
| Manager characteristics | Yes | Yes |
| Fund characteristics | Yes | Yes |
| *Fixed effects* | No | No |
| Observations | 221,743 | 221,743 |
| $R^2$ | 0.00202 | 0.00168 |

*Heteroskedasticity-robust standard errors in parentheses*
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

**Figure 2: Identifying Market Conditions**
This figure illustrates how we define certain market conditions based on the monthly price level movements of the S&P 500. Peaks (valleys) are identified as the month of its local maxima (local minima), with a minimum threshold of 15. Time periods leading up to a peak (valley) are defined as an increasing (decreasing) market. In both cases, the peak and valley months are excluded from the two market trends.




## 3.5 The Role of Unobservable Manager Education on Mutual Fund Performance

Due to the construction of our education-related manager variables and the potential attenuation bias it might generate, we need to discuss how the lack of available information about fund managers' education affects our results. Therefore, we create a missing education variable, set to be 1 for managers for whom we could not retrieve information on at least one level of their education and 0 otherwise. The additional goal of this analysis is to confirm our presumption, that as mutual fund managers tend to promote their academic achievements on all possible platforms, it is reasonable to construct our education-related variables in a way that they take the value of 1, if the fund manager acquired that title, and be 0 if we find no information about them possessing that level of education, assuming they did not attain it. We expand our two main specifications (Model 3 in Table 3 and in Table 4) with the missing education variable and present the regression outputs in Table 7. Our results on the role of gender on excess fund returns remain virtually unchanged. Although the female underperformance still exists when using only manager-specific controls, it is eliminated by

incorporating variables of fund features. The rest of the coefficients also remain vastly similar to the original specifications in both significance and magnitude, yet the missing education variable appears to be the strongest predictor of performance. While we do not intend to offer guidelines for selecting portfolio managers, these results suggest that investors could plausibly benefit from researching the educational backgrounds of their prospective fund managers. Nevertheless, the results in Table 7 foster the construction of our education-related variables.

**Table 7: Missing Education Variable**

This table shows the estimates of mutual fund excess return over the market (proxied by the S&P 500) regressed on manager and fund characteristics, measured in percentage points, in a sequential manner. Gender is a dummy variable that denotes the sex of the manager, being 1 if it is female, 0 if male. Ivy League undergraduate is a dummy variable that is 1 if the manager completed undergraduate studies in an Ivy League university, 0 if not. Ivy League graduate is a dummy variable that is 1 if the manager completed graduate studies in an Ivy League university, 0 else. Non-Ivy League graduate is a dummy variable that is 1 if the manager completed graduate studies in a non-Ivy League university, 0 otherwise. CFA or similar is a dummy variable that is 1 if the manager obtained the Chartered Financial Analyst (CFA) or similar designation, 0 if not. MBA is a dummy variable that is 1 if the manager has an MBA, 0 otherwise. PhD is a dummy variable that is 1 if the manager has a PhD, 0 else. Manager tenure measures the years passed since the manager began managing a given fund. Missing education takes is a dummy variable, which is 1 if at least one education-related variable is unobservable for a manager. Log of net assets denotes the natural logarithm of the net assets of the fund's oldest share class. Net expense ratio stands for annual report net expense ratio of the fund's oldest share class. Fund age is the years since inception of the mutual fund. Observations are fund-months. In each estimation time fixed effects are included.

| | Excess return | |
|---|---|---|
| | (1) | (2) |
| Gender | -0.0692*** | -0.0250 |
| | (0.0188) | (0.0194) |
| Ivy League undergraduate | 0.0024 | -0.0043 |
| | (0.0146) | (0.0157) |
| Non-Ivy League graduate | -0.0241 | -0.0324 |
| | (0.0203) | (0.0210) |
| Ivy League graduate | 0.0461** | 0.0200 |
| | (0.0231) | (0.0245) |
| CFA or similar | 0.0170 | -0.0033 |
| | (0.0109) | (0.0115) |
| MBA | 0.0471*** | 0.0411** |
| | (0.0180) | (0.0187) |
| PhD | 0.0113 | 0.0019 |
| | (0.0309) | (0.0320) |
| Manager tenure | -0.0054*** | -0.0022* |
| | (0.0010) | (0.0011) |
| Missing education | -0.1488*** | -0.1188*** |
| | (0.0220) | (0.0238) |
| Log of net assets | | 0.0149*** |
| | | (0.0034) |
| Net expense ratio | | -0.0720*** |
| | | (0.0196) |
| Fund age | | -0.0035*** |
| | | (0.0005) |
| *Time fixed effects* | Yes | Yes |
| Observations | 266,112 | 221,743 |
| $R^2$ | 0.21123 | 0.22800 |

*Heteroskedasticity-robust standard errors in parentheses*
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

## 3.6 Risk Measures and Investment Style of Mutual Fund Managers

A natural progression from the analysis on how managerial characteristics affect mutual fund performance is studying their relationship to risk attributes and managing style measures. We regress annualized standard deviation, semi-deviation, beta, $R^2$, turnover ratio, skewness and kurtosis on our set of manager-specific variables.[13] The results of these regressions are summarized in Table 8. Dissonant with general perceptions, we find that both the standard deviation and semi-deviation of female fund managers are indifferent from that of males. However, we observe that female-led funds in our sample have higher beta, exceeding male-led funds by 0.01. Furthermore, female fund managers exhibit a lower selectivity, indicated by their 0.0083 higher $R^2$, implying their deviation from the market in asset allocation is more conservative. Female-led funds are characterized by 6.58% lower turnover ratio than their peers. That is, as reflected in the fewer trades executed, female portfolio managers tend to be less overconfindent than males, consistent with the findings of Barber and Odean (2001), Dwyer et al. (2002) and Niessen-Ruenzi and Ruenzi (2019). Although both skewness and kurtosis appears to be lower for female-overseen funds, the results are statistically insignificant. Therefore, we cannot conclude that their return distribution is markedly less peaked and tailed, with less extreme outliers than that of males.

The relationship between managerial characteristics and risk as well as investment style measures we observe is the following. Whereas Ivy League undergraduates do not deviate from undergraduates of less prestigious institutions in terms of these measures, they are characterized by a more skewed return distribution, with more potential upside gain. Both Ivy League and Non-Ivy League graduates tend to take on significantly lower volatility, with lower selectivity and the former group is also characterized by lower semi-deviation. CFA holders also appear to deviate less from the market in their portfolio holdings, and trade less, suggesting a more cautious investment strategy. Consistent with greater experience and smaller risk appetite, managers with longer tenure exhibit significantly lower standard deviation, semi-deviation, beta, $R^2$ and turnover ratio. Nevertheless, whereas results of our analysis on the effect of managerial and fund characteristics on performance are of substantial economic significance, the findings on risk and investment styles are predominantly marginal in that aspect.

[13] We calculate yearly standard deviation, semi-deviation, skewness and kurtosis only for those funds that have all 12 return observations in a year. Following the same restriction, the Beta and the $R^2$ are obtained from estimating the market model for each fund in each year. The turnover ratio is an annually available variable obtained from Morningstar. Thus, in this analysis, the observations are fund-years, which leads to the exclusion of managers, who did not oversee their funds for at least one calendar year.

## Table 8: Risk and Style Measures and Manager Characteristics

This table incorporates the estimates of regressing risk-related measures on gender and additional manager-related controls. SD denotes the annual standard deviation, calculated from monthly fund return, similarly to the Semi-deviation. The Beta and the $R^2$ are obtained from estimating the market model, for each year using monthly data. Turnover ratio is a yearly available percentage measure from Morningstar, quantifying the trading activity of a manager. It is calculated by taking the lesser of purchases of sales (except with securities that have a maturity less than one year) and dividing by the average monthly net asset. Skewness and Kurtosis are annual measures computed for each fund in the sample. All of these measures - except the turnover ratio - are calculated with the restriction that a fund has to have twelve return observation in a year, during the time the fund manager is in position. All of the risk and managing style measures are yearly. Gender is a dummy variable that is 1 if the manager is female, 0 if male. Ivy League undergraduate is a dummy variable that takes the value 1 if the manager completed undergraduate studies in an Ivy League university, 0 if not. Ivy League graduate is a dummy variable that takes the value 1 if the manager completed graduate studies in an Ivy League university, 0 else. Non-Ivy League graduate is a dummy variable that is 1 if the manager completed graduate studies in a non-Ivy League university, 0 otherwise. CFA or similar is a dummy variable that is 1 if the manager obtained the Chartered Financial Analyst (CFA) or similar designation, 0 if not. MBA is a dummy variable that is 1 if the manager has an MBA, 0 otherwise. PhD is a dummy variable that takes the value 1 if the manager has a PhD, 0 else. Manager tenure measures the years passed since the manager began managing a given fund. Observations are fund-years. In each estimation time fixed effects are included.

| | SD | Semi-deviation | Beta | $R^2$ | Turnover ratio | Skewness | Kurtosis |
|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) |
| Gender | 0.0677 | 0.0323 | 0.0129* | 0.0083* | -6.581** | -0.0213 | -0.0230 |
| | (0.1405) | (0.0941) | (0.0077) | (0.0047) | (2.605) | (0.0158) | (0.0227) |
| Ivy League undergraduate | 0.0508 | 0.0388 | 0.0012 | -0.0043 | -1.546 | 0.0268** | -0.0118 |
| | (0.1036) | (0.0693) | (0.0058) | (0.0038) | (2.292) | (0.0120) | (0.0175) |
| Ivy League graduate | -0.4386*** | -0.2248** | 0.0021 | 0.0213*** | -8.954 | -0.0273 | -0.0027 |
| | (0.1567) | (0.1065) | (0.0089) | (0.0055) | (6.543) | (0.0188) | (0.0271) |
| Non-Ivy League graduate | -0.2447* | -0.1147 | 0.0050 | 0.0123** | -8.171 | -0.0098 | -0.0049 |
| | (0.1373) | (0.0934) | (0.0077) | (0.0048) | (6.877) | (0.0162) | (0.0231) |
| CFA or similar | -0.0294 | -0.0050 | 0.0038 | 0.0073*** | -11.40*** | 0.0063 | -0.0104 |
| | (0.0818) | (0.0542) | (0.0045) | (0.0028) | (2.713) | (0.0089) | (0.0128) |
| MBA | 0.1569 | 0.0604 | 0.0044 | -0.0064 | -5.431 | 0.0085 | -0.0237 |
| | (0.1258) | (0.0863) | (0.0071) | (0.0045) | (5.919) | (0.0154) | (0.0218) |
| PhD | -0.3053 | -0.1711 | 0.0127 | 0.0114 | -3.331 | -0.0085 | -0.0263 |
| | (0.2196) | (0.1504) | (0.0136) | (0.0080) | (9.161) | (0.0263) | (0.0377) |
| Manager tenure | -0.0356*** | -0.0257*** | -0.0017*** | -0.0006*** | -2.102*** | -0.0008 | $3.2 \times 10^{-5}$ |
| | (0.0069) | (0.0046) | (0.0004) | (0.0002) | (0.1900) | (0.0008) | (0.0011) |
| Time fixed effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Observations | 18,774 | 18,774 | 18,774 | 18,774 | 16,944 | 18,774 | 18,774 |
| $R^2$ | 0.55494 | 0.60355 | 0.19618 | 0.37153 | 0.01995 | 0.05681 | 0.04334 |

*Heteroskedasticity-robust standard errors in parentheses*
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

# 4 Conclusion

Incentivized by a Goldman Sachs report attracting media attention due to stating female fund managers outperformed their male counterparts in the first eight months of 2020, we investigate how gender and other managerial attributes influence mutual fund performance. Our analysis covers the period from 1984 to 2022 and is built on a partially hand-collected dataset, allowing us to draw comprehensive inference on the topic. We document that while the education profiles of mutual fund managers by gender are fairly similar, smaller proportion of females have graduate degrees from universities that are not Ivy League, and their tenures are of shorter duration, on average.

Testing the influence of gender on excess return in a univariate regression setup, then extended with manager-specific independent variables in a multivariate setting, we find that female fund managers significantly underperform their male colleagues. This result is consistent with the outcomes of studies conducted on samples representative of the population (see, e.g. Jianakoplos and Bernasek, 1998) and with widespread beliefs about the "inferior money managing abilities" of females. However, controlling for fund-specific variables eliminates the statistical significance of the gender coefficient, leading to the conclusion that the excess return of female-led funds does not deviate from that of overseen by males. This observation is analogous with the idea that in the competitive field of fund management, female managers have to be similarly well-educated as their peers (see, for instance Atkinson et al., 2003; Welch and Wang, 2013). It also points in the direction, that the characteristics of mutual funds have stronger implication on performance than the attributes of their managers. In addition, we observe that whereas the prestige of fund managers' undergraduate institution, holding a PhD or a CFA designation does not affect their achieved excess returns, graduate studies attained in an Ivy League university, as well as having an MBA imply enhanced performance.

Delving deeper into the performance of female fund managers throughout the business cycle, we report that although during the last four recession periods, on aggregate, they significantly lagged behind males in terms of performance, this is driven by their poor excess returns amid the economic fallout of the Internet Bubble. Notably, female mutual fund managers significantly surpassed by more than 67 bp their male counterparts' excess returns during the months of the COVID-induced recession. Although female-led funds in our sample outperformed male-led ones during the exceptionally good months of the market, they fared worse in periods of market slumps. Consequently, as the comparative performance of male and female fund managers varies substantially under different market and economic conditions,

these effects appear to largely offset each other. Thus, these observations support our finding that, in the long-run, there are no performance deviations among genders. Correspondingly, for the majority of risk measures we study, we observe no dissimilarities in the case of female-led funds. Nevertheless, we report that female fund managers take on marginally higher systematic risk and exhibit lower selectivity. In line with Barber and Odean (2001), Dwyer et al. (2002), and Niessen-Ruenzi and Ruenzi (2019), we find evidence that female fund managers are less overconfident.

Our study yields broad and substantial implications. Identifying which managerial attributes are associated with higher performance is of unequivocal importance for investors, as supported by the immense amount and variety of information available about fund managers. We contribute to dispelling the presumption of inferior performance of female-led funds, thereby fostering the mitigation of gender-based prejudice in the delegated asset management industry. Moreover, our results also conduce to unraveling the puzzle of the historically low proportion of females among mutual fund managers. Finally, our findings shed light on the potential strategic placement of female fund managers within their families, paving the way for further research.

# References


Aggarwal, R. and Boyson, N. M. (2016). The performance of female hedge fund managers. *Review of Financial Economics*, 29:23–36.

Angelidis, T., Giamouridis, D., and Tessaromatis, N. (2013). Revisiting mutual fund performance evaluation. *Journal of Banking & Finance*, 37(5):1759–1776.

Atkinson, S. M., Baird, S. B., and Frye, M. B. (2003). Do female mutual fund managers manage differently? *Journal of Financial Research*, 26(1):1–18.

Babalos, V., Caporale, G. M., and Philippas, N. (2015). Gender, style diversity, and their effect on fund performance. *Research in International Business and Finance*, 35:57–74.

Barber, B. M. and Odean, T. (2001). Boys will be boys: Gender, overconfidence, and common stock investment. *The Quarterly Journal of Economics*, 116(1):261–292.

Bliss, R. T. and Potter, M. E. (2002). Mutual fund managers: Does gender matter? *The Journal of Business and Economic Studies*, 8(1):1.

Brown, S. J., Goetzmann, W., Ibbotson, R. G., and Ross, S. A. (1992). Survivorship bias in performance studies. *The Review of Financial Studies*, 5(4):553–580.

Brown, S. J. and Goetzmann, W. N. (1995). Performance persistence. *The Journal of Finance*, 50(2):679–698.

Byrnes, J. P., Miller, D. C., and Schafer, W. D. (1999). Gender differences in risk taking: A meta-analysis. *Psychological Bulletin*, 125(3):367.

Carhart, M. M., Carpenter, J. N., Lynch, A. W., and Musto, D. K. (2002). Mutual fund survivorship. *The Review of Financial Studies*, 15(5):1439–1463.

Chevalier, J. and Ellison, G. (1999). Are some mutual fund managers better than others? Cross-sectional patterns in behavior and performance. *The Journal of Finance*, 54(3):875–899.

Clare, A., Sherman, M., O'Sullivan, N., Gao, J., and Zhu, S. (2022). Manager characteristics: Predicting fund performance. *International Review of Financial Analysis*, 80:102049.

Dwyer, P. D., Gilkeson, J. H., and List, J. A. (2002). Gender differences in revealed risk taking: evidence from mutual fund investors. *Economics Letters*, 76(2):151–158.

Elton, E. J., Gruber, M. J., and Blake, C. R. (1996). Survivorship bias and mutual fund performance. *The Review of Financial Studies*, 9(4):1097–1120.

Fallor, E. (2020). Female-managed mutual funds outperforming in 2020 – Goldman Sachs report. *S&P Global*. Available at: https://www.spglobal.com/marketintelligence/en/news-insights/latest-news-headlines/female-managed-mutual-funds-outperforming-in-2020-8211-goldman-sachs-report-60153006 (Accessed: 25 October, 2024).

Flood, C. (2020). Female-managed US funds outperform all-male rivals. *Financial Times*. Available at: https://www.ft.com/content/021a1b60-a5fa-42ad-83b4-482268cac7ac (Accessed: 25 October, 2024).

Golec, J. H. (1996). The effects of mutual fund managers' characteristics on their portfolio performance, risk and fees. *Financial Services Review*, 5(2):133–147.

Gottesman, A. A. and Morey, M. R. (2006). Manager education and mutual fund performance. *Journal of Empirical Finance*, 13(2):145–182.

Investment Company Institute (2024). Factbook 2024.

Jianakoplos, N. A. and Bernasek, A. (1998). Are women more risk averse? *Economic Inquiry*, 36(4):620–630.

Kaur, I. (2017). Performance of equity mutual fund and educational credentials of fund manager. *Vision*, 21(1):23–34.

Lehmann, B. N. and Modest, D. M. (1987). Mutual fund performance evaluation: A comparison of benchmarks and benchmark comparisons. *The Journal of Finance*, 42(2):233–265.

Niessen-Ruenzi, A. and Ruenzi, S. (2019). Sex matters: Gender bias in the mutual fund industry. *Management Science*, 65(7):3001–3025.

Poole, B. S., Bianco, C. A., Giroux, C., et al. (2006). Mutual fund management and fund performance. *Journal of Business & Economics Research (JBER)*, 4(1).

Rau, P. R. and Wang, J. (2022). Do investors pay less attention to women (fund managers)? *Available at SSRN 3926970*.

Stevens, P. (2020). Women-managed funds are outperforming as tech exposure pays off, Goldman finds. *CNBC*. Available at: https://www.cnbc.com/2020/08/31/women-managed-funds-are-outperforming-as-tech-exposure-pays-off-goldman-finds.html (Accessed: 25th October, 2024).

Tolikas, K. and Callonnec, M. (2023). Managerial characteristics and performance of eurozone mutual funds. *Journal of Financial Research*, 46(4):925–947.

U.S. Bureau of Labor Statistics (2022). BLS Report 1097. Available at: https://www.bls.gov/opub/reports/womens-databook/2022/ (Accessed: 31 March, 2025).

Welch, S. and Wang, Y. (2013). Is manager gender important in the performance of mutual funds? *College of Saint Benedict Saint John's University Accounting and Finance Faculty Publications*, 6.

# 5 Appendix

## 5.1 Robustness

The choice of benchmark for performance evaluation has been a long debated topic in the mutual fund literature (see, e.g. Lehmann and Modest, 1987; Angelidis et al., 2013). To address this, we reestimate our main results using the Morningstar Analyst Benchmarks instead of the S&P 500. These are Russell return indices obtained from Eikon Datastream, corresponding to the Morningstar Category[14] of each mutual fund. As illustrated in Table A-1 and Table A-2, our results are virtually unaffected by the change in benchmark.

In our main analysis, with the aim of preserving as much data as possible, we do not limit our estimation to using only the observations of managerial attributes that do not lack fund-specific variables. To ensure that the availability of these variables does not influence our results, we reestimate Model 3 of Table 3 and of Table 4. As observable in Model 1 of Table A-3 our main results are robust to reducing the sample to observations with complete fund-related variables.

Given the nature of mutual fund data, time dependence cannot be ruled out. To account for the possibility of autocorrelation, we report our main results with Newey-West standard errors in Table A-4 and Table A-5. Although these standard errors are marginally higher than their heteroskedasticity-robust counterparts, significance levels remain similar.

[14] Morningstar Category is a size and value based style measure of mutual funds, reflecting their portfolio holdings.

**Table A-1: Manager Characteristics and Mutual Fund Performance - Alternative Benchmark**

This table summarizes the estimates of mutual fund excess return over the market (proxied by the Russell Index corresponding to each fund's Morningstar Category) regressed on manager characteristics, measured in percentage points, in a sequential manner. Gender is a dummy variable that is 1 if the manager is female, 0 if male. Ivy League undergraduate is a dummy variable that takes the value 1 if the manager completed undergraduate studies in an Ivy League university, 0 if not. Ivy League graduate is a dummy variable that takes the value 1 if the manager completed graduate studies in an Ivy League university, 0 else. Non-Ivy League graduate is a dummy variable that takes the value 1 if the manager completed graduate studies in a non-Ivy League university, 0 otherwise. CFA or similar is a dummy variable that is 1 if the manager obtained the Chartered Financial Analyst (CFA) or similar designation, 0 if not. MBA is a dummy variable that is 1 if the manager has an MBA, 0 otherwise. PhD is a dummy variable that takes the value 1 if the manager has a PhD, 0 else. Manager tenure measures the years passed since the manager began managing a given fund. Observations are fund-months. In each estimation time fixed effects are included.

| | Excess return | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| Gender | -0.0563*** | -0.0616*** | -0.0691*** |
| | (0.0187) | (0.0188) | (0.0188) |
| Ivy League undergraduate | 0.0149 | 0.0160 | 0.0191 |
| | (0.0145) | (0.0145) | (0.0145) |
| Non-Ivy League graduate | 0.0706*** | 0.0241 | 0.0244 |
| | (0.0124) | (0.0193) | (0.0193) |
| Ivy League graduate | 0.1361*** | 0.0885*** | 0.0930*** |
| | (0.0151) | (0.0223) | (0.0223) |
| CFA or similar | | 0.0329*** | 0.0306*** |
| | | (0.0110) | (0.0110) |
| MBA | | 0.0492*** | 0.0454** |
| | | (0.0179) | (0.0179) |
| PhD | | 0.0195 | 0.0159 |
| | | (0.0309) | (0.0309) |
| Manager tenure | | | -0.0056*** |
| | | | (0.0009) |
| *Time fixed effects* | Yes | Yes | Yes |
| Observations | 266,112 | 266,112 | 266,112 |
| $R^2$ | 0.21090 | 0.21096 | 0.21106 |

*Heteroskedasticity-robust standard errors in parentheses*
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

**Table A-2: Manager and Fund Characteristics and Mutual Fund Performance - Alternative Benchmark**

This table summarizes the estimates of mutual fund excess return over the market (proxied by the Russell Index corresponding to each fund's Morningstar Category) regressed on manager and fund characteristics, measured in percentage points, in a sequential manner. Gender is a dummy variable that is 1 if the manager is female, 0 if male. Ivy League undergraduate is a dummy variable that takes the value 1 if the manager completed undergraduate studies in an Ivy League university, 0 if not. Ivy League graduate is a dummy variable that is 1 if the manager completed graduate studies in an Ivy League university, 0 else. Non-Ivy League graduate is a dummy variable that is 1 if the manager completed graduate studies in a non-Ivy League university, 0 otherwise. CFA or similar is a dummy variable that is 1 if the manager obtained the Chartered Financial Analyst (CFA) or similar designation, 0 if not. MBA is a dummy variable that is 1 if the manager has an MBA, 0 otherwise. PhD is a dummy variable that is 1 if the manager has a PhD, 0 else. Manager tenure measures the years passed since the manager began managing a given fund. Observations are fund-months. In each estimation time fixed effects are included.

| | Excess return | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| Gender | -0.0138 | -0.0158 | -0.0216 |
| | (0.0160) | (0.0161) | (0.0161) |
| Ivy League undergraduate | 0.0091 | 0.0100 | 0.0114 |
| | (0.0136) | (0.0137) | (0.0137) |
| Non-Ivy League graduate | 0.0321*** | 0.0175 | 0.0171 |
| | (0.0117) | (0.0185) | (0.0185) |
| Ivy League graduate | 0.0703*** | 0.0546** | 0.0559*** |
| | (0.0147) | (0.0214) | (0.0214) |
| CFA or similar | | 0.0098 | 0.0087 |
| | | (0.0103) | (0.0103) |
| MBA | | 0.0172 | 0.0157 |
| | | (0.0171) | (0.0172) |
| PhD | | -0.0197 | -0.0214 |
| | | (0.0306) | (0.0307) |
| Manager tenure | | | -0.0037*** |
| | | | (0.0010) |
| Log of net assets | 0.0110*** | 0.0109*** | 0.0119*** |
| | (0.0032) | (0.0032) | (0.0033) |
| Net expense ratio | -0.0721*** | -0.0718*** | -0.0703*** |
| | (0.0202) | (0.0202) | (0.0204) |
| Fund age | -0.0031*** | -0.0031*** | -0.0026*** |
| | (0.0004) | (0.0004) | (0.0004) |
| *Time fixed effects* | Yes | Yes | Yes |
| Observations | 221,414 | 221,414 | 221,414 |
| $R^2$ | 0.04586 | 0.04587 | 0.04593 |

*Heteroskedasticity-robust standard errors in parentheses*
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

**Table A-3: Manager and Fund Characteristics and Mutual Fund Performance - Restricted Number of Observations**

This table shows the estimates of mutual fund excess return over the market (proxied by the S&P 500) regressed on manager and fund characteristics, measured in percentage points, in a sequential manner. Gender is a dummy variable that is 1 if the manager is female, 0 if male. Ivy League undergraduate is a dummy variable that takes the value 1 if the manager completed undergraduate studies in an Ivy League university, 0 if not. Ivy League graduate is a dummy variable that takes the value 1 if the manager completed graduate studies in an Ivy League university, 0 else. Non-Ivy League graduate is a dummy variable that takes the value 1 if the manager completed graduate studies in a non-Ivy League university, 0 otherwise. CFA or similar is a dummy variable that is 1 if the manager obtained the Chartered Financial Analyst (CFA) or similar designation, 0 if not. MBA is a dummy variable that is 1 if the manager has an MBA, 0 otherwise. PhD is a dummy variable that takes the value 1 if the manager has a PhD, 0 else. Manager tenure measures the years passed since the manager began managing a given fund. Observations are fund-months. In both estimations time fixed effects are included. The sample for Model 1 is reduced to exclude fund-months where not all three fund specific variable were available.

| | Excess return | |
|---|---|---|
| | (1) | (2) |
| Gender | -0.0382** | -0.0253 |
| | (0.0194) | (0.0194) |
| Ivy League undergraduate | 0.0116 | 0.0079 |
| | (0.0155) | (0.0155) |
| Non-Ivy League graduate | 0.0135 | 0.0046 |
| | (0.0201) | (0.0200) |
| Ivy League graduate | 0.0755*** | 0.0561** |
| | (0.0235) | (0.0236) |
| CFA or similar | 0.0135 | 0.0067 |
| | (0.0115) | (0.0115) |
| MBA | 0.0466** | 0.0398** |
| | (0.0187) | (0.0187) |
| PhD | 0.0014 | 0.0054 |
| | (0.0321) | (0.0320) |
| Manager tenure | -0.0047*** | -0.0023** |
| | (0.0010) | (0.0011) |
| Log of net assets | | 0.0148*** |
| | | (0.0034) |
| Net expense ratio | | -0.0724*** |
| | | (0.0196) |
| Fund age | | -0.0035*** |
| | | (0.0005) |
| *Time fixed effects* | Yes | Yes |
| Observations | 221,743 | 221,743 |
| $R^2$ | 0.22683 | 0.22789 |

*Heteroskedasticity-robust standard errors in parentheses*
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

**Table A-4: Manager Characteristics and Mutual Fund Performance - Newey-West Standard Errors**

This table shows the estimates of mutual fund excess return over the market (proxied by the S&P 500) regressed on manager characteristics, measured in percentage points, in a sequential manner. Gender is a dummy variable that is 1 if the manager is female, 0 if male. Ivy League undergraduate is a dummy variable that takes the value 1 if the manager completed undergraduate studies in an Ivy League university, 0 if not. Ivy League graduate is a dummy variable that takes the value 1 if the manager completed graduate studies in an Ivy League university, 0 else. Non-Ivy League graduate is a dummy variable that takes the value 1 if the manager completed graduate studies in a non-Ivy League university, 0 otherwise. CFA or similar is a dummy variable that is 1 if the manager obtained the Chartered Financial Analyst (CFA) or similar designation, 0 if not. MBA is a dummy variable that is 1 if the manager has an MBA, 0 otherwise. PhD is a dummy variable that takes the value 1 if the manager has a PhD, 0 else. Manager tenure measures the years passed since the manager began managing a given fund. Observations are fund-months. In both estimations time fixed effects are included.

| | Excess return | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| Gender | -0.0563*** | -0.0616*** | -0.0691*** |
| | (0.0210) | (0.0211) | (0.0211) |
| Ivy League undergraduate | 0.0149 | 0.0160 | 0.0191 |
| | (0.0162) | (0.0163) | (0.0162) |
| Non-Ivy League graduate | 0.0706*** | 0.0241 | 0.0244 |
| | (0.0137) | (0.0218) | (0.0218) |
| Ivy League graduate | 0.1361*** | 0.0885*** | 0.0930*** |
| | (0.0165) | (0.0251) | (0.0250) |
| CFA or similar | | 0.0329*** | 0.0306** |
| | | (0.0122) | (0.0121) |
| MBA | | 0.0492** | 0.0454** |
| | | (0.0203) | (0.0203) |
| PhD | | 0.0195 | 0.0159 |
| | | (0.0341) | (0.0341) |
| Manager tenure | | | -0.0056*** |
| | | | (0.0010) |
| *Time fixed effects* | Yes | Yes | Yes |
| Observations | 266,112 | 266,112 | 266,112 |
| $R^2$ | 0.21090 | 0.21096 | 0.21106 |

*Newey-West standard errors in parentheses*
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*

**Table A-5: Manager and Fund Characteristics and Mutual Fund Performance - Newey-West Standard Errors**

This table summarizes the estimates of mutual fund excess return over the market This table shows the estimates of mutual fund excess return over the market (proxied by the S&P 500) regressed on manager and fund characteristics, measured in percentage points, in a sequential manner. Gender is a dummy variable that is 1 if the manager is female, 0 if male. Ivy League undergraduate is a dummy variable that takes the value 1 if the manager completed undergraduate studies in an Ivy League university, 0 if not. Ivy League graduate is a dummy variable that takes the value 1 if the manager completed graduate studies in an Ivy League university, 0 else. Non-Ivy League graduate is a dummy variable that takes the value 1 if the manager completed graduate studies in a non-Ivy League university, 0 otherwise. CFA or similar is a dummy variable that is 1 if the manager obtained the Chartered Financial Analyst (CFA) or similar designation, 0 if not. MBA is a dummy variable that is 1 if the manager has an MBA, 0 otherwise. PhD is a dummy variable that takes the value 1 if the manager has a PhD, 0 else. Manager tenure measures the years passed since the manager began managing a given fund. Observations are fund-months. In both estimations time fixed effects are included.

| | Excess return | | |
|---|---|---|---|
| | (1) | (2) | (3) |
| Gender | -0.0192 | -0.0216 | -0.0253 |
| | (0.0208) | (0.0208) | (0.0208) |
| Ivy League undergraduate | 0.0068 | 0.0071 | 0.0079 |
| | (0.0173) | (0.0174) | (0.0174) |
| Non-Ivy League graduate | 0.0393*** | 0.0049 | 0.0046 |
| | (0.0142) | (0.0221) | (0.0221) |
| Ivy League graduate | 0.0925*** | 0.0552** | 0.0561** |
| | (0.0179) | (0.0262) | (0.0262) |
| CFA or similar | | 0.0075 | 0.0067 |
| | | (0.0127) | (0.0127) |
| MBA | | 0.0408** | 0.0398* |
| | | (0.0208) | (0.0208) |
| PhD | | 0.0065 | 0.0054 |
| | | (0.0354) | (0.0355) |
| Manager tenure | | | -0.0023** |
| | | | (0.0012) |
| Log of net assets | 0.0144*** | 0.0142*** | 0.0148*** |
| | (0.0035) | (0.0035) | (0.0035) |
| Net expense ratio | -0.0737*** | -0.0734*** | -0.0724*** |
| | (0.0178) | (0.0178) | (0.0179) |
| Fund age | -0.0038*** | -0.0038*** | -0.0035*** |
| | (0.0005) | (0.0005) | (0.0005) |
| *Time fixed effects* | Yes | Yes | Yes |
| Observations | 221,743 | 221,743 | 221,743 |
| $R^2$ | 0.22786 | 0.22788 | 0.22789 |

*Newey-West standard errors in parentheses*
*Signif. Codes: ***: 0.01, **: 0.05, *: 0.1*