Do You Need to Be A Quant to Be A Better Hedge Fund Manager?

A. Hassouni

Centre E. Bernheim, Solvay Brussels School of Economics and Management, Université Libre de Bruxelles, av. F.D. Roosevelt 50, CP 139, B-1050 Brussels, Belgium.

ahassoun@ulb.ac.be

H. Pirotte

Centre E. Bernheim, Solvay Brussels School of Economics and Management, Université Libre de Bruxelles, av. F.D. Roosevelt 50, CP 114/05, B-1050 Brussels, Belgium.

hpirotte@ulb.ac.be

Do You Need to Be A Quant to Be A Better Hedge Fund Manager?

This version: December 4, 2018

This paper examines the relationship between managers' educational background and hedge fund performance. Extending the analysis of Chevalier and Ellison (1999a), we investigate whether managers with a quantitative academic background outperform managers without a quantitative academic background. The paper looks at two categories of hedge funds (the equity market neutral funds and the funds of hedge funds) and documents the existence of some differential ability among hedge fund managers in generating raw and risk-adjusted returns, which depends on the category to which the hedge fund belongs. More specifically, we find that managers with a quantitative background tend to earn higher raw and risk-adjusted returns in the case of the equity market neutral funds. However, the picture reverses when we consider the funds of hedge funds. These findings are robust to the different methods that are used to measure hedge fund risk-adjusted performance.

1 Introduction

Selecting the right candidate for a specific role is challenging in any business. And when it comes to the investment industry, this is becoming even harder. In the past decade, the investment industry has witnessed an outstanding growth of quantitative strategies, ranging from low-cost exchange traded funds to highly priced hedge funds. This rapid growth of quantitative investing and the growing idea that the industry will be dominated by quantitative analysts who will be developing trading algorithms has made the quants very appealing in the industry.

In the present paper, we focus on the hedge fund industry and we analyze whether a hedge fund manager with a quantitative background is likely to outperform a

manager without a quantitative background. More specifically, we looked at the
manager's academic specialization at his/her undergraduate institution and assess
whether managers who majored in a quantitative academic program exhibit
superior performance as compared to managers who majored in a non-quantitative
academic program.

This paper is indeed not the first to investigate the relationship between fund
performance and managers' education. Prior research underlines two main
educational characteristics that have an impact on fund performance. On the one
hand, Chevalier and Ellison (1999) and Li, Zhang and Zhao (2011) document a
positive and significant relationship between the average SAT (Scholastic Aptitude
Test) scores of the undergraduate institution from which the manager graduated
and the performance of his/her fund. On the other hand, Golec (1996) and
Gottesman and Morey (2006) find that managers who hold an MBA degree
outperform managers without an MBA degree.

In this paper we extend the previous studies by analyzing the role played by the
fund manager's academic specialization at his/her undergraduate institution on
hedge fund performance. More specifically, in addition to the manager
characteristics that were considered in the previous research we also analyze the
influence that the academic specialization of the manager at his/her undergraduate
institution has on hedge fund performance. If one thinks that hedge fund managers
are qualified managers whose job consists of overseeing and implementing refined
investment strategies, it is reasonable to conjecture that managers who are
equipped with specific quantitative and analytical skills might be in an advantage
as compared to their counterparts. The idea underlying this research question is
that specialized programs provide managers with specific knowledge and equip
them with specialized tools to make investment decisions.

The manager characteristics that we consider in the present analysis include the
field of study in which the manager specialized at his/her undergraduate institution,
the average SAT score at the manager's undergraduate institution, whether the

3

manager holds an MBA degree, a Ph.D., a non-MBA master degree, or a CFA[1] or CAIA[2] certificate, and the number of years the manager has worked.

To conduct our analyses, we use a sample of 265 hedge fund managers who played the role of the principal manager for an equity market neutral[3] fund or a fund of hedge fund for some part of the 1994–2013 period. The analyses are conducted both for the total sample of hedge funds and for the two categories of hedge funds separately. The reason why we make a distinction between the two categories of hedge funds (equity market neutral funds and funds of hedge funds) is that we hypothesize that the impact of managers with a quantitative academic background might be different depending on whether the category to which the hedge fund belongs is quantitative or not. More specifically, we first perform our analysis on the whole sample of hedge funds. Then, we conduct the analysis separately for the equity market neutral funds, which is a very quantitative category as it requires the use of refined quantitative portfolio construction technics. Finally, we run the same analyses on the funds of hedge funds, which are considered as less demanding in terms of quantitative technics. Focusing on the sample of hedge funds and considering the period from 1994 to 2013, we test the following hypothesis:

Hypothesis 1: "Hedge fund managers who graduated in a quantitative academic program outperform hedge fund managers who graduated in a non-quantitative academic program".

Our approach differs from previous studies in different ways. First, the data used in the present analysis is characterized by a higher granularity. The characteristics of the managers are hand-collected mainly from the managers' LinkedIn profiles, which allow us to identify very specific details about the managers' academic background, professional career and professional qualifications. Second, similar to the previous analyses, we examine the selectivity of the undergraduate institution attended by the manger, by mean of the average composite SAT score. However, we extend this investigation by looking at the manager's specialization in his/her

---

[1] The Chartered Financial Analyst (CFA) certification is a professional credential provided by the American-based CFA institute to candidates who succeed in completing the CFA program.

[2] The Chartered Alternative Investment Analyst (CAIA) certification is a professional credential provided by the CAIA association to candidates who succeed the CAIA program on alternative investments.

[3] Equity Market Neutral hedge funds are also referred to as statistical arbitrage hedge funds.

undergraduate studies. Finally, our analyses are conducted over a longer sample period (January 1994 - December 2013) that is characterized by bullish periods and at least three market collapses (the LTCM crisis around October 1998, the bursting of the IT bubble around April 2000 and the 2008 financial crisis that started in September 2008).

Using the above specifications, we find that managers with a quantitative background have a different impact on various aspects of fund performances depending on the category to which the hedge fund belongs. More specifically, the analyses show that managers with a quantitative background deliver higher risk-adjusted returns, higher average excess returns and higher volatility in the case of the equity market neutral hedge funds. In addition, we find that mangers with a quantitative background who attend higher-SAT undergraduate institutions perform better than their counterparts. However, in the case of the funds of hedge funds, managers with a quantitative background tend to generate lower risk-adjusted returns, lower average excess returns and higher volatility than those without a quantitative background.

Our findings with respect to the two educational variables that were studied in the literature are equipoised. Concerning the possession of an MBA degree, our findings are in line with what has been found in the literature. However, for the SAT score of the managers' undergraduate institution, our findings are at odd with what has been shown in the previous studies. For the remaining educational and professional characteristics of the hedge fund managers, the results are not statistically significant, but the sings of the coefficient estimates remain generally the same across the analyses.

The remainder of the paper unfolds as follows. In the following section, we give an overview of the literature that analyzes the relationship between hedge fund performance and the academic background of the managers. In section 3, we outline our data of hedge fund returns and manager characteristics. In section 4, we outline the measures of risk-adjusted performance that we use to conduct the analyses. In section 5, we analyze whether managers with a quantitative background exhibit a differential ability in terms of raw and risk-adjusted returns as well as risk-taking

behavior. In section 6, we analyze the impact of managers with a quantitative background who attended higher-SAT institutions. In section 7, we provide our concluding remarks.

2 Literature Review

Golec (1996) is the first paper to examine whether mutual fund managers' characteristics such as age, tenure (the length of time a manager has managed his or her fund) and possession of an MBA degree help to explain differences in fund performance, risk and fees. The results from his analysis show that all else being equal, investors can expect better risk-adjusted performance from younger managers with MBA degrees who have longer tenure at their funds, and that tenure is the most significant predictor of performance. Golec's study has been criticized because it suffers from a survivorship bias as many non-surviving funds were excluded from his sample.

Chevalier and Ellison (1999a) include an additional manager characteristic; that is the average SAT score of students at the manager's undergraduate institution. Focusing on the period from 1988 to 1994 and after controlling for differences in fund characteristics and survivorship biases, the authors find that the most robust manager characteristic that is related to performance is the average SAT score. They find that managers from higher-SAT undergraduate institutions deliver higher risk-adjusted returns. As suggested by the authors, there exist several interpretations for this finding. One of the potential explanations is that managers from higher-SAT institutions possess better stock-picking skills. Other explanations include the possibility that managers from higher-SAT institutions benefit from better education, more valuable networks that provide managers with better source of information, improved access to IPOs, efficient executions of trade, and/or prioritized access to specific funds that only hire from high-SAT institutions. The other behavioral variables (possession of an MBA, manager age and manager tenure) that are included in the analysis do not appear to have a significant impact on performance. Although Chevalier's and Ellison's study do not suffer from

survivorship bias, one could think that their findings might be specific to their relatively bullish sample period.

Bliss and Potter (2002) extend the previous studies by investigating whether gender affects fund performance. Using a sample of 3223 US and international funds from which 11 percent are managed by women, the authors find no evidence of risk-taking differentials between female and male managers. Also, the authors find no statistical difference in trading frequency – as measured by turnover ratio – between male and female managers, suggesting that male managers are not necessarily more overconfident as compared to their female counterparts. Finally, analyses of raw returns show that, after controlling for risk and other potential influences (such as the fund size, the P/E ratio of the fund, the market capitalization of the fund's median holding, the fund's turnover ratio and the fund's beta), no significant differences exist between funds managed by women and those managed by men. Although this study by Bliss and Potter provide several interesting results, it lacks somehow advanced statistical analyses since most of the results are only based on comparisons of averages.

Gottesman and Morey (2006) refine the analysis of Chevalier and Ellison (1999) by investigating whether the quality of the MBA program, as measured by the average GMAT score and Business Week ranking, has any effect on performance. The authors also consider additional educational variables into their analysis, such as whether the manager's undergraduate institution is a liberal arts school, and whether the manager holds a CFA designation, a non-MBA masters-level degree, or a Ph.D. Using a sample of 518 mutual funds and a period that runs from 2000 to 2003, the authors find that managers who attended more prestigious MBA programs deliver superior performance as compared to that delivered by both managers without MBA degrees and managers holding MBAs from less prestigious programs. Unlike Chevalier and Ellison (1999), Gottesman and Morey (2006) find no evidence of a link between the quality of the undergraduate institution from which the manager graduated and the fund performance. The authors argue that this difference might be due to their method of dealing with survivorship bias. In

addition to these results, the authors find that the other educational variables (CFA, non-MBA master and Ph.D.) are generally unrelated to fund performance.

Li et al. (2011) is the first study to conduct the analysis on hedge funds. The authors investigate the impact of manager characteristics on different aspects of fund performance, including the fund-risk taking behavior, raw and risk-adjusted returns, and fund flows. The manager characteristics considered in their study include the average composite SAT score of the manager's undergraduate institution, and the number of years the manager has worked. The variable SAT is considered as a proxy of intelligence and education, while the variable work reflects the working experience and career concern of the hedge fund manager. Using a sample of 1,002 hedge funds and focusing on the period between January 1994 and September 2003, the authors run Fama and MacBeth (1973) regressions and document that managers from higher-SAT institutions tend to have less (total, systematic and idiosyncratic) risks, to deliver higher raw and risk-adjusted returns, and to attract more capital inflows. On the other hand, the authors do not find evidence that managers with more work experience tend to have higher raw and risk-adjusted returns and to take less risks. The authors conduct few sensitivity analyses and find that their results are robust to the different risk-adjustment benchmarks, sample periods, and types of funds (fund of funds versus regular hedge funds) they consider.

Fang and Wang (2015) consider 11 manager characteristics, which they classify into four categories – physical characteristics (gender and age of the manager), educational background (possession of an MBA degree, a non-MBA master degree, and/or a Ph.D., whether the manager majored in an economics or a business academic program, and whether the manager has overseas experience), work experience (number of years of working in an investment-related industry), and professional qualifications (whether the manager holds a CFA designation, or a CPA (Certified Public Accountant) qualification). Using a sample of 157 fund managers from the Chinese capital market that covers the period from January 2008 to June 2011, the authors performed panel and cross-sectional data analyses to investigate the impact of the 11 manager characteristics on different aspects of fund

performance, including the fund's excess return, total risk and Sharpe ratio, and the manager's stock-picking ability and market-timing skill. The results provide evidence that managers with an MBA degree or a CFA designation demonstrate better stock-picking abilities, and deliver higher excess return and better comprehensive performance. Further analyses show that excess return is the main driver (as compared to total risk) of performance and that the impact of holding an MBA degree or a CFA qualification on fund performance is through the impact of these characteristics on stock-picking ability, which in turn has an impact on excess returns and thus affects the fund performance. The analysis also finds that gender and university major affects fund risk.

Next, we outline the data on hedge fund returns and manager characteristics that were collected in order to conduct our analysis.

3 Data on Manager Characteristics and Hedge Fund Returns

To conduct the present analysis, we construct a dataset on the characteristics of the lead managers for whom we were able to find information on their educational and professional backgrounds. To this aim, we mainly referred to the LinkedIn profiles of the managers. For educational background, we collect the name of the institution from which the manager received his/her undergraduate degree as well as the year in which the manager started his/her undergraduate studies and the year in which he/she graduated. Based on the name of the undergraduate institution, we collect the average composite SAT score of the institution from College Data, a member of National Association for College Admission Counseling (NACA)[4]. For some institutions, we are unable to find the SAT score. For these cases, we use the GPA or ACT score of the institution that we convert into a SAT score. We also collect the information on the field of studies that the manager undertook during his/her undergraduate degree. This information allows us to categorize the managers into two categories: the *quants* versus the *non-quants*. The *quants* are the managers whose field of studies was either in Engineering,

---

[4] Founded in 1937, NACA is an organization dedicated to help students who are in their way of going from secondary to undergraduate education.

Computer Science, Mathematics or Physics. Other variables that we are able to identify include whether the manager holds an MBA degree, a non-MBA master degree, a Ph.D., or a CFA/CAIA certificate. Regarding the manager's professional experience, we are able to identify the number of years the manager has worked either directly from the manager's profile or by assuming that the manager started working in the year following his/her graduation.

Next, the data on hedge fund returns are obtained from the Lipper TASS database. TASS is a comprehensive database that has been used extensively in the literature on hedge funds thanks to its considerable coverage of live and dead hedge funds. The information included in TASS is directly collected from hedge fund managers who report their information mainly for the purpose of advertisement. The database from which we collect our sample of hedge funds covers the period from January 1974 to December 2013. Hedge funds are classified into "live" and "graveyard" categories. Live funds are those who were actively reporting to TASS as of December 2013. The graveyard category encompasses hedge funds that were liquidated or stopped reporting to the database as of December 2013. The graveyard category exists only from January 1994, meaning that hedge funds that became inactive before 1994 were directly dropped from the database. Therefore, in order to alleviate the problem of survivorship bias, we include both live and graveyard funds and reduce our sample to the period running from January 1994 to December 2013.

As mentioned previously, in the present paper we only focus on two categories of hedge funds – the equity market neutral and the funds of hedge funds categories –, which account for 5,134 funds. Using the information provided by TASS[5], we are able to identify 1,340 people linked to the equity market neutral funds and 7,310 people linked to the funds of hedge funds. From this pool of 8,650 people, we only retain the lead manager for each particular fund. The lead manager is either the founder of the fund or the person who is responsible of investment strategies. People for whom we are unable to identify the job title are dropped from the sample[6]. This first screening leads us to a sample including 929 lead managers (244 in the

---

[5] For each particular fund, TASS database provides the names and other practical information such as the job title and the contact information of key people linked to the fund.

[6] There were 1,212 people for whom the job title was undefined.

category of equity market neutral funds and 685 in the category of funds of hedge funds). From the sample of 929 lead managers that we retain from the TASS database, we are able to identify most of the characteristics for 265 managers (58 from the equity market neutral funds and 207 from the funds of hedge funds).

Table 1 depicts a summary of the statistics on managers' and hedge funds' characteristics. To be consistent with the approach underlying our analysis, we present the summary statistics separately for the equity market neutral funds (EMN) and the funds of hedge funds (FoF).

TABLE 1

Summary Statistics of Monthly Hedge Fund Returns, Manager and Fund Characteristics

Summary statistics for the funds' monthly returns, manager characteristics and fund characteristics are provided for the 207 funds of hedge funds and the 58 equity market neutral funds. Monthly returns are obtained as percentage change in net asset values over a month and are net of management and incentive fees as well as other fund expenses. Monthly excess returns are the difference between the monthly returns of the funds and the monthly risk-free interest rate. Manager characteristics are the characteristics of the lead manager of a particular fund. QUANT is a dummy variable that equals one if the manager has a quantitative background. The variable SAT depicts the average composite SAT score of the institution from which the manager obtained his/her undergraduate degree. MBA is a dummy variable that equals one if the manager holds an MBA degree. PHD is a dummy variable that equals one if the manager holds a Ph.D. MASTER is a dummy variable that equals one if the manager holds a non-MBA Master degree. CFA is a dummy variable that equals one if the manager holds a CFA/CAIA certificate. The variable WORK represents the number of years the manager has worked and is expressed on a yearly basis. Fund characteristics include the fund age and the fund size. The fund age is expressed on a yearly basis and the fund size is depicted by the total of fund assets under management, expressed on a monthly basis.

Panel A: Summary Statistics of Monthly Returns, Manager and Fund Characteristics for the Equity Market Neutral Funds

	Mean	Std. Dev.	Min	Q1	Median	Q3	Max
Fund Returns							
Monthly return %	0.56	2.77	-14.60	-0.59	0.50	1.58	26.20
Monthly ex return %	0.29	2.76	-15.14	-0.83	0.25	1.33	25.69
Manager Characteristics							
QUANT	0.41	0.50	0	0	0	1	1
SAT (/100)	19.42	3.00	11.28	17.70	21.14	21.81	23.45
MBA	0.42	0.50	0	0	0	1	1
PHD	0.14	0.35	0	0	0	0	1
MASTER	0.19	0.40	0	0	0	0	1
CFA	0.26	0.45	0	0	0	0.75	1
WORK (years)	15.97	8.96	1	9	15	21	40
Fund Characteristics							
Fund age (years)	4.94	3.21	1	2	4	7	14
Fund size($millions)	94.46	310.80	0.11	8.89	28.76	72.78	3,857.00

Table 1 (*continued*)

Table 1 (*continued*)

Panel B: Summary Statistics of Monthly Returns, Manager and Fund Characteristics for the Funds of Hedge Funds

	Mean	Std. Dev.	Min	Q1	Median	Q3	Max
Fund Returns							
Monthly return %	0.539	2.321	-16.750	-0.382	0.670	1.590	16.358
Monthly ex return %	0.351	2.313	-16.830	-0.550	0.480	1.410	16.048
Manager Characteristics							
QUANT	0.157	0.367	0	0	0	0	1
SAT (/100)	17.760	4.477	8.730	14.240	19.300	21.810	22.650
MBA	0.429	0.498	0	0	0	1	1
PHD	0.086	0.282	0	0	0	0	1
MASTER	0.100	0.302	0	0	0	0	1
CFA	0.043	0.204	0	0	0	0	1
WORK (years)	21.970	10.106	1	15	20	29	46
Fund Characteristics							
Fund age (years)	7.972	5.167	1	4	7	11	27
Fund size ($ millions)	24.480	10.106	17.540	22.940	24.510	26.250	32.360

The average raw and excess monthly returns are respectively 0.56% and 0.29% for the equity market funds and 0.54% and 0.35% for the funds of hedge funds. The lowest monthly excess return is -15.14% for the equity market neutral funds and -16.83% for the funds of hedge funds, whereas the highest monthly excess return is around 25.69% for the equity market neutral funds and 16.05% for the funds of hedge funds. Equity market neutral funds have an average age of about 5 years, while the funds of hedge funds have their average age at around 8 years. The average size of the equity market neutral funds and the funds of hedge funds are $94.46 million and $116.40 million, respectively. In terms of the manager characteristics, 41% of the equity market neutral funds are run by managers with a quantitative academic background, whereas only 16% of the funds of hedge funds are run by managers with a quantitative academic background. The average SAT score of the institutions from which the managers graduated is around 1,942 for the equity market neutral funds, while it is around 1,776 in the case of the funds of hedge funds. Managers who hold an MBA degree are around 42% of the managers in the case of the equity market neutral funds and 43% in the case of the funds of hedge funds. Managers who hold a Ph.D. account for 14% in the case of the equity

market neutral funds and 9% in the case of the funds of hedge funds. Managers who hold a non-MBA master are about 19% in the case of the equity market neutral funds and about 10% in the case of the funds of hedge funds. Managers who are CFA/CAIA certified account for 26% in the case of the equity market neutral funds and for 4% in the case of the funds of hedge funds. Finally, in terms of work experience, the managers of the equity market neutral funds have on average 16 years of work experience, whereas the managers of the funds of hedge funds have on average 22 years of work experience.

From this summary of statistics, we can observe some structural differences both in terms of fund characteristics and manager characteristics between the equity market neutral funds and the funds of hedge funds. This gives another reason of why it is reasonable to conduct separate analyses for the two categories of hedge funds.

4 Risk-Adjusted Performance

A challenge that is faced in any study on hedge fund performance is that the list of measures that can be identified is so long that it seems impossible to find the best approach to measure hedge fund risk-adjusted performance. Therefore, to ensure the robustness of our findings, we opt for three categories of measures to assess hedge fund risk-adjusted performance.

As a first analysis of hedge fund performance, we consider the Sharpe ratio. Developed by W. Sharpe, the Sharpe ratio remains without any contest the most widely used measure of risk-adjusted performance. For each hedge fund and at the end of each month, we consider the monthly returns from the 12 previous months and we divide the average excess return (i.e. in excess of the risk-free rate, represented by the 3-month US T-bill) by the volatility of the returns. This allows us to have a series of monthly Sharpe ratios for each individual hedge fund that we regress against manager characteristics. Even if using traditional measure like the Sharpe ratio to assess hedge fund performance has been extensively criticized in the literature (see for example Fung & Hsieh, 1997; Brooks and Kat, 2001; Agarwal and Naik, 2004), we use the Sharpe ratio in the present analysis as a first attempt to

understand the relationship between hedge fund performance and manager characteristics.

The second category of performance appraisal encompasses the Fama and French (1992) 3-factor model and the 7-factor model developed by Fung, Hsieh, Naik and Ramadorai (2008). The Fama and French model is widely used in the asset pricing literature and is based on three factors: a market factor that represents the excess return (i.e. in excess of the risk-free rate) of the market portfolio, a size factor that depicts the difference in returns between a portfolio of small companies and a portfolio of big companies according to their market capitalization, and a book-to-market factor that captures the difference in returns between companies with high and low book-to-price ratios. The 7-factor model is also widely used in the literature on hedge fund performance and has been shown to have major explanatory power for hedge fund returns. The 7 factors that form the model include a market factor, a size factor, the excess returns on portfolios of lookback straddle options on currencies, commodities and bonds, the yield spread of the 10-year U.S. T-bond over the 3-month U.S. T-bill, and the change in the credit spread of the Moody's BAA bond over the 10-year U.S. T-bond. For the purpose of the present analysis, the monthly factors of the Fama and French model are directly collected from the website of Kenneth R. French[7]. The factors used in the model of Fung, Hsieh, Naik and Ramadorai (2008) are either directly retrieved for the website of David A. Hsieh[8] or constructed based on data from the website of the Federal Reserve Bank of St. Louis[9].

In the third and last category, we use an approach that is similar to that used by Li, Zhang and Zhao (2011) and capture hedge fund risk-adjusted performance by mean of a one-factor model in which the factor is represented by a hedge fund index. The index is obtained by taking, at each month from January 1994 to December 2013, the value-weighted average of returns of all the hedge funds included in the TASS database. The idea behind this approach is that it allows capturing how individual hedge funds behave compared to the average hedge fund. Therefore, by regressing

---

[7] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/index.html
[8] https://faculty.fuqua.duke.edu/~dah7/HFRFData.htm
[9] https://fred.stlouisfed.org

the risk-adjusted returns from this model on manager characteristics we can assess the ability of managers to perform as compared to the average hedge fund.

Using the previous factor models, we conduct time-series regressions that allow us to capture the monthly risk-adjusted returns of the individual hedge funds. More specifically, for each fund and at the end of each month, we regress the past 24 monthly returns on the monthly factors as in the following regression:

(1) $$r_{it} = \alpha_i + \beta'_{it}F_t + \varepsilon_{it}$$

where r_{it} is the excess return of fund i over month t, F_t is generally a vector that depicts the monthly values of the different factors, β'_{it} is also generally a vector that captures the exposure of hedge fund i at month t to the factors. From these time-series regressions, we capture the monthly risk adjusted returns of the individual hedge funds ($\hat{\alpha}_{it}$) as:

(2) $$\hat{\alpha}_{it} = r_{it} - \hat{\beta}'_{it}F_t$$

Next, to assess whether managers with a quantitative academic background perform better than managers without a quantitative academic background, we follow a similar approach as the one used in the literature and extend it by looking at one additional educational variable, which is whether the manager majored in a quantitative academic program. In particular, we conduct our analyses based on least squares regression models with heteroscedasticity-consistent standard errors as follows:

(3) $$y_{it} = \alpha + \beta_1 QUANT_i + \beta_2 SAT_i + \beta_3 MBA_i + \beta_4 PHD_i + \beta_5 MASTER_i + \beta_6 CFA_i +$$
$$\beta_7 WORK_{it} + \beta_8 WORK_{it}^2 + \beta_9 FUNDAGE_{it} + \beta_{10} FUNDSIZE_{it-1} + \sum_{l=1}^{T} \delta_l Year_l + \epsilon_{it}$$

Where y_{it} depicts either the average excess return that were generated by fund i over month t, the volatility of the returns of fund i as measured at month t, or the risk-adjusted returns of fund i over month t. $QUANT_i$ is a dummy variable that equals one if the manager graduated in a quantitative academic program. SAT_i is the average composite SAT score of students at the institution from which the manager graduated. MBA_i is a dummy variable that equals one if the manager of fund i holds an MBA degree. PHD_i is a dummy variable that equals one if the

manager of fund i holds a Ph.D. $MASTER_i$ is a dummy variable that equals one if the manager of fund i holds a non-MBA master degree. CFA_i is a dummy variable that equals one if the manager of fund i is CFA/CAIA certified. $WORK_{it}$ depicts the number of years the manager has worked. The square of the variable $WORK$ is also included to capture any non-linear relationship between the work experience of the manager and the hedge fund performance. We also include two control variables that are commonly used in the literature. Those two control variables are the $FUNDAGE_{it}$, as measured by the number of years since the inception of the hedge fund; and the $FUNDSIZE_{it-1}$, as depicted by the logarithm of the total of fund assets under management at the end of past month ($\log(AUM)_{it-1}$). $Year_l$ are yearly time-fixed effects that aim at controlling for any event that happened during the period of analysis and which might have an impact on hedge fund performance. ϵ_{it} depicts the error term of the model.

5 Do Managers with A Quantitative Background Perform Better Than Their Counterparts?

Our goal in this section is to test *hypothesis 1*, as outlined in the first section. As explained above, the hypothesis is tested first for the whole sample of hedge funds and then separately for the equity market neutral funds and the funds of hedge funds.

5.1 Preliminary Findings

In this section, we present the findings from our regressions of monthly average excess returns and monthly volatility on manager characteristics. The findings from these regressions are reported in table 2 for the total sample of hedge funds, in table 3 for the equity market neutral funds and in table 4 for the funds of hedge funds.

The findings from table 2 show that the coefficients of the variable $QUANT$ are positive and significant in all regressions. This suggests that hedge fund managers who graduated from a quantitative academic program tend to deliver on average higher excess return and to take higher risk than managers without a quantitative academic background. The estimates of the coefficient of the variable $QUANT$ in the

regressions with the average excess return show that the *quants* deliver on average 0.078% additional monthly excess return as compared to the *non-quants*. Similarly,

TABLE 2

Raw Excess Return, Volatility and Manager Characteristics for the Total Sample of Hedge Funds

Table 2 reports the findings from regressions of raw excess returns and volatility of the total sample of hedge funds on manager characteristics. Manager characteristics include a dummy variable that equals one if the manager graduated in a quantitative academic program (QUANT), the average SAT score of students at the manager's undergraduate institution (SAT), a dummy variable that equals one if the manager holds an MBA degree (MBA), a dummy variable that equals one if the manager holds a Ph.D. (PHD), a dummy variable that equals one if the manager holds a non-MBA master degree (MASTER), a dummy variable that equals one if the manger holds a CFA/CAIA certificate (CFA), and the number of years the manager has worked (WORK). Two control variables are also included in our model: the fund age depicted by the number of years since the fund's inception and the fund size represented by the lagged logarithm of total fund assets under management. We also report the multiple R^2 and adjusted R^2 of the linear regressions, as well as the number of funds considered in the analyses. ***, **, and * entries represent the significance of the parameters at the 1%, 5% and 10% levels, respectively.

	Raw Excess Return		Volatility	
Intercept	1.432e-03	-9.156e-03***	5.687e-02***	6.080e-02***
QUANT	6.473e-04**	7.791e-04***	1.868e-03***	2.146e-03***
SAT	-1.325e-04***	-1.448e-04***	-7.444e-04***	-7.605e-04***
MBA	9.287e-04***	8.441e-04***	1.299e-03***	1.047e-03***
PHD	4.805e-05	1.137e-04	2.055e-03***	2.130e-03***
MASTER	-9.685e-04***	-2.049e-04	-3.961e-03***	-3.577e-03***
CFA	1.683e-03***	1.575e-03***	1.115e-02***	1.086e-02***
WORK	1.463e-04***	2.682e-04***	4.257e-04***	4.318e-04***
WORK²	-2.759e-06***	-5.185e-06***	-9.994e-06***	-1.004e-05***
Fund age	-2.534e-04***	-1.398e-04***	-1.222e-04***	-2.459e-04***
Fund size	2.558e-04***	4.218e-04***	-1.597e-03***	-1.365e-03***
Time-fixed Effects	No	Yes	No	Yes
R^2	0.0292	0.1908	0.1075	0.2874
Adjusted R^2	0.0280	0.1879	0.1064	0.2848
Number of funds	111	111	111	111

TABLE 3

Raw Excess Return, Volatility and Manager Characteristics for Equity Market Neutral Funds

Table 3 reports the findings from regressions of raw excess returns and volatility of the equity market neutral funds on manager characteristics. Manager characteristics include a dummy variable that equals one if the manager graduated in a quantitative academic program (QUANT), the average SAT score of students at the manager's undergraduate institution (SAT), a dummy variable that equals one if the manager holds an MBA degree (MBA), a dummy variable that equals one if the manager holds a Ph.D. (PHD), a dummy variable that equals one if the manager holds a non-MBA master degree (MASTER), a dummy variable that equals one if the manger holds a CFA/CAIA certificate (CFA), and the number of years the manager has worked (WORK). Two control variables are also included in our model: the fund age depicted by the number of years since the fund's inception and the fund size represented by the lagged logarithm of total fund assets under management. We also report the multiple R^2 and adjusted R^2 of the linear regressions, as well as the number of funds considered in the analyses. ***, **, and * entries represent the significance of the parameters at the 1%, 5% and 10% levels, respectively.

	Raw Excess Return		Volatility	
Intercept	1.134e-02***	4.462e-03	7.970e-02***	3.452e-02***
QUANT	4.529e-03***	4.024e-03***	3.685e-03***	2.171e-03***
SAT	-5.537e-04***	-4.581e-04***	-1.773e-03***	-1.226e-03***
MBA	4.625e-04	-1.530e-04	-6.996e-04	-1.398e-03*
PHD	-1.776e-03	-1.614e-04	8.924e-03***	1.461e-02***
MASTER	-1.504e-04	9.467e-04	-4.311e-03***	-2.748e-03***
CFA	8.988e-04	1.987e-03***	1.166e-02***	1.199e-02***
WORK	2.897e-04***	5.735e-04***	1.521e-03***	2.089e-03***
WORK²	-6.772e-06**	-1.310e-05***	-3.427e-05***	-4.658e-05***
Fund age	-1.036e-03***	-8.746e-04***	-4.922e-04***	1.096e-03***
Fund size	2.477e-04**	4.600e-04***	-2.234e-03***	-1.521e-03***
Time-fixed Effects	No	Yes	No	Yes
R²	0.1818	0.2474	0.3234	0.5495
Adjusted R²	0.1779	0.2378	0.3202	0.5438
Number of funds	41	41	41	41

TABLE 4

Raw Excess Return, Volatility and Manager Characteristics for Funds of Hedge Funds

Table 4 reports the findings from regressions of raw excess returns and volatility of the funds of hedge funds on manager characteristics. Manager characteristics include a dummy variable that equals one if the manager graduated in a quantitative academic program (QUANT), the average SAT score of students at the manager's undergraduate institution (SAT), a dummy variable that equals one if the manager holds an MBA degree (MBA), a dummy variable that equals one if the manager holds a Ph.D. (PHD), a dummy variable that equals one if the manager holds a non-MBA master degree (MASTER), a dummy variable that equals one if the manger holds a CFA/CAIA certificate (CFA), and the number of years the manager has worked (WORK). Two control variables are also included in our model: the fund age depicted by the number of years since the fund's inception and the fund size represented by the lagged logarithm of total fund assets under management. We also report the multiple R^2 and adjusted R^2 of the linear regressions, as well as the number of funds considered in the analyses. ***, **, and * entries represent the significance of the parameters at the 1%, 5% and 10% levels, respectively.

	Raw Excess Return		Volatility	
Intercept	5.981e-03***	-6.059e-03***	5.636e-02***	7.833e-02***
QUANT	-1.090e-03***	-5.828e-04*	1.285e-03***	2.617e-04
SAT	-2.312e-05	-5.222e-05*	-3.957e-04***	-3.741e-04***
MBA	9.270e-04***	8.908e-04***	2.594e-04	-6.324e-05
PHD	-8.104e-04*	-8.172e-04**	-1.959e-03***	-2.137e-03***
MASTER	-8.924e-04***	-6.329e-04**	-4.675e-03***	-3.814e-03***
CFA	4.711e-04	2.709e-03***	2.901e-03**	-1.720e-03*
WORK	2.039e-04***	2.351e-04***	6.883e-05	-1.596e-04**
WORK²	-4.281e-06***	-4.835e-06***	-2.661e-06*	1.098e-06
Fund age	-1.579e-04***	-9.269e-05***	-1.251e-04***	-3.910e-04***
Fund size	-1.507e-04	1.372e-04	-1.661e-03***	-2.080e-03***
Time-fixed Effects	No	Yes	No	Yes
R^2	0.0138	0.2585	0.0773	0.3232
Adjusted R^2	0.0121	0.2548	0.0757	0.3197
Number of funds	70	70	70	70

the estimates of the coefficient of the variable *QUANT* in the regressions with the volatility of the returns show that the returns generated by the hedge funds that are managed by the *quants* are on average 0.215% more volatile than the returns generated by hedge funds that are managed by the *non-quants*. These findings

suggest that the higher returns delivered by the quants come as a compensation of their risk taking.

Next, we go one step further and analyze the two categories of hedge funds separately. The findings from these two analyses are quite different. On the one hand, the *quants* appear to generate on average higher excess return and to take higher risk than the *non-quants* in the case of the equity market neutral funds. On the other hand, the findings for the funds of hedge funds show that managers with a quantitative background deliver on average less excess return and tend to take higher risk as compared to managers who majored in a non-quantitative background. In the next section, we are going to see how these findings evolve when we consider risk-adjusted performance.

5.2 Findings Based on Risk-Adjusted Returns

As mentioned previously, the risk-adjusted performance of the hedge funds is captured based on four measures: the Sharpe ratio, the risk-adjusted returns from the Fama and French (1992) 3-factor model, the risk-adjusted returns from the Fung, Hsieh, Naik and Ramadorai (2008) 7-factor model, and the risk-adjusted returns from a model with only one factor that is represented by the value-weighted average of returns of all hedge funds in the TASS database.

Table 5 reports the findings for the total sample of hedge funds. The findings regarding the academic background of the hedge fund managers are quite mitigated when it comes to risk-adjusted performance. They show that *hypothesis 1* is only valid in the case of the regressions with the Sharpe ratio. Indeed, the coefficient estimate of the variable *QUANT* is positive and significant in the regression with the Sharpe ratio, it is negative and not significant in the regressions with the risk-adjusted returns from the factor models when we do not control for time, and it is positive and not significant in the regressions with the risk-adjusted returns from the factor models when we control for time.

Regarding the two other educational variables that were analyzed in the literature (SAT and MBA), we could not find evidence that the average SAT score of the manager's undergraduate institution is positively linked to his/her fund's

performance. In terms of the possession of an MBA degree, our findings are however in line with the literature in the sense that managers who hold an MBA degree appear to outperform managers without an MBA degree. The findings regarding the other characteristics of the hedge fund managers are quite mixed and do not lead to a clear conclusion. Finally, the findings related to the control variables are significant in all regressions and point to a negative relationship between the performance and the age of the hedge funds and to a positive relationship between the performance and the size of the hedge funds.

As in the case of the preliminary findings, we also conducted separate analyses of the relationship between fund performance and manager characteristics for the equity market neutral funds and the funds of hedge funds. Table 6 exhibits the findings for the equity market neutral funds. The findings evidence a significant and positive relationship between fund risk-adjusted performance and the variable *QUANT*, which is robust to the different risk-adjustment methods that are applied. The coefficients of the variables *QUANT* in the regressions with the risk-adjusted returns from the factor models vary between 0.004 and 0.006 when we control for time, and between 0.009 and 0.010 when we do not control for time. These estimates suggest that all else being equal, managers of the equity market neutral funds who majored in a quantitative academic background deliver on average between 0.4% and 1% additional risk-adjusted return on a monthly basis. The findings regarding the other educational and professional characteristics of the fund managers are similar to what we find in the analyses of the total sample of hedge funds.

Findings for the funds of hedge funds are reported in table 7. They show that *hypothesis 1* is rejected for this category of hedge funds. This finding is also robust to the four methods used to capture the risk-adjusted performance. Indeed, the coefficient estimates of the variable *QUANT* remain negative in all the regressions and vary between -0.004 and -0.002 in the regressions with the risk-adjusted returns from the factor models. This suggests that all else being equal, the *quants* deliver on average between 0.2% and 0.4% less risk-adjusted returns on a monthly basis as compared to the *non-quants*. Here also, the findings associated with the

21

TABLE 5 - Risk-Adjusted Returns and Manager Characteristics for the Total Sample of Hedge Funds

Table 5 reports the findings from regressions of monthly risk-adjusted returns of the total sample of hedge funds on manager characteristics. Manager characteristics include a dummy variable that equals one if the manager graduated in a quantitative academic background (QUANT), the average SAT score of students at the manager's undergraduate institution (SAT), a dummy variable that equals one if the manager holds an MBA degree (MBA), a dummy variable that equals one if the manager holds a Ph.D. (PHD), and a dummy variable that equals one if the manager holds a non-MBA master degree (MASTER), a dummy variable that equals one if the manger is CFA/CAIA certified (CFA), and the number of years the manager has worked (WORK). Two control variables are also included in our model: the fund age depicted by the number of years since the fund's inception and the fund size represented by the lagged logarithm of total fund assets under management. We also report the multiple R^2 and adjusted R^2 of the linear regressions, as well as the number of funds considered in the analyses. ***, **, and * entries represent the significance of the parameters at the 1%, 5% and 10% levels, respectively.

	Sharpe ratio		3-factor		7-factor		Index	
Intercept	-6.102e-01***	-1.0358e00***	1.624e-02***	-2.661e-02***	1.471e-02***	-9.154e-03*	-1.607e-02	-6.434e-02**
QUANT	2.665e-02**	2.755e-02**	-3.741e-04	5.877e-04	-5.971e-04	1.919e-04	-6.688e-04	1.894e-04
SAT	-3.201e-03**	-3.338e-03**	-7.610e-05	-1.960e-04*	-2.414e-04**	-3.148e-04***	-1.147e-04	-2.700e-04**
MBA	3.649e-02***	3.246e-02***	1.191e-03	8.203e-04	1.094e-03	5.916e-04	2.184e-03**	1.715e-03*
PHD	-2.579e-02	-2.933e-02	-2.579e-03*	-2.397e-03*	-3.540e-03***	-2.725e-03**	-1.996e-03	-1.961e-03
MASTER	-7.553e-02***	-5.464e-02***	-2.829e-03***	-2.614e-03**	-3.417e-03***	-2.850e-03***	1.364e-03	1.154e-03
CFA	-8.034e-02***	-6.921e-02***	1.717e-04	9.752e-04	-3.132e-05	1.561e-04	6.730e-03**	6.591e-03**
WORK	1.253e-02***	1.527e-02***	-1.413e-04	9.316e-05	-3.224e-05	1.803e-04	1.259e-04	5.291e-04**
WORK²	-1.963e-04***	-2.533e-04***	2.471e-06	-1.345e-06	4.256e-07	-2.811e-06	-2.434e-06	-9.278e-06**
Fund age	-1.591e-02***	-1.182e-02***	-3.846e-04***	-1.569e-04*	-4.750e-04***	-2.697e-04***	-3.627e-04***	-2.318e-05
Fund size	5.180e-02***	5.461e-02***	-1.555e-04	7.692e-04**	1.514e-04	9.675e-04***	1.292e-03	2.189e-03
Time-fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
R²	0.0453	0.2473	0.0060	0.0765	0.0122	0.1165	0.0047	0.0603
Adjusted R²	0.0441	0.2445	0.0044	0.0725	0.0106	0.1115	0.0031	0.0563
Number of funds	111	111	90	90	90	90	90	90

TABLE 6 - Risk-Adjusted Returns and Manager Characteristics for the Equity Market Neutral Funds

Table 6 reports the findings from regressions of monthly risk-adjusted returns of the equity market neutral funds on manager characteristics. Manager characteristics include a dummy variable that equals one if the manager graduated in a quantitative academic background (QUANT), the average SAT score of students at the manager's undergraduate institution (SAT), a dummy variable that equals one if the manager holds an MBA degree (MBA), a dummy variable that equals one if the manager holds a Ph.D. (PHD), and a dummy variable that equals one if the manager holds a non-MBA master degree (MASTER), a dummy variable that equals one if the manger is CFA/CAIA certified (CFA), and the number of years the manager has worked (WORK). Two control variables are also included in our model: the fund age depicted by the number of years since the fund's inception and the fund size represented by the lagged logarithm of total fund assets under management. We also report the multiple R^2 and adjusted R^2 of the linear regressions, as well as the number of funds considered in the analyses. ***, **, and * entries represent the significance of the parameters at the 1%, 5% and 10% levels, respectively.

	Sharpe ratio		3-factor		7-factor		Index	
Intercept	2.920e-02	2.592e-01*	1.461e-02***	9.569e-04	1.180e-02	2.723e-03	2.772e-02	5.338e-03
QUANT	3.223e-01***	3.110e-02***	9.220e-03***	4.324e-03*	9.475e-03***	3.861e-03*	9.768e-03***	5.774e-03**
SAT	-1.259e-02***	-1.332e-02***	-5.580e-04	-1.912e-04	-5.648e-04	-3.586e-05	-8.150e-04	-5.406e-04
MBA	8.087e-02***	6.463e-02***	3.377e-03	2.131e-03	4.499e-03*	2.840e-03	4.361e-03	3.437e-03
PHD	-3.027e-01***	-2.927e-01***	-1.110e-02**	-5.209e-03	-1.394e-02***	-6.657e-03	-8.951e-03**	-4.042e-03
MASTER	-4.684e-02*	-3.655e-02	2.344e-04	-2.880e-03	2.154e-04	-2.668e-03	6.276e-03**	3.686e-03
CFA	-6.676e-02***	3.126e-02	1.783e-03	1.688e-03	3.234e-03	2.213e-03	8.430e-03	8.358e-03
WORK	-1.088e-02***	6.883e-03	-7.269e-05	-3.040e-04	-2.785e-04	-2.415e-04	1.647e-03	1.422e-03
WORK²	2.203e-04**	1.305e-04	-2.079e-06	5.241e-06	3.298e-07	3.417e-06	-3.520e-05	-2.861e-05
Fund age	-4.404e-02***	--5.652e-02***	-1.493e-03***	-1.876e-03***	-1.326e-03***	-1.740e-03***	-2.493e-03***	-2.783e-03***
Fund size	3.714e-02***	3.951e-02***	5.454e-04	1.144e-03**	8.047e-04	1.221e-03***	-8.285e-04	-2.307e-04
Time-fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
R²	0.2343	0.2991	0.0423	0.0915	0.0541	0.1020	0.0507	0.0956
Adjusted R²	0.2306	0.2903	0.0355	0.0756	0.0475	0.0863	0.0440	0.0797
Number of funds	41	41	29	29	29	29	29	29

TABLE 7 - Risk-Adjusted Returns and Manager Characteristics for the Funds of Hedge Funds

Table 7 reports the findings from regressions of monthly risk-adjusted returns of the funds of hedge funds on manager characteristics. Manager characteristics include a dummy variable that equals one if the manager graduated in a quantitative academic background (QUANT), the average SAT score of students at the manager's undergraduate institution (SAT), a dummy variable that equals one if the manager holds an MBA degree (MBA), a dummy variable that equals one if the manager holds a Ph.D. (PHD), and a dummy variable that equals one if the manager holds a non-MBA master degree (MASTER), a dummy variable that equals one if the manger is CFA/CAIA certified (CFA), and the number of years the manager has worked (WORK). Two control variables are also included in our model: the fund age depicted by the number of years since the fund's inception and the fund size represented by the lagged logarithm of total fund assets under management. We also report the multiple R^2 and adjusted R^2 of the linear regressions, as well as the number of funds considered in the analyses. ***, **, and * entries represent the significance of the parameters at the 1%, 5% and 10% levels, respectively.

	Sharpe ratio		3-factor		7-factor		Index	
Intercept	-4.889e-01***	-1.128***	3.557e-02***	-1.539e-02*	3.141e-02***	2.471e-03	2.823e-02***	-2.059e-02**
QUANT	-8.235e-02***	-5.237e-02***	-4.252e-03***	-2.623e-03*	-3.779e-03***	-2.320e-03**	-4.26e-03***	-4.060e-03***
SAT	-2.983e-03*	-3.542e-03**	8.034e-05	-1.381e-04	-6.869e-05	2.715e-04***	4.380e-05	-1.365e-04
MBA	5.109e-02***	4.552e-02***	8.181e-04	6.486e-04	8.967e-04	6.576e-04	2.034e-03**	1.902e-03**
PHD	-3.656e-03	-4.857e-03	-1.005e-03	-1.428e-03	-2.160e-03**	-1.990e-03*	-1.008e-03	-1.502e-03
MASTER	9.689e-03	1.452e-02	1.258e-03	-6.335e-04	7.700e-04	-4.717e-04	3.733e-03**	8.262e-04
CFA	-1.891e-02	1.096e-01***	-1.199e-03	1.401e-03	-1.478e-03	4.122e-04	2.118e-04	3.537e-03
WORK	2.393e-02***	2.486e-02***	-1.508e-05	2.092e-04	3.627e-05	2.081e-04	1.119e-04	4.440e-04**
WORK²	-4.528e-04***	-4.633e-04***	-1.611e-06	-4.511e-06	-2.627e-06	-4.726e-06	-4.278e-06	-9.378e-06**
Fund age	-1.314e-02***	-7.996e-03***	-2.835e-04***	-1.447e-04*	-3.724e-04***	-2.032e-04***	-1.390e-04*	4.214e-06
Fund size	3.900e-02***	4.950e-02***	-1.417e-03***	-5.239e-05	-9.390e-04***	2.784e-04	-1.330e-03***	-2.558e-04
Time-fixed Effects	No	Yes	No	Yes	No	Yes	No	Yes
R²	0.0342	0.3443	0.0095	0.1018	0.0149	0.1165	0.0075	0.0862
Adjusted R²	0.0325	0.3410	0.0076	0.0968	0.0130	0.1115	0.0055	0.0811
Number of funds	70	70	61	61	61	61	61	61

other educational and professional characteristics of the fund managers are similar to what we observe in the analyses with the total sample of hedge funds.

To sum-up this section, the results suggest that all else being equal managers who majored in a quantitative academic background outperform their counterparts in the case of the equity market neutral funds. However, in the case of the funds of hedge funds they fail to outperform the managers without a quantitative academic background. These findings are robust to the different method that we use to estimate the funds' risk-adjusted performance. The findings associated to the other educational and professional characteristics of the hedge fund managers do not converge to the same conclusion through the various analyses.

5.3 Robustness Checks

As highlighted in the previous section, *hypothesis 1* was valid for the equity market neutral funds but was rejected for the funds of hedge funds. In this section, we formally test whether the difference between the parameter estimates of the variable *QUANT* for the equity market neutral funds and the funds of hedge funds is statistically significant. To this aim, we first merge the data for the two categories of funds. We then create a dummy variable *EMN* that equals one for the equity market neutral funds and 0 for the funds of hedge funds, as well as the variable *QUANTEMN* that is the product of the variables *QUANT* and *EMN*. Finally, we repeat our analysis while adding the variables *EMN* and *QUANTEMN* as independent variables to regression equation (3). In this analysis, the variable *QUANTEMN* tests the null hypothesis that the coefficient estimate of the variable QUANT for the equity market neutral funds is equal to that of the funds of hedge funds.

The findings from this analysis are displayed in table 8. To be consistent with our approach, we report the results for the Sharpe ratio, as well as for the risk-adjusted returns from the 3-factor model, the 7-factor model and the index model. We find that the coefficient estimate for the variable *QUANTEMN* is positive and statistically significant for all the regressions, except in the case of the risk-adjusted

25

TABLE 8

Robustness Checks

Table 8 provides robustness checks of whether the coefficient estimates of the variable *QUANT* for the equity market neutral funds and the funds of hedge funds are significantly different. The hypothesis is tested by merging the data of the two categories of funds and by running regressions in which we include a dummy variable (*EMN*)that equals one if the fund is an equity market neutral as well as an interaction term between the variables *QUANT* and *EMN*. The robustness checks are provided for the regressions of the Sharpe ratio, as well as the alphas from the 3-factor model, the 7-factor model and the index model on manager characteristics. The variable SAT represents the average SAT score of students at the manager's undergraduate institution. The variable MBA is a dummy variable that equals one if the manager holds an MBA degree. PHD is a dummy variable that equals one if the manager holds a Ph.D. MASTER is a dummy variable that equals one if the manager holds a non-MBA master degree. CFA is a dummy variable that equals one if the manger is CFA/CAIA certified. WORK represents the number of years the manager has worked. Two control variables are also included in the model: the fund age depicted by the number of years since the fund's inception and the fund size represented by the lagged logarithm of total fund assets under management. We also report the multiple R^2 and adjusted R^2 of the linear regressions, as well as the number of funds considered in the analyses. ***, **, and * entries represent the significance of the parameters at the 1%, 5% and 10% levels, respectively.

	Sharpe ratio	3-factor	7-factor	Index
Intercept	-6.443e-01***	-9.781e-03	-2.937e-03	-4.788e-02
QUANTEMN	2.615e-01***	5.947e-03**	7.005e-03***	4.612e-03
QUANT	-5.368e-02***	-9.661e-04	-1.823e-03*	-1.040e-03
EMN	-2.462e-01***	-4.538e-03***	-5.144e-03***	-1.933e-03
SAT	-1.595e-03	-2.762e-04**	-2.867e-04**	-4.154e-04***
MBA	4.658e-02***	1.182e-03	1.083e-03	2.238e-03**
PHD	-3.418e-02*	-1.285e-03	-2.653e-03**	-3.072e-04
MASTER	7.260e-04	-1.685e-03	-1.335e-03	1.063e-03
CFA	2.949e-02	2.649e-03	1.664e-03	7.774e-03***
WORK	1.482e-02***	1.257e-04	1.262e-04	5.950e-04***
WORK²	-2.766e-04***	-1.691e-06	-2.521e-06	-9.701e-06***
Fund age	-8.259e-03***	3.604e-05	-1.936e-04***	2.437e-04**
Fund size	4.612e-02***	6.397e-04*	7.718e-04***	2.177e-03
Time-fixed Effects	Yes	Yes	Yes	Yes
R^2	0.2003	0.0620	0.0883	0.0477
Adjusted R^2	0.1974	0.0581	0.0846	0.0438
Number of funds	111	90	90	90

return from the index model where the coefficient is positive but not statistically significant. Based on these findings, we can argue that, on average, the *quants* from the equity market neutral funds significantly outperform the *quants* from the funds of hedge funds.

5.4 Sensitivity Analysis for The Definition of The Variable Quant

In the previous sections, the managers that we considered as *quants* are the ones who specialized in Engineering, Computer Science, Mathematics and Physics at their undergraduate institutions. The choice of this classification is based on the definition that is given to *quants* in the investment industry. In this section, we enlarge the scope of this definition and include also managers who specialized in Quantitative Finance at their undergraduate institutions. Indeed, one might argue that managers who graduated from Quantitative Finance might perform as good as managers who graduated from the other quantitative fields. The empirical findings from this sensitivity analysis of the definition of the variable *QUANT* are reported in tables 9 and 10 for the equity market neutral funds and the funds of hedge funds, respectively. The regression analyses are conducted for the Sharpe ratio as well as the risk-adjusted returns from the 3-factor model, the 7-factor model and the index model.

The coefficient estimates of the variable *QUANT* for the equity market neutral funds are not statistically significant in all regressions, except in the case of the Sharpe ratio in which the coefficient is significantly positive but of lower magnitude as compared to the more restrictive definition that was used in the previous sections. In the case of the funds of hedge funds, the coefficient estimates of the variable *QUANT* remain negative, but their magnitude is larger in absolute term.

These findings suggest that the inclusion of the managers who graduated from Quantitative Finance does impact the outperformance of the *quants* and that a distinction should be made between managers who graduated from Quantitative Finance and from the other quantitative fields.

TABLE 9

Sensitivity Analysis for The Definition of The Variable *QUANT* – The Case of Equity Market Neutral Funds

Table 9 provides findings from the regressions that aim at conducting a sensitivity analysis on the definition of the variable *QUANT*. In this definition, we classify as *quants* the managers who graduated from Engineering, Computer Science, Mathematics, Physics and Quantitative Finance. The findings are provided for the equity market neutral funds and concern the regressions of the Sharpe ratio, as well as the alphas from the 3-factor model, the 7-factor model and the index model on manager characteristics. The variable QUANT is a dummy variable that equals 1 if the manager is classified as *quant*. The variable SAT represents the average SAT score of students at the manager's undergraduate institution. The variable MBA is a dummy variable that equals one if the manager holds an MBA degree. PHD is a dummy variable that equals one if the manager holds a Ph.D. MASTER is a dummy variable that equals one if the manager holds a non-MBA master degree. CFA is a dummy variable that equals one if the manger is CFA/CAIA certified. WORK represents the number of years the manager has worked. Two control variables are also included in the model: the fund age depicted by the number of years since the fund's inception and the fund size represented by the lagged logarithm of total fund assets under management. We also report the multiple R^2 and adjusted R^2 of the linear regressions, as well as the number of funds considered in the analyses. ***, **, and * entries represent the significance of the parameters at the 1%, 5% and 10% levels, respectively.

	Sharpe ratio	3-factor	7-factor	Index
Intercept	2.592e-01*	-1.008e-02	-2.519e-03	-1.378e-01
QUANT	3.110e-02***	1.299e-03	2.989e-03	-7.567e-04
SAT	-1.332e-02***	9.709e-05	1.408e-04	5.743e-04
MBA	6.463e-02***	7.744e-04	1.938e-03	-6.189e-04
PHD	-2.927e-01***	-1.305e-03	-3.820e-03	8.973e-03
MASTER	-3.655e-02	-5.867e-03**	-5.766e-03**	3.690e-04
CFA	3.126e-02	1.527e-03	1.724e-03	1.575e-02**
WORK	6.883e-03	-3.658e-04	-3.285e-04	2.488e-03
WORK²	1.305e-04	6.950e-06	5.934e-06	-6.572e-05
Fund age	-5.652e-02***	-1.661e-03***	-1.735e-03***	-1.942e-03***
Fund size	3.951e-02***	1.521e-03***	1.418e-03***	6.470e-03
Time-fixed Effects	Yes	Yes	Yes	Yes
R^2	0.2991	0.0852	0.0964	0.0821
Adjusted R^2	0.2903	0.0692	0.0806	0.0660
Number of funds	41	29	29	29

TABLE 10

Sensitivity Analysis for The Definition of The Variable *QUANT* – The Case of Funds of Hegde Funds

Table 10 provides findings from the regressions that aim at conducting a sensitivity analysis on the definition of the variable *QUANT*. In this definition, we classify as *quants* the managers who graduated from Engineering, Computer Science, Mathematics, Physics and Quantitative Finance. The findings are provided for the funds of hedge funds and concern the regressions of the Sharpe ratio, as well as the alphas from the 3-factor model, the 7-factor model and the index model on manager characteristics. The variable QUANT is a dummy variable that equals 1 if the manager is classified as *quant*. The variable SAT represents the average SAT score of students at the manager's undergraduate institution. The variable MBA is a dummy variable that equals one if the manager holds an MBA degree. PHD is a dummy variable that equals one if the manager holds a Ph.D. MASTER is a dummy variable that equals one if the manager holds a non-MBA master degree. CFA is a dummy variable that equals one if the manger is CFA/CAIA certified. WORK represents the number of years the manager has worked. Two control variables are also included in the model: the fund age depicted by the number of years since the fund's inception and the fund size represented by the lagged logarithm of total fund assets under management. We also report the multiple R^2 and adjusted R^2 of the linear regressions, as well as the number of funds considered in the analyses. ***, **, and * entries represent the significance of the parameters at the 1%, 5% and 10% levels, respectively.

	Sharpe ratio	3-factor	7-factor	Index
Intercept	-1.217e00***	-1.356e-02	3.937e-03	-1.890e-02**
QUANT	1.470e-02	-3.415e-03**	-2.857e-03***	-4.597e-03***
SAT	-4.859e-03***	-1.228e-04	-2.628e-04***	-1.492e-04
MBA	3.367e-02**	7.032e-04	6.874e-04	1.960e-03**
PHD	-1.896e-02	-1.250e-03	-1.919e-03*	-1.381e-03
MASTER	6.927e-03	-6.521e-04	-5.351e-04	1.046e-03
CFA	1.267e-01***	1.520e-03	4.494e-04	3.681e-03
WORK	2.450e-02***	2.153e-04	2.019e-04	4.178e-04**
WORK²	-4.424e-04***	-4.797e-06	-4.704e-06	-9.016e-06**
Fund age	-7.862e-03***	-1.496e-04*	-2.086e-04***	-3.458e-06
Fund size	5.512e-02***	-1.596e-04	2.058e-04	-3.051e-04
Time-fixed Effects	Yes	Yes	Yes	Yes
R^2	0.3454	0.1027	0.1191	0.0871
Adjusted R^2	0.3421	0.0977	0.1142	0.0820
Number of funds	70	61	61	61

6 Do Quants Who Attended Higher-SAT Institutions Outperform Their Counterparts?

In this section, we go one step further and attempt to answer the question of whether it is important to have a quant from a higher-SAT undergraduate institution as the key person in the hedge fund. More specifically, in this section we test the following hypothesis:

Hypothesis 2: "quants from higher-SAT undergraduate institutions outperform their counterparts".

To test *hypothesis 2*, we create an interaction term by multiplying the variables *QUANT* and *SAT* that we add to the regression equation (3). The empirical findings from this regression analysis are reported in tables 11 and 12 for the equity market neutral funds and the funds of hedge funds, respectively. The coefficient estimates show that *quants* from higher-SAT undergraduate institutions perform better than *quants* from lower-SAT undergraduate institutions in the case of equity market neutral funds. The coefficient estimates of the variable *QUANTSAT* are positive and statistically significant in regressions with the Sharpe ratio and the risk-adjusted return from the 7-factor model; and positive but not statistically significant in the regressions with the risk-adjusted returns from the 3-factor model and the index model. In the case of the funds of the hedge funds, the empirical results are rather mitigated. The coefficient estimate for the interaction term is positive but not statistically significant in the models with the Sharpe ratio and the risk-adjusted return from the 3-factor model. It is positive and statistically significant in the model with the risk-adjusted return from the 7-factor model. And it is negative but not statistically significant in the model with the risk-adjusted return from the index model.

As suggested by Chevalier and Ellison (1999a), the positive relationship between the SAT scores of students at the institutions from which the *quants* graduated and the performance of their hedge funds might be interpreted in different ways. First, this finding might suggest that *quants* from higher-SAT institutions possess better skills. Second, this positive relationship can be explained by the possibility that *quants* from higher-SAT institutions benefit from better education, more valuable

TABLE 11

Quants from Higher-SAT Undergraduate Institutions and Hedge Fund Performance – The Case of Equity Market Neutral Funds

Table 11 provides findings from the regressions in which we test whether *quant* managers from higher-SAT undergraduate institutions outperform their counterparts in the case of equity market neutral funds. The hypothesis is tested by adding an interaction term (QUANTSAT) between the variables QUANT and SAT. The findings are provided for the regressions of the Sharpe ratio, as well as the alphas from the 3-factor model, the 7-factor model and the index model on manager characteristics. The variable QUANT is a dummy variable that equals 1 if the manager graduated in a quantitative academic program. The variable SAT represents the average SAT score of students at the manager's undergraduate institution. The variable MBA is a dummy variable that equals one if the manager holds an MBA degree. PHD is a dummy variable that equals one if the manager holds a Ph.D. MASTER is a dummy variable that equals one if the manager holds a non-MBA master degree. CFA is a dummy variable that equals one if the manger is CFA/CAIA certified. WORK represents the number of years the manager has worked. Two control variables are also included in the model: the fund age depicted by the number of years since the fund's inception and the fund size represented by the lagged logarithm of total fund assets under management. We also report the multiple R^2 and adjusted R^2 of the linear regressions, as well as the number of funds considered in the analyses. ***, **, and * entries represent the significance of the parameters at the 1%, 5% and 10% levels, respectively.

	Sharpe ratio	3-factor	7-factor	Index
Intercept	4.739e-01***	-4.088e-03	2.564e-02	-3.388e-03
QUANTSAT	5.692e-02***	1.283e-05	4.381e-03**	7.799e-04
QUANT	-8.656e-01***	3.934e-03	-8.769e-02**	-9.571e-03
SAT	-2.230e-02***	-1.347e-04	-5.093e-04	-7.804e-04
MBA	1.539e-01***	1.308e-03	7.380e-03**	6.443e-03**
PHD	-2.310e-01***	-4.527e-03	-3.769e-03	-1.871e-03
MASTER	-1.768e-02	-3.762e-03	-3.085e-03	2.536e-03
CFA	-1.723e-02	1.469e-03	1.434e-03	1.044e-02**
WORK	-1.694e-02***	-2.902e-04	-8.017e-04	4.548e-04
WORK²	2.746e-04**	4.750e-06	1.087e-05	-1.165e-05
Fund age	-5.759e-02***	-1.766e-03***	-2.402e-03***	-1.943e-03***
Fund size	4.284e-02***	1.341e-03**	1.114e-03**	1.331e-03**
Time-fixed Effects	Yes	Yes	Yes	Yes
R^2	0.3042	0.0948	0.1138	0.1024
Adjusted R^2	0.2950	0.0783	0.0976	0.0860
Number of funds	41	29	29	29

TABLE 12

Quants from Higher-SAT Undergraduate Institutions and Hedge Fund Performance – The Case of Funds of Hedge Funds

Table 12 provides findings from the regressions in which we test whether *quant* managers from higher-SAT undergraduate institutions outperform their counterparts in the case of funds of hedge funds. The hypothesis is tested by adding an interaction term (QUANTSAT) between the variables QUANT and SAT. The findings are provided for the regressions of the Sharpe ratio, as well as the alphas from the 3-factor model, the 7-factor model and the index model on manager characteristics. The variable QUANT is a dummy variable that equals 1 if the manager graduated in a quantitative academic program. The variable SAT represents the average SAT score of students at the manager's undergraduate institution. The variable MBA is a dummy variable that equals one if the manager holds an MBA degree. PHD is a dummy variable that equals one if the manager holds a Ph.D. MASTER is a dummy variable that equals one if the manager holds a non-MBA master degree. CFA is a dummy variable that equals one if the manger is CFA/CAIA certified. WORK represents the number of years the manager has worked. Two control variables are also included in the model: the fund age depicted by the number of years since the fund's inception and the fund size represented by the lagged logarithm of total fund assets under management. We also report the multiple R^2 and adjusted R^2 of the linear regressions, as well as the number of funds considered in the analyses. ***, **, and * entries represent the significance of the parameters at the 1%, 5% and 10% levels, respectively.

	Sharpe ratio	3-factor	7-factor	Index
Intercept	-1.127e-00***	-1.567e-02*	1.681e-03	-1.994e-02**
QUANTSAT	1.675e-03	1.155e-04	3.924e-04*	-3.156e-04
QUANT	-8.619e-02	-4.751e-03	-9.523e-03**	1.439e-03
SAT	-3.735e-02**	-1.720e-04	-3.533e-04***	-3.817e-05
MBA	4.580e-02***	6.584e-04	7.068e-04	1.820e-03*
PHD	-5.089e-03	-1.366e-03	-1.732e-03*	-1.637e-03
MASTER	1.368e-02	-7.372e-04	-6.410e-04	1.213e-03
CFA	1.096e-01***	1.474e-03	7.529e-04	3.344e-03
WORK	2.494e-02***	2.167e-04	1.746e-04	4.494e-04**
WORK²	-4.647e-04***	-4.586e-06	-4.020e-06	-9.592e-06**
Fund age	-8.103e-03***	-1.516e-04*	-1.985e-04***	1.545e-05
Fund size	4.963e-02***	-1.096e-05	4.086e-04	-3.811e-04
Time-fixed Effects	Yes	Yes	Yes	Yes
R²	0.3445	0.1019	0.1165	0.0880
Adjusted R²	0.3411	0.0967	0.1113	0.0827
Number of funds	70	61	61	61

networks that provide them with better source of information, and efficient executions of trade. Finally, it might be the case that the *quants* from higher-SAT institutions benefit from prioritized access to specific funds that only hire from high-SAT institutions.

7 Conclusion

This paper attempts to extend the previous research on the relationship between manager educational background and fund performance by looking at one additional educational variable, which is the specialization of the fund manager during his/her undergraduate studies. More specifically, we focus on the hedge fund industry and we attempt to answer the question of whether managers who received a quantitative academic training perform better than managers who did not receive such training. To conduct this analysis, we use a similar model as what has been used in the literature. Our model includes, in addition to the academic specialization of the manager at his/her undergraduate institution, other educational and professional characteristics including the average composite SAT score of the institution from which the manager graduated, the number of years the manager has worked, as well as dummy variables that capture information on whether the manager holds an MBA degree, a Ph.D., a master degree, or a CFA/CAIA certificate. The model also includes two commonly used control variables, which are the number of years since the inception of the hedge fund and the lagged size of the fund as measured by the logarithm of the total of the fund's assets under management.

The main idea underlying our research paper is that a good hedge fund manager ought to have a good understanding of the math underlying his/her investment strategies. Hence, hedge fund managers who are qualified as *quants* might be in an advantage as compared to the *non-quants*. In addition, we wanted also to analyze whether this added value is different depending on the industry in which the hedge fund is active. Therefore, our analyses are also conducted separately for two hedge fund categories: the equity market neutral funds, which is characterized as a quantitative category and the funds of hedge funds, which is considered as less demanding in terms of quantitative technics.

The present paper indeed suggests that, depending on the category to which the hedge fund belongs, it is better or not to have a *quant* as the key person in the fund. More specifically, in the case of the equity market neutral funds, it seems that a manager who majored in a quantitative academic background outperforms on average a manager who did not major in a quantitative program. In addition, the findings suggest that it is even better to have a *quant* who attended a high-SAT undergraduate institution. However, in the case of the funds of hedge funds, the situation is the opposite, in the sense that in this industry the managers who specialized in a quantitative academic program in their undergraduate institution tend to underperform their counterparts. These findings are insensitive to the different methods that were used to estimate the funds' risk-adjusted performance.

The paper indeed documents the existence of some differential ability among hedge fund managers that is likely to be attributed to their academic background. It suggests that in the case of the equity market neutral funds (the funds of hedge funds) investors might be better off (worse off) by selecting a manager with a quantitative academic background. The analysis also suggests that, in the case of the equity market neutral funds, investors might be even better off by selecting quants who graduated from high-SAT institutions.

References

Agarwal, V., and Narayan, Y. N., 2004. Risks and portfolio decisions involving hedge funds. Review of Financial Studies 17, 63–98.

Bliss, R. T., and Potter M. E., 2002. Mutual Fund Managers: Does Gender Matter? Journal of Business and Economics Studies 8 (1),1–15.

Boyson, N. M. Why Do Experienced Hedge Fund Managers Have Lower Returns? Working paper, Purdue University.

Boyson, N.M. Another Look at Career Concerns: A Study of Hedge Fund Managers. Working paper. Northeastern University.

Brooks, C. and Kat, H. M., 2001. The statistical properties of hedge fund index returns and their implications for Investors. Cass Business School Research Paper.

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

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

Fama, E. F., and French, K. R., 1992. The Cross-Section of Expected Stock Returns. Journal of Finance 47 (2), 427–465.

Fama, E. F., and French, K. R., 1993. Common Risk Factors in the Returns on Stocks and Bonds. Journal of Financial Economics 33, 3–56.

Fang, Y., and Wang, H., 2015. Fund Manager Characteristics and Performance. Investment Analyst Journal 44 (1), 102–116.

Fung, W., and Hsieh, D.A.,1997. Empirical characteristics of dynamic trading strategies: the case of hedge funds. Review of Financial Studies 10, 275-302.

Fung, W., Hsieh, D.A., Naik, N., and Ramadorai, T., 2008. Hedge Funds: Performance, Risk, and Capital Formation. Journal of Finance 63, 1777–1803.

Golec, J. H., 1996. The Effects of Mutual Fund Managers' Characteristics on their Portfolio Performance, Risk and Fees. Financial Services Review 5, 133–148.

Gottesman, A. A., and Morey, M. R., 2006. Manager Education and Mutual Fund Performance. Journal of Empirical Finance 13, 145–182.

Gottesman, A. A., and Morey, M. R., 2010. CEO Educational Background and Firm Performance. Journal of Applied Finance 20 (2), 70–82.

Graham, J. R., Harvey, C. R., and Puri, M., 2013. Managerial Attitudes and Corporate Actions. Journal of Financial Economics 109, 103–121.

Kaplan, S. N., Klebanov, M. M., and Sorensen, M., 2012. Which CEO Characteristics and Abilities Matter? Journal of Finance 67 (3), 973–1007.

Kaplan, S. N., and Sorensen, M. Are CEOs Different? Characteristics of Top Managers. Working paper. Columbia University.

Korinotis, G. M., and Kumar, A., 2013. Do Portfolio Distortions Reflect Superior Information or Psychological Biases? Journal of Financial and Quantitative Analysis 48(1), 1–45.

Li, H., Zhang, X., and Zhao R., 2011. Investing in Talents: Manager Characteristics and Hedge Fund Performances. Journal of Financial and Quantitative Analysis 46 (1), 59–82.

Sharpe, W.F., 1994. The Sharpe ratio. Journal of Portfolio Management, Fall, 49–58.