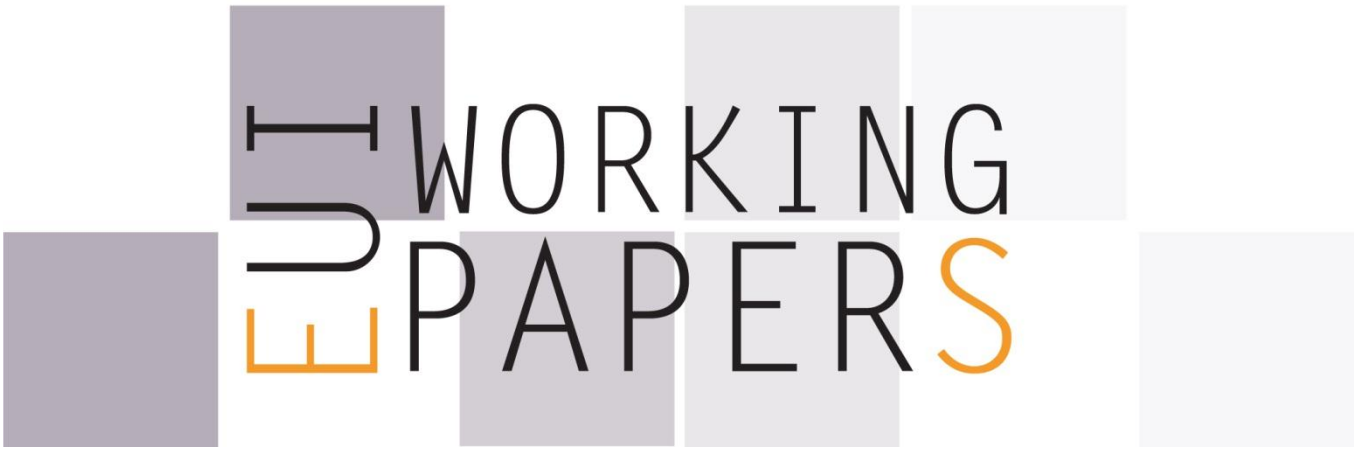

RSCAS 2013/21
Robert Schuman Centre for Advanced Studies

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EUI Working Paper **RSCAS** 2013/21

ISSN 1028-3625

Printed in Italy, March 2013
European University Institute
Badia Fiesolana
I – 50014 San Domenico di Fiesole (FI)
Italy
www.eui.eu/RSCAS/Publications/
www.eui.eu
cadmus.eui.eu

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Abstract

Social contacts influence decisions and economic outputs in a variety of contexts. Does social network matter also in financial markets? In this paper I investigate the effect of social networks on mutual funds performance by exploiting data on the education of U.S. fund managers. The results show that performance is better for fund managers with many social connections. Furthermore, positional advantages in the social network generate superior performance. This evidence suggests that social interaction and information spillovers have a positive and meaningful value for mutual funds.

Keywords

Social Network, Mutual Fund, Performance.

JEL Classification: G23, L14

1. Introduction*

In many contexts, beliefs, attitudes, and decisions are significantly affected by social interactions. Previous evidence indicates that social networks are important channels of information transmission about jobs, experience goods, new technologies and opinions. Whether there are information spillovers in competitive environments too, such as financial markets, is still an open question. The objective of this paper is to examine the role of social networks on fund managers performance.

While a substantial body of literature investigates returns in financial markets and the mutual fund industry, few papers deal with the underlying patterns of information acquisition actually used by professional investors. Shiller and Pound (1989) document that fund managers use computers, reports by analysts, macro-forecasts, personal investigation and newspapers. In addition, managers formulate investment choices by speaking with other people. Similarly, Drachter et al. (2007) conduct a telephone survey among German mutual fund managers and their results confirm the existence of an informal exchange of information with other people, in particular other fund managers. According to this evidence, fund managers seem to actively exchange information with colleagues and not just passively herd other funds. This contrasts with the view that investors act as profit maximizers in a perfectly efficient and competitive[1] market, and therefore, should not share their own private information. Yet, Kahneman and Tversky (see, e.g., Kahneman and Tversky 1979) show that people facing uncertainty do not act necessarily in a fully rational way. Financial markets are an ideal setting in which to test individual decision making and a number of studies are available on individual investors (Barber and Odean, 2000; Grinblatt and Keloharju, 2000). Whether professional investors, in a similar fashion to individual investors,

*This research was conducted while the author was a Jean Monnet Fellow at the RSCAS of the EUI.
I would like to thank Ulrike Malmendier for helpful discussions during the early stages of this project. I also thank Klaus Schaeck and seminar participants at UC Berkeley and Padova University.

[1]Several business publications and information services rank and evaluate in relative terms mutual funds with similar investment objectives. Similarly, an extensive empirical literature models the mutual fund market as a tournament in which funds compete with one another (Brown et al., 1996).

do not behave as standard "rational" investment models would predict is somewhat less obvious. On the one hand, professional investors have specific training, trading is their professional activity and they have access to a large number of information sources. On the other hand, investors experience a high level of uncertainty, markets follow unpredictable patterns and, over the last decade, have significantly increased in complexity. Moreover, while attention is a scarce cognitive resource for all people (Kahneman, 1973), social interaction is likely to be a salient source of information.
Thus, direct and indirect information acquired through social interactions may have a role in investors' decision making. If this is the case, ultimate choice, stock selections and timings of trades are, to some extent, influenced by colleagues and friends, and, as a result, interpersonal connections affect fund performance. Viewing the financial market as a network of agents characterized by information spillovers implies that the relative positions of mutual funds managers in the intricate web of linkages may influence their fund performances.

In this study, a network is constructed using detailed information on managers' educational backgrounds. More precisely, I consider two fund managers to be socially connected if they graduated from the same university with the same type of degree.[2] This previously built network structure, is exogenous and can be quite a good proxy for the effective network that a manager maintains. In other words, a better "education network" established during undergraduate and graduate studies can favor *valuable* endogenous social connections in the future.
In order to relate fund performance to managers' networks, I use tools provided by social network analysis. First, I investigate the topology of the network. As a result, I find that fund managers' networks have all the characteristics of a *small-world*. Second, relating fund performances to network characteristics, I find that larger funds hire well connected managers. This results indicates that social network is used in the labor market for fund managers. Third, I compute measures of network centrality and find that funds managed by better socially connected managers have a better performance.

[2]I am not the first to use information on education as a proxy for social networks: other papers derive social connections between fund managers and executives (Cohen et al., 2008), analysts and company board members (Cohen et al., 2010), and executives and bank officers (Engelberg et al., 2012).

This finding suggests that fund managers benefit from being in a better position in the network. In accordance with the findings of Shiller and Pound (1989) and Drachter et al. (2007), I interpret this result as a consequence of using the informal social network in the decision-making process. Even though this evidence might be reconciled in a fully rational paradigm, assuming, for example, that investors hold complementary pieces of information[3] or have reciprocal preferences towards a few colleagues, it indicates that professional investors do not act in isolation and benefit from exchanging ideas with others. With the development of online communication tools, which provide enormous possibilities for staying in constant touch with friends, it is most likely that the effect of social interaction in investment decisions is much more important than I am able to document. Indeed, anecdotal evidence suggests that professional managers use online investors communities to discuss strategies, ideas, and stock picks.[4]

The present paper relates to different strands of literature. First, a number of papers test for behavioral models in the trading activity of professional investors. Their empirical findings show that they exhibit herding (Grinblatt et al., 1995), home bias (Shiller et al., 1996), excessive turnover (Dow and Gorton, 1997), loss aversion (Coval and Shumway, 2005; Haigh and List, 2005), disposition effect (Venezia and Shapira, 2007; Cici, 2012), and undereaction to news (Frazzini, 2006). My paper contributes by underling the social dimension of the decision-making process among mutual fund managers.
Second, a growing literature examines social networks in financial settings. My work is close in the spirit of Hochberg et al. (2007), who analyze the networks of venture capitalists (VCs) and find that better networked VCs exhibit better performances. Similarly, in Fracassi (2012) corporate finance policies are related to the social networks of board of directors. In order to quantify the relative importance of each actor in a network, both papers use measures of network centrality. Following a similar approach, I study

[3]Stein (2008) considers a model in which competitors exchange information with one another; he shows that a truth-telling equilibrium is sustainable with complementarity of information.

[4]For example, many traders, individual investors, investment advisors, and money managers have Twitter accounts and use them to talk about stocks. The phenomenon is so widespread that more recently, a service company computes a daily sentiment indicator for a number of stocks based on tweets mentioning individual stocks.

the relationship between mutual fund performance and managers' networks. Moreover, I also address issues of network topology, as in Davis and Greve (1997), who, in contrast to my study, use data on members of corporate boards.
Third, mutual fund performance has been the object of investigation of numerous works, and some papers emphasize the role of manager characteristics. The pioneering study by Golec (1996), using a limited sample of funds, shows that funds managed by younger managers, with an MBA and long tenure achieve better performance. In contrast, Chevalier and Ellison (1999) find that none of these characteristics are particularly important but that what really matters is the mean composite SAT score.[5] In Gottesman and Morey (2006) the quality of the MBA is a good predictor of fund performance. Other works investigate difference in performance based on fund managers' gender (Atkinson et al., 2003; Niessen and Ruenzi, 2007), the number of managers (e.g. Prather and Middleton, 2002; Chen et al., 2004; Bär et al., 2008),[6] and team diversity (Bär and Niessen, 2007). One novelty of my paper is that I focus on managers' social networks, which, by providing access to valuable information, influence fund performance.

The remainder of the paper is organized as follows. Section 2 illustrates the data and provides network definitions. Section 3 characterizes the fund managers' networks. Section 4 describes the empirical strategy and Section 5 presents the main results. Section 6 concludes.

2. Data and social network definitions

2.1. Data

To perform my investigation, I combine different data sources. First, data on managers' education comes from the Mornigstar Principia CD-Rom.

[5]SAT Reasoning Test (Scholastic Aptitude Test and Scholastic Assessment Test) tests reading, writing and math; usually colleges and universities use the SAT score to make their admission decisions.

[6]These works, yielding ambiguous predictions, investigate the difference in performance between single and team-managed funds. The number of funds managed by teams of managers, either named or anonymously, has grown much in the last decade. This phenomenon has been documented by Massa and Reuter (2006). In these mutual funds, either the portfolio decisions are taken by a committee or each manager decides for a part of the portfolio.

However, it is not exhaustive so I enlarge my sample by collecting data from several web sites (sec.info, fund websites, zoom.info). The information about managers' education comprises academic institution, type of degree and year of graduation. In addition, I use information from College Board to compute the average SAT at university level. College Board[7] provides the scores of the 25th and 75th percentiles and I compute the average of these values.
Second, the data source for fund information is the Survivorship-Bias-Free US Mutual Fund Database provided by the Center for Research in Security Prices (hereafter CRSP). CRSP reports various data about funds; I collect information about return, assets, expenses, fund age, and turnover. The unit of observation in CRSP is each share class of a fund, but I need a unique observation for each fund. Indeed, each manager in a fund is responsible for all share classes within a single portfolio of holdings. Hence, to avoid double counting, as in Grinblatt et al. (1995), I add up these data into one observation per fund.[8]
I merge the Mornigstar data and CRSP data; for all the funds that do not have a match I merge them manually by looking at the name (otherwise, these funds are deleted). My analysis is limited to funds managed by a *unique* manager, in such a way that there is just one decision-maker per fund. I further restrict the sample by considering only those funds with an active investment style: Growth, Aggressive Growth, Growth &Income, Income.[9] The period of observation spans from 1996 to 2007.

2.2. Social network definitions

This section introduces network notations and statistics that are helpful in illustrating the structure and defines centrality measures. A network is a set of *nodes* $N = \{1, ..., n\}$. Nodes are interconnected through *links*, which are defined with $g_{i,j}$ representing the relationship between node i and node j. The total number of links is $D = \sum_{i \in N} \sum_{j \in N} g_{i,j}$. In my setting, nodes are mutual fund managers, and links, based on academic affiliation, represent

[7]College Board does not report scores for all colleges and universities in my sample. In these cases as in Christoffersen and Sarkissian (2009), I exploit the ACT scores (American College Testing).

[8]For variables such as expense ratios or returns values are weighted by the total net assets of each share class.

[9]I select all the funds that are classified in one of these categories as defined by the Investment Company Data Inc. (ICDI).

social connections. More precisely, managers are connected if they attended the same institution and they gained the same degree. Here, each link is *undirected*, exactly like in friendship or other bilateral relationship, because g is symmetric in such a way that $g_{ij} = g_{ji}$.
To describe the overall network I need to introduce a number of statistical definitions. Network *density*, defined as $\delta = D/n(n-1)$ is the proportion of the actual number of links out of all possible links. The shortest path length $d(i,j)$ between two nodes, i and j, is defined as the minimum number of links that need to be traversed to pass from i to j (or vice versa). Then, the average path length is simply the average value of the shortest paths over all distinct pairs of nodes, mathematically $L = \frac{\sum d(i,j)}{n(n-1)}$. The clustering coefficient C_i for a node i is given by the proportion of links between the nodes within its neighborhood divided by the maximum possible number. Then, the clustering coefficient for the entire graph is the average over all nodes.

To identify the importance of managers in the overall network I have to provide some definitions at node level. *Degree* is the number of links from node i, formally $k_i(g) = \sum_{i \in N} g_{i,j}$. A higher number of links means a central position in the network and a greater number of social contacts. In my setting, managers with a higher number of links have greater opportunities to exchange information, and better opportunities to have access to valuable information. *Closeness* is a measure of influence. Unlike the degree of centrality, closeness takes into account both direct and indirect links: $c_C(i) = \frac{1}{\sum_{y \in U} d(i,j)}$ where $d(i,j)$ is the shortest path between i and j. The most central unit can reach all the others quickly. In "communication networks", the possibility of either reaching other investors or being reachable by others over shorter path lengths is a source of power.
Degree and closeness capture, in different ways, how well connected a mutual fund manager is. I interpret the social network of fund managers as a conduit of information exchange. Thus, social connections serve either to communicate valuable information or to search for information. Consequently, better connected managers, to some extent, should exhibit better performance. However, rumors too might spread through social connections,[10] and thus

[10]If this is the case, social networks may have no impact, or even a negative effect, on fund performance.

the relationship between fund performance and managers' social networks is not a priori obvious.

3. Descriptive analysis

3.1. Fund and manager characteristics

After these restrictions, and considering only funds managed by managers for whom valid education information is available, my sample consists of 4989 fund-year observations. Summary statistics are given in table 1; the second column shows characteristics for all the funds and managers. On average, the turnover ratio is 88.24% and the expense ratio is 1.25%. The average fund age, defined as the difference between the current year and the year of organization of the fund, is 13 years.

In addition to SAT, by using the education information about fund managers I construct two additional variables: MBA (a dummy variable that takes value one if the manager holds an MBA, and zero otherwise) and PHD (a dummy variable that takes value one if the manager holds a PhD, and zero otherwise). The average SAT is approximately 1252 and 650 managers hold an MBA degree while only 42 managers hold a PhD. The year of graduation allows me to infer the age of managers. As in Chevalier and Ellison (1999), I assume that manager was 21 years old upon college graduation. This information is not available for all managers so I create a dummy variable equal to one for managers with missing age (MISSINGAGE). Managers' tenure is computed as the difference between the current year and the first year that the manager took control of the fund. The average manager's age is 46, while their tenure at a fund averages about 5 years. According to my definition of the network, a number of managers do not have any connections. I generate a dummy variable called *NET*, which equals 1 if the manager in charge has at least one connection in that year, and 0 otherwise. In my sample, there are 956 fund-year observations without connections. The third and the fourth column shows fund and manager characteristics in the two sub-samples. Funds with networked managers are significantly older, have larger amounts of assets, but lower expenses compared to non-connected funds. Managers that do not belong to a network generally attended less "popular" (at least in the finance industry) universities and they do not hold

an MBA.[11] Connected managers have higher tenure and SAT score.

3.2. Network structure and measures

In this section I focus on a description of managers' networks.
First, given my above definitions, managers are mapped onto a network year by year. As a result, I have on average 301 vertices and 3,031 links. Network information is used to draw a graph, which seems to be neither a random graph nor completely ordered and, in comparison with the total number of nodes, the number of links per node is small (see figure 1). While there are only a few nodes with a high number of connections, many managers are mutually reachable through paths, which establish a big component, in which there is a path from each vertex to any other manager, represented by the academic institutions where many fund managers graduated (75% of the managers).
The network statistics are shown in table 2 (part A). The network has a sparse topology, with a density score equal to 0.033, meaning that approximately only 3 mangers know each other, but the average path length, L, is equal to 3.88 which indicates that, on average, in less than 4 steps the whole network can be traversed, this is quite a short chain connecting pairs of people. Moreover, the manager network is highly clustered, with the coefficient C equal to 0.82. Given these characteristics of the networks I deepen my study of their topology by verifying for the existence of small world network (henceforth SWN) properties.[12] In all years, the results confirm that the manager networks are like a SWN, which is an interesting result given the diffusion properties of such a network structure.
Second, the key variables for my investigation are the centrality measures used as proxies for managers' positions in the network. Table 2 (part B) reports the descriptive statistics of the centrality measures.
Correlations with fund and manager characteristics are generally quite low, except for degree/closeness with MBA and SAT. This means that managers with a high number of connections hold an MBA and this follows from the

[11] Given my definition of links, managers with an MBA have a higher probability of being connected with someone else.

[12] The SWN properties require that L is almost as small as L_{random} and $C >> C_{random}$ where L_{random} and C_{random} are respectively the average path length and the clustering coefficient of a random graph of the same size and with the same number of vertices as the manager network.

network definition. The high correlation with SAT means that funds select many managers from good universities and as a consequence they are highly networked. Correlations between degree and closeness are high because, by construction, a manager with a high number of direct links will have a high number of indirect links (the correlation with closeness is 0.69). I run regressions for the two centrality measures separately, as in Hochberg et al. (2007), so multicollinearity is not a problem.

4. Methodology

4.1. Measures of performance

In this section, I describe the empirical strategy to test the impact of social connections on fund performance. The first step of the procedure is to compute the fund return. Different measures of return are used. I consider the *gross return* (defined as the difference between the raw return and the risk free) and the *abnormal return* (the difference between the gross return of the fund and the mean return across all funds in the same market segment for a given year). These measures do not take into account the riskiness of a fund's strategy, and therefore I consider other measures of performance already adopted in previous studies.
I calculate the fund's Jensen Alpha, the 3-factor model, the 4-factor model, the Treynor Mazuy model and a model with public information.
The market model or CAPM Jensen (1969) is represented as follows

$$r_{i,t} = \alpha_{i,t} + \beta_{i,t} r_{M,t} + e_{i,t} \tag{1}$$

where $r_{M,t} = (R_{M,t} - \tau_t)$. $r_{i,t}$ is the return on the aggregate mutual fund portfolio i at time t minus the riskfree rate of interest (the one-month U.S. T-bill rate for time t, τ_t), and $R_{M,m,t}$ is the return of the U.S. market portfolio. $\alpha_{i,t}$ is the fund alpha for each fund i. This measure of performance is preferred to raw returns because it is risk-adjusted. That is, Jensen's alpha will *not* be high when a low skilled manager takes a highly risky position (assets with high betas), in the contrary case the raw return could appear highly positive.

The second measure is computed by using the well-known Fama and French model (1993) and it has been appraised as a better representation of fund

performance. Formally,

$$r_{i,t} = \alpha_{i,t} + \beta_{i,t} r_{M,t} + \gamma_{i,t} SMB_t + \delta_{i,t} HML_t + e_{i,t} \quad (2)$$

where SMB_t and HML_t are respectively the size and the book-to-market of the three-factor model. I obtain the monthly time-series of the three Fama-French factors and the momentum factor from Professor Kenneth French's data library.[13]

The third model is the four-factor model used by Carhart (1997) defined as

$$r_{i,t} = \alpha_{i,t} + \beta_{i,t} r_{M,t} + \gamma_{i,t} SMB_t + \delta_{i,t} HML_t + \eta_{i,t} UMD_t + e_{i,t} \quad (3)$$

This model is similar to the Fama and French model but adds a further term UMD_t, which represents the momentum factor in order to capture the momentum anomaly (Jegadeesh and Titman, 1993).

Treynor and Mazuy (1966) emphasize that α can include the market timing ability of fund managers. So they rewrite eq. 1 as

$$r_{i,t} = \alpha_{i,t} + \beta_{i,t} r_{M,m,t} + \gamma_{i,t} r_{M,t}^2 + e_{i,t} \quad (4)$$

In this equation $\gamma_{i,t}$ represents market timing ability.

Indeed, Ferson and Schadt (1996) and Christopherson et al. (1998) point out the importance of separating managers' ability and private versus public information. Thus, I consider the following conditional alpha model:

$$r_{i,t} = \alpha_{i,t} + \beta_{i,t} r_{M,t} + \varphi_{i,t}(Z_{Tbill,t-1} r_{M,t}) + \varphi_{j,t}(Z_{Term,t-1} r_{M,t}) + e_{i,t} \quad (5)$$

$Z_{Tbill,t-1}$ is the one month U.S. Treasury bill rate and $Z_{Term,t-1}$ is a proxy for public information (term-structure spread) and it is calculated as the difference between the rates of the 10-year U.S. government bond and the three-month U.S. T-bill.

In all these methods, $\alpha_{i,t}$ can be interpreted as a measure of over or under performance: when it is positive it denotes a manager whose investment choices add value to the fund, while a negative $\alpha_{i,t}$ denotes a manager who

[13] http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/

reduces the value of the fund. As in previous articles, I use one year of data. Namely, to compute α in 1996 I use return information starting from January 1995. A fund is deleted if there are no return data for 12-months.[14]

4.2. Empirical model

The above measures of performance allow me to estimate the importance of social networks. As a second step of the procedure I use the following specification:

$$\alpha_{i,T} = a_{i,T} + \vartheta_{i,T} X_{Fund,T} + \theta_{i,T} X_{Manager,T} + \zeta_{i,T} Network_T + e_{i,T} \quad (6)$$

$X_{Fund,T}$ and $X_{Manager,T}$ are the set of control variables for fund and manager characteristics respectively. Control variables for fund characteristics are: size (the log of the total net assets in millions of dollars), expenses (annual total expense ratios in%), turnover (yearly turnover ratio in %) and fund age (difference in years between the current year and the year organization of the fund). Previous literature finds that these characteristics impact on fund performance (Chen et al., 2004, e.g.). In addition, following Chevalier and Ellison (1999) and Gottesman and Morey (2006), I add some controls for managers: tenure, MBA, PHD, SAT, AGE and MISSINGAGE. The coefficient of interest is ζ and the variables NET, degree, and closeness, defined in the previous section, are used as proxies for the explanatory variable *Network*. All regressions include time and style fixed effects and errors are clustered by managers.

5. Empirical results

5.1. Fund characteristics and social networks

In this section, I analyze the relationship between fund characteristics and manager variables, using network measures in particular. Table 3 and 4 show the results for BETA (model 1), turnover, expense and size. I estimate separate regressions for each network variable and, along with manager characteristics, I control for fund style and time.
Previous results about the relationship between BETA and manger education are mixed. While Chevalier and Ellison (1999) find a positive and significant

[14]The yearly α is a noisy measure of performance but it allows to capture differences across funds.

relationship with MBA and SAT, Gottesman and Morey (2006) find that neither the quantity nor the quality of education are significantly related to fund BETA. Other manager characteristics are important in Chevalier and Ellison: higher betas are chosen by older managers or managers with shorter tenure. My results are in line with Gottesman and Morey regarding education, and the effect of tenure is negative and statistically significant. Network and degree are not statistically significant while the coefficient of closeness is positive and significant at the 10 percent level. This finding might suggest that more central managers are able to take more risk because they have better access to information flows. Turnover is negatively related to both tenure and SAT, as Chevallier and Ellison and Gottesman and Morey find. Also the relationship between expense ratio and manager characteristics is in line with the findings of Chevalier and Ellison. In addition, my results suggest that both turnover and expense ratio are lower for managers with many connections. Furthermore, the estimated coefficient analyzing fund size are positive for manager tenure, SAT and MBA, but negative for manager age. In all three regressions, network variables are positive and significant, suggesting that larger funds hire well-connected managers. This result may suggest that larger funds are located in the business city centers where the best universities are located. In addition, the social network may be used to enter in the mutual fund industry, particularly by larger funds.

Overall, despite considering a longer time period, my findings concerning fund characteristics and manager characteristics are substantially in line with previous studies. The analysis of network variables suggests that more central managers take slightly more risk, managers with many connections negatively influence to a limited extent the turnover ratio and expense, and are hired by larger funds.

5.2. Fund performance and social networks

I begin by exploring the differences in fund performance between managers with some connections and managers that are not connected to anyone else (see table 5). For all the years, the funds are sorted according with to values of NET, and two different portfolios are created (one for funds that have the value NET=1, another for NET=0). For each portfolio I consider all seven performance measures. The results of the portfolio analysis suggest that in all cases the returns are negative, but the differences are statistically significant only for raw return, abnormal return and four-factor alpha (table 5, part A). Then, I study differences in performance at the micro-level,

controlling for fund and manager characteristics. In all the regressions, as control variables I include a segment-fixed effect to compare funds that have the same investment style and time-fixed effect. I implement model 6 including the dummy variable NET. The estimates of the network variable are not statistically significant (table 5, part B).

The existence of a small world structure underlines the fact that managers have substantially different positions in the network, which might influence performance. Thus, I exploit centrality measures: degree and closeness. Table 6 shows the regression results. In column 2 the dependent variable is gross return and a coefficient 0.0344 for the impact of degree indicates that, for example, a manager with 10 connections outperforms a manager without connections by 0.3%. I obtain similar results for models estimated with alternative performance measures. These results suggest that managers' direct links have some positive impact on fund performance. Thus, it is possible that, in addition to the number of direct links, the position in the overall network and indirect links are also important in financial outcomes[15]. Table 7 shows results in which as centrality measure I include closeness. Remember that closeness measures the influence in the network and takes into account also indirect connections. Let me consider as an example the results for fund performance measured by the Four factor model (column 5). A coefficient of 0.0049 for the impact of closeness indicates that a manager with a value of closeness of 0.15 outperforms a manager with a closeness of 0 by 0.7%. The impact estimated with the other models is similar and statistically significant. Results about fund characteristics are similar to previous literature. Fund size is significantly negative related to performance. Regarding manager characteristics, I find that managers age is negatively related to fund performance, while educational variables indicate that educational background has little influence on performance (with the exception of MBA, but the sign and significance level vary across the panels).[16] In my sample, managers with many connections graduated from highly ranked colleges or Ivy League universi-

[15]Betweenness is an additional centrality measure proposed in the social network literature. Unfortunately managers network does not have betweenness power, consequently results are not statistically significant when using such measure as *Network* variable in the empirical model.

[16]As a robustness check I run all regressions omitting SAT and MBA and obtain similar results to tables 6 and 7.

ties. To deal with such issue, all models are estimated controlling for SAT. Furthermore, as a robustness check, I construct a weighted network, where the links are defined as in Section 2 and, in addition, *weighted* with SAT values. Results for weighted-Degree and weighted-Closeness are presented in tables 8 and 9, respectively. Importantly, the coefficients are similar to the previous findings. This suggests that the quality of the network is important but the positive impact of degree and closeness on performance is *not* driven entirely by the prestige of universities. Overall, positional advantages in the social network generate superior performance and have a value per se.

5.3. Discussion

A growing number of studies find that social connections and the networks they generate may have effects on economic outcomes (Hochberg et al., 2007; Fracassi, 2012; Engelberg et al., 2012). As the findings indicate, positive externalities are present in social connections also in the mutual fund industry. Managers exploiting additional information disseminated in the network are able to obtain better performances. Unfortunately, the data do not allow investigation into the underlying mechanisms through which networks create value. One possibility is that managers strategically exchange private news with colleagues, motivated by the complementarities in their information sets.[17] Differently, other-regarding behaviour between friends or acquaintances[18] may work as channel for transmitting investment strategies and ideas, which are further propagated through indirect social connections. Another possible explanation for information sharing is in the uncertainty and complexity of the markets. It is possible that individuals rely more on others when they face risky decisions. In line with this intuition, Kelly and O Grada (2000) find that Irish depositors during the two panics of 1854 and 1857 based their decisions to close their bank accounts on the choices of their peers'. This is not the only paper on individual investors and social influence. A few works find that social interactions are important in stock market participation (Hong et al., 2004; Brown et al., 2008) and investment decisions (Feng and Seasholes, 2004; Ivković and Weisbenner, 2007). In the end, according to my results, despite the higher level of sophistication mu-

[17]Similarly, Fracassi concludes that social network is used for exchanging information about corporate finance policies.

[18]Although the high level of competition in the mutual fund industry would predict that managers are motivated exclusively by self-interest.

tual fund managers may have decision-making processes which are not so different from those of individual investors. A further possibility is that networks create value in other ways.[19] In Cohen et al. (2008) investment positions have higher returns when social connections between mutual fund managers and board members are present. In Bertrand et al. (2005), Faccio (2006), and Faccio et al. (2006) firms extract benefits through political connections. However, I cannot exclude other mechanisms my findings suggest that social network have a positive value in financial markets and encourage further works which could explore non-standard data sources, such as on-line community information or experimental evidence.

6. Conclusion

The present work suggests an alternative view of the mutual fund industry. Managers are linked between each other using educational information. This social network exhibits small world characteristics, such topology, found in many other applications, has important impact on social interactions and, lastly, on diffusion of information.
Consistent with the network structure, my results suggest that social connections have a positive impact on fund performance and a central position in the social network guarantees some information gains.
To conclude, this paper highlights the importance of social network in financial markets in influencing investment decisions and performance. This result constitutes interesting avenues of potential further research both in finance and economics. Additional data or laboratory experiments would provide cleanest evidence about the role of social interaction in (highly) competitive settings.

[19]Otherwise, managers' educational backgrounds may reflect commonalities in ethics and culture which may impact the perceptions of risk and, ultimately, the portfolio performance.

Figure 1: **Fund managers social network (year 2001).** The network shows connections between fund managers based on educational information. The figure has been drawn using the Pajek software for large social networks (Kamada-Kawai energy algorithm).

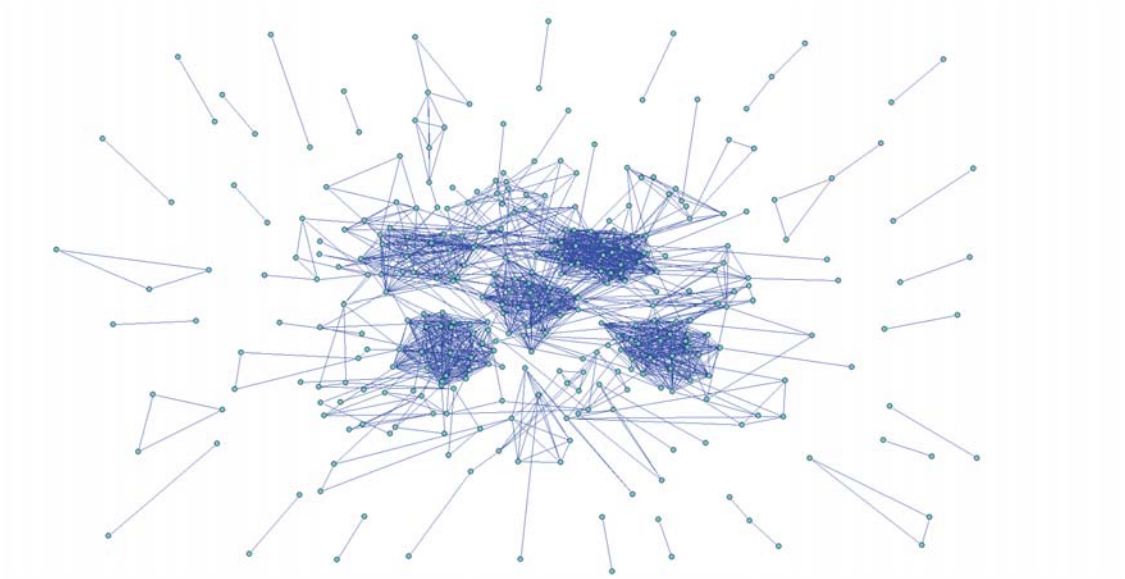

Table 1: **Summary statistics of mutual funds and managers.** The table shows the average values of mutual fund and managers characteristics. The values shown in brackets are standard deviations. Column 5 gives the difference between column 3 (subsample of funds with connected managers) and column 4 (subsample of funds with managers without any link). Statistical significance, based on a two-sided t-test, at the 10%, 5%, and 1% levels is denoted by *, **, ***.

	All	Network=1	Network=0	Difference
FUNDS				
Assets (in million)	1997	2293	1153	1239***
	[7420]	[4948]	[8016]	
Fund Age	13.51	13.84	12.46	1.37***
	[14.47]	[14.03]	[14.60]	
Expenses (in %)	1.25	1.24	1.28	-0.05**
	[0.57]	[0.58]	[0.53]	
Turnover (in %)	88.24	88.13	88.57	0.44
	[1.00]	[0.98]	[1.06]	
MANAGERS				
AGE	46.23	46.31	45.92	0.38
	[9.47]	[9.47]	[9.47]	
MISSINGAGE	0.67	0.70	0.56	0.12***
	[0.47]	[0.46]	[0.49]	
Tenure	5.27	5.37	4.96	0.41**
	[5.00]	[5.16]	[4.44]	
SAT	1252	1283	1155	128***
	[155]	[146]	[145]	
MBA	0.63	0.72	0.34	0.37***
	[0.48]	[0.44]	[0.47]	
Phd	0.03	0.03	0.0	0.00
	[0.19]	[0.19]	[0.18]	

Table 2: **Summary statistics: network and centrality measures.** Part A reports average values across times of number of nodes (N), total number of links (D), network density (δ), size of giant strong connected component, average path length (L) and clustering coefficient (C) for the managers networks. L_{random} and C_{random} are respectively the average path length and the cluster coefficient for random networks the same number of nodes and links of the observed network. Part B shows the summary statistics for degree and closeness. Values are averaged across managers and times.

A. Network measures

	Average
N	301
D	1,496
δ	0.033
L	3.88
L_{random}	2.73
C	0.824
C_{random}	0.035

B. Centrality measures

	Degree	Closeness
Mean	9	0.157
St.dev.	10	0.091
Min	1	0.005
Max	48	0.327

Table 3: **Regressions of fund characteristics on network measures I.** The dependent variables are BETA (β model-1), Turnover (previous year annual turnover ratio), Expense (previous year total annual expense ratios) and Size (the log of the total net assets in millions of dollars). Control variables are Size, M.AGE (manager age), MISSINGAGE (dummy variable equal 1 if manager age is not available), Tenure (computed as the difference between the current year and the first year that the manager took the control of the fund.), SAT (is a proxy for the quality of the university), MBA (it is a dummy variable that takes value one if the manager holds a MBA) and PHD (it is a dummy variable that takes value one if the manager holds a PHD). The year and style fixed effects are included in all regressions but their coefficients are not shown. Managers are connected if they attended the same institution and they gained the same degree. NET is a dummy variable equal 1 if manager is connected, 0 otherwise, Degree is the total number of social connections for each manager. Standard errors (cluster at manager level) are shown in parentheses, Closeness is a centrality measure. Statistical significance at the 10%, 5% and 1% levels is denoted by *, **, *** respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	$\beta_{i,t}MKT$	$\beta_{i,t}MKT$	$\beta_{i,t}MKT$	Turnover	Turnover	Turnover
Size	0.0010	-0.0013	-0.0021	-0.0589***	-0.0579***	-0.0590***
	(0.0036)	(0.0040)	(0.0041)	(0.0057)	(0.0069)	(0.0071)
Tenure	-0.0047***	-0.0039**	-0.0039**	-0.0295***	-0.0307***	-0.0310***
	(0.0013)	(0.0014)	(0.0015)	(0.0025)	(0.0030)	(0.0030)
Missingage	0.0292	0.0438	0.0444	0.2003**	0.1845	0.1804
	(0.0316)	(0.0369)	(0.0375)	(0.0840)	(0.1237)	(0.1243)
Manager Age	-0.0009	-0.0010	-0.0010	-0.0039**	-0.0031	-0.0030
	(0.0007)	(0.0009)	(0.0009)	(0.0016)	(0.0025)	(0.0025)
SAT	0.0052	0.0142***	0.0075*	-0.0177	-0.0222*	-0.0286**
	(0.0038)	(0.0040)	(0.0040)	(0.0126)	(0.0124)	(0.0109)
MBA	0.0104	0.0041	-0.0112	0.0614**	0.0591	0.0280
	(0.0133)	(0.0188)	(0.0188)	(0.0287)	(0.0409)	(0.0346)
PHD	0.0171	0.0323	0.0341	0.2084***	0.1749**	0.1857**
	(0.0325)	(0.0408)	(0.0403)	(0.0564)	(0.0647)	(0.0645)
NET	0.0043			0.0965*		
	(0.0104)			(0.0510)		
Degree		-0.0004			-0.0032*	
		(0.0007)			(0.0019)	
Closeness			0.1867*			-0.0741
			(0.0969)			(0.2799)
_cons	1.2155***	0.5771***	0.6431***	1.0310***	1.1569***	1.2501***
	(0.0485)	(0.0479)	(0.0475)	(0.1317)	(0.1496)	(0.1313)
N	4982	3909	3909	4982	3909	3909
R2_a	0.15	0.15	0.15	0.11	0.10	0.10

Table 4: **Regressions of fund characteristics on network measures II.**

	(1) Expenses	(2) Expenses	(3) Expenses	(4) Size	(5) Size	(6) Size
Size	-0.1111***	-0.1089***	-0.1095***			
	(0.0082)	(0.0096)	(0.0095)			
Tenure	0.0067**	0.0106***	0.0104***	0.0684***	0.0709***	0.0743***
	(0.0024)	(0.0030)	(0.0030)	(0.0106)	(0.0107)	(0.0106)
Missingage	-0.0572	-0.0758*	-0.0793*	2.5175***	3.1627***	3.2146***
	(0.0422)	(0.0459)	(0.0454)	(0.1656)	(0.2050)	(0.2066)
Manager Age	0.0025**	0.0025**	0.0026**	-0.0482***	-0.0602***	-0.0614***
	(0.0010)	(0.0010)	(0.0010)	(0.0038)	(0.0046)	(0.0047)
SAT	-0.0167**	-0.0159**	-0.0187**	0.1571***	0.0873***	0.0819***
	(0.0057)	(0.0056)	(0.0063)	(0.0186)	(0.0248)	(0.0241)
MBA	-0.0094	0.0120	-0.0080	0.3700***	0.2200**	0.3564***
	(0.0168)	(0.0192)	(0.0206)	(0.0600)	(0.0969)	(0.0783)
PHD	0.2412**	0.2374**	0.2456**	-0.2484	-0.2271	-0.3080
	(0.0760)	(0.0901)	(0.0893)	(0.1718)	(0.1896)	(0.1965)
NET	0.0352			0.2608***		
	(0.0242)			(0.0756)		
Degree		-0.0025**			0.0258***	
		(0.0011)			(0.0050)	
Closeness			-0.1295			2.4610***
			(0.1403)			(0.4856)
_cons	1.8092***	1.8077***	1.8603***	3.0579***	3.0288***	2.8219***
	(0.0570)	(0.0824)	(0.0803)	(0.2834)	(0.4250)	(0.3919)
N	4982	3909	3909	4982	3909	3909
R2_a	0.23	0.23	0.23	0.11	0.12	0.12

Table 5: **Performance and Network.** Managers are connected if they attended the same institution and they gained the same degree. In Part A I divide the sample into two portfolios one for managers within a network (NET=1) and one for managers without any connections (NET=0) and I calculate the equally weighted average. Part B shows the results of the second stage of my methodology. The intercept, all controls (fund and manager characteristics), year and style fixed effects are included in all regressions but their coefficients are not shown. Standard errors (cluster at manager level) are shown in parentheses. Statistical significance at the 10%, 5% and 1% levels is denoted by *, **, *** respectively.

A. Performance-Portfolio Analysis

	Gross	Abn	$\alpha_{i,t}MKT$
Network=1	0.0760	-0.0067	-0.0010
Network=0	0.0926	0.0005	-0.0004
Difference	-0.0166***	-0.0073**	-0.0005*

B. Regression (eq. 6)

	Gross	Abn	$\alpha_{i,t}MKT$	$\alpha_{i,t}3F$	$\alpha_{i,t}4F$	$\alpha_{i,t}TM$	$\alpha_{i,t}Cond$
NET	0.0032	0.0020	0.0003	0.0003	0.0003	0.0005	0.0003
	(0.0025)	(0.0025)	(0.0002)	(0.0003)	(0.0003)	(0.0004)	(0.0004)

Table 6: **Fund Performance and Degree.** The table shows the results of the second stage of my methodology. Control variables for fund characteristics are Perf_1 (previous period performance), Size (the log of the total net assets in millions of dollars), Fund Age (difference in years between the current year and the year organization of the fund), Expenses_1 (previous year total annual expense ratios) and Turnover (previous year annual turnover ratio). Control variables for manager characteristics are M.AGE (manager age), MISSINGAGE (dummy variable equal 1 if manager age is not available), Tenure (computed as the difference between the current year and the first year that the manager took the control of the fund.), SAT (is a proxy for the quality of the university), MBA (it is a dummy variable that takes value one if the manager holds a MBA) and PHD (it is a dummy variable that takes value one if the manager holds a PHD). Managers are connected if they attended the same institution and they gained the same degree. Degree is the total number of social connections for each manager. The intercept, year and style fixed effects are included in all regressions but their coefficients are not shown. Standard errors (cluster at manager level) are shown in parentheses. Statistical significance at the 10%, 5% and 1% levels is denoted by *, **, *** respectively.

	(1) Gross	(2) Abn	(3) $\alpha_{i,t}MKT$	(4) $\alpha_{i,t}3F$	(5) $\alpha_{i,t}4F$	(6) $\alpha_{i,t}TM$	(7) $\alpha_{i,t}Cond$
Perf_1	0.1781***	0.2019***	0.2106***	0.1620***	0.1517***	0.1519***	0.1268***
	(0.0419)	(0.0417)	(0.0332)	(0.0347)	(0.0295)	(0.0336)	(0.0343)
Size	-0.0042**	-0.0040***	-0.0003**	-0.0002**	-0.0002**	-0.0003**	-0.0004**
	(0.0013)	(0.0012)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Fund Age	-0.0001	-0.0001	-0.0000	-0.0000*	-0.0000**	-0.0000	-0.0000
	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Turnover_1	0.0026	0.0029	0.0002	-0.0002	-0.0003	0.0007	0.0007
	(0.0039)	(0.0036)	(0.0003)	(0.0003)	(0.0002)	(0.0005)	(0.0005)
Expenses_1	-0.0042	-0.0054	-0.0010*	-0.0009*	-0.0008*	-0.0010**	-0.0009
	(0.0089)	(0.0090)	(0.0006)	(0.0005)	(0.0005)	(0.0005)	(0.0010)
Tenure	-0.0005	-0.0003	-0.0000	0.0000	0.0000	-0.0000	-0.0000
	(0.0003)	(0.0003)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Missingage	0.0188	0.0198	0.0018*	0.0031***	0.0027***	0.0015	0.0006
	(0.0143)	(0.0121)	(0.0009)	(0.0008)	(0.0007)	(0.0016)	(0.0018)
Manager Age	-0.0003	-0.0004*	-0.0000**	-0.0001***	-0.0001***	-0.0000	-0.0000
	(0.0002)	(0.0002)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
SAT	0.0016	0.0015	0.0000	-0.0000	-0.0000	0.0001	0.0001
	(0.0013)	(0.0012)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
MBA	-0.0062	-0.0059	-0.0007**	-0.0009**	-0.0008**	-0.0015**	-0.0010**
	(0.0044)	(0.0040)	(0.0003)	(0.0003)	(0.0003)	(0.0005)	(0.0005)
PHD	0.0049	0.0071	0.0001	-0.0000	0.0001	-0.0003	0.0003
	(0.0112)	(0.0106)	(0.0009)	(0.0007)	(0.0007)	(0.0008)	(0.0009)
Degree	0.0344**	0.0339***	0.0023**	0.0019**	0.0020**	0.0023**	0.0027**
	(0.0116)	(0.0101)	(0.0007)	(0.0008)	(0.0008)	(0.0009)	(0.0012)
N	3909	3909	3909	3909	3909	3909	3909
R2_a	0.65	0.05	0.15	0.12	0.13	0.16	0.12

Table 7: **Fund Performance and Closeness.** The table shows the results of the second stage of my methodology. Control variables for fund characteristics are Perf_1 (previous period performance), Size (the log of the total net assets in millions of dollars), Fund Age (difference in years between the current year and the year organization of the fund), Expenses_1 (previous year total annual expense ratios) and Turnover (previous year annual turnover ratio). Control variables for manager characteristics are M.AGE (manager age), MISSINGAGE (dummy variable equal 1 if manager age is not available), Tenure (computed as the difference between the current year and the first year that the manager took the control of the fund.), SAT (is a proxy for the quality of the university), MBA (it is a dummy variable that takes value one if the manager holds a MBA) and PHD (it is a dummy variable that takes value one if the manager holds a PHD). Managers are connected if they attended the same institution and they gained the same degree. Closeness is a centrality measure taking into account both direct and indirect links. The intercept, year and style fixed effects are included in all regressions but their coefficients are not shown. Statistical significance at the 10%, 5% and 1% levels is denoted by *, **, *** respectively. Standard errors (cluster at manager level) are shown in parentheses.

	(1) Gross	(2) Abn	(3) $\alpha_{i,t}MKT$	(4) $\alpha_{i,t}3F$	(5) $\alpha_{i,t}4F$	(6) $\alpha_{i,t}TM$	(7) $\alpha_{i,t}Cond$
Perf_1	0.1789***	0.2030***	0.2113***	0.1616***	0.1517***	0.1522***	0.1270***
	(0.0419)	(0.0417)	(0.0333)	(0.0347)	(0.0297)	(0.0336)	(0.0343)
Size	-0.0041**	-0.0039**	-0.0003**	-0.0002**	-0.0002**	-0.0003**	-0.0004**
	(0.0013)	(0.0012)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Fund Age	-0.0001	-0.0001	-0.0000	-0.0000*	-0.0000*	-0.0000	-0.0000
	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Turnover_1	0.0026	0.0029	0.0002	-0.0002	-0.0003	0.0007	0.0007
	(0.0038)	(0.0036)	(0.0003)	(0.0003)	(0.0002)	(0.0005)	(0.0005)
Expenses_1	-0.0044	-0.0057	-0.0011*	-0.0009*	-0.0008*	-0.0010**	-0.0010
	(0.0089)	(0.0091)	(0.0006)	(0.0005)	(0.0005)	(0.0005)	(0.0010)
Tenure	-0.0004	-0.0002	-0.0000	0.0000	0.0000	-0.0000	-0.0000
	(0.0003)	(0.0003)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Missingage	0.0203	0.0208*	0.0019**	0.0031***	0.0027***	0.0015	0.0007
	(0.0145)	(0.0122)	(0.0009)	(0.0008)	(0.0007)	(0.0017)	(0.0018)
Manager Age	-0.0004	-0.0004*	-0.0000**	-0.0001***	-0.0001***	-0.0000	-0.0000
	(0.0002)	(0.0002)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
SAT	0.0012	0.0014	0.0000	-0.0001	-0.0000	0.0000	0.0001
	(0.0013)	(0.0013)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0002)
MBA	-0.0030	-0.0021	-0.0005*	-0.0008**	-0.0006**	-0.0013**	-0.0007
	(0.0039)	(0.0038)	(0.0003)	(0.0003)	(0.0003)	(0.0007)	(0.0007)
PHD	0.0029	0.0051	-0.0000	-0.0001	-0.0000	-0.0004	0.0002
	(0.0115)	(0.0108)	(0.0009)	(0.0008)	(0.0007)	(0.0008)	(0.0009)
Closeness	0.0738***	0.0642**	0.0046**	0.0049**	0.0037**	0.0056**	0.0042
	(0.0217)	(0.0196)	(0.0017)	(0.0015)	(0.0014)	(0.0028)	(0.0029)
N	3909	3909	3909	3909	3909	3909	3909
R2_a	0.65	0.05	0.15	0.12	0.13	0.17	0.12

Table 8: **Fund Performance and Degree II.** The table shows the results of the second stage of my methodology. Control variables for fund characteristics are Perf_1 (previous period performance), Size (the log of the total net assets in millions of dollars), Fund Age (difference in years between the current year and the year organization of the fund), Expenses_1 (previous year total annual expense ratios) and Turnover (previous year annual turnover ratio). Control variables for manager characteristics are M.AGE (manager age), MISSINGAGE (dummy variable equal 1 if manager age is not available), Tenure (computed as the difference between the current year and the first year that the manager took the control of the fund.), SAT (is a proxy for the quality of the university), MBA (it is a dummy variable that takes value one if the manager holds a MBA) and PHD (it is a dummy variable that takes value one if the manager holds a PHD). Managers are connected if they attended the same institution and they gained the same degree, links are weighted by SAT. Degree_w is the total number of weighted social connections for each manager. The intercept, year and style fixed effects are included in all regressions but their coefficients are not shown. Standard errors (cluster at manager level) are shown in parentheses. Statistical significance at the 10%, 5% and 1% levels is denoted by *, **, *** respectively.

	(1) Gross	(2) Abn	(3) $\alpha_{i,t}MKT$	(4) $\alpha_{i,t}3F$	(5) $\alpha_{i,t}4F$	(6) $\alpha_{i,t}TM$	(7) $\alpha_{i,t}Cond$
Perf_1	0.1782***	0.2021***	0.2107***	0.1620***	0.1517***	0.1520***	0.1270***
	(0.0420)	(0.0418)	(0.0332)	(0.0346)	(0.0295)	(0.0336)	(0.0343)
Size	-0.0042**	-0.0040***	-0.0003**	-0.0002**	-0.0002**	-0.0003**	-0.0004**
	(0.0013)	(0.0012)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Fund Age	-0.0001	-0.0001	-0.0000	-0.0000*	-0.0000*	-0.0000	-0.0000
	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Turnover_1	0.0027	0.0030	0.0002	-0.0002	-0.0003	0.0007	0.0007
	(0.0039)	(0.0037)	(0.0003)	(0.0003)	(0.0002)	(0.0005)	(0.0005)
Expenses_1	-0.0042	-0.0055	-0.0011*	-0.0009*	-0.0008*	-0.0010**	-0.0009
	(0.0089)	(0.0090)	(0.0006)	(0.0005)	(0.0005)	(0.0005)	(0.0010)
Tenure	-0.0005	-0.0003	-0.0000	0.0000	0.0000	-0.0000	-0.0000
	(0.0003)	(0.0003)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Missingage	0.0191	0.0201*	0.0018*	0.0031***	0.0027***	0.0014	0.0006
	(0.0143)	(0.0120)	(0.0009)	(0.0008)	(0.0007)	(0.0016)	(0.0018)
Manager Age	-0.0004	-0.0004*	-0.0000**	-0.0001***	-0.0001***	-0.0000	-0.0000
	(0.0002)	(0.0002)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
SAT	0.0015	0.0015	0.0000	-0.0000	-0.0000	-0.0000	0.0000
	(0.0012)	(0.0012)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
MBA	-0.0058	-0.0054	-0.0007**	-0.0009**	-0.0008**	-0.0017**	-0.0013**
	(0.0043)	(0.0040)	(0.0003)	(0.0003)	(0.0003)	(0.0005)	(0.0005)
PHD	0.0048	0.0070	0.0001	-0.0000	0.0001	-0.0002	0.0004
	(0.0112)	(0.0106)	(0.0009)	(0.0007)	(0.0007)	(0.0008)	(0.0009)
Degree_w	0.0350**	0.0341***	0.0024***	0.0021**	0.0022**	0.0036***	0.0041***
	(0.0108)	(0.0095)	(0.0007)	(0.0008)	(0.0008)	(0.0009)	(0.0012)
N	3909	3909	3909	3909	3909	3909	3909
R2_a	0.65	0.05	0.15	0.12	0.13	0.11	0.12

Table 9: **Fund Performance and Closeness II.** The table shows the results of the second stage of my methodology. Control variables for fund characteristics are Perf_1 (previous period performance), Size (the log of the total net assets in millions of dollars), Fund Age (difference in years between the current year and the year organization of the fund), Expenses_1 (previous year total annual expense ratios) and Turnover (previous year annual turnover ratio). Control variables for manager characteristics are M.AGE (manager age), MISSINGAGE (dummy variable equal 1 if manager age is not available), Tenure (computed as the difference between the current year and the first year that the manager took the control of the fund.), SAT (is a proxy for the quality of the university), MBA (it is a dummy variable that takes value one if the manager holds a MBA) and PHD (it is a dummy variable that takes value one if the manager holds a PHD). Managers are connected if they attended the same institution and they gained the same degree, links are weighted by SAT. Closeness_w is a weighted centrality measure taking into account both direct and indirect links. The intercept, year and style fixed effects are included in all regressions but their coefficients are not shown. Statistical significance at the 10%, 5% and 1% levels is denoted by *, **, *** respectively. Standard errors (cluster at manager level) are shown in parentheses.

	(1) Gross	(2) Abn	(3) $\alpha_{i,t}MKT$	(4) $\alpha_{i,t}3F$	(5) $\alpha_{i,t}4F$	(6) $\alpha_{i,t}TM$	(7) $\alpha_{i,t}Cond$
Perf_1	0.1782***	0.2021***	0.2108***	0.1616***	0.1515***	0.1525***	0.1277***
	(0.0421)	(0.0418)	(0.0334)	(0.0347)	(0.0296)	(0.0337)	(0.0346)
Size	-0.0042**	-0.0040***	-0.0003**	-0.0002**	-0.0002**	-0.0003**	-0.0004**
	(0.0013)	(0.0012)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
Fund Age	-0.0001	-0.0001	-0.0000	-0.0000	-0.0000*	-0.0000	-0.0000
	(0.0001)	(0.0001)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Turnover_1	0.0026	0.0029	0.0002	-0.0002	-0.0003	0.0007	0.0007
	(0.0038)	(0.0036)	(0.0003)	(0.0003)	(0.0002)	(0.0005)	(0.0005)
Expenses_1	-0.0042	-0.0055	-0.0011*	-0.0009*	-0.0008*	-0.0010**	-0.0009
	(0.0089)	(0.0091)	(0.0006)	(0.0005)	(0.0005)	(0.0005)	(0.0010)
Tenure	-0.0004	-0.0002	-0.0000	0.0000	0.0000	-0.0000	-0.0000
	(0.0003)	(0.0003)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Missingage	0.0202	0.0211*	0.0019**	0.0031***	0.0028***	0.0016	0.0007
	(0.0145)	(0.0122)	(0.0009)	(0.0008)	(0.0007)	(0.0016)	(0.0018)
Manager Age	-0.0004	-0.0004*	-0.0000**	-0.0001***	-0.0001***	-0.0000	-0.0000
	(0.0002)	(0.0002)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
SAT	0.0008	0.0011	0.0000	-0.0001	-0.0001	-0.0001	-0.0000
	(0.0012)	(0.0013)	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0002)
MBA	-0.0039	-0.0030	-0.0005*	-0.0009**	-0.0007**	-0.0016**	-0.0010
	(0.0038)	(0.0037)	(0.0003)	(0.0003)	(0.0003)	(0.0006)	(0.0006)
PHD	0.0026	0.0049	-0.0000	-0.0001	-0.0000	-0.0004	0.0002
	(0.0115)	(0.0109)	(0.0009)	(0.0008)	(0.0007)	(0.0008)	(0.0009)
Closenesess_w	0.0708***	0.0620***	0.0043**	0.0049***	0.0041***	0.0077***	0.0070**
	(0.0177)	(0.0158)	(0.0014)	(0.0013)	(0.0012)	(0.0021)	(0.0025)
N	3909	3909	3909	3909	3909	3909	3909
R2_a	0.65	0.05	0.15	0.126	0.13	0.11	0.12

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