Keeping Up with the Ponzis[*]

Ville Rantala
University of Miami

March 15, 2017

Abstract

I study how peers influence financial decision-making in a large socially spreading Ponzi scheme. Investors could join the scheme only by personal invitation from an existing member, and I can observe inviter-invitee relationships among the participants. Controlling for personal characteristics and inviter fixed effects, investors invest more if their inviter has comparatively higher income, age, and education. The marginal effect of the inviter's income is highest when it is just above the invitee's income, consistent with relative wealth concerns influencing decision-making. I also find that social behavior and investment behavior are correlated: Inviters invest more compared to non-inviters.

Keywords: Investor behavior, peer influence, Ponzi scheme, social network, relative wealth concerns

1. Introduction

"Men do not desire to be rich, but to be richer than other men."

John Stuart Mill

Ponzi schemes are a recurring and prevalent financial fraud. According to Forbes Magazine (2014), the schemes that were exposed in the U.S. between 2008 and 2013 involved over $50 billion dollars, and a new scheme was uncovered about every week on average. The economic mechanisms behind Ponzi schemes have attracted interest from economists, because even many legitimate investment settings can at times resemble naturally occurring Ponzis (Shiller 2000; Basu 2014). Such processes can occur when investors earn high returns from a particular asset and drive its price further up by recommending it to their peers, drawing larger and larger groups of investors to the same investment opportunity. This mechanism resembles the fraudulent Ponzi schemes where investors' profits are paid out of other investors' inflows.

Ponzi schemes typically have a strong social component and investors are drawn to the investment opportunity by peer recommendation. In this paper I study how social comparisons influence the investment decisions of Ponzi scheme victims using data from a large fraudulent investment scheme called Wincapita. The analyses provide information about the economic motivations for following peers' investment advice in Ponzi schemes. More generally, the results also shed light on how social comparisons and peer information influence individual investors' decision-making regarding high-risk investment assets.

Wincapita was a Finnish investment operation with over 10,000 investors and over 100 million euros in assets. The scheme operated between 2003 and 2008, and involved over 0.2% of the total population of Finland. Wincapita generated large profits to its investors claiming that the money

1

came from successful currency trading. In reality, it was a scam operating like a classic Ponzi scheme. No new funds were generated by actual investments and all the money that was paid out came from the investors themselves. The scheme was operated by one man, and the police investigation indicates that he was the only person who knew the complete nature of the operation.

Although the existence of peer effects in financial decision-making is well-documented,[1] their empirical identification is notoriously difficult (Manski 1993). A specific feature of Wincapita makes it an ideal setting for studying the role of social interaction effects in Ponzi schemes. Investors could join Wincapita only by personal invitation from an existing member who was referred to as sponsor.[2] Information about the scheme was not publicly available, which means that when an investor joins, the information received from the sponsor has resulted in the decision to invest. I can observe sponsoring relationships between individual Wincapita participants, and I study how these social connections within the scheme are related to the amounts of money invested by the investors. The dataset for this study has been hand-collected from over 53,000 pages of police investigation documents, which contain the police interview transcripts of over 3,300 individual investors. Rantala (2017) uses the same dataset to study the diffusion process of word-of-mouth investment information.

In the main analysis I run regressions explaining the total invested amount divided by annual income with variables measuring relative differences in personal characteristics between an

---

[1] Peers have been shown to influence bank run participation (Kelly and Ó Gráda 2000; Iyer and Puri 2012), professional money managers' portfolios (Hong, Kubik, and Stein 2005; Pool, Stoffman, and Yonker 2015), retirement plan decisions (Duflo and Saez, 2002, 2003), stock market participation (Hong, Kubik, and Stein 2004; Brown, Ivković, Smith, and Weisbenner 2008; Kaustia and Knüpfer, 2012), and trading behavior (Hvide and Östberg 2015). Hirshleifer and Teoh (2009) provide a general review of behavior contagion in capital markets.

[2] The investors had a financial incentive to invite new members, but they were not required or expected to do so. The sponsors received 200 euros for each investor they sponsored and they were also entitled to 20% of the makeshift profits earned by the sponsored investors' investments. The sponsor's sponsor did not receive any part of the profits, so Wincapita was not a pyramid scheme where the early joiners receive profits directly from all the subsequent joiners. See Section 2 for details.

investor and his sponsor. When measuring the impact of peer's characteristics on peer-induced investment decisions, a problem in most empirical settings is that the personal characteristics of the peer can be correlated both with the influence he has on others and the type of people he is connected to. The Wincapita setting allows me to get around this problem by including sponsor fixed effects in the regressions. When they are included, I can analyze how differences relative to the sponsor impact the invested amounts while controlling for the general influence the sponsor has on his sponsored investors. The sponsor fixed effects also function as peer group fixed effects and control for any joint characteristics shared by the investors with the same sponsor.

Regressions with sponsor fixed effects and controls for the investors' personal characteristics show that investors invest statistically significantly more if their sponsor has relatively higher income, if the sponsor is older, and if the sponsor has a relatively higher education level. I measure the effect of these differences with dummy variables. The effect of the sponsor's income is very economically significant: Its values indicate an increase in the invested amount corresponding to 6-12% of the person's annual income. This increase represents 26-52% of the median invested amount as percentage of income.

Age, income, and education are all potential sources of personal credibility, and one possible explanation for why these sponsor characteristics are associated with higher invested amounts is that investors put more weight on suggestions coming from credible sources. When it comes to income, the finding can also be explained by "keeping up with the Joneses" behavior. One possible economic motivation for investing in the same asset as peers are relative wealth concerns (Abel, 1990; Gali, 1994; Bakshi and Chen 1996; DeMarzo, Kaniel, and Kremer 2008). Wincapita was a get-rich-quick scheme, and investors may have been worried about falling behind their Wincapita-member peers unless they invest similarly. The finding that people invest more relative to their

3

own income if their inviter has comparatively higher income is consistent with the basic idea of "keeping up with the Joneses". Furthermore, if peer wealth is a reference point, prospect theory suggests investors are more concerned about catching up in wealth relative to a richer peer compared to increasing their wealth relative to a poorer peer.

To dig deeper into the role of income differences in the investment decisions, I divide investors into deciles based on the value of sponsor's taxable income minus the investor's own taxable income, and run a regression explaining the invested amount scaled by annual income with dummies for the top nine deciles. As previously, the regression includes sponsor fixed effects and year of joining dummies. Based on the dummy coefficients, the effect of the income difference is nonlinear, and there is strong discontinuity around the point where the investor's income is equal to the sponsor's income. Consistent with the prospect theory hypothesis, the marginal effect of the income difference is highest when the sponsor's income is just above the investor's own income. A regression where the decile dummies are formed based on sponsor's absolute income without deducting the investor's own income does not produce statistically significant coefficients for any of the dummies, and there is no increasing trend in the coefficient values. These results imply that the relative income difference, rather than the sponsor's absolute income is a driver in decision-making and the findings are in line with "keeping up with the Joneses" behavior. As further evidence of the link between income differences and investment behavior, I find that Wincapita investors invest more if their income is below the median income level in their local neighborhood.

I also compare the amounts invested by sponsors and non-sponsors and find that sponsors themselves invest statistically significantly more. The coefficient for a sponsor dummy in a regression explaining invested amounts is positive and corresponds to 13-14% of the person's annual income. This finding is consistent with the idea that personal investment behavior and

4

social behavior are correlated, and indicates that the sponsors who recommend Wincapita to others put their own money where their mouth is.

The results contribute to the literature by providing information about the role of social comparisons and "keeping up with the Joneses" effects in peer-induced investments. Previous field experiment studies provide somewhat mixed results about the effect of social comparisons in financial decisions: Bursztyn, Ederer, Ferman, and Yuchtman (2014) find that investors are particularly likely to imitate a financially sophisticated peer, whereas Beshears, Choi, Laibson, Madrian, and Milkman (2015) find that upward social comparisons can discourage people from investing based on peer information. It is possible that the credibility of the source is particularly important in Ponzi processes and speculative investments where the legitimacy of the investment opportunity is a significant concern. Kaustia and Knüpfer (2012) propose that extrapolation from others' outcomes can play a part in explaining the success of Ponzi-type securities scams, as favorable peer outcomes can persuade individuals to overcome their initial suspicions. The perceived credibility of the peer can be an important factor in such considerations.

There is little direct empirical evidence about the role of "keeping up with the Joneses" effects in peer-induced investment decisions, despite their key role in a number of economic theories. Survey responses in a field experiment conducted by Bursztyn et al. (2014) indicate that most participants who invested in the same asset as their peers mention relative return or consumption concerns as a motivating factor for their decision. Hong, Jiang, Wang, and Zhao (2014) find that local status concerns affect individual investors' trading and risk-taking. This paper links to the literature by providing evidence of "keeping up with the Joneses effects" in peer-recommended high-risk investments.

"Keeping up with the Joneses" preferences have also broader implications beyond Ponzi schemes. Models by DeMarzo, Kaniel, and Kremer (2004) and Gomez, Priestley, and Zapatero (2009) suggest that they can cause households to take excessive risk by holding concentrated positions in local stocks. DeMarzo, Kaniel, and Kremer (2008) propose that relative wealth concerns may be an important contributor to financial bubbles. "Keeping up with the Joneses" behavior offers one possible explanation for investors' concentrated holdings in specific high-risk assets in settings such as financial bubbles and Ponzi schemes, and I provide empirical evidence which is consistent with this hypothesis. Investors whose utility is highly dependent on their wealth relative to socially connected peers may be willing to accept high exposure to asset-specific risks as long as the same risks are also borne by the peers.

The rest of the paper is organized as follows: Section 2 provides background information about Wincapita, Section 3 describes the data, Section 4 for studies the relationship between sponsoring others and the amounts invested in Wincapita, Section 5 analyzes the effect of the sponsor's characteristics and the neighborhood income level on the invested amounts, and Section 6 concludes.

2. Wincapita as an investment scheme

This section provides background information about the Wincapita Ponzi scheme. All information is based on the police investigation documents of Wincapita (see Section 3 for details). Rantala (2017) analyzes the spreading dynamics of the scheme and provides further details about the spreading process and the network structure of sponsoring relationships. The following description borrows heavily from Rantala (2017).

Wincapita claimed to be a highly profitable investment operation, which investors could join only by personal invitation from an existing member. The scheme was characterized to its investors

as a private investment club and it was active between September 2003 and March 2008. At the beginning, Wincapita told that its profits were generated by a successful sports betting system. In early 2005 the scheme announced a change in its operations and claimed to focus on currency trading. After the change, Wincapita's profits were allegedly based on a trading system that could forecast intraday changes in the Euro/U.S. dollar exchange rate. In reality, Wincapita functioned like a classic Ponzi scheme throughout its existence. All withdrawn profits were financed by investments that were made by new and existing investors and the profits shown to investors were completely artificial.

An investor became a Wincapita member after making an initial investment and he could invest additional funds at any time. After joining, the members could log in to the scheme's website with a personal username and password. The investors managed their investment through the website and it showed how the value of the investment had developed over time. The website also provided general information about the scheme. Communication with investors was handled almost entirely through the website and e-mail and investors' money transfers were handled through an online payment service called Moneybookers.

The invested funds had to remain in the scheme for a lock-up period of six months. After six months some or all of the funds and generated makeshift profits could be withdrawn, or the money could be reinvested again. No money was paid out without a specific request. According to the police investigation, the realized returns were in the range of several hundred percent over a six-month period, so Wincapita can be characterized as a get-rich-quick scheme. The minimum initial investment required for joining the club increased gradually throughout Wincapita's existence, and at the end it was 3,000 euros. Part of the initial investment was supposed to cover the fees of the club.

The investors could gain additional profits by sponsoring new investors into the club, but they were not required or expected to do so. They received 200 euros on their Wincapita account for each sponsored investor and the sponsor was also entitled to 20% of the profits generated by the funds that were invested by their sponsored investors. As the managing organization, Wincapita also took 10% of the profits to cover its costs, so effectively each investor received 70% of the virtual profits earned by his investment. According to the police documents, these rules were in place at least since January 1st 2007. It is possible that there was some variation in the amounts before that, but the general sponsoring system remained similar throughout Wincapita's existence. The sponsor's sponsor would not receive any part of the profits, so the investor's position in the sponsoring network had otherwise no impact on his profits.

Wincapita required that investors can only sponsor people who they know personally. The police interview documents show that the scheme spread through many different kinds of social relationships, and the sponsors include e.g. friends, co-workers, relatives, and neighbors. The scheme never had any public advertisement and a copy of its rules obtained by the police shows that they explicitly forbid members from distributing information through websites, news groups, web forums, mass e-mails, or other forms of public media. According to the police documents, Wincapita first received public media attention in September 2007 when an investigative television journalist made a news story of the club speculating that it may function like a Ponzi scheme. Wincapita continued its operation and new investors continued to join despite the news coverage.

Wincapita was started and operated by a man called Hannu Kailajärvi. The police investigation indicates that he was the only person who knew the complete nature of its operations. A few other individuals helped with website updates and day-to-day management of the club in different phases of the scheme, but they were lead to believe that Wincapita was generating profits through active

trading. After the scheme ended, police investigation revealed that Wincapita did not have any investment operations, bookkeeping, or actual parent company.

Kailajärvi deceived the investors in several ways to convey the image that Wincapita was a legitimate investment operation. He set up empty shell companies abroad to provide documentation of alleged international operations and often used fake names in communication to give the impression that the scheme has a large number of employees. He also created a web application where the investors could follow signals allegedly generated by Wincapita's trading system in real time. The application displayed actual real-time currency data with "signal markers" that were only vaguely interpreted to the investors. Kailajärvi also often claimed that details about the investment operations are business secrets.

The operation of Wincapita ended in March 2008 when Kailajärvi fled from Finland and took down the scheme's website. Kailajärvi's disappearance was immediately followed by one of the largest police investigations in Finnish history and he was arrested in Sweden nine months later after an international manhunt. Kailajärvi was subsequently convicted of aggravated fraud.

In the end, Wincapita had over 10,000 investors and the total amount of funds invested in the scheme exceeded 104 million euros. Out of this amount, 89 million euros had been paid back to the investors as withdrawn funds during the course of the scheme. Because of Finnish legislation, investors whose withdrawals from Wincapita exceeded their personal investments were not allowed to keep the net profit.[3] These investors did not face criminal charges, but had to pay the

---

[3] Chapter 10 of Finnish Criminal Code mandates that any financial gain made as a result of criminal activity has to be paid to the state even if the person receiving the gain has not committed a crime and has acted in good faith. The police could identify the money transfers made by each individual through Wincapita's Moneybookers statements. The final decision on the confiscation of Wincapita gains was made on a separate trial for each individual. In a similar vein, Bankruptcy Code provisions known as clawbacks have been used to recover false profits from individual Ponzi scheme investors in many cases in the U.S.

state an amount corresponding to their net gain from Wincapita. This means that in the end, there was no way to financially benefit from the scheme as an investor.

3. Data and descriptive statistics

Finnish National Bureau of Investigation was responsible for the police investigation of Wincapita. The investor data and information regarding Wincapita have been collected from their police investigation documents. The sample consists of investors who were personally interviewed by the police. The police investigation documents form a formal document known as pre-trial protocol. The pre-trial protocol contains a summary of the police investigation, transcripts of the interviews carried out during the investigation, and copies of relevant evidence material, such as bank statements, investigation reports, and e-mails. The document number of Wincapita's pre-trial protocol is 2400/R/81/10. There are altogether more than 53,000 pages of material in the protocol, and the majority of the pages are related to individual investors' police interviews. The National Bureau of Investigation provides copies of the pre-trial protocol for a fee.

3.1. Details about the police investigation process

The police investigation and the interviews of individual investors were carried out between 2008 and 2010. After the investigation began, the police made public announcements asking investors to contact them to claim losses and to provide information for the criminal investigation. The investors who had lost money could make claims based on their net loss (total amount invested minus total amount withdrawn) and if they did, they were requested to provide evidence that the amounts had been transferred into or out of Wincapita. Typically, the evidence consisted of bank statements or receipts. The police had access to the statements of Wincapita's Moneybookers

account,[4] and these account statements were the most important source of information when money transfers were verified. Even if an investor did not wish to pursue claims, he was always interviewed to collect evidence.

Based on the documents, I can identify 3,323 interviewed investors whose invested amount is available in the documents. Out of the interviewed investors, 57% contacted the police themselves and 43% were invited to the interview by the police.[5] Most interviews took place in a police station near the person's home, but in some individual cases they were carried out over the telephone or e-mail, if it was very difficult to reach the individual otherwise. The interviews began with general questions about the person's actions in Wincapita, followed by detailed questions about the investment and sponsoring activities. The police typically asked the same standard questions in the same order, accompanied by possible clarifying questions related to previous answers. The interview documents contain full transcripts of the individuals' answers and the interviewing officer's questions. The transcripts were signed and verified by the interviewed person at the end of the interview.

3.2. Definitions of data items

The police interview transcripts provide information about invested and withdrawn amounts, sponsoring relationships, and data for several personal characteristic variables. Sponsoring relationships are identified based on answers to the questions "Who was your sponsor?", "Did you sponsor anyone?", "Do you know people who were above your sponsor in the Wincapita

---

[4] The complete and detailed account statements of Wincapita's Moneybookers account are not included in the pre-trial protocol due to the data exchange agreement between Finland and the United Kingdom, but they are frequently referred to as a data source.

[5] In cases where the investor was invited to the interview, the documents do not specify what the reason was. Many of the invited individuals had made large money transfers into and out of Wincapita or otherwise had an active role in the club. Some of them were asked to verify other investors' earlier statements about money transfers, so collecting evidence regarding other people's financial claims against Wincapita may also have been a motive for contacting certain investors.

structure?" and possible other information about sponsoring relationships that is mentioned elsewhere in the interview.

I have collected most personal characteristic variables from a personal information sheet, which is the first page of each interview document, and some variables are based on answers to specific interview questions. The information sheet is a standard police form, which records identifying and contact information about the person. The personal characteristic variables that I can collect from the documents are the investor's age (recorded at the end of 2007), gender, education level, and a binary variable indicating whether the investor is an entrepreneur. Age is obtained from the first six digits of the person's Finnish social security number, which consist of the person's date of birth. Education level is recorded based on the answer to a specific interview question: At the beginning of each interview, the interviewed person was asked to describe his professional and educational background. I divide people into three education level categories based on the highest degree possessed by the person: people with only mandatory basic education, people with upper secondary education (including vocational schools), and people with higher education (bachelor's degree or higher). An investor is classified as an entrepreneur if he has mentioned "entrepreneur" as his profession on the information sheet, or otherwise mentioned that he owns a private business or company. Investors are classified as entrepreneurs even if the private business is not their primary source of income.

The only external data source that I use is Finnish public tax information. I have matched the annual taxable income for the year 2007 to individual investors based on a publicly available income listing.[6] Taxable income is calculated as the sum of the person's earned and capital income. In Finnish taxation a person's taxable income is divided into these two categories, and they are

---

[6] The listing is "Veropörssi Magazine", which uses the data of the Finnish tax authority as its source. Published listings of similar scope are not available for other years.

taxed at different rates. The listing contains the earned and capital income for all Finnish citizens for whom either of the two exceeded 12,000 euros in 2007.

I have collected all quantifiable information about the individuals' Wincapita investments that is generally available in the interview documents. The investors were asked how much money they had invested in Wincapita and how much money they had withdrawn from Wincapita. They were also asked to describe how and when they joined the scheme. The police compared this information to the information they possessed, such as Wincapita's Moneybookers statements and other bank information. The invested amounts are recorded based on the amounts determined as the person's investments in the police interview document. In individual cases where there is some uncertainty about the exact amount, the amount is recorded as the amount the police interviewer presented to the investors as his likely investments based on the information they have.

I have also collected the investors' first invested amount and time of joining. These variables can in most cases be recoded based on the investors' description of how they joined the scheme. As the police were primarily interested in the total invested amount and the conditions of joining the club, the documents do not typically record the exact timing of each separate cash flow transferred into the scheme. The year of joining can be defined for over 99% of the investors and the first invested amount is available for 96% of the investors for whom the total invested amount is available.

3.3. Descriptive statistics of the sample

Table 1 provides descriptive statistics of the investors. Most investors are male (82% of the sample) and the average and median age is 46 years. The median income among investors for whom the item is available is 34 thousand euros per year and the average is 48 thousand. Based on the highest degree possessed by the person, 38% have higher education, and 87% have higher

than basic education. Rantala (2017) compares the interviewed people to Finnish adult population and finds that Wincapita investors have comparatively higher income and education level. Overall, there is large variation in the personal characteristics, and the investors do not fit under any single demographic category.

The median invested amount is eight thousand euros and the average is 15 thousand. The median investor invested an amount that corresponds to 23% of his annual income gross of taxes, which shows that the typical invested amounts are economically significant relative to the investors' income level. The year of joining statistics show that most investors joined the scheme during the last years of its operation (43% in 2007 and 26% in 2008 before the collapse of the scheme in March).

4. Do people who successfully invite their friends invest more themselves?

I start the empirical analysis by studying whether investors who sponsor others invest more money relative to their income compared to the investors who do not. This analysis reveals whether the investors' personal and social behaviors in the scheme are correlated. More broadly, the analysis also answers the question "Do the investors put their own money where their mouth is?"

I measure an investor's willingness to invest in Wincapita based on the total amount funds invested in the scheme divided by the investor's annual income. The total amount of funds invested is defined as the amount of own money the person transferred into Wincapita during its existence and annual income is the person's taxable income. The higher the value of the ratio, the more the investor is willing to invest relative to his income. The median value for the ratio among the sample investors is 0.23 and the average is 0.42.

Before proceeding to more detailed analysis, I first study whether the typical invested amount relative to annual income is statistically higher among sponsors compared to non-sponsors without

14

introducing any control variables. The median value for the ratio among non-sponsors is 0.20 and the average is 0.35, while among sponsors the median is 0.31 and the average is 0.48. The difference is both economically and statistically significant: The median sponsor invests over 50% more compared to the median non-sponsor and a *t*-test for the difference in means produces a *t*-value of 7.79. The difference between the two groups is very similar also if the investors who withdrew any money from Wincapita are excluded. In such case, the median is 0.21 for non-sponsors and 0.32 for sponsors. *t*-value for the difference in means is 6.08.

Next, I run OLS regressions explaining the scaled invested amount with independent variables measuring sponsoring behavior. The regressions include control variables for investor characteristics that can affect both investment behavior and sponsoring behavior in the scheme. In all the regressions of this paper, I exclude observations with the highest and lowest 5% of the values for the scaled invested amounts in the data, to ensure that the findings are not driven by the extreme tails of the distribution. The income distribution among the sample investors has a heavy right tail, and high-income individuals who invest only a very small amount are one possible source of extreme observations. Several investors mention that they borrowed significant amounts of money to invest in Wincapita, and low-income individuals with borrowed money are another potential source of tail observations. The exclusion of the 5% tails sets the range of scaled invested amounts in the regressions between 0.03 and 1.35. For comparison, the lowest value in the data is 0.005 and the highest is 18.19.

The main explanatory variable is a dummy for investors who are sponsors (dubbed "Sponsor dummy"). Standard control variables in all the regressions are annual income, annual income squared, age, age squared, a dummy for females, and a dummy for entrepreneurs. Annual income measures the person's taxable income in 2007, as defined earlier. The income and age variables

control for the possibility that the typical invested amount as percentage of income varies with the income level or age group. I also include squared terms for these variables to capture potential nonlinearities. The inclusion of dummy variables for females and entrepreneurs is motivated by previous research linking males (Barber and Odean, 2001; Grinblatt and Keloharju, 2009) and entrepreneurs (Hvide and Panos 2014) with higher overconfidence and risk-taking in investment decisions. Overconfidence may play a particularly important role in investment decisions related to get-rich-quick schemes such as Wincapita. All regressions include dummies for the investor's year of joining and cluster standard errors by the year of joining. The year of joining dummies control for the amount of time the person has spent as an investor in the scheme and also account for the possibility that the investors who join in different years differ from each other by some unobservable characteristic.

Additional control variables in some specifications include dummies separating the three education level categories defined in Section 3 and sponsor fixed effects. Social interactions typically takes place between people who share similar personal and sociodemographic characteristics (McPherson, Smith-Lovin, and Cook 2001). The sponsor fixed effects offer a way to control for unobservable personal characteristics that are shared by the people with the same sponsor. When they are included, I have to restrict the sample to observations where at least two investor share the same sponsor and have non-missing values for the variables used in the regression.

The regression results in Table 2 show that the sponsors invest more than non-sponsors also after controlling for personal characteristics and the year of joining. Column 1 shows the baseline regression with the standard control variables. The sponsor dummy is highly economically and statistically significant with a coefficient of 0.14 and t-value of 10.49. Column 2 adds dummies

16

for the two highest education level categories as additional control variables, and Column 3 further adds sponsor fixed effects. The additional control variables have very little impact on the coefficient of the sponsor dummy. It is 0.13 with t-value of 9.25 in Column 2 and 0.14 with t-value of 6.71 in Column 3. The coefficient values imply an increase of over 50% relative to the median value of the scaled invested amount.

Since being a sponsor is positively correlated with the invested amount, a natural follow-up hypothesis is that the number of sponsored people is also positively correlated with the invested amount among sponsors. Regressions in Columns 4 and 5 of Table 2 study this hypothesis by replacing the sponsor dummy with logarithm of the number of sponsored investors. The regression tests whether investors who sponsor more people also invest more conditional on being a sponsor. Column 4 reports results from a regression with baseline controls and Column 5 adds education level controls. Log(Number of sponsored investors) is statistically significant at the 5% level with t-value 2.63 in Column 4 and statistically significant at the 10% level with t-value 1.69 in Column 5. These results provide further support for the hypothesis that sponsoring behavior and personal investment behavior in Wincapita are correlated.

Why do investors who sponsor others invest more? The simplest explanation is that the investors who are most enthusiastic about Wincapita both invest more in it personally and are more likely to tell others about it. Another possible explanation is social utility (Hong, Kubik, and Stein 2004; Bursztyn el al. 2014): Investors may derive utility from investing in the same asset as their peers e.g. because of the possibility of discussing the investment with their friends or because of relative wealth concerns. The more people a Wincapita investor sponsors, the more peers he has among the investors. Reinforcement learning based on the observed decisions of others can also

contribute to the findings. The sponsors have verifiably introduced the investment idea to their friends and the friends have responded positively and joined Wincapita.

The strong correlation between investment behavior and social behavior is an interesting finding, because it can potentially help Ponzi schemes grow and survive. Ponzi schemes require a steady flow of funds from either new or existing investors to pay out profits, and the investors who both invite others and personally invest additional funds can contribute to their survival particularly in the early stages when the existing investor base is small. Shiller (2000) proposes that psychological contagion is a key factor in the formation of asset pricing bubbles, and mentions naturally occurring Ponzi processes as an amplifying factor in the bubble formation process. The correlation between social behavior and investment behavior can also potentially contribute to such Ponzi-like cascades in legitimate investment settings.

5. Differences relative to peers and the invested amounts

In the main part of the empirical analysis, I study how relative differences in personal characteristics between an investor and his sponsor are related to the invested amounts. The characteristics that are statistically related to the invested amounts can provide information about the economic motivations for following peers' advice in investment decisions. I also analyze whether income difference relative to other people in the same postal code area is related to the invested amounts.

5.1. Sponsor's personal characteristics and the invested amounts

I study the effect of sponsor characteristics by running regressions that are similar to the sponsoring regressions reported in Section 4. As before, the dependent variable is the scaled invested amount. I measure the role of sponsor's personal characteristics with separate dummy

18

variables for investors whose sponsor has relatively higher income, investors whose sponsor is older, investors whose sponsor is of same gender, investors whose sponsor has a comparatively higher education level, and investors whose sponsor has a comparatively lower education level. The difference in education level is based on the three categories defined earlier. I also study whether geographic distance to the sponsor is related to the invested amounts by including log(distance to sponsor in kilometers) as an additional explanatory variable.

Table 3 reports descriptive statistics of relative differences between the sponsors and their sponsored investors. The sponsor has comparatively higher income in 64% of the sponsor-sponsored investor pairs, is older in 51% of the pairs, and is of same gender in 81% of the pairs. Sponsor's education level is comparatively higher in 21% of the cases and comparatively lower in 26% of the cases. The average geographic distance to sponsor is 76 kilometers and the median distance is 16 kilometers.

Control variables in all the regressions are taxable income, taxable income squared, age, age squared, a dummy for females, a dummy for entrepreneurs, dummies for the two highest education level categories, dummies for the investors' year of joining and the sponsor dummy. The sponsor dummy is included, because the previous analyses show that it has a statistically significant impact on the invested amounts. The variables are defined as in Section 3.

Importantly, I include sponsor fixed effects in all the regressions. Because the investors are not matched randomly with their sponsors, it is possible that the personal characteristics of the sponsor are correlated with the type of people he sponsors in Wincapita. Sponsor characteristics can also be correlated with the influence the sponsor has on the investment decisions of the invited investors. The sponsor fixed effects allow me to control for these issues. They also effectively function as peer group fixed effects and control for the effect of any joint characteristics shared by

the people with the same sponsor. The sponsor fixed effects limit the sample to observations where at least two investors share the same sponsor. As before, I cluster standard errors by year of joining.

The results from these regressions shown in Table 4 indicate that several sponsor characteristics are related to the invested amounts. Investors invest more if their sponsor has comparatively higher taxable income and the sponsor's relative age and education level are positively correlated with the invested amounts. The dummy for investors with a higher income sponsor is positive and statistically significant at the 5% level in all the specifications with coefficients ranging between 0.06 and 0.12. These coefficients imply an increase of 26 to 52 percent relative to the median invested amount, so they are also economically significant. The coefficient for investors with an older sponsor is statistically significant at the 5% level in all specifications with coefficient values ranging between 0.05 and 0.08. The dummy for investors whose sponsor has a higher education level is positive and statistically significant at the 1% level with a coefficient value of 0.06 and the dummy for investors whose sponsor has a lower education level is negative and statistically significant at the 1% level with a coefficient value of -0.13.

The same gender dummy and the coefficient for log(geographic distance to sponsor in kilometers) are not statistically significant. The coefficients for the sponsor dummy are always statistically significant with values close to the coefficients reported earlier in Table 2. The number of observations decreases with the number of explanatory variables, starting from 876 in the first specification and ending with 613 when all the variables are included.

The results so far indicate that personal characteristic differences relative to the sponsor are related to the invested amounts even after controlling for sponsor fixed effects. The findings are consistent with the idea that investors invest more based on information that comes from a credible and trustworthy source. Age, education, and income are potential sources of personal status and

credibility, and relative differences in these characteristics are positively correlated with the invested amounts.

5.2. Robustness checks

As a robustness check, Column 5 of Table 4 reports results from a regression specification with the main explanatory variables using two-way clustering of standard errors by year of joining and sponsor. Clustering by sponsor accounts for the possibility that heterogeneity between groups with different sponsors affects the standard errors. The two-way clustering has only little impact on the *t*-values, and the same variables are statistically significant.

Table 5 reports results from additional robustness checks that address potential concerns related to sample composition and default choices for the invested amounts. All the regressions in Table 5 have the same baseline explanatory variables as Column 3 of Table 4. When deciding on how much to invest in Wincapita, potential default choices or anchoring values are at least the minimum investment required for joining the scheme and the amount the investor's sponsor has invested in Wincapita. Sponsor-sponsored investor pairs where both investors invest the default amount could be one explanation for why investors with higher income sponsors invest more relative to their own income. Column 1 excludes observations where both the investor and the sponsor invested the exact same amount and Column 2 excludes observations where the invested amount is lower than or equal to €3,000, which was the highest minimum investment required during Wincapita's existence.

Columns 3 and 4 provide additional subsample results. Column 3 excludes investors who were invited to the police interview and did not contact the police by their own initiative. A potential concern is that there may be some systematic selection bias among the investors who were contacted by the police. Column 4 only includes observations where at least four other investors

in the regression sample share the same sponsor. This regression studies the possibility that sponsors who invited only few investors drive the results and sponsor characteristics are less relevant in cases where the sponsor invited many people.

The coefficient values in all the regressions of Table 5 are close to the coefficient values in Column 3 of Table 4, and these additional sample restrictions have very little impact on the results. The dummy coefficients for relative differences in income, age, and education have the same signs as in Table 4, and they are statistically significant at the 10% level or higher in all the specifications. Only five investors in the sample invested the exact same amount as their sponsor, so identical invested amounts between investors and sponsors cannot explain the findings.

A person's income is often correlated with his age and education, and relative differences in all these three sponsor characteristics are associated with higher invested amounts. This raises the question: does the sponsor's income have an effect independently of his age and education? Separate subsample regressions in Table 6 exclude observations where the sponsor is older or more educated, or has both these characteristics. The coefficients for the higher income sponsor dummy are close to the values reported in Table 4, so the relative income difference has an effect also when the sponsor does not possess the other statistically significantly positive characteristics.

5.3. The relationship between relative income differences and the invested amounts

Next, I study the nature of the relationship between relative income differences and invested amounts in more detail. Besides credibility and trust, relative wealth concerns and "keeping up with the Joneses" behavior are also possible explanations for the income findings. Wincapita was a get-rich-quick scheme and investors may have been worried about losing in wealth compared to their peers if they do not invest similarly. If peers' wealth or income is a reference point in decision-making, it is natural to expect that the marginal effect of the income difference within the sponsor-

sponsored investor pair is strongest when the sponsor's income is close to the investor's own income. When the income difference is small, the expected profits from Wincapita are more likely to cause a tangible change in relative wealth between the two individuals.

Prospect theory provides another complementary explanation for why the relative income difference may have a nonlinear effect on the invested amounts. Based on prospect theory, investors who care about relative income changes may be more concerned about catching up in wealth relative to their wealthier peers than about increasing their wealth relative to their poorer peers. This discrepancy can potentially explain why higher income peers have a larger impact on investment decisions compared to lower income peers.

Previous research indicates that relative income differences affect utility. Luttmer (2005) finds that neighbors' relatively higher earnings are associated with lower levels of self-reported happiness. Card, Mas, Moretti, and Saez (2012) observe that income differences relative to co-workers affect job satisfaction. Even if investors do not observe the earnings of their peer directly, the income level is likely reflected on observed consumption, status, and wealth.

I examine how the effect of the income difference relative to the sponsor varies with the size of the difference. If the sponsor's perceived income level is an important reference point, one can expect discontinuity around the point where the sponsor's income is equal to the investor's own income. The prospect theory-based explanation would also suggest that the marginal effect is highest when the sponsor's income is just above the investor's own income. I conduct the analysis by sorting investors into deciles based on sponsor's annual income minus own annual income. I include dummies for the top nine deciles in a regression explaining total invested amount divided by annual income. As before, I exclude the lowest and highest 5% of the values for the dependent variable and include year of joining dummies and sponsor fixed effects.

23

Figure 1 shows how the coefficients of the nine decile dummies vary and plots 95% confidence intervals for the dummies. The horizontal axis of the figure measures sponsor's income minus own income and the vertical axis measures the coefficient value. The plots for the dummies connect the decile values measured on the x-axis to the corresponding dummy coefficient values measured on the y-axis. All coefficients show the difference relative to the first decile, which is the omitted category in the regression.

The shape of the curve provides support for the relative wealth concern hypothesis. The curve is not linearly increasing and the marginal effect of the income difference is significantly higher around the point where sponsor's income is equal to the investor's own income. The marginal increase is highest just above zero in the area between the fifth decile (income difference 0.9 thousand) and the sixth decile (income difference 9.45 thousand). The discontinuity around point zero suggests that the sponsor's income level is an important reference point and a strong marginal effect just above point zero is consistent with the prospect theory hypothesis.

The figure peaks at the eighth decile, and deciles nine and ten are below the peak, so the coefficients do not increase monotonically with the income difference. The coefficients for deciles between four and nine are statistically significant at the 1% level and the coefficient for decile ten is statistically significant at the 10% level.

I also test whether the absolute income of the sponsor is related to the invested amounts. I sort investors into deciles based on their sponsor's taxable income and run a regression similar to the one used in Figure 1. The only difference is that I cannot include sponsor fixed effects, as they would overlap with the explanatory variables. Figure 2 shows the coefficients of the dummies in a graph that is similar to Figure 1, with the absolute income of the sponsor on the horizontal axis. None of the dummies are statistically significant, and there is no clear trend in the coefficients. A

comparison between Figure 1 and Figure 2 indicates that relative, rather than absolute, income of the sponsor affects investment decisions.

5.4. *The relationship between income difference relative to the neighborhood and the invested amounts*

If catching up in wealth relative to peers motivates the behavior of some Wincapita investors, another relevant reference group may be the people living in the same neighborhood. Next, I analyze whether investors whose income is below the typical income level in their neighborhood invest more compared to other investors. Previously, local income differences have been linked to risk-taking in personal investments by Kumar (2009), who finds that investors who earn less than their neighbors invest relatively more in lottery-type stocks.

I run regressions explaining the total invested amount divided by annual income with a dummy variable for investors whose income is below the median income in the postal code area in which they live. I use the median income in the postal code area as a proxy for the typical income level in the local neighborhood. Based on 2014 statistics by Statistics Finland, the median Finnish postal code area has a population of 474, and the average population is 1,781. The regressions are otherwise similar to the regressions reported in Table 4, and include sponsor fixed effects and the same control variables. I also include specifications that additionally have the baseline explanatory variables from Table 4 and some specifications include the median income in the postal code area to control for the possibility that the absolute income level of the neighborhood is related to the invested amounts.

Table 7 reports the results. The dummy for investors whose income is below the median income in the postal code area is statistically significant and positive in all the specifications and has coefficient values ranging between 0.07 and 0.10. The median income level of the postal code area

25

is not statistically significant in any specification. These results are consistent with the idea that catching up with the perceived wealth of neighbors may have been a motivating factor behind some Wincapita investments. As before, the results suggest that relative, rather than absolute, income level of the neighborhood affects decision-making.

5.5. Implications of the income difference findings

Overall, the income difference findings are consistent with the idea that investors consider relative wealth effects when investing based on peers' advice. The finding that investors invest more relative to their own income if the sponsor has relatively higher income is consistent with the basic idea of "keeping up with the Joneses" and the shape of the curve in Figure 1 suggests that peer's income is a reference point in decision-making. The result that investors invest more if their income is below the income level of their neighborhood also suggests that the possibility of catching up in wealth relative to wealthier peers can be one motivation for high-risk investments.

There is only little previous empirical evidence of "keeping up with the Joneses" effects in investment decisions, but relative wealth-driven investment behavior can potentially have broad implications. DeMarzo, Kaniel, and Kremer (2008) propose that relative wealth concerns play an important role in the formation of financial bubbles, and the results of this paper are consistent with the hypothesis that relative wealth affects decision-making in high-risk investments. A potential implication is that investor behavior in investment settings such as Ponzi schemes and financial bubbles may not be driven just by expectations of unusually high returns, but also by fear of losing in wealth relative to peers.

"Keeping up with the Joneses" behavior can also offer one explanation for why even sophisticated investors sometimes participate in dubious high-risk investment schemes such as Wincapita. If some investors are highly concerned about wealth changes relative to peers, they

may be willing to engage in extreme financial risk-taking just to make sure that they do not lose in wealth relative to their reference group. Importantly, relative wealth concerns offer a potential explanation for these high-risk investments without involving assumptions about completely unrealistic return expectations or unusual risk preferences.

6. Conclusion

The findings of this paper provide information about the behavior of investors in socially spreading Ponzi schemes, and also more generally about the microfoundations of peer effects in financial decision-making. The results show that the source of peer information matters, and factors such as relative wealth concerns, social utility, and the perceived sophistication of the peer may have an effect on peer-induced investment decision. Several of these considerations involve the peer as a socially connected person or point of comparison and not merely as an information intermediary. An implication is that the economic motivations for following peers' investment advice can differ significantly from the motivations for following investment advice from other sources, such as professional investment advisors and the public media.

References

Abel, A. A. (1990). Asset prices under habit formation and catching up with the Joneses. *American Economic Review* 80, 38–42.

Bakshi, G. & Chen, Z. (1996). The spirit of capitalism and stock market prices. *American Economic Review* 86, 133–157.

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

Basu, K. (2014). The Ponzi Economy. *Scientific American* 310, 70-75.

Benartzi, S. & Thaler, R. H. (2007). Heuristics and biases in retirement savings behavior. *Journal of Economic Perspectives* 21, 81-104.

Beshears, J., Choi J.J., Laibson, D., Madrian, B.C., & Milkman, K.L. (2015). The effect of providing peer information on retirement savings decisions. *Journal of Finance,* Forthcoming.

Brown, J.R., Ivković, Z., Smith, P.A., & Weisbenner S.J. (2008). Neighbors matter: Causal community effects and stock market participation. *Journal of Finance* 63, 1509-1531.

Bursztyn, L., Ederer, F., Ferman, B., & Yuchtman, N. (2014). Understanding mechanisms underlying peer effects: Evidence from a field experiment on financial decisions. *Econometrica* 82, 1273-1301.

Card, D., Mas, A., Moretti, E., & Saez, E. (2012). Inequality at work: the effect of peer salaries on job satisfaction. *American Economic Review* 102, 2981-3003.

DeMarzo, P. M., Kaniel, R., & Kremer, I. (2004). Diversification as a public good: Community effects in portfolio choice. *Journal of Finance* 59, 1677-1716.

DeMarzo, P. M., Kaniel, R., & Kremer, I. (2008). Relative wealth concerns and financial bubbles. *Review of Financial Studies* 21, 19-50.

Duflo, E., & Saez, E. (2002). Participation and investment decisions in a retirement plan: The influence of colleagues' choices. *Journal of Public Economics* 85, 121-148.

Duflo, E., & Saez, E. (2003). The role of information and social interactions in retirement plan decisions: Evidence from a randomized experiment. *Quarterly Journal of Economics* 118, 815-842.

Forbes Magazine (2014). A Ponzi Pandemic: 500+ Ponzi Schemes Totaling $50+ Billion in 'Madoff Era' http://www.forbes.com/sites/jordanmaglich/2014/02/12/a-ponzi-pandemic-500-ponzi-schemes-totaling-50-billion-in-madoff-era/

Gali, J., (1994). Keeping up with the Joneses: consumption externalities, portfolio choice, and asset prices. *Journal of Money, Credit, and Banking* 26, 1–8.

Gomez, J.-P., Priestley, R., & Zapatero, F. (2009). Implications of keeping-up-with-the-Joneses behavior for the equilibrium cross section of stock returns: international evidence. *Journal of Finance* 64, 2703-2737.

Grinblatt, M. & Keloharju, M. (2009). Sensation seeking, overconfidence, and trading activity. *Journal of Finance* 64, 549-578.

Han, B., & Hirshleifer, D. (2013). Self-enhancing transmission bias and active investing. Working Paper.

Hirshleifer, D. & Teoh, S. H. (2009). Thought and behavior contagion in capital markets. In Handbook of Financial Markets: Dynamics and Evolution. Eds. T. Hens and K. R. Schenk-Hoppé. Elsevier/North-Holland.

Hong, H., Jiang, W., Wang, N., & Zhao, B. (2014). Trading for Status, *Review of Financial Studies* 27, 3171-3212.

Hong, H., Kubik, J. D., & Stein, J. C. (2004). Social interaction and stock-market participation. *Journal of Finance* 59, 137-163.

Hong, H., Kubik, J. D., & Stein, J. C. (2005). Thy neighbor's portfolio: Word-of-mouth rffects in the holdings and trades of money managers. *Journal of Finance* 60, 2801-2824.

Hvide, H. K. & Panos G. A. (2014). Risk tolerance and entrepreneurship. *Journal of Financial Economics* 111, 200-223.

Hvide, H. K. & Östberg, P. (2015). Stock investments at work. *Journal of Financial Economics,* forthcoming.

Iyer, R. & Puri, M. (2012). Understanding bank runs: The importance of depositor-bank relationships and networks. *American Economic Review* 102, 1414-1445.

Kelly, M. & Ó Gráda, C. (2000). Market contagion: Evidence from the panics of 1854 and 1857. *American Economic Review* 90, 1110–24.

Kaustia, M. & Knüpfer, S. (2012). Peer performance and stock market entry. *Journal of Financial Economics* 104, 321-338.

Kumar, A. (2009). Who Gambles in the Stock Market? *Journal of Finance* 64, 1889-1933.

Manski, C. F. (1993). Identification of endogenous social effects: the reflection problem. *Review of Economic Studies* 60, 531-542.

Luttmer, E. F. P. (2005). Neighbors as negatives: relative earnings and well-being. *Quarterly Journal of Economics* 120, 963-1002.

McPherson, M., Smith-Lovin, L., & Cook, J. C. (2001). Birds of a feather: homophily in social networks. *Annual Review of Sociology* 27, 415-444.

Pool, V. K., Stoffman, N., & Yonker, S. E. (2015). The people in your neighborhood: Social interactions and mutual fund portfolios. *Journal of Finance* 70, 2679-2732.

Rantala, V. (2017). How do investment ideas spread through social interaction? Evidence from a Ponzi scheme. Working paper.

Shiller, R. J. (2000). Irrational exuberance. Princeton University Press, New Jersey.
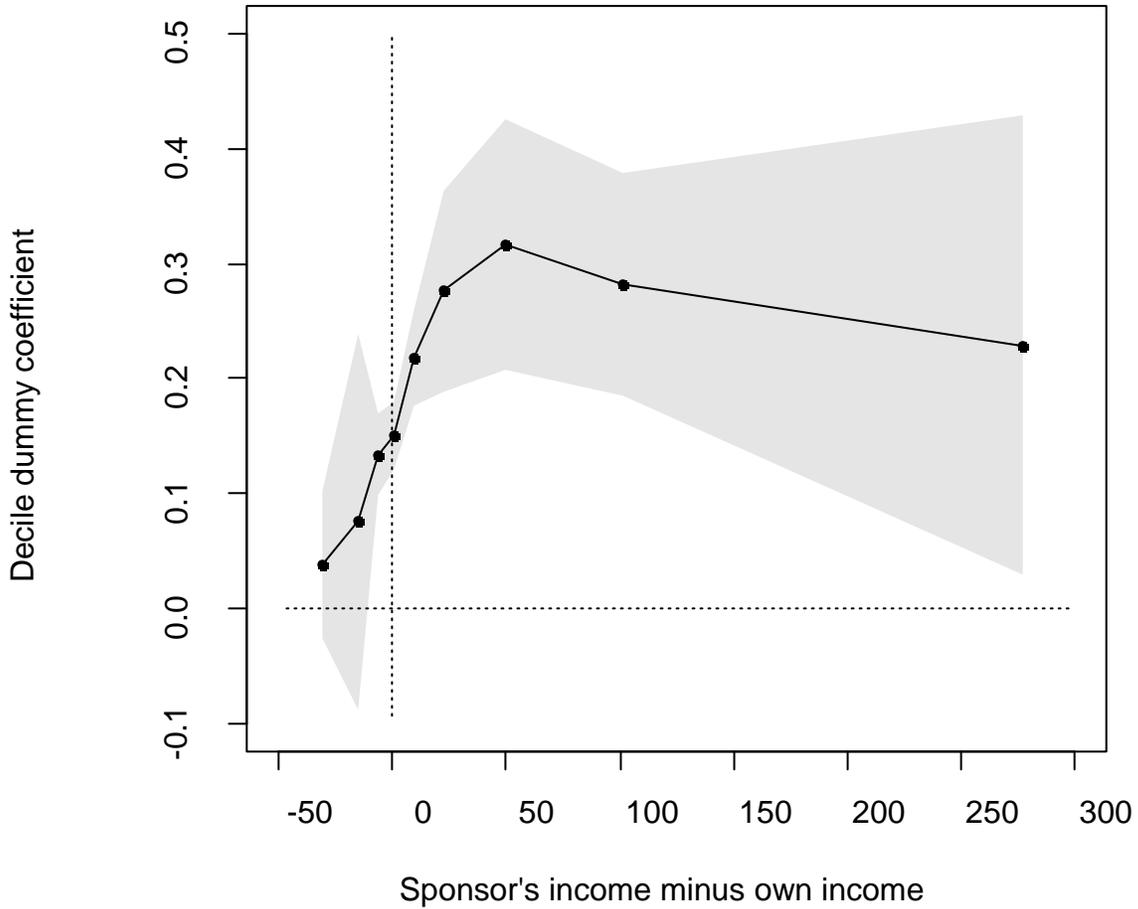
Figure 1
The Relationship between Invested Amounts and Income Difference Relative to the Sponsor among the Wincapita Investors

This figure shows how individual investors' invested amounts in Wincapita as percentage of annual income vary with the relative difference in taxable income between an investor and his sponsor. The figure is based on a regression where the dependent variable is the total amount of funds an investor transferred into Wincapita divided by his annual taxable income. The main explanatory variables are dummies which are formed by sorting investors into deciles based on the value of sponsor's taxable income minus the investor's own taxable income. Dummies for the top nine deciles are included as independent variables, and the omitted category is the first decile (observations where sponsor's income minus own income has the lowest values). The regression includes dummies for the investors' year of joining and sponsor fixed effects. The observations consist of all investors in Wincapita for whom the data is available. In the figure, each plot combines a coefficient value (measured on the vertical axis) with the corresponding decile value (measured on the horizontal axis) and the individual plots are connected with a line. The gray area shows the 5% confidence interval for the coefficients based on standard errors clustered by the year of joining. All taxable income values are based on the taxable income in 2007.
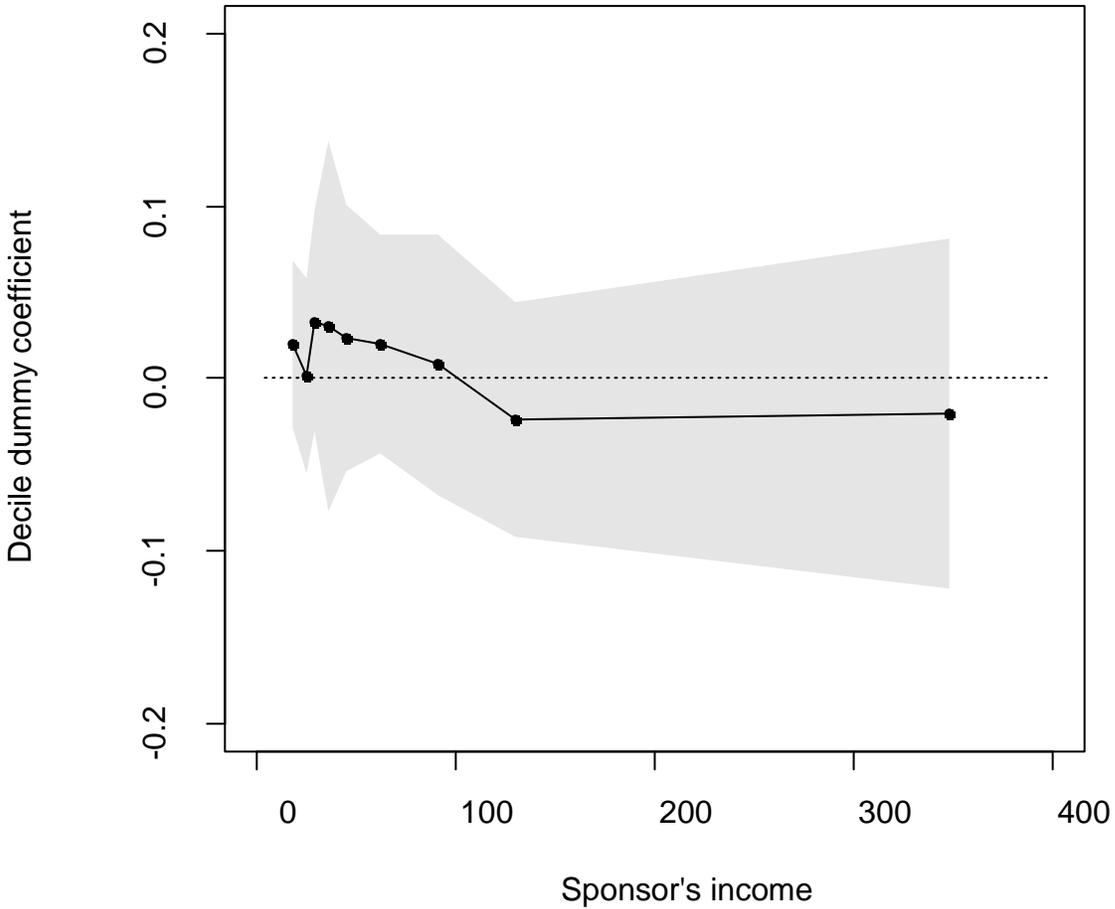
Figure 2
The Relationship between Invested Amounts and Sponsor's Absolute Income Level among the Wincapita Investors

This figure shows how individual investors' invested amounts in Wincapita as percentage of annual income vary with their sponsor's annual income. The figure is based on a regression where the dependent variable is the total amount of funds an investor transferred into Wincapita divided by his annual taxable income. The main explanatory variables are dummies which are formed by sorting investors into deciles based on the value of their sponsor's taxable income. Dummies for the top nine deciles are included as independent variables in the regression, and the omitted category is the first decile (observations where sponsor's income has the lowest values). The regression includes dummies for the investors' year of joining. The observations consist of all investors in Wincapita for whom the data is available. Each plot combines a coefficient value (shown on the vertical axis) with the corresponding decile value (show on the horizontal axis) and the individual plots are connected with a line. The gray area shows the 5% confidence interval for the coefficients based on standard errors clustered by the year of joining. All taxable income values are based on the taxable income in 2007.

31

Table 1
Characteristics of the Sample Investors

This table reports descriptive statistics of the sample investors. The sample consists of people who were investors in Wincapita and were interviewed by the police. Panel A contains distribution statistics of continuous variables related to investor characteristics, invested amounts, and the number of sponsored investors. Panel B reports statistics based on the percentage of investors in different personal characteristic categories. Panel C reports the distribution of the investors' year of joining. Age is measures at the end of 2007 and annual income is based on taxable income in the year 2007. Total invested amount measures the total amount of funds the investor transferred into Wincapita, and the first invested amount is the first amount the investor transferred into the scheme.

Panel A: Statistics on investor characteristics, invested amounts, and the number of sponsored people

	p5	p25	p50	p75	p95	Average	N
Age	26	37	46	55	66	46.16	3,340
Annual income (thousands of Euros)	15.4	23.9	33.65	48.2	109.9	47.64907	2,806
Total invested amount (euros)	1,000	4,000	8,000	15,102	49,368	15,268	3,322
First Invested Amount (euros)	300	2,500	4,000	7,000	15,500	5,926	3,204
Total invested amount / annual income	0.03	0.12	0.23	0.45	1.35	0.42	2766
First invested amount / annual income	0.01	0.06	0.12	0.22	0.53	0.18	2,672
Number of sponsored investors	0	0	0	1	6	1.14	3,340

Panel B: Statistics on different investor groups as percentage of the sample

Characteristic	Female	Entrepre-neur	Higher than basic education	Higher education	Sponsor	Sponsored more than one
	18.4 %	26.3 %	87.2 %	37.9 %	25.7 %	16.0 %

Panel C: Statistics on investors' year of joining

Year of joining	2003	2004	2005	2006	2007	2008
	1.4 %	7.0 %	10.0 %	12.0 %	43.2 %	26.3 %

Table 2
Sponsoring and the Total Amount of Funds Invested in Wincapita

This table reports results from cross-sectional OLS regressions where the dependent variable is the total amount of funds an investor invested in Wincapita divided by his annual income. The main independent variable is either a dummy for investors who are sponsors or log(number of sponsored investors). The regressions with log(number of sponsored investors) are run only for investors who are sponsors. All regressions include the following control variables: annual income, annual income squared, a dummy variable for females, age, age squared, and a dummy variable for entrepreneurs. Annual income is the person's taxable income in 2007 and age is measured at the end of 2007. Some specifications also include dummies for the investor's level of education as additional control variables. The education level control variables consist of a dummy for investors whose highest degree is from an upper secondary school and a dummy for investors who have a higher education degree. The omitted category is investors with only mandatory basic education. All regressions include dummies for the investor's year of joining, and Column 3 includes sponsor fixed effects. t-statistics based on standard errors clustered by year of joining are reported in brackets below the coefficients.

	(1)	(2)	(3)	(4)	(5)
Sponsor dummy	0.140	0.129	0.138		
	[10.49]	[9.25]	[6.71]		
Log(number of sponsored investors)				0.047	0.038
				[2.63]	[1.69]
Annual income	-0.002	-0.003	-0.002	-0.003	-0.003
	[-9.06]	[-12.54]	[-10.31]	[-13.98]	[-20.21]
Annual income sqrd	0.000	0.000	0.000	0.000	0.000
	[6.60]	[9.40]	[5.96]	[7.43]	[12.15]
Female	-0.010	-0.028	-0.011	-0.016	-0.068
	[-1.39]	[-4.39]	[-1.31]	[-0.69]	[-2.23]
Age	-0.005	-0.004	-0.003	0.002	0.003
	[-2.51]	[-1.57]	[-0.86]	[0.27]	[0.59]
Age sqrd	0.000	0.000	0.000	0.000	0.000
	[2.90]	[1.90]	[1.21]	[0.50]	[0.35]
Entrepreneur	0.051	0.053	0.018	0.057	0.067
	[7.31]	[5.86]	[1.46]	[4.14]	[2.95]
Upper secondary education		-0.006	-0.022		0.042
		[-0.48]	[-0.86]		[1.37]
Higher education		-0.010	-0.052		0.132
		[-1.02]	[-2.82]		[4.92]
Sponsor fixed effects	No	No	Yes	No	No
N	2,480	2,011	1,407	605	475
R^2	0.133	0.134	0.416	0.127	0.147

Table 3
Sponsors Compared to Their Sponsored Investors

This table compares sponsors to their sponsored investors based on personal characteristics and geographic location. The reported statistics are based on all sponsor – sponsored investor pairs where the measured statistic is available for both the sponsor and the sponsored investor. Panel A reports the distribution of the investors' difference to their sponsor in age, income, and geographic distance. Age is measured at the end of 2007 and income is the person's taxable income in 2007. Geographic distance is calculated based on the street addresses reported in the police interview. Panel B reports the percentage of cases where the sponsor is older, has higher taxable income, is of same gender, and has a lower or higher education level. It also reports the percentage of investors who mention that their sponsor is a co-worker or relative.

Panel A: Statistics comparing investors to their sponsors based on age, income, and location.

	p5	p25	p50	p75	p95	Average	N
Sponsor's age minus investor's age	-23	-6	1	9	36	1.4	2,013
Sponsor's income minus investor's income	-61.3	-10	9.5	73.1	459.4	65.0	1,682
Geographic distance (kilometers)	0.2	4.4	16.1	80.5	387.9	76.4	2,057

Panel B: Percentage statistics on sponsoring relationships.

Sponsor is older	Sponsor has higher income	Sponsor is of same gender	Sponsor has a lower education level	Sponsor has a higher education level	Sponsor is a co-worker	Sponsor is a relative or family member
51.2 %	64.0 %	80.7 %	25.9 %	21.4 %	8.2 %	15.5 %

Table 4
Sponsor's Personal Characteristics and the Total Amount of Funds Invested in Wincapita

This table reports results from cross-sectional OLS regressions where the dependent variable is the total amount of funds an investor invested in Wincapita divided by his annual income. The main independent variables measure the investor's difference relative to his sponsor in terms of personal characteristics and geographic location. They include separate dummies for investors whose sponsor has higher taxable income (based on taxable income from the year 2007), investors whose sponsor is older, investors whose sponsor has a comparatively higher education level, investors whose sponsor has a comparatively lower education level, and also log(distance to sponsor) measured in kilometers. The measured education level is based on three categories: investors who have only mandatory basic education, investors whose highest degree is from an upper secondary school, and investors who have a higher education degree. The regressions also include a dummy variable for investors who are sponsors. All regressions include the following unreported control variables: annual income, annual income squared, a dummy variable for females, age, age squared, a dummy variable for entrepreneurs, and dummies for the two highest education level categories defined earlier. Annual income is the person's taxable income in 2007 and age is measured at the end of 2007. All regressions include dummies for the investor's year of joining, and sponsor fixed effects. t-statistics are reported in brackets below the coefficients. Columns 1 to 4 cluster standard errors by year of joining and Column 5 uses two-way clustering by both year of joining and the sponsor of the investor.

	(1)	(2)	(3)	(4)	(5)
Sponsor has higher income	0.063	0.098	0.121	0.108	0.121
	[2.70]	[5.46]	[6.16]	[4.28]	[5.60]
Sponsor is older		0.049	0.069	0.075	0.069
		[2.23]	[3.80]	[4.05]	[4.53]
Sponsor is of same gender		-0.047	-0.052	-0.078	-0.052
		[-1.10]	[-1.13]	[-1.65]	[-1.29]
Sponsor has relatively higher education			0.063	0.055	0.063
			[3.25]	[2.47]	[6.45]
Sponsor has relatively lower education			-0.132	-0.130	-0.132
			[-5.01]	[-5.05]	[-4.04]
Log(distance to sponsor)				0.004	
				[0.80]	
The investor is a sponsor	0.149	0.153	0.153	0.163	0.153
	[4.71]	[3.38]	[3.48]	[3.21]	[4.29]
Personal controls	Yes	Yes	Yes	Yes	Yes
Sponsor fixed effects	Yes	Yes	Yes	Yes	Yes
Two-way clustering of standard errors	No	No	No	No	Yes
N	876	768	645	613	645
R^2	0.362	0.392	0.413	0.416	0.413

Table 5
Robustness Checks Related to the Effect of Sponsor's Personal Characteristics on the Total Amount of Funds Invested in Wincapita

This table reports results from cross-sectional OLS regressions where the dependent variable is the total amount of funds an investor invested in Wincapita divided by his annual income. The main independent variables measure the investor's difference relative to his sponsor in terms of personal characteristics. They include separate dummies for investors whose sponsor has higher taxable income (based on taxable income from the year 2007), investors whose sponsor is older, investors whose sponsor has a comparatively higher education level, and investors whose sponsor has a comparatively lower education level. The measured education level is based on three categories: investors who have only mandatory basic education, investors whose highest degree is from an upper secondary school, and investors who have a higher education degree. The regressions also include a dummy variable for investors who are sponsors. All regressions include the following unreported control variables: annual income, annual income squared, a dummy variable for females, age, age squared, a dummy variable for entrepreneurs, and dummies for the two highest education level categories defined earlier. Annual income is the person's taxable income in 2007 and age is measured at the end of 2007. Column 1 excludes observations where the investor invested the same amount as his sponsor, Column 2 excludes investors whose total invested amount is less than or equal to €3000, Column 3 excludes investors who were invited to the police interview and did not contact the police by their own initiative, and Column 4 excludes observations where less than five investors in the regression have the same sponsor. All regressions include dummies for the investor's year of joining, and sponsor fixed effects. t-statistics based on standard errors clustered by the year of joining are reported in brackets below the coefficients.

	Excluding investors who invested the same amount as their sponsor	Excluding investors whose invested amount is €3000 or lower	Excluding investors who were invited to the interview by the police	Excluding observations where less than five investors have the same sponsor
	(1)	(2)	(3)	(4)
Sponsor has higher income	0.120	0.124	0.071	0.090
	[6.04]	[6.14]	[13.69]	[2.02]
Sponsor is older	0.067	0.086	0.062	0.060
	[3.66]	[4.20]	[4.19]	[4.34]
Sponsor is of same gender	-0.051	-0.071	-0.016	-0.131
	[-1.11]	[-1.61]	[-1.59]	[-1.62]
Sponsor has relatively higher education	0.063	0.068	0.062	0.066
	[3.30]	[4.56]	[1.74]	[2.56]
Sponsor has relatively lower education	-0.136	-0.139	-0.110	-0.145
	[-4.69]	[-2.86]	[-1.95]	[-6.78]
The investor is a sponsor	0.152	0.161	0.148	0.206
	[3.36]	[3.19]	[4.96]	[2.14]
Personal controls	Yes	Yes	Yes	Yes
Sponsor fixed effects	Yes	Yes	Yes	Yes
N	640	545	438	344
R^2	0.414	0.422	0.465	0.407

Table 6
The Relationship between Sponsor's Relative Income and the Invested Amounts When the Sponsor Is Not Older or More Educated

This table reports results from cross-sectional OLS regressions where the dependent variable is the total amount of funds an investor invested in Wincapita divided by his annual income. The regressions in Columns 1 and 2 are based on investors whose sponsor is not older than them and the regressions in Columns 3 and 4 are based on investors whose sponsor does not have a comparatively higher education level. The regression in Column 5 is based on investors whose sponsor is not older and does not have a comparatively higher education level. The main independent variables measure the investor's difference relative to his sponsor in terms of personal characteristics. They include separate dummies for investors whose sponsor has higher taxable income (based on taxable income from the year 2007), investors whose sponsor is older, investors whose sponsor has a comparatively higher education level, and investors whose sponsor has a comparatively lower education level. The measured education level is based on three categories: investors who have only mandatory basic education, investors whose highest degree is from an upper secondary school, and investors who have a higher education degree. The regressions also include a dummy variable for investors who are sponsors. All regressions include the following unreported control variables: annual income, annual income squared, a dummy variable for females, age, age squared, a dummy variable for entrepreneurs, and dummies for the two highest education level categories defined earlier. Annual income is the person's taxable income in 2007 and age is measured at the end of 2007. All regressions include dummies for the investor's year of joining, and sponsor fixed effects. *t*-statistics are reported in brackets below the coefficients. Standard errors are clustered by the investors' year of joining.

	(1)	(2)	(3)	(4)	(5)
	Investors whose sponsor is not older		Investors whose sponsor is not more educated		Investors whose sponsor is not older or more educated
Sponsor has higher income	0.074	0.082	0.126	0.126	0.132
	[2.88]	[2.19]	[4.10]	[4.87]	[1.72]
Sponsor is older				0.106	
				[3.10]	
Sponsor is of same gender	-0.173	-0.177	-0.04	-0.043	-0.157
	[-1.28]	[-1.18]	[-0.72]	[-0.72]	[-0.91]
Sponsor has higher education		0.227			
		[1.98]			
Sponsor has lower education		-0.238			
		[-1.38]			
Sponsor dummy	0.157	0.127	0.182	0.193	0.143
	[3.19]	[1.87]	[3.31]	[3.28]	[2.64]
Personal controls	Yes	Yes	Yes	Yes	Yes
Sponsor fixed effects	Yes	Yes	Yes	Yes	Yes
N	333	289	484	484	191
R^2	0.503	0.532	0.416	0.427	0.544

Table 7
Income Difference Relative to the Postal Code Median and the Total Amount of Funds Invested in Wincapita
This table reports results from cross-sectional OLS regressions where the dependent variable is the total amount of funds an investor has invested in Wincapita divided by his annual income. The main independent variable is a dummy, which takes the value one if the investor's taxable income is below the median taxable income in the postal code area where he lives. Other reported independent variables are the median income in the postal code area in thousands of euros, and dummies for investors whose sponsor has higher taxable income (based on taxable income from the year 2007), investors whose sponsor is older, investors whose sponsor has a comparatively higher education level, investors whose sponsor has a comparatively lower education level, and a dummy for investors who are sponsors. The measured education level is based on three categories: investors who have only mandatory basic education, investors whose highest degree is from an upper secondary school, and investors who have a higher education degree. All regressions also include the following unreported control variables: annual income, annual income squared, a dummy variable for females, age, age squared, a dummy variable for entrepreneurs, and dummies for the two highest education level categories defined earlier. Annual income is the person's taxable income in 2007 and age is measured at the end of 2007. All regressions include dummies for the investor's year of joining, and sponsor fixed effects. t-statistics are reported in brackets below the coefficients. Standard errors are clustered by year of joining.

	(1)	(2)	(3)	(4)
Investor's income is below postal code median	0.089	0.096	0.070	0.072
	[3.07]	[2.95]	[2.46]	[2.54]
Median income in postal code area		-0.003		-0.001
(thousands of euros)		[-1.25]		[-0.38]
Sponsor has higher income			0.115	0.114
			[5.82]	[5.79]
Sponsor is older			0.070	0.070
			[4.46]	[4.46]
Sponsor is of same gender			-0.065	-0.064
			[-1.36]	[-1.33]
Sponsor has higher education			0.067	0.067
			[3.70]	[3.68]
Sponsor has lower education			-0.126	-0.126
			[-4.78]	[-4.68]
Sponsor dummy	0.140	0.140	0.155	0.155
	[6.62]	[6.64]	[3.80]	[3.82]
Personal controls	Yes	Yes	Yes	Yes
Sponsor fixed effects	Yes	Yes	Yes	Yes
N	1,407	1,407	645	645
R^2	0.424	0.425	0.418	0.418