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February 2010

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January, 2010

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Abstract: Entrepreneurs are surprisingly unlikely to have partners. In spite of the obvious advantages to forming partnerships, only a small minority of entrepreneurs (less than 10%, excluding family businesses) have partners. A number of possible explanations exist for this puzzling phenomenon, including an inability to locate suitable partners, fear of moral hazard, and a preference for not working in groups. Utilizing a diverse subject population with a high proportion of active entrepreneurs, we use a team production experiment to study whether entrepreneurs prefer to work alone or in a team. The data indicate that entrepreneurs, while no less likely to be good teammates, are substantially less interested in joining teams. This suggests that efforts to encourage partnership among entrepreneurs may run contrary to the preferences of this group.

Acknowledgements: We would like to thank the Kauffman foundation for funding this project. We would like to thank Tim Salmon and Jessen Hobson for sharing experimental materials. We would like to thank faculty and staff at the Jim Moran Institute for assisting with subject recruitment, and Janet Jabs for editing assistance. We would like to thank Scott Shane and seminar participants at the University of Texas - Dallas, Florida State University, EWEBE, and UC Santa-Barbara for helpful comments. All errors are solely the authors' responsibility.

1. Introduction: Entrepreneurship is a strikingly anti-social activity. According to Shane (2007, p. 75), "between 50 and 60 percent of all new businesses are founded by a single individual." Most firms that have more than one founder are started by spouses or relatives (e.g. mom and pop businesses), so that "less than 10 percent of all new businesses are founded by teams of nonrelatives." This statistic is surprising since the presence of a business partner has been shown to increase the performance of start-up firms (Cooper and Bruno, 1977; Feeser and Willard, 1990; Reynolds and White, 1997; Schutjens and Wever, 2000). Starting a business with a partner gives an entrepreneur several advantages, including increased start-up capital,[1] specialization by partners, and improved decision making by teams (Kerr and Tindale, 2004). Given the generally miserable performance of entrepreneurial ventures (Evans and Leighton, 1989; Shane, 2007), it seems reasonable that entrepreneurs should want to seize upon any possible advantage.

Given the potential benefits of forming a partnership, it remains unclear (and little studied)[2] why entrepreneurs generally start firms alone. One possible explanation is that nascent entrepreneurs are isolated from potential partners due to a lack of social and business networks. A second possibility is that entrepreneurs avoid partnerships due to fear of moral hazard. Such concerns would be especially justified if moral hazard was more prevalent among individuals who become entrepreneurs than in the general population. Finally, the lack of partners may reflect a distinctive feature of entrepreneurs' preferences. There exist several pieces of evidence suggesting that entrepreneurs have psychological traits which make team membership undesirable for them. Analyzing data from a large national survey of entrepreneurs, the Panel Study of Entrepreneurial Dynamics (PSED), Reynolds and Curtin (2008) found that entrepreneurs were more motivated by a preference for autonomy than a desire for wealth. This preference for autonomy could be one of the factors leading to fewer partnerships, but Reynolds and Curtin used a broad measure of autonomy that also included preferences for greater freedom and flexibility in lifestyle. The importance of autonomy as a reason for establishing a new business is particularly strong for women, so this result may reflect a need for flexible work hours to deal with childcare issues rather than a desire for independence. On a related theme, there is also evidence that entrepreneurs have a relatively high need for control as measured by nAch scores.[3] Since having a partner reduces an entrepreneur's control over what happens in their business, a relatively high need for control could motivate the decision by many entrepreneurs to work alone. Unfortunately, much of the evidence suggests that a high need for control is a general trait of business managers rather than a distinctive feature of entrepreneurs.[4] Thus, the literature contains indirect evidence that entrepreneurs might have a lower willingness than their peers to work with a partner, but lacks compelling direct evidence.

[1] Fairlie and Robb (2007) show that increasing start-up capital improves the survival rate of new firms.
[2] Studies of entrepreneurship and teams have focused on other topics such as the composition of teams (Ruef, Aldrich, and Carter, 2003), the success rate of teams versus individual start-ups (Schutjens and Wever, 2000), and entry into and/or exit from into existing entrepreneurial teams (Forbes, Borchert, Zellmer-Bruhn, and Sapienza, 2006; Ucbasaran, Lockett, Wright, and Westhead, 2003).
[3] This is a common psychological measure of whether individuals have an internal locus of control. One trait of high nAch individuals is a preference for settings in which they have direct control over the outcome.
[4] Multiple studies find that entrepreneurs have higher nAch scores than the general population (Shapero, 1977; Bowen and Hisrich, 1986; Durand, 1975). However, it is also well established that managers do not differ significantly from entrepreneurs in this trait (Babb and Babb,1992; Brockhaus, 1982).

The primary goal of this research is to provide direct evidence that entrepreneurs exhibit stronger preferences for working alone than similar non-entrepreneurs. As a secondary goal, we also study whether the behavior of entrepreneurs is different in a team setting than that of similar non-entrepreneurs. We accomplish these goals by examining team production decisions in an experimental setting, utilizing a diverse subject population with a high proportion of active entrepreneurs. Subjects engaged in a real effort task, answering logic questions from the GMAT. In an initial phase, subjects played in isolation and were paid based on how many questions they answered in a five minute period. For the second phase of the experiment, subjects were randomly paired with a partner and spent another five minutes answering questions. Critically, payoffs from each question were allocated *ex ante* to either an individual account or a group account. The group account paid 50% more than the individual account, but group payoffs were split evenly between partners. Individual payoffs were maximized by allocating all questions to the individual account, but team payoffs were maximized if all questions were allocated to the team account. The structure of payoffs in the second phase allows for moral hazard, letting us identify whether entrepreneurs are more prone to moral hazard in teams than otherwise similar non-entrepreneurs. At the beginning of the third and final phase of the experiment, subjects bid for the right to play in a team. Potential bids include negative numbers, making it possible for subjects to display a preference for playing as individuals. Depending on their bid and a randomly drawn price, subjects either played the final phase by themselves or with a new randomly chosen partner. We use subjects' willingness to pay (WTP) to play in a team as our primary measure of their preference for working with a partner versus working alone.

We find that entrepreneurs are no more prone to moral hazard than similar individuals. In Stage 2 of the experiment, subjects who are full-time entrepreneurs and older than 30 allocate 67% of the questions to the team account as compared with 65% for other subjects who are older than 30. This result provides little support for the idea that the aversion of entrepreneurs to forming partnerships is due in part to unusually high levels of moral hazard among entrepreneurs. We observe strong positive age effects on the willingness of subjects to allocate questions to the team account, paralleling the results of Charness and Villeval (2009).[5] Subjects' aptitude for answering GMAT questions and subjects' income both have negative effects on allocations to the team account, albeit only weakly in the case of income.

Entrepreneurs are dramatically less willing to pay to join a team for the final stage of the experiment. Subjects who are full-time entrepreneurs and older than 30 bid significantly less to join a team than other subjects who are older than 30. The magnitude of the difference is large, representing 25% of the average payoff for the final stage of the experiment. This negative effect is almost entirely due to the subset of subjects who are long-term entrepreneurs, reporting both current and previous employment as full-time entrepreneurs. Turning to other variables, we observe a strong link between generosity and willingness to join a team as subjects who allocate more questions to the team in Stage 2 also bid significantly more to join a team for Stage 3. We also find a weak positive age effect and a weak negative aptitude effect.

Looking at why subjects, especially entrepreneurs, don't want to join teams, the data supports two possibilities. The first is guilt avoidance – subjects don't want to join teams because they anticipate free-riding and don't want to feel guilty about their actions. Not joining a team serves as a form of impulse control for these individuals.The data is consistent with guilt avoidance providing a partial explanation for

[5] See also Whitt and Wilson (2007).

subjects' general unwillingness to join teams, but *not* with guilt avoidance explaining why entrepreneurs are particularly unwilling to be in teams. The second possibility comes from subjects' responses to a question in the post-experiment survey asking why they did or did not want to join a team. Not surprisingly most subjects who bid negative amounts also make negative comments about joining a team. Many express a general aversion to teams, citing a fear of losing control or a preference for self-reliance. The interdependence of teammates in our experiment is minimal. Subjects don't work together in any meaningful sense and having a teammate can only improve a purely self-regarding subject's payoff.[6] If our experiment triggers subjects' general aversion to teams, this suggests that they have a visceral preference for autonomy that transcends the specific situation they face. We speculate that this visceral preference is stronger among individuals who are entrepreneurs, a conjecture which is weakly supported by the data. If this conjecture can be confirmed in future work, it suggests that a preference for autonomy not only encourages individuals to start a business, as the results of Reynolds and Curtin suggest, but also leads to them not forming a partnership in spite of the financial benefits.

Given the extensive research indicating that start-up firms are more successful when the venture involves more than one person (Schutjens and Wever, 2000; Reynolds and White, 1997; Feeser and Willard, 1990; Cooper and Bruno, 1977), programs designed to encourage partnerships among entrepreneurs starting new businesses seem likely to improve the financial performance of new firms (although not necessarily improving the psychological well-being of their founders). A natural policy implication of our results is that any program designed to encourage entrepreneurial partnerships will be swimming upstream against the strong preferences of entrepreneurs. However, a closer reading of the results suggests a more nuanced interpretation. The aversion of entrepreneurs to team membership increases as they become more involved with entrepreneurship. Subjects who are 30 or younger and want to be entrepreneurs in the future are slightly more willing than their peers to join teams. Subjects who report being full-time entrepreneurs currently *but not in the past* are less willing than their peers to join teams, but the effect is weak. The subjects who are the most averse to joining teams are those who report *both current and past experience* as entrepreneurs. Our results therefore suggest that interventions designed to encourage entrepreneurial partnerships are more likely to succeed if aimed at novice entrepreneurs.[7]

Our results add to a relatively new strand of the entrepreneurship literature that uses economic experiments to identify differences between entrepreneurs and otherwise similar individuals.[8] Experiments are best viewed as a complement to other methodologies used by researchers in entrepreneurship, and like all methodologies come with strengths and weaknesses. Benefits of utilizing an experimental approach include the following: (1) Subjects' choices are observed in a *controlled* environment where the experimenter controls what options are available, what information the entrepreneur receives, and how much the entrepreneur earns subject to his decisions and the choices of other subjects. To understand the value of a controlled environment, consider the motivations underlying the decision whether or not to join a team. An individual's desire to join a team depends both on his

[6] A purely self-regarding individual is an individual who solely cares about maximizing their own monetary payoff.
[7] Approximately 60% of new firms are started by individuals with no previous entrepreneurial experience (Reynolds and Curtin, 2008).
[8] For other examples of experimental work designed to identify the psychological traits of entrepreneurs, see Elston, Harrison, and Rutström's (2005, 2006) on risk attitudes and Burmeister and Schade (2007) on status quo bias.

preferences, such as a desire for autonomy, and his beliefs about the behavior of others.[9] In field settings, beliefs cannot be observed, making it difficult to determine whether the likelihood of joining a team varies between populations because of differences in preferences or differences in beliefs. In a controlled environment, differences in beliefs can be limited through the use of common feedback. This allows us to fairly confidently identify differences in the likelihood of joining teams with differences in preferences. (2) Subjects' choices directly affect their monetary payoffs from the experiment. Many of the traits attibuted to entrepreneurs have been identified through non-incentivized surveys. There is debate within the entrepreneurship literature on the conclusiveness of studies based solely on non-incentivized surveys (Gartner, 1988), and substantial evidence from the experimental literature that subjects responding to monetary incentives make different choices than subjects responding to hypotheticals (e.g. Holt and Laury, 2002). In terms of our experiment, virtually everyone is willing to pay lip service to the notion that teamwork and cooperation are good things. It is more telling to see if people are willing to join teams and invest effort in teams when they have to put their money where their mouth is. (3) The artificiality of experiments, often criticized as a liability, is also an asset because it allows us to put entrepreneurs in situations that would not naturally occur. For example, we are interested in whether entrepreneurs are unusually prone to moral hazard. Since most entrepreneurs do not start with partners, field data can't reveal anything about their behavior in teams. Even if we restrict attention to entrepreneurs who are in teams, the resulting sample is highly selected. In our experiment, all subjects play with a teammate by design, allowing us to observe how all subjects behave when participating in team production.

While we believe economic experiments are a useful tool for examining the traits of entrepreneurs, we are not foolish enough to believe that they are a perfect tool. Large scale surveys like the PSED allow for bigger and more representative samples than are possible with experiments.[10] We suggest that a useful approach is to utilize controlled experiments with monetary payoffs *and* non-incentivized surveys as complements, taking advantage of the strengths of each approach. For example, the data reported below establishes that entrepreneurs are relatively averse to joining teams, indicating that this is a cause of the low rate of team formation in new firms. However, our study is designed to confirm the role of an aversion to joining teams rather than eliminating other potential explanations such as an inability to find suitable partners. Because the weight placed on economic factors in an entrepreneur's decision whether to form a team is determined by the specific setting and incentives faced by a potential entrepreneur, field work that asks entrepreneurs about the specific situation they faced in forming a new firm is necessary to establish the relative importance of an aversion to teams versus more economic factors.

The organization of this paper is as follows. Section 2 presents the experimental design with a focus on our unusual subject population and their effect on our experimental design. Section 3 gives an overview of the experimental results while Section 4 gives more formal econometric analysis. Section 5 discusses the results and Section 6 concludes.

[9] The expected payoff from joining a team is an increasing function of other team members' expected efforts. Moreover, conditional cooperators will find a team more attractive if others are expected to cooperate.
[10] For example, the PSED II includes data from 1214 individuals. To run our experiment with this sample size, holding incentives fixed, would have cost almost $50K.

2. Experimental Design

A) Experimental Task: We implemented team production with a real effort task rather than a simpler abstract setup (i.e. allocating tokens to an individual account or a team account). The use of a real effort task has several benefits for our purposes. Because many of our subjects are years removed from academia, we did not want the experiment to seem overly abstract. Using a real effort task rather than "tokens" makes effort concrete for the subjects. We also used the real effort task to give subjects a sense of ownership over their effort. Many of our subjects have incomes greater than $100K/year. We offered subjects generous incentives (about $40 for a half hour experiment), but were nonetheless concerned that the monetary stakes might not be salient for high income subjects. The results of Hoffman, McCabe, Shachat, and Smith (1994) suggest subjects feel greater ownership over money generated by their effort as opposed to money they are simply given. We therefore made subjects earn the money being allocated to individual or team accounts as a means to increase saliency of the payoffs. Finally, we wanted a natural measure of ability that varied among our subjects. Having this measure lets us control for whether the results reflect some subjects being more able or overconfident than others. It also allows us to address a secondary issue of some interest, the relative willingness of high ability subjects to join teams.

The specific task faced by subjects was answering questions drawn from the Graduate Management Admission Test (GMAT), the standard admissions test for business schools in the United States. All questions were multiple choice questions with five possible answers. We selected questions that either involved reasoning through business related problems or solving simple logic problems. Questions that involved mathematical computation were eliminated so older subjects who hadn't taken algebra in decades would not feel at a disadvantage. The questions were framed in naturalistic language and should not have seemed overly abstract to our subjects. A sample question is shown in Figure 1 with the correct answer highlighted.

Figure 1

Sample Question: Company Alpha buys free-travel coupons from people who are awarded the coupons by Bravo Airlines for flying frequently on Bravo airplanes. The coupons are sold to people who pay less for the coupons than they would pay by purchasing tickets from Bravo. This marketing of coupons results in lost revenue for Bravo. To discourage the buying and selling of free-travel coupons, it would be best for Bravo Airlines to restrict the . . .

(A) number of coupons that a person can be awarded in a particular year
(B) use of the coupons to those who were awarded the coupons and their immediate families
(C) days that the coupons can be used to Monday through Friday
(D) amount of time that the coupons can be used after they are issued
(E) number of routes on which travelers can use the coupons

Answering GMAT questions is a good experimental task for several reasons. Answering multiple choice questions is a simple task that is easily implemented in an online environment, can be repeated

many times in a short period, and is easily explained to subjects. Virtually all Americans have taken a standardized test at some point, so the task is familiar. The questions are sufficiently difficult that subjects are unlikely to see an answer immediately without any thought, but sufficiently easy that most subjects should be able to complete several in a limited period of time. Even though the GMAT is used for business school admission, the questions are sufficiently general that business experience is only mildly helpful in answering them. Thus, business experience is not highly correlated with our measure of aptitude.

To limit a potential source of variation across subjects, all individuals faced the same questions in the same order. Contamination across subjects through sharing of questions seems unlikely since subjects were geographically scattered and would not have known who the other subjects were. We checked for contamination by testing whether later subjects answered more questions correctly and find no effect.

B) Subject Pool: A central feature of our experimental design is its diverse subject pool. Subjects for the main experiment came from five separate groups. Table 1 summarizes the characteristics of subjects recruited from these groups as well as the entire subject population for the main experiment.

Table 1: Subject Pool Characteristics

Subject Pool	Age	Gender (% Female)	Employed Full-Time	High Income (> $100K)	Self Employed[11]
Jim Moran Institute (34 subjects)	48.5	38.2%	88.2%	44.1%	79.4%
Full-Time COB (38 subjects)	27.3	55.3%	21.1%	0.0%	0%
Part-Time COB (38 subjects)	33.0	31.6%	89.5%	13.2%	13.2%
COB Alumni (30 subjects)	49.2	26.7%	76.7%	40.0%	26.7%
Undergraduates (44 subjects)	20.9	40.9%	6.8%	2.3%	9.1%
All Data (184 subjects)	34.4	38.5%	52.7%	17.4%	24.5%

1) Jim Moran Institute: The Jim Moran Institute (JMI) is run by FSU's College of Business (COB). It promotes entrepreneurship, providing services that include free consulting for entrepreneurs, round-tables about entrepreneurship, and general information for individuals interested in entrepreneurship. Subjects recruited through JMI were our largest source of self-employed individuals.

   Several features of the JMI population played an important role in our experimental design. The majority of the JMI subjects live in the Tallahassee area, but more than a third of them live elsewhere. The geographic dispersion of JMI subjects (as well as part-time COB students and COB alumni) was an important factor driving our decision to use an online experiment rather than a more

[11] This statistic reflects all individuals who report being either part or full-time self-employed.

traditional laboratory experiment. Incomes are relatively high for the JMI subjects (44% earn more than $100/K year) and time is presumably tight for them, so the experiment was designed to provide relatively high incentives and a short time commitment. The average subject in our main experiment earned $38 and the experiment only took a half hour to complete. We strictly limited the information we collected, to stay within a half hour time budget. To make participation as convenient as possible, subjects could log in and participate at any time within a two week window.

An important feature of the JMI subject pool is their educational background. Unfortunately, we only obtained educational backgrounds for 25 of the 34 JMI subjects. Of these 25 subjects, 18 had only an undergraduate education, 5 had MBAs, and 2 had professional degrees from non-business fields. Unlike COB students and alumni, JMI subjects generally did not have a graduate business education.

2) Full-time and Part-time COB: We sent a recruiting email to all students currently enrolled in professional programs at Florida State University's College of Business (COB). These are primarily students in the MBA program, although we also have participants who are earning Masters in Accounting, MIS, or Risk Management/Insurance. As can be seen in Table 1, the full and part time COB students are quite different and are best considered as separate subject groups. The full-time students are mainly traditional MBA students taking courses on campus in Tallahassee. They are younger than the part-time students and generally don't work full-time (50% of full-time COB students are not working at all). The part-time students mostly work full-time and are primarily in FSU's on-line MBA program (22 of 37 subjects). The part-time students have higher incomes than the full-time students, with 62% of the part-time students reporting annual income of $50K or greater, as compared to only 18% of the full-time students.

3) COB Alumni: We sent a recruiting email to all COB graduate alumni who graduated between 1975 and 2004. Alumni who graduated before 1975 were excluded to avoid recruiting large numbers of retirees and post-2004 graduates were excluded so individuals in the alumni subject pool would have at least five years of work experience. As can be seen in Table 1, the COB alumni who participated in our experiment resemble the JMI participants along many dimensions, particularly age and income. There were some differences between the two groups. The alumni were more geographically dispersed than the JMI subjects, with less than a third living in Tallahassee. Unlike the JMI subjects, the alumni (by definition) all had a graduate degree in some business field.

4) Undergraduates: Undergraduate subjects in the main experiment participated online like all other subjects in the main experiment. To reduce the likelihood of collusion among undergraduate subjects, we ran experiments for undergraduates during the break between the spring and first summer semesters, a time period when virtually no undergraduates are in Tallahassee. Undergraduate subjects were recruited using ORSEE (Greiner, 2004). Because the experiment did not require subjects to be on campus, a few recent graduates whose email addresses were still in the system also participated.

The 29 full-time entrepreneurs in our experiments are substantially different from the 15 part-time entrepreneurs along several dimensions, including a higher average age (48 vs. 39 years) and higher

likelihood of annual income over $100K (48% vs. 27%). Because of these differences we treat part-time and full-time entrepreneurs as separate groups. Earlier studies which found behavioral differences between part-time and full-time entrepreneurs (Elston, Harrison, and Rutström, 2006) also helped persuade us to analyze the two groups separately.

C) Preliminary Experiment: In measuring preferences for joining teams, an unwanted source of variation is subjects' beliefs about their potential teammates. For example, undergraduates might be more willing to join teams than COB alumni because undergraduates have more optimistic beliefs about their teammates' willingness to contribute to team production. To reduce variation in beliefs, subjects in the main experiment drew their teammates from a common pool of previous participants and were given multiple opportunities to observe extensive feedback about the behavior of individuals in this common pool (but not about the specific individual they were matched with) prior to making any decisions about joining a team. Given this common feedback, beliefs about potential teammates should be similar across groups in the main experiment. The preliminary experiment described in this subsection provided the common pool of potential teammates for the main experiment.[12]

All subjects in the preliminary experiments were undergraduates at FSU. Subjects were recruited using ORSEE. Sessions were run in the xs/fs laboratory at FSU using z-tree (Fischbacher, 2007). There were 60 subjects in the preliminary experiments.

The preliminary experiment consisted of three stages. In the first stage, subjects had five minutes to answer as many GMAT questions, up to a maximum of fifteen, as possible. Prior to seeing each question, subjects were asked which of two accounts, Account A or Account B, they wanted to allocate the question to. Account A paid $2.40 per correct answer and Account B paid $1.80 per correct answer. Subjects were not penalized for incorrect answers, regardless of which account was chosen. This two account structure was used in the first stage to maintain parallelism with later stages where there was a team account, but there was no reason for a subject to choose Account B in the first stage. After choosing an account, subjects were shown the question and could take as much time as they wanted to choose an answer. The same question was shown regardless of which account had been selected. Subjects received no feedback about their performance while the stage was ongoing. Once the stage was completed, the subjects received feedback about how many questions they had allocated to each account, how many of the questions allocated to each account had been answered correctly, and their total earnings from each account. The subjects were also shown the average number of questions allocated to each account and the average number of correct questions for each account across all individuals in their session.

Stage 2 of the preliminary experiment was the same as Stage 1, except subjects were randomly paired with a partner from a future session. Subjects were explicitly told that their teammate would not be playing until later and that payoffs from Stages 2 and 3 would not occur until a later date. Once again, prior to seeing each question the subjects chose to allocate it to either Account A or Account B. Account A remained a private account that paid $2.40 per correct answer. Account B was now a team account that paid $3.60 per correct answer, split evenly between the two teammates. The individual

[12] We considered eliciting beliefs and then controlling for beliefs in the regression analysis, but decided against this due to concerns with the time involved as well as the possibility of affecting subject behavior (Croson, 2000).

payoff from Account B was $1.80, the same as in Stage 1, yielding an MPCR of .75. Subjects did not know whether their teammate was contributing questions to Account A or Account B while Stage 2 was ongoing and received no feedback after the stage about their teammate's choices (giving subjects information about their teammate's choices would have required time travel). The feedback following Stage 2 showed the same information, based on the choices of other subjects in their session, as the feedback after Stage 1.

A central problem in real effort experiments is loss of control over incentives since the ability of subjects to complete the task is unknown *ex ante*. Use of a two account design with identical questions allows us to precisely control the MPCR within a real-effort experiment. Regardless of how good or bad subjects are at solving GMAT questions, the expected monetary payoff from allocating a question to Account B is 75% of the expected monetary payoff from Account A.[13]

For Stage 3, subjects were randomly matched with a new future teammate. Stage 3 was then conducted in a manner identical to Stage 2. At the conclusion of the session, subjects in the preliminary experiments were paid their $10 show-up fee as well as their payoff for Stage 1. They were given a date to pick up additional payments for Stages 2 and 3. We followed this up with an email reminding subjects that their payments for Stages 2 and 3 were available.

Table 2 summarizes the data from the preliminary sessions. *Data from the preliminary sessions are not included in any of the results reported in Section 4.* In Stage 1, subjects correctly allocate almost all questions to Account A. In Stage 2, 37% of the questions were allocated to Account B, the team account. This dropped to 28% in Stage 3 following the pattern of declining contributions typically observed in public goods experiments. The number of questions attempted rose over the three stages while the percentage of correct answers fell. These changes reflect a group of subjects (20% of the subject pool) who learned to take advantage of the lack of penalty for getting questions wrong by quickly guessing on all remaining questions toward the end of the five minute period.

Table 2: Summary of Preliminary Experiment Results

Stage	Correct Account A	Attempted Account A	Correct Account B	Attempted Account B
1	2.57	6.18	0.15	0.42
2	1.82	5.17	1.12	3.05
3	1.95	6.22	0.75	2.44

D) Main Experiment: All subjects in the main experiment participated via the internet using zTree (Fischbacher, 2007). Screenshots of the experiment, including all instructions, are available in the online appendix to this paper.[14] Potential subjects received a recruiting email that provided a brief description of the research project, links to information about us and the Florida State experimental group (to ease subject concerns about online fraud), and a link to a website where they could participate

[13] See van Dijk, Sonnemans, and van Winden (2001) for a similar approach in a real effort experiment studying incentive systems.

[14] Online appendix located at: http://myweb.fsu.edu/djcooper/research/entrepreneurteamsappendix.pdf

in the experiment. The website contained a link for downloading z-leaf, along with installation instructions. When the subjects started zLeaf, they were automatically connected to our zTree server in Tallahassee to run the experiment. Subjects could (and did) call us for help with installing and running the software. At the end of the experiment, subjects were asked to provide a mailing address for payment. We mailed a check for their full earnings to this address within two weeks of their completion of the experiment. Average payment was $38.17.

Subjects were instructed to conduct the experiment "by yourself in a quiet location." We suggested that they should do the experiment in the evening at home. Although subjects could participate at any time they wanted within a two week window, most followed our instructions and participated in the evening. We have no way of knowing where the subjects were when they participated, what other websites they may have logged onto, or whether they were alone. The number of questions answered correctly in Stage 1 for undergraduates in the lab and undergraduates participating online do not differ significantly, suggesting that online participants were not receiving assistance with answering the questions. There are obvious concerns with running experiments online, but we feel that the benefits of gaining access to subjects who would otherwise be unlikely to participate outweigh the methodological costs.

The main experiment has a three stage design inspired by Niederle and Vesterlund (2007). Stages 1 and 2 of the main experiment were identical to Stages 1 and 2 in the preliminary experiment, except that the teammate in Stage 2 was a previous participant, drawn from the preliminary experiment. Subjects in the main experiment knew that their teammates were previous participants, but were not given specific information about the identity of subjects in the preliminary experiment. The instructions made it clear to subjects in the main experiment that their teammates played under the same rules as them and would be paid for any contributions to the team account. Subjects in the main experiment were given no specific information about the choices of their teammates either while the game was in progress or after. They instead received feedback at the end of Stages 1 and 2 about the average choices of all individuals in the preliminary experiment, identified as the pool of potential teammates. This feedback included the average number of questions allocated to each account and the average number of correct answers for each account. Giving all subjects in the main experiment identical feedback about potential teammates after Stages 1 and 2 is designed to reduce differences in beliefs about potential teammates.

Prior to Stage 3 of the main experiment, a BDM mechanism (Becker, DeGroot, and Marschak, 1964) determined whether subjects participated individually as in Stage 1 or in a team as in Stage 2. Subjects were instructed that their potential teammate would be a previous participant, but not the same person they were partnered with for Stage 2. Subjects knew that, unlike them, their potential teammates did not have a choice about whether they were members of a team. Without this information, sophisticated subjects might have adjusted their beliefs to reflect selection into the pool of potential teammates, reducing the likelihood of common beliefs.

Getting into the specifics of the BDM mechanism, subjects were initially asked whether they preferred to participate in Stage 3 as an individual or in a team. This preference was used solely to frame the BDM, so positive numbers correspond to the subject's preferred option. Subjects were then asked to submit the highest price they would be willing to pay to join a team. Admissible prices ranged between

-$10 and $10.[15] Our use of negative prices is somewhat unusual – if a subject chooses a negative price, this indicates that they would have to be paid to join a team. After the subject submitted their willingness to pay to join a team, a random number was drawn from a uniform distribution over the range between -$10 and $10. If the number drawn was smaller than the subject's bid, they were assigned a partner for Stage 3 and paid the amount drawn. If the price drawn was a negative number, we paid the subject to join a team. If the number drawn was greater than the subject's bid, they played Stage 3 as an individual and paid (or received) nothing. The procedures for Stage 3 were identical to those used in Stage 1 for subjects participating as individuals and Stage 2 for subjects in teams.

The BDM makes it a dominant strategy for utility maximizing subjects to submit their true willingness to pay to join a team. Given the payoff structure in our experiments, for a purely self-regarding individual (i.e. an individual who solely cares about maximizing their own monetary payoff) it is also a weakly dominated strategy to submit a negative bid. The individual account pays the same amount whether a subject is in a team or not, so a purely self-regarding subject can always join a team, contribute all questions to the individual account, and still receive payment from any questions their partner contributes to the team account. Subjects received detailed instructions on the BDM which stressed that it was to their benefit to bid their true maximum willingness to pay to join a team. Subjects were given multiple examples illustrating how the mechanism works and the perils of not bidding their true willingness to pay for joining a team. Nonetheless, it is well-known that the BDM can yield biased valuations.[16] The same mechanism was used for all subjects in our experiments, so any bias should not affect our conclusions unless it differs systematically across different types of subjects. The results section presents evidence that our conclusions are not driven by use of the BDM.[17]

After Stage 3 was completed, we elicited risk preferences using a mechanism adapted from Eckel and Grossman (2008).[18] Subjects were offered a choice between five binary gambles. The outcome for their chosen gamble was determined after the experiment was over and the resulting payoff, ranging between $0.10 and $3.25, was added to their earnings for the experiment. The five gambles are constructed so that both expected value and risk (standard deviation of payoffs) are increasing in the order of gambles. Choosing a higher gamble therefore corresponds to lower risk aversion. To make the mechanism easier for subjects to understand, all probabilities were 50/50, gambles were framed in terms of flipping a coin, and subjects were given a visual representation of the payoffs along with the numeric values.

Also after Stage 3, we elicited a measure of subjects' overconfidence by asking them to compare their ability to answer questions with other subjects from their subject group (rather than subjects in the preliminary experiment). For example, COB students were asked "We would like to ask you how you believe your performance on questions in Stage 2 ranks against other masters students from the FSU College of Business." Subjects were asked to choose what quartile their performance fell into. They

[15] The maximum and minimum bids were set to be slightly larger than average earnings from a stage, which were $7.67 for Stage 1 and $9.35 for Stage 2. Only 11 of 184 bids were on one of the two boundaries.
[16] See Bardsley, Cubitt, Loomes, Moffatt, Starmer, and Sugden (pp. 271-4, 2009) for a recent summary of methodological issues surrounding the BDM.
[17] We experimented with modifications to the wording and mechanism designed to simplify the task for subjects. None of the simplifications affected subject behavior.
[18] We'd like to thank Tim Salmon for sharing his adaptation of the Eckel-Grossman mechanism, used in Macpherson, Prasad, and Salmon (2009).

were paid an additional $2 if their choice was correct. On average our subjects were overconfident, with 54% overestimating the quartile their performance fell into as compared to only 14% who underestimated their performance.

The experiment ended with subjects filling out a survey about their demographic characteristics and employment history, particularly self-employment. A copy of the survey given to COB alumni is in the online appendix. We limited the survey to a single screen to increase the likelihood that subjects would answer the questions. This reduced the number of questions we could ask, but we succeeded in having almost all subjects fill out the entire survey. The income question was categorical, so we only know a range for the subjects' self-reported incomes. The survey also included a text box where subjects were asked to tell why they did or did not want to participate as part of a team.

3. Results of the Main Experiment: Table 3 gives an overview of the data from the main experiment that parallels the information provided for the preliminary experiment in Table 2. Comparing undergrads with undergrads, the average number of questions answered correctly in Stage 1 is almost identical in the main and preliminary experiments (2.90 vs. 2.72), implying that subjects who participated online were not receiving outside assistance. As in the preliminary experiment, the number of questions attempted rose over time while the percentage of questions answered correctly fell over time. This once again reflects a subset of the subjects (18% of the subjects) who gamed the system by quickly guessing answers at the end of the five minute period.

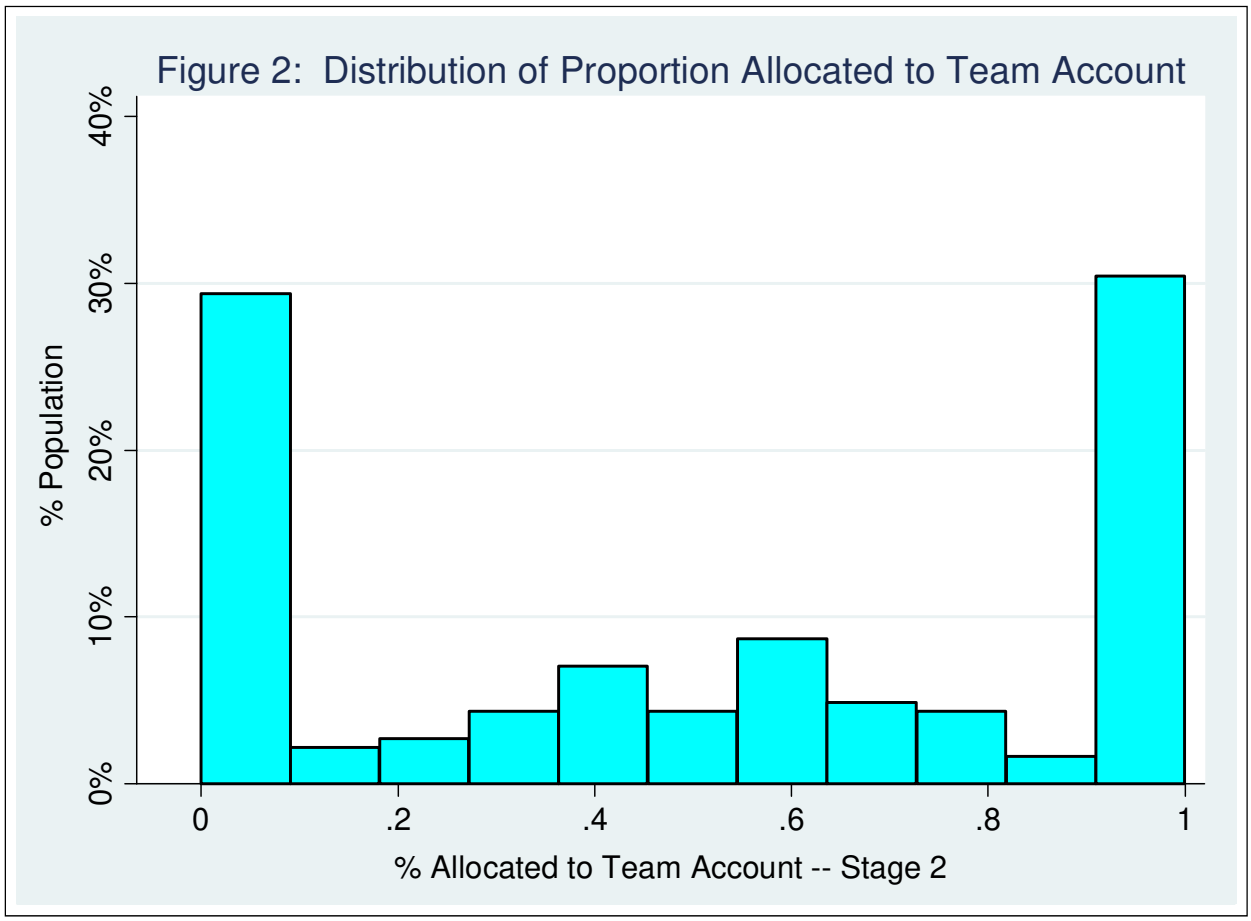
Table 3: Summary of Main Experiment Results

Stage	Correct Account A	Attempted Account A	Correct Account B	Attempted Account B
1	3.00	5.81	0.20	0.42
2	1.90	4.13	1.54	3.74
3 (Individual)	3.02	8.33	0.19	0.47
3 (Team)	1.63	4.09	1.24	3.49

In Stage 2, 48% of questions were allocated to Account B. Comparing undergraduates with undergraduates, slightly more questions were allocated to Account B in the preliminary experiment (37%) than in the main experiment (31%). This difference is not statistically significant. For subjects assigned to teams in Stage 3, the proportion of questions allocated to Account B is 47%. Allocations to the team account are decreasing (as expected) since subjects who were assigned to teams in Stage 3 allocated 59% of their questions to Account B in Stage 2.

Figure 2 shows the distribution of allocations to the team account in Stage 2. An observation in this figure is the proportion of questions allocated to the team account by a single subject. 90% of the subjects attempted at least five questions, providing them with ample opportunity to mix their allocations between the two accounts. The population divides roughly into thirds, with 28% of the subjects allocating all questions to the individual account in Stage 2, 29% allocating all questions to the team account, and the remaining 43% allocating at least one question to each of the accounts. The median subject allocated 54% of their questions to the team account.

We identify subjects as entrepreneurs if they report being self-employed in the post-experiment survey. Self-employment is an imperfect proxy for entrepreneurship, but since there isn't universal agreement on the definition of an entrepreneur (Reynolds and Curtin, 2007) it isn't obvious that a better proxy exists. Self-employment has commonly been used as a proxy for being an entrepreneur in the empirical literature on entrepreneurship (e.g. Evans and Leighton, 1989; Hamilton, 2000; Fairlie, 2005) and was also used to screen and identify entrepreneurs for the PSED II. Space was extremely limited on the post-experiment survey, and using self-employment as a proxy for entrepreneurship makes it straight-forward to identify subjects as entrepreneurs (according to this definition) with a single question.



Comparing entrepreneurs directly with the rest of the experimental population isn't very useful because there is so much variation on dimensions other than self-employment status. Section 4 uses regressions to identify the effects of being an entrepreneur, controlling for subjects' other characteristics, but the current section tries to give an intuitive feel for the data with less formal analysis. To do this while somewhat controlling for other sources of variation, we take advantage of the fact that virtually all of the full-time entrepreneurs (28 of 29) in our subject pool are older than 30. This is germane because there are strong age effects in our data on allocating questions to the team account, echoing the age effects observed by Charness and Villeval (2009). Figure 3 illustrates this, breaking down the subject pool by decade cohorts. There is an obvious jump in the proportion of questions allocated to the team account in Stage 2 for subjects older than 30, after which there is no clear relationship between age and

allocation to the team account.[19] We therefore consider differences between full-time entrepreneurs and the rest of the subject pool for both the full dataset and for the dataset restricted to subjects older than 30. This restriction controls (roughly) for the strong age effect in the data while discarding almost no observations from full-time entrepreneurs.

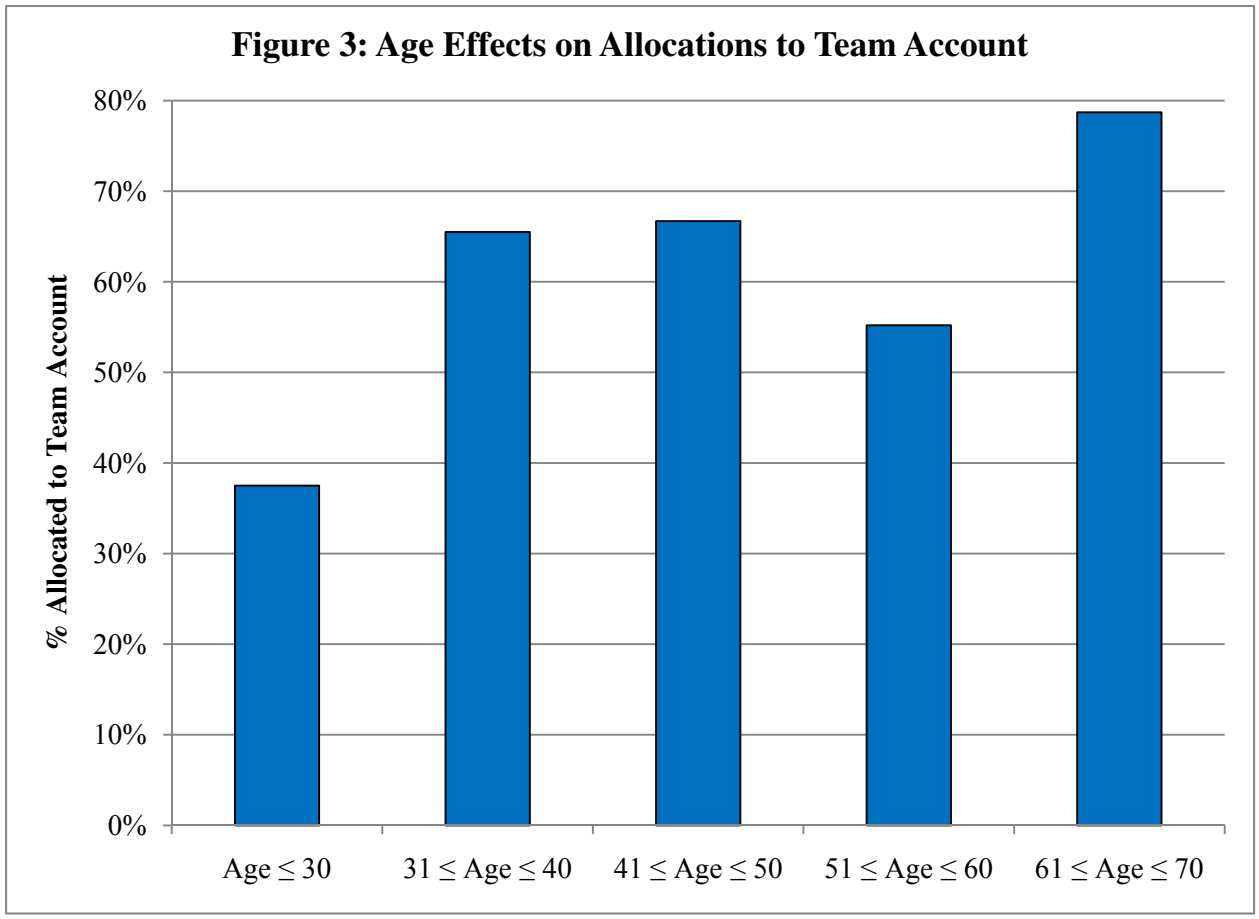
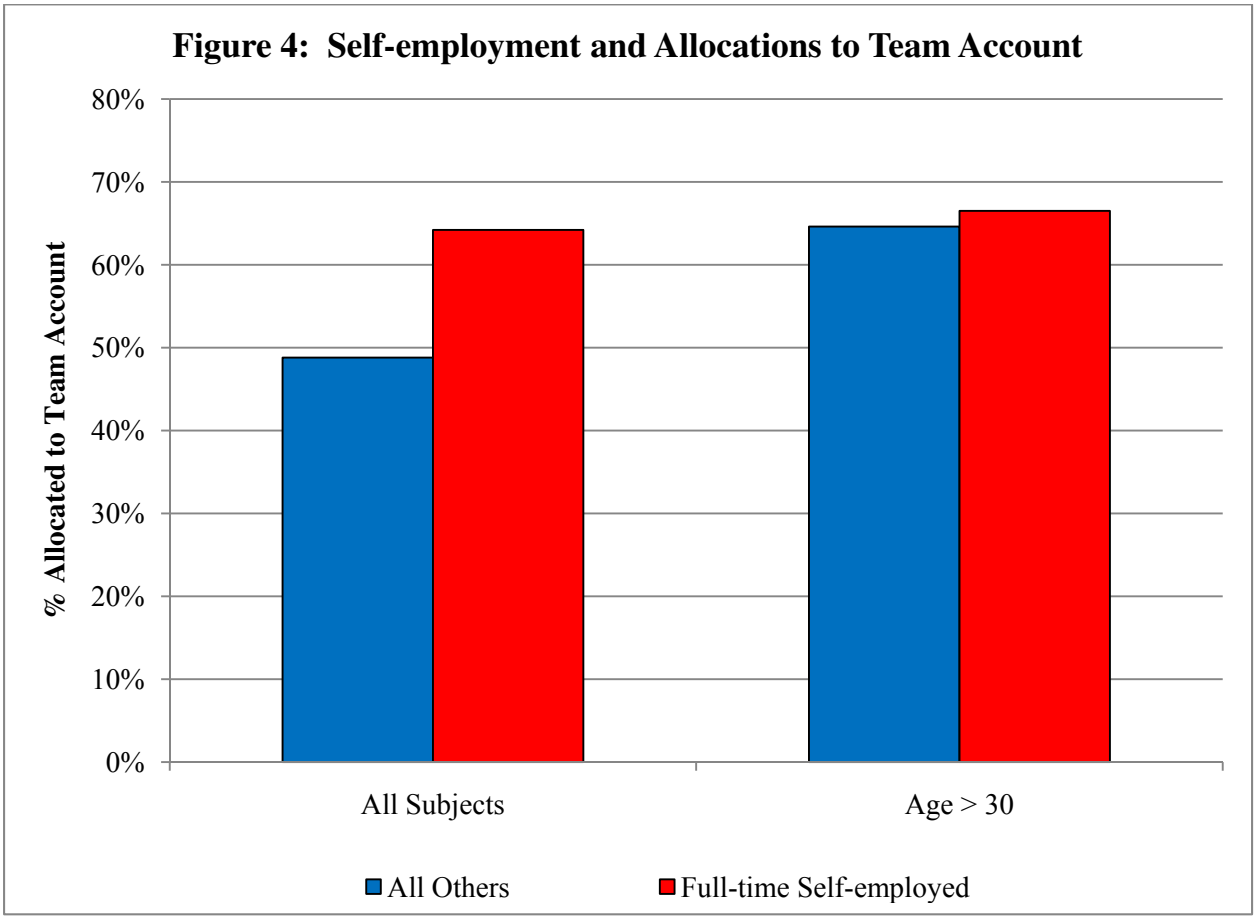


Figure 4 compares the percentage of questions allocated to the team account for subjects who are full-time entrepreneurs and subjects who are not. Because there are relatively few subjects who are part-time entrepreneurs – only nine in the older than 30 population – Figure 4 pools the part-time entrepreneurs with the subjects who are not entrepreneurs at all. The regression analysis in Section 4 uses the full dataset and controls for subjects who are part-time entrepreneurs. This more careful approach does not change any of our conclusions about full-time entrepreneurs. The left cluster of bars in Figure 4 is based on data from the entire population, while the right cluster limits the sample to subjects older than 30. Looking at the entire population, full-time entrepreneurs allocate more questions to the team account than other subjects. This difference vanishes when the comparison is based solely on subjects older than 30, indicating that the apparent effect is due to the relative age of full-time entrepreneurs.

[19] Regression analysis, discussed in Section 4, indicates that neither the dip for subjects in their 50s or the increase for those in their 60s is statistically significant.

Regularity 1: Controlling for age, subjects who are full-time entrepreneurs allocate questions to the team account in Stage 2 at the same rate as other subjects.



We now arrive at the central question of the paper: are entrepreneurs less willing to join teams? Figure 5 shows the distribution of bids to join a team for the entire population. Recall that possible bids range between -$10 and $10, with negative bids indicating a preference for playing as an individual. The mean bid is slightly negative (-$0.29) and the distribution is quite spread out (StD = $4.75). About half of the subjects (54%) submitted a negative bid, even though this is weakly dominated for purely self-regarding subjects.

There are many large bids, with 23% of bids having an absolute value greater than $5.00. Given that the average payoff for Stage 3 (not including any payments or receipts for joining a team) was only $7.55,[20] the prevalence of large bids must reflect some combination of very strong feelings about playing in teams and subject confusion. Realistically, it is hard to imagine that confusion doesn't play a role, so Sections 3 and 4 examine whether the effect of being a full-time entrepreneur can be explained by subject confusion.

[20] Average Stage 3 payoffs are about the same for subjects who have a bid with an absolute value greater than $5 and those who make smaller bids ($7.25 vs. $7.64).

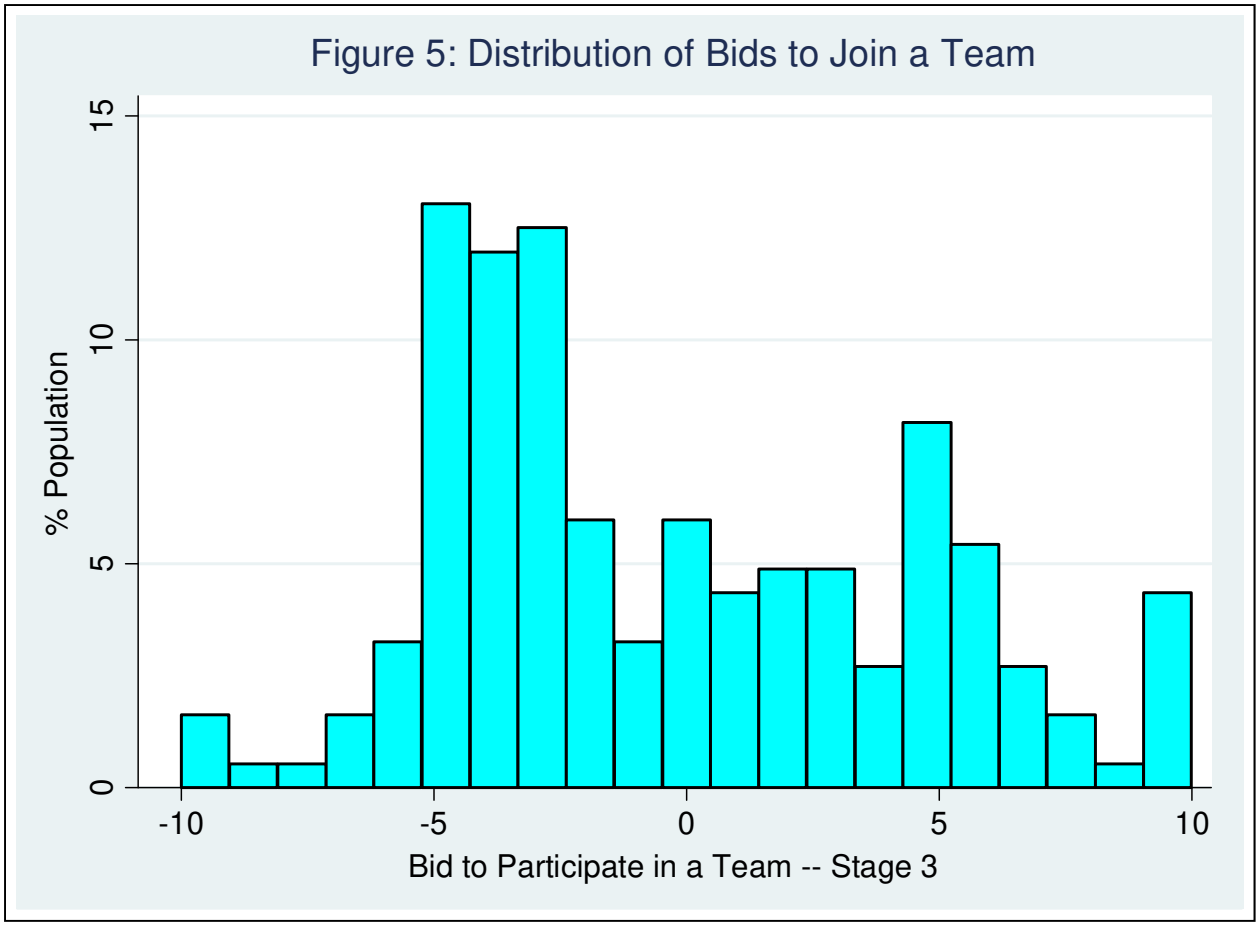
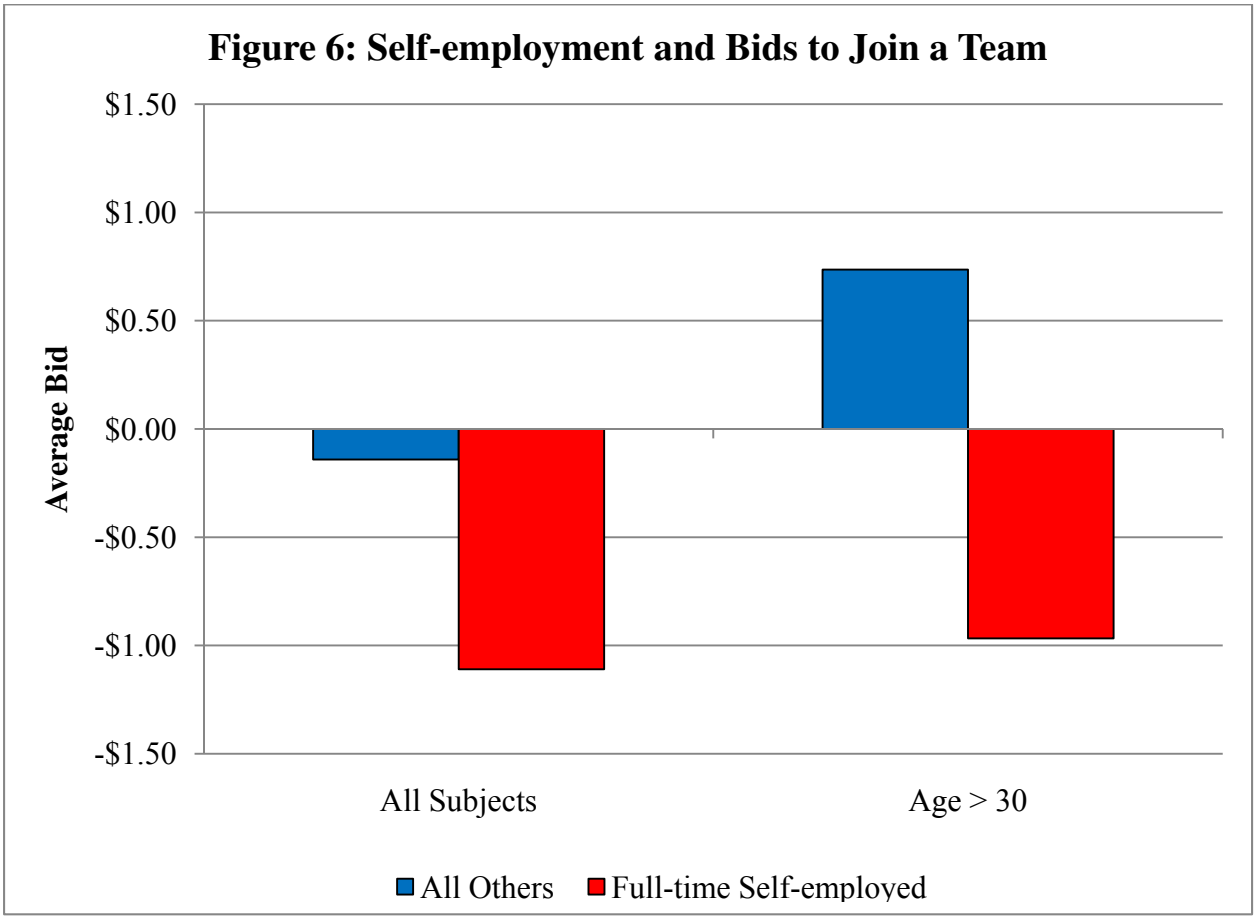


Figure 6 compares the average bid to participate in a team by subjects who are full-time entrepreneurs and subjects who are not. Once again, part-time entrepreneurs are pooled with subjects who are not entrepreneurs. The left hand cluster of bars is based on data from the entire population while the right hand cluster only uses data from subjects older than 30 – there are also age effects in the bids to participate in a team (see Section 4). Even looking at the full population there is an obvious effect from being a full-time entrepreneur, as full-time entrepreneurs bid $0.97 less (on average) to be in a team than other subjects. Limiting the population to subjects who are older than 30 makes the effect more obvious, increasing the difference between full-time entrepreneurs and others to $1.70. This difference in average bids is large. A difference of $1.70 represents 39% of the average absolute value of bids for subjects older than 30 ($4.34) and 25% of the average Stage 3 payoff for subjects older than 30 ($6.70).

The lower willingness of full-time entrepreneurs to join teams cannot be explained by subject confusion about the BDM mechanism. One likely sign of confusion about the BDM is use of unusually large bids, but bids with an absolute value greater than $5 are slightly less frequent for full-time entrepreneurs (25%) than for other subjects older than 30 (32%). Even if subjects are confused about the BDM mechanism, it seems unlikely that they would be confused about the meaning of the sign of their bid. Only 32% of full-time entrepreneurs bid strictly positive amounts to join a team for Stage 3, as compared with 48% of all other subjects older than 30. Therefore, measuring willingness to join teams

in a way that doesn't rely on the details of the BDM mechanism also shows lower interest in teams for full-time entrepreneurs.



The preceding analysis focuses on whether subjects are *currently* entrepreneurs, but we also have survey data on whether subjects were *previously* entrepreneurs. By itself, having been a full-time entrepreneur previously is not associated with lower willingness to join a team. Among subjects older than 30, subjects who are not currently full-time entrepreneurs, but were in the past, actually bid slightly more on average to be in a team ($1.09) than subjects who have never been full-time entrepreneurs ($0.67). However, the seventeen subjects who report *both currently and previously* being full-time entrepreneurs are extremely reluctant to join teams with an average bid of -$2.49, compared with an average bid of $1.38 for subjects who are currently full-time entrepreneurs but were *not* previously. More rigorous statistical analysis, controlling for other subject characteristics, indicates that subjects with any experience as full-time entrepreneurs, current or past, are less willing to join teams, but the effect is only large (and statistically significant) for those who report both currently and previously being full-time entrepreneurs. See Section 4 for details. The negative effect of being a full-time entrepreneur on willingness to join teams is largely due to subjects that report being long-term entrepreneurs, suggesting that increased experience as an entrepreneur is correlated with an increased aversion to joining teams.

Desire to be a full-time entrepreneur in the future does not predict willingness to join a team. Consider subjects who are 30 or younger, full-time students (either undergraduates or COB students), and have no current or past experience with being full-time entrepreneurs. The survey asked these individuals if they would like to be self-employed full-time in the future. Subjects who answer that they would like to be full-time entrepreneurs in the future bid slightly more on average to join a team ($0.06) than other subjects in this population (-$0.29). Something about being an entrepreneur, rather than the mere desire to be an entrepreneur, must explain the relative unwillingness of entrepreneurs to join a team.

Regularity 2: Subjects who are full-time entrepreneurs bid less to join a team for Stage 3 than other subjects. This effect is driven by the subset of subjects who are both currently and previously full-time entrepreneurs. Among younger subjects, a desire to be a full-time entrepreneur is not associated with lower willingness to join a team.

4. Regression Analysis: The preceding analysis suggests that full-time entrepreneurs are less willing to join teams than other subjects, but are equally willing to allocate effort to team production when forced to join a team. However, subjects vary on many dimensions beyond being entrepreneurs. Figure 3 shows that there are strong age effects in the data, and it is easy to imagine that factors such as gender, income, and aptitude for the task could also affect behavior. We therefore use regressions to separate the impact of being an entrepreneur from the effects of other subject characteristics.

The two variables used as dependent variables in our regressions are the proportion of questions allocated to the team account in Stage 2 and the bid to join a team in Stage 3. A tobit specification is used in both cases since both variables are censored. *All statements about statistical significance are based on robust standard errors.*

All regressions on Table 4 include dummies for the subject pool the individual was drawn from. In Models 1 and 2, the regressions where the proportion of questions allocated to the team is the dependent variable, these four dummies are neither individually nor jointly significant. In contrast, the four subject pool dummies are jointly significant at the 5% level in Models 3 and 4 where the dependent variable is the bid to join a team. Examining individual parameter estimates yields a clear pattern. The three groups of COB students (part-time, full-time, alumni) form one cluster. An F-test fails to reject the null hypothesis that these three parameter estimates are equal to each other (F-stat = 1.09; p =0.34). Both undergraduates and JMI subjects bid more than any group of COB students to join teams and do not differ significantly from each other (t-stat = 1.24; p = 0.22). If the four subject pool dummies are replaced with a single dummy for the three groups of COB students, the resulting parameter estimate is large (-$2.45) and statistically significant at the 1% level (t-stat = 2.88; p < .01). Comparing the two models, the improvement in statistical fit from adding subject pool dummies (as opposed to a single dummy for COB students) fails to achieve significance at the 10% level (F-stat = 1.64; p = .18). Given that few of the JMI subjects had business school degrees, it seems probable that the subject pool dummies primarily capture an effect associated with a business-school background, either a direct effect of experiences from business school or a selection effect. Our conclusions are unchanged if the model with a single dummy for COB students is used rather than the model with subject pool dummies. Parameter estimates for the subject pool dummies are suppressed in Table 4 to save space.

Table 4: Tobit Regressions

	Model 1	Model 2	Model 3	Model 4
Dependent Variable	Allocation to Team	Allocation to Team	Bid to be in Team	Bid to be in Team
Part-time Entrepreneur	.560** (.272)	.611** (.277)	-0.40 (1.15)	-0.90 (1.17)
Full-time Entrepreneur	.190 (.283)	.217 (.280)	-4.15*** (1.42)	-4.08*** (1.32)
Age > 30	.642*** (.223)	.543** (.221)	2.29** (1.12)	1.25 (1.19)
Gender (0 = Male, 1 = Female)	.076 (.140)	.069 (.140)	0.84 (0.74)	0.83 (0.71)
Income ≥ $50,000	-.051 (.179)	-.012 (.179)	-0.36 (1.00)	-0.12 (0.94)
Income ≥ $100,000	-.410* (.212)	-.342 (.208)	-0.83 (1.22)	-0.21 (1.19)
Stage 1 Number of Correct Answers		-.090** (.040)		-.365* (.195)
Risk Measure (1 – 5, increasing risk)		.001 (.039)		.327 (.203)
Over-confidence		-.005 (.063)		0.05 (.346)
Stage 2 % Allocated to Team				2.25** (0.91)
Log-likelihood	-180.96	-178.04	-527.50	-521.26

All regressions on Table 4 include 184 observations. The numbers reported in parentheses are robust standard errors. Three (***), two (**), and one (*) stars indicate statistical significance at the 1%, 5%, and 10% respectively. Parameter estimates for the subject group dummies and a dummy for observations missing a value for income have been suppressed in this table.

The independent variables that appear in Table 4 are the following:

1) Entrepreneur: All regressions include a dummy for subjects who report being a part-time entrepreneur and a dummy for subjects who report being a full-time entrepreneur. As discussed previously, we use self-employment as a proxy for being an entrepreneur.

2) Age: All regressions include a dummy for subjects older than 30. In an alternative specification we included four dummies for the decade cohorts, as shown in Figure 3, but these finer controls for age effects did not significantly improve the fit.

3) Gender: All regressions include a gender dummy, coded as 0 for men and 1 for women.

4) Income: All regressions include a dummy for subjects with incomes in the $50K/year to $100K/year range and a dummy for subjects with income greater than $100K/year. Using finer partitions of the

subjects' annual incomes does not significantly improve the fit. There are six observations where subjects declined to report an income (all survey questions gave subjects the option of "no response"). All regressions include a dummy for missing income. This dummy is never statistically significant and is suppressed in Table 4.

5) Aptitude: Models 2 and 4 use the number of questions answered correctly in Stage 1 as a measure of aptitude. Specifications that control for the number of questions attempted (to control for subjects who start rapidly guessing at the end of the five minute stage) or the number of questions answered correctly in Stage 2 do not significantly improve the fit or change our conclusions.

6) Risk Attitude: Models 2 and 4 use the gamble chosen in the Eckel-Grossman mechanism as a measure of risk attitude. Lower numbers correspond to higher risk aversion.

7) Overconfidence: Models 2 and 4 use the difference between subjects' stated and actual quartiles of questions answered correctly in Stage 2 as a measure of overconfidence. Higher numbers correspond to higher overconfidence.

8) Allocation to Team Account: Model 4 includes the percent of questions allocated to the team account in Stage 2 as a control variable. This is a good predictor of how much subjects are likely to contribute to the team account in Stage 3 if assigned to a team.

Models 1 and 2 study subjects' willingness to allocate questions to the team account in Stage 2. Model 1 includes controls for subject characteristics and Model 2 adds controls for behavioral measures from the experiment (aptitude for the task, risk attitude, and overconfidence). In both models, entrepreneurs are estimated to allocate more questions to the team account. This effect is stronger and statistically significant at the 5% level for part-time entrepreneurs.

Consistent with our observations from Figure 3, a strong positive age effect is observed with the dummy for subjects older than 30 being statistically significant at least at the 5% level in both models. A weak income effect is observed with subjects in the highest income class allocating fewer questions to the team account. The magnitude of this effect is large but it barely achieves statistical significance at the 10% level. Looking at the behavioral measures in Model 2, there is a strong negative relationship between aptitude for the task, measured by the number of questions answered correctly in Stage 1, and the proportion of questions allocated to the team account. This effect is statistically significant at the 5% level. Intuitively, the (expected) monetary loss from allocating questions to the team account is an increasing function of aptitude. If there is a fixed benefit from "warm glow," then the allocation rate should decrease in aptitude as observed.

Regularity 3: The regression analysis finds a strong positive effect on allocations to the team account in Stage 2 for part-time entrepreneurs.

Models 3 and 4 examine subjects' bids to join a team in Stage 3. Model 3 includes controls for subject characteristics and Model 4 adds controls for behavioral measures from the experiment (aptitude for the task, risk attitude, overconfidence, and allocations to the team account in Stage 2). Part-time

entrepreneurs differ little from subjects who are not entrepreneurs, but the parameter estimate for subjects who are full-time entrepreneurs is large, negative, and statistically significant at the 1% level in both models. Because the latter finding is the central result of our paper, we have run a number of robustness checks. First, we reran Model 3, only including subjects who are over 30. This provides a stronger control for any age effects. The parameter estimate for full-time entrepreneurs is slightly reduced but remains statistically significant at the 5% level. Second, we ran a probit with a dummy for strictly *negative* bids as the dependent variable and the same independent variable as Model 3. This provides a more formal check of whether the effect can be attributed to subject confusion about the BDM mechanism. The estimated parameter for full-time entrepreneurs is positive and statistically significant at the 5% level.

Section 3 noted that the effect of currently being a full-time entrepreneur on willingness to join a team was largest for subjects who also report having been a full-time entrepreneur previously. To determine whether this observation is robust to controls for other subject characteristics, we ran a version of Model 3 that replaces the dummy for being a full-time entrepreneur currently with three dummies for subjects who were full-time entrepreneurs previously but are not currently, subjects who are full-time entrepreneurs currently but not previously, and subjects who report being full-time entrepreneurs both currently and previously. The base is subjects who have never been entrepreneurs. The parameter estimates for these three variables are -$1.52, -$2.17, and -6.70, respectively, with standard errors of 1.93, 1.45, and 1.98. The first two estimates are not statistically significant, while the third is significant at the 1% level. The difference between the estimates for subjects who are only currently full-time entrepreneurs and subjects who report being full-time entrepreneurs both currently and previously is significant at the 5% level. While any experience as a full-time entrepreneur is negatively associated with willingness to join teams, the strong negative effect of currently being a full-time entrepreneur on bids to join a team is driven primarily by the current full-time entrepreneurs who also report having been full-time entrepreneurs in the past.

Turning to secondary issues, Model 4 shows a negative relationship, albeit weak, between bids and aptitude for the task, measured by the number of questions answered correctly in Stage 1. We hypothesize that this reflects the relatively high costs of contributing questions to the team account for high aptitude subjects.[21] There is a strong positive relationship between allocating questions to the team account in Stage 2 and bids to join a team in Stage 3. The reduction of age effects between Models 3 and 4 is due to the addition of a control for Stage 2 allocations to the team.

Regularity 4: The regression analysis finds a strong, robust negative relationship between being a full-time entrepreneur and bids to join a team in Stage 3. Regression analysis confirms that this effect is largely driven by subjects who report being a full-time entrepreneur both currently and previously.

5. Discussion of Results: The main result of our experiment is that subjects who are full-time entrepreneurs are far less willing to join teams for Stage 3, as indicated by substantially lower bids. The

[21] Intuitively, utility includes both monetary payoffs and non-pecuniary elements, such as warm glow from allocating questions to the team account and greater autonomy by not joining a team. For subjects who plan on allocating some questions to the team, increasing the cost of allocating questions to the team account makes joining a team less attractive from a monetary point of view without necessarily affecting the non-pecuniary elements.

obvious question is why these entrepreneurs are less willing to join teams, raising the broader question of why subjects in general might not want to join teams. Being unwilling to join a team is quite different from not allocating questions to the team subject to being in a team. If a subject is purely self-regarding, he should never allocate questions to the team account but should always bid a (weakly) positive amount to join a team since he can benefit from free-riding. Strictly negative bids must therefore either be driven by subject confusion or some feature of subject preferences beyond pure selfishness.

Subject confusion doubtlessly affected the magnitude of some bids and possibly even led to some of the strictly negative bids. However, several features of the data make it appear unlikely that subject confusion is the primary explanation for strictly negative bids. Subjects that allocate no questions to the team account in Stage 2 are displaying behavior completely consistent with rational behavior by a self-regarding individual, but 67% of these subjects submit strictly negative bids to join a team for Stage 3. It seems implausible that these subjects who do well at maximizing their monetary payoffs in Stage 2 have suddenly become confused and unable to maximize their monetary payoffs prior to Stage 3. Along similar lines, high aptitude subjects are more likely to submit strictly negative bids. 66% of the subjects who answered strictly more than the median number of questions in Stage 1 submitted strictly negative bids, compared with only 46% for subjects at or below the median. It is difficult to come up with an argument for why subjects who are doing particularly well in Stage 1 are exceptionally confused prior to Stage 3. The simplest explanation for the preceding observations is that something beyond confusion plays an important role in generating strictly negative bids.

One possibility is that subjects try to avoid teams to prevent feeling guilty. Suppose a subject knows that they will free-ride if they join a team. He may anticipate feeling guilty about this greedy behavior, but may also anticipate being unable to control himself. Bidding a strictly negative amount serves as a self-commitment device, helping the subject avoid the possibility of joining a team, taking a greedy action, and then feeling guilty. The data provides several pieces of indirect evidence for the role of guilt avoidance. Recall that subjects who didn't allocate any questions to the team in Stage 2 were particularly likely to submit strictly negative bids. These subjects had good reason to believe they would be greedy if assigned to a team for Stage 3, and their tendency to bid strictly negative amounts is consistent with trying to avoid the guilt associated with uncontrollable greed. Likewise, consider subjects who submitted strictly negative bids but were assigned to teams by the BDM mechanism. These subjects decreased their proportion of questions allocated to the team account from 51% in Stage 2 to 27% in Stage 3, a much larger change than the decrease from 70% to 63% for subjects with weakly positive bids assigned to teams for Stage 3. Judging by their subsequent choices, subjects who revealed a desire to avoid playing in a team (by submitting a strictly negative bid) had good reason to believe that they would behave in a guilt-inducing fashion during Stage 3. This is not direct evidence of guilt avoidance, but is consistent with this hypothesis.[22]

Guilt avoidance may play an important role in driving subjects to not want to join teams for Stage 3, but doesn't provide a compelling explanation for full-time entrepreneurs being more averse to join teams

[22] Another possible explanation for strictly negative bids is that subjects bid strictly negative amounts because they did not want to feel obligated to contribute to the team account. Given that subjects who submit strictly negative bids allocate very little to the team account in Stage 3, this explanation seems unlikely.

than other subjects. First, full-time entrepreneurs are no less likely than others to contribute to team accounts. As documented above, they allocate about the same proportion of questions to the team account in Stage 2 as other subjects older than 30. Full time entrepreneurs assigned to teams for Stage 3 actually allocate more questions to their team in Stage 3 (81%) than other subjects older than 30 (67%), although this difference is not statistically significant. Second, the relationship between allocations to the team account in Stage 2 and bids to join a team in Stage 3 is no different for full-time entrepreneurs than for other subjects older than 30.[23] Combining these observations, full-time entrepreneurs have no reason to feel unusually guilty and are no more likely to cut their bids when they do have reason to feel guilty.

Another reason subjects might avoid teams is that they dislike the loss of control team play involves (or put more positively, subjects like the autonomy of playing as an individual). In the post-experiment survey subjects were asked why they did or did not wish to join teams. Not surprisingly, many subjects who submit strictly negative bids also make negative comments about joining teams. It is common for them to cite a fear of losing control or a preference for self-reliance, as in the following examples:

"I don't want my payoff dependent on someone else's responses."
"I rather rely on myself."
"I like being able to control my own path. I don't like being dependent on others."

It seems unlikely that these fears of losing control were reasoned responses to the experimental environment. The pairs that subjects join are only teams in a very minimal sense. Teammates cannot communicate, do not need to complete a task together, and in fact do not directly interact in any way. By allocating all their questions to the individual account, a purely self-regarding subject could guarantee that having a teammate could only help them financially. We instead suspect that comments like the preceding reflect a strong visceral dislike of teams and the associated lack of control, possibly reflecting subjects' negative experiences in field settings.

The data provides weak evidence that visceral dislike of being in teams explains the relatively strong aversion of full-time entrepreneurs to joining teams. Restricting the data to subjects older than 30, full-time entrepreneurs make more negative comments about teams than other subjects (57% vs. 48%). We have classified which comments express a visceral dislike of teams. We tried to be conservative in coding this category, but it remains a highly subjective exercise. Keeping this caveat in mind, negative comments from full-time entrepreneurs were more likely to express a visceral preference for not joining a team (31% vs. 23%). We conjecture that the experience of being an entrepreneur gives individuals a taste for autonomy, a conjecture we hope to confirm in future projects that directly explore subjects' motivations for wanting to join (or avoid) teams. A central feature of these projects will be inclusion of a longitudinal element so we can track how preferences change with entrepreneurial experience.

Evidence from the post-experiment survey must be interpreted cautiously since subjects were not required to fill in the text box and no financial incentives were involved. Almost all of the subjects (177

[23] To reach this conclusion, we modified Model 4 by including interaction terms between the proportion allocated to the team account in Stage 2 and dummies for being older than 30 and being a full-time entrepreneur. The parameter estimates for these two terms are \$3.22 and \$1.38 with standard errors of 1.97 and 2.33 respectively.

of 184) made some comment in the text box, but many of the comments were brief and some topics were notable for never being mentioned. In particular, guilt avoidance never came up in the comments about why subjects didn't want to join a team. This doesn't necessarily imply that guilt avoidance is absent in our population. If subjects are embarrassed by their greed, they may not want to admit to the experimenter that they avoided joining a team to constrain their own greedy behavior. We suspect that comments about avoiding teams to prevent a loss of control, like those quoted above, reflect subjects' true feelings. There is nothing obviously embarrassing about these statements and nothing to be gained by lying about a desire for autonomy. However, our survey likely understates the fraction of subjects who were motivated by desires for control and/or autonomy as well as completely missing motivations for avoiding teams, like guilt avoidance, that subjects felt uncomfortable revealing.

6. Conclusion: The goal of our experimental design was to study entrepreneurs' preferences for joining teams versus working alone. We provide direct evidence that entrepreneurs, especially long-term entrepreneurs, are significantly less interested in joining teams than similar individuals. Our results indicate that the psychological characteristics of entrepreneurs must be considered seriously as an important component of entrepreneurs' unwillingness to form partnerships.

While entrepreneurs don't particularly like joining teams, it does not follow that they are bad teammates. Their willingness to contribute to a team account, our experimental measure of moral hazard and free-riding, is no worse than their peers. By extension, there is no clear reason for entrepreneurs to feel unusually vulnerable to moral hazard since their potential partners are not especially likely to free-ride.

Several secondary results of our experiment are noteworthy. The strong age effects we observe confirm and extend the results of Charness and Villeval (2009). We find a negative income effect on allocating questions to the team account that has not been previously reported in the literature. Being cynical, we speculate that there is a direct link between having a high income and being unwilling to help others. We find that high aptitude individuals are strongly less willing to contribute questions to the team account and weakly less willing to join teams. These results make sense in our framwork, since contributing questions to the team account is relatively expensive for high aptitude individuals,[24] but contrast with the finding of Hamilton, Nickerson, and Owan (2003) that high ability types sort into teams first despite taking a hit in salary for this move. They suggest that non-pecuniary factors, such as a desire to teach less able teammates, may be the cause of the willingness of high ability types to join teams. Our team environment is very stark in comparison to the complex field setting of Hamilton *et al.* An interesting question for future work is what features must be added to the experimental environment to generate results similar to those of Hamilton *et al*.

Much work remains to be done, using both experiments and more traditional methods such as surveys. The most pressing need is for future work collecting direct evidence (rather than relying on evidence from an unpaid post-experiment survey) that entrepreneurs' low willingness to pay for team membership is driven by relatively strong preferences for autonomy and control rather than (for example) guilt

[24] Kocher, Strauß, and Sutter (2006) also report that high aptitude individuals are relatively unwilling to join teams, but in their case the relatively high willingness of low aptitude individuals to join teams is driven by a desire for improved decisions due to joint decision making. See Bandiera, Barankay, and Rasul (2009) for related findings on aptitude and team composition.

avoidance. Also of great interest is understanding why aversion to team membership is highest for long-term entrepreneurs. This increasing aversion to team membership may reflect either the selection process that leads to being a long-term entrepreneur or something about the experience of being an entrepreneur that changes individuals' preferences. Given that having a partner improves the odds of a new business surviving (Cooper and Bruno, 1977), we conjecture that it is the experience of being an entrepreneur that drives the strong aversion of experienced entrepreneurs to teams. In future work, we hope to utilize both experiments and surveys to gather longitudinal data confirming this hypothesis.

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