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6 May 2016

Cutthroats or Comrades: Information Sharing Among Competing Fund Managers*

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This version: May 6, 2016
[First draft: February 18, 2015]

Abstract

Recent evidence of correlated trading among networked fund managers provides an indication that professional investors exchange investment ideas. To examine the motivations underlying this type of collaboration, we design a laboratory experiment in which competing fund managers share ideas until either chance or one of the fund managers (by choice to obtain a competitive advantage) terminates the exchange. We find that managers are more willing, and likely, to share when their rival's *ability* and *intention* to share in return are high. For a manager's decision to share, subjective expectations about rivals' intentions matter more than common expectations about their ability.

Key words: conversation, correlated trading, experimental finance, fund managers, hedge funds, information sharing, word-of-mouth communication

JEL Classification: C72, C91, D8, G02, G14, G23

*We thank Gary Bolton, Lea Cassar, Carolin Haeussler, Ernan Haruvy, Holger Herz, Kyle Hyndman, Elena Katok, Wolfgang Luhan, Chris Malloy, Asaf Manela, Michael Rebello, Giorgo Sertsios, Sophie Shive, Jeremy Stein, Alexander Wagner, Joel van der Weele, and conference and seminar participants at the University of Maryland (Finance), UT Dallas (Finance), UT El Paso (Economics/Finance), Experimental Finance 2014 (Zurich), ESA 2014, and the Dublin Colloquium of Behavioral and Experimental Finance 2014 for comments and suggestions. Financial support from the Center and Laboratory for Behavioral Operations and Economics (CLBOE) at UT Dallas is gratefully acknowledged.

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1 Introduction

Every year, hedge fund managers in the U.S. and around the world spend billions of dollars collecting, and protecting, investment ideas they believe will bring value to their fund. In doing so, fund managers have been known to utilize some rather unscrupulous methods to gather this type of information, while simultaneously engaging in protracted, and expensive, litigation in order to protect their own information.[1] This has often led to the characterization of the professional investment world as one populated by *cutthroat* fund managers who will do anything to gain an edge on their peers and on the market. However, despite this popular depiction of the financial world,[2] what researchers have observed about managerial investment behavior does not always support this narrative. Shiller and Pound (1989:47) survey investors and find that "direct interpersonal communications are very important in [their] decisions," and Shiller (2000:155) concludes that "[w]ord-of-mouth transmission of ideas appears to be an important contributor to day-to-day or hour-to-hour stock market fluctuations." More recent empirical evidence, documenting the extent to which financial trades are correlated,[3] suggests that information sharing among investors continues unabated, and that even hedge fund managers in direct competition with one another appear to share investment ideas. It is surprising that—in spite of the large sunk costs funds incur to ensure informational security and the potentially larger opportunity costs incurred by disclosing valuable investment ideas—there appears to be evidence suggesting that managers circumvent their own safeguards in order to collaborate with rivals. In this paper,

[1] See, for example, Schmerken (2014) or Hamilton and Sangster (2012). Vardi (2013) describes how hedge funds use espionage-like tactics for information discovery. Finally see the many reports in *The HedgeFund Law Report* (`http://www.hflawreport.com/articles/by/topic/431`) concerning litigation by hedge funds against employees—current and former—for disclosing, or stealing, proprietary information.

[2] For this characterization of the industry as "cut-throat," see, for instance, MacDonald (2007) ("the cut-throat, male-dominated world of hedge funds"), Sorkin (2008) ("the hedge fund business is far more cut-throat"), Leopold (2013), or Mohamed El-Erian's (CEO of PIMCO) *Foreword* in Ahuja (2012:xii).

[3] See Grinblatt and Keloharju (2001), Hau (2001), Feng and Seasholes (2004), Hong, Kubik, and Stein (2004), Ivković and Weisbenner (2005), Brown, Ivković, Smith, and Weisbenner (2008), Shive (2010), Gerritzen, Jackwerth, and Plazzi (2016), or Pool, Stoffman, and Yonker (2015).

we examine factors that motivate hedge fund managers to behave as comrades rather than cutthroats.

Most of the empirical literature is forced to be agnostic about the exact nature of the correlated trading effect because of data limitations (e.g., we cannot observe information sharing, only its effect). However, a myriad of recent theoretical arguments attempt to explain the mechanism behind the correlated trading phenomenon.[4] A compelling theoretical explanation for correlated trading postulates that fund managers make investments based on their respective information sets. If a fund manager shares investment ideas with another manager, their information sets become more correlated and, in turn, so do their investments. Stein (2008) demonstrates that a mutual gain from collaboration (e.g., from sharing ideas) is sufficient to justify communication among fund managers.[5] In his model, competing managers are willing to share ideas for investment opportunities with rivals when they expect to receive *feedback* in the form of additional ideas or a refinement of the original idea.[6] However, because we can not directly observe communication between managers,[7] this theory of a collaborative exchange of information is difficult to test empirically. Yet, if we believe that correlated trading is a result of the direct communication of investment ideas, then a thorough examination of the motivation underlying such collaboration may help us uncover evidence of its existence. We propose an experimental approach, which has the twin

[4] See Duffie and Manso (2007), Colla and Mele (2010), Manela (2014), or Andrei and Cujean (2015).

[5] We acknowledge that this is not the only potential process through which the information sets of two hedge fund managers may become correlated. For instance, Dow and Gorton (1994) argue that traders invest only if they expect other traders to enter the market with sufficiently high probability. Revealing private information—or, *talking their books*—increases other traders' awareness and potentially induces more investment. Or, as Crawford, Gray, and Kern (forthcoming) argue in the context of the framework by Pontiff (2006), a trader may share information to induce other traders to enter and push the price of a mis-priced security towards its fundamental value. However, we show that a mutual gain from collaboration alone is *sufficient* to justify collaboration. We leave tests of other potential channels—such as the described *awareness argument*—for future research.

[6] To clarify, here feedback is not a process in which a critical evaluation of the idea is returned to the manager; rather, feedback arrives in the form of an additional idea or a refinement of the original idea that is shared with the initiating fund manager.

[7] The literature on correlated trading does not observe communication between investors but merely infers such. A notable exception is Crawford, Gray, and Kern (forthcoming), who observe communication (i.e., feedback) in a unique data set from a social network website.

advantages of being able to overcome the lack of empirically observable communication, and of being a direct test of the behavioral motivation to collaborate with a rival.

We find that a manager's willingness to share an idea increases in her expectations of receiving feedback. We argue that the manager's expectation of receiving feedback from a rival crucially depends on two aspects. First, a rival manager must have the *ability* to provide feedback by sharing an idea; this is objective, because in our model and experiment, the managers know each other's abilities.[8] Second, a rival manager must have the *intention* of providing feedback. This portion of a manager's expectation is subjective, and we show that subjects form complex beliefs about their rival's intention to continue collaboration. Thus, a fund manager expects to receive feedback from a rival manager if both the rival's ability and intention to provide feedback are sufficiently strong. Our unique experimental design allows us to dissect the expectation of feedback and study the effects of *ability* and *intention* in isolation.[9]

We present three sets of results. First, a fund manager's expectation about her rival's intention to provide feedback has a greater impact on the fund manager's decision to exchange information than does the rival's ability to provide feedback. Second, a rival's ability has a stronger effect on a fund manager's decision to exchange information than the fund manager's own ability. This implies that a less able fund manager is more likely, and more willing, to share information with a more able fund manager, and vice versa. Third, we provide an in-depth examination into the determinants of the subjective expectations formed by the fund managers. We find that subjects form expectations about their rival's intention

[8] Note that we do not model the formation of the network in which the rival managers reside. We implicitly assume that a network exists, and that, given this connection, rivals have knowledge of each other's ability.

[9] A common concern regarding laboratory experiments is one of external validity. For recent contributions, see Levitt and List (2007a,b, 2008), Camerer (2015), or Kessler and Vesterlund (2015). Fréchette (2015) concludes that, for the most part, experiments remain externally valid (i.e., games played by students and professionals seem to bring about largely the same qualitative outcomes). Similar results have been obtained in experiments conducted in a finance-specific context, such as in Abbink and Rockenbach (2006) (option markets with undergraduate students and traders at a large German bank), Cooper, Kagel, Lo, and Kagel (1999) (strategic markets game with students and managers), Cooper (2006) (effort turn-around game with undergraduate students and executive MBA students), or Alevy, Haigh, and List (2007) (information cascades with MBA students and Chicago Board of Trade traders).

to share ideas in a manner that comports quite closely with our theoretical predictions about behavior. Finally, it is important to note that these results hold even when we control for personal connections, the prevalence of social norms (i.e., fairness and trustworthiness), or risk aversion. Within our study, none of these factors have a consistent effect on a fund manager's decision to share information. This implies that even rival managers who are not *comrades* are willing to exchange information driven only by their expectations of receiving feedback.

Our experimental implementation employs a hedge fund management framework in which players exchange "ideas" for investment opportunities.[10] Communication is a process of back-and-forth sharing of ideas between two hedge fund managers. In each round, a fund manager has the chance to generate a new idea to share. The probability of doing so reflects a manager's ability. If a manager generates a new idea, she must decide to share the idea with her rival fund manager or conceal it. If she conceals the idea so that no new information is exchanged, the communication ends. If, instead, she shares the idea, then her rival is given the chance to generate a new idea according to her ability. If the rival generates a new idea, she can either share this idea (and thus provide "feedback") or conceal the idea. If any of the fund managers fail to generate a new idea, then no new information can be shared and the communication ends. The game thus continues an indeterminate number of rounds and ends if either a manager decides to conceal an idea or a manager fails to generate a new idea.

Managers compete across potential investors for their fund, and each manager exerts monopolistic control over a fraction of the market and competes with other managers over the remaining portion. A manager's compensation increases in the absolute number of investment ideas that she possesses at the end of the game.[11] This part of a manager's payoffs accrues from the monopolistic segment of the market. This is akin to the portion of a fund

[10]Experimental instructions and a detailed description of the game are provided in the Online Appendix, available from the authors upon request.

[11]In game-theoretical terms, our model represents a dynamic and multi-stage yet one-time interaction between fund managers. However, we note that a repeated game (e.g., one in which payoffs are materialized after each round of sharing) would likely introduce a form of "reputational" concern into the managers' incentives to share an idea.

manager's compensation that stems from good performance with the investor capital already under her control. In addition, if a manager holds more ideas than her rival, she captures the competitive segment of the market as well. Thus, the fund manager with the best relative investment performance captures all the remaining uncommitted investor capital. This combination of the absolute and relative number of ideas introduces a straightforward trade-off: on the one hand, it incentivizes managers to share ideas so as to increase the number of ideas and thus increase payoffs from the monopolistic side of the market; on the other hand, it gives each manager an incentive to conceal ideas in order to capture the competitive side of the market.[12] In order to disentangle the effect of a manager's own ability from her rival's ability, we develop an asymmetric extension of the model in Stein (2008) in which we allow fund managers to have different abilities (i.e., different probabilities of success of generating a new idea), and we vary the distribution of ability throughout the game.[13]

In addition to the literature on correlated trading and communication between investors or fund managers, our paper contributes to a number of areas. Our results relate to the general literature on disclosure and exchange of information among agents with competing interests (Stein, 2008; Hellmann and Perotti, 2011; Dziuda and Gradwohl, 2015; Augenblick and Bodoh-Creed, 2014; Ganglmair and Tarantino, 2014; Guttman, Kremer, and Skrzypacz, 2014). As for empirical evidence, von Hippel (1987) provides results for information sharing in the steel minimill industry and Häussler (2011), Häussler, Jiang, Thursby, and Thursby (2013) in academic research; Gächter, von Krogh, and Haeflinger (2010) present experimental results for a setting in which private investors fund public goods innovation. Our results further contribute to a growing literature in experimental finance.

The remainder of the paper is structured as follows. In Section 2, we introduce our

[12] This feature of the model (i.e., the gains from concealing information ["secrecy"] are instantaneous whereas the benefits from sharing ["disclosure"] are delayed and dependent on others' actions) is akin to the trade-off in Mukherjee and Stern (2009).

[13] We present this asymmetric extension of the model in Section 2. Additional notation and results are relegated to the Online Appendix.

theoretical framework. In Section 3, we motivate our framework and relate its features to the reality of hedge fund markets. In Section 4, we discuss the experimental design and derive the hypotheses from our theoretical predictions. In Section 5, we present our main results. We conduct robustness checks in Section 6. We summarize in Section 7.

2 A Model of Word-of-Mouth Communication

2.1 Basic Framework

In our analysis we consider an asymmetric version of the model in Stein (2008) in which players exchange *ideas* for investment opportunities and where more ideas increase value. The incentive to share an idea depends on the probability of receiving an idea in return (i.e., "feedback"). Our theoretical model separates one's *ability* to share an idea (which is by a commonly known, that is, objective probability) from one's *intention* to share (which requires a rival to form subjective expectations).

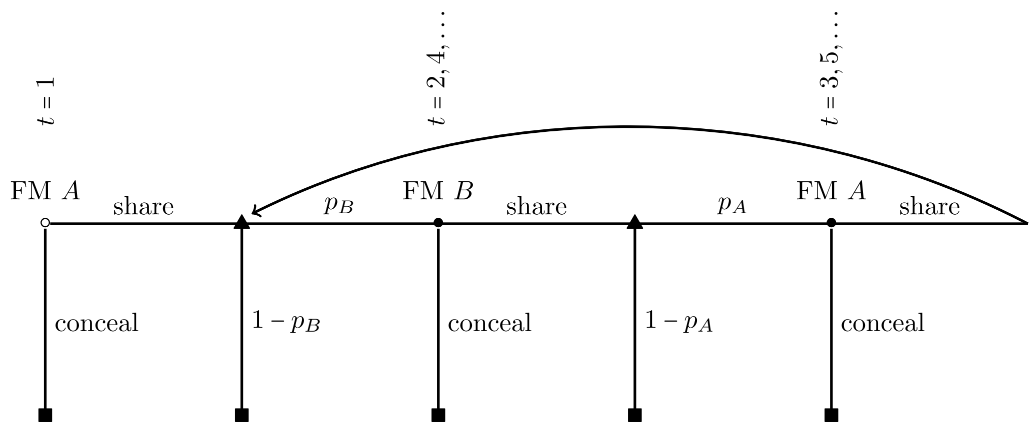
2.1.1 Decisions and Timing

Two players—we shall call them fund managers (FM)—take turns in generating and sharing new ideas for investment opportunities. FM A moves in odd rounds, and FM B moves in even rounds. FM A begins in round $t = 1$ with an existing idea and must decide whether to share it with FM B. In all future rounds $t \geq 2$, FM $i = A, B$ then generates one new idea with success probability $p_{i,t}$ and must decide whether to share this new idea with FM $j \neq i$ or conceal it. This probability $p_{i,t}$ depends on the previous round's action but is otherwise time-invariant:

$$p_{i,t} = \begin{cases} p_i & \text{if FM } j \text{ shared an idea in } t-1 \\ 0 & \text{if no idea was shared in } t-1. \end{cases} \tag{1}$$

Figure 1: Timeline of Word-of-Mouth Communication

The figure depicts the timeline and structure of the game of word-of-mouth communication. FM A initially hold one idea, and FM B holds 0 ideas. FM A in $t = 1$ decides to share or conceal her initial idea. In all $t \geq 2$, FM i generates a new idea with probability $p_{i,t}$ and decides to share this idea with FM j or conceal the idea. The game continues until one of the FMs fails to generate a new idea or decides to conceal.



An assumption of strict complementarity in the generation of ideas (Stein, 2008; Hellmann and Perotti, 2011; Ganglmair and Tarantino, 2014) implies that communication continues until one player fails to generate a new idea (i.e., termination by chance) or decides to conceal a newly generated idea (i.e., termination by choice).

The timeline of the game and structure of the decision-making is depicted in Figure 1. The hollow circle indicates the first round and the beginning of the game in which FM A decides whether to share or conceal her initial idea. The triangle indicates a move by chance: once FM A has shared, FM B successfully generates a new idea with probability p_B but fails with probability $1 - p_B$. If FM B succeeds, she decides whether to share or conceal the new idea. This decision is indicated by a solid circle. If a failure occurs, the game ends (indicated by a square). The communication continues for an indeterminate number of rounds but has a finite expected duration.[14]

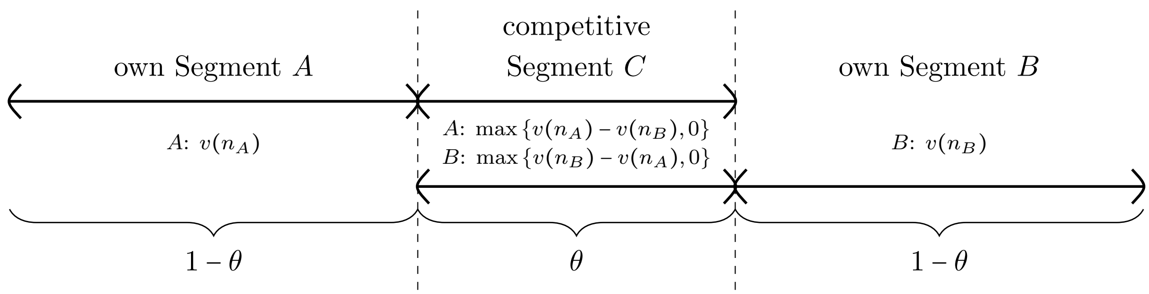
2.1.2 Payoffs

An FM's payoffs are a function of her own stock of ideas n_i and her competitor's stock of ideas n_j. For the construction of payoffs, we follow Stein (2008) and consider a simple

[14] We derive the expected duration of the process in the Online Appendix.

Figure 2: Fund Managers in Competition

This figure depicts the market for funds in which the fund managers compete. FM i generates payoffs $v(n_i)$ from her own Segment i, where n_i denotes FM i's number of ideas for investment opportunities. The FM with more ideas also generates profits from the competitive Segment C. These payoffs for FM i are positive if $n_i > n_j$ and increase in $n_i - n_j$.



market structure as depicted in Figure 2. We assume that FMs compete for investors in the following way: FM i has captured all the investors in her own Segment i (with a market share $1-\theta$), and the payoffs from this side of the market depend on the stock of ideas n_i. These payoffs are represented by a function $v(n_i)$ that increases in n_i at a decreasing rate with $v(0) = 0$. A fraction θ of an FM's payoffs are generated in the *competitive segment* of the market. This Segment C contains new investors both FMs compete to attract, and the FM who finishes with the greater stock of ideas attracts all new investors. The payoffs from these new investors are greater when the difference between the two FMs' respective stocks of ideas is greater. In this model, the payoffs for FM i from the competitive Segment C are $v(n_i) - v(n_j)$ if $n_i > n_j$, and zero otherwise.

The payoffs are realized after the game has ended. At this point, FM i's total realized payoffs from her own Segment i and the competitive Segment C are

$$U_i = (1-\theta)\, v(n_i) + \theta \max\{v(n_i) - v(n_j), 0\}. \tag{2}$$

When deciding whether to share or to conceal an idea, FM i faces an inter-temporal tradeoff and compares her immediate payoffs from concealing (after which the game ends) with the expected payoffs from sharing the idea and potentially continuing communication. An FM's decision to share the idea gives the other FM a chance to generate and later share yet another new idea. Sharing in t therefore has the potential to increase the overall stock of ideas. FM i therefore benefits from higher future payoffs in her Segment i through this collaboration. At the same time, by sharing, FM i runs the risk that FM j conceals her new idea in the next round. When FM i conceals the idea in t, then she stays ahead of the other FM and is able to reap immediate payoffs from the competitive Segment C.

2.2 Incentive Compatible Communication

Formally, provided that stage t is reached (when both FMs have shared ideas in all $t-1$), if FM i conceals the idea, then she holds $n_i = t$ ideas whereas j holds $n_j = t-1$ ideas. FM i's payoffs in any $t \geq 1$ are then:

$$U_i(conceal@t) = (1-\theta)\,v(t) + \theta\,[v(t) - v(t-1)] = v(t) - \theta v(t-1). \tag{3}$$

If, instead, FM i decides to share the new idea in $t \geq 1$, then her expected payoffs depend on the expected future stream of ideas, and therefore on how she expects FM j to decide in future rounds. Suppose both FMs play time-invariant strategies σ_i and let

$$\tilde{\sigma}_j \equiv E(\sigma_j) \tag{4}$$

denote FM i's subjective expectations of FM j's mixed strategy (i.e., FM j's probability of sharing or expected intentions). FM i's expected payoffs[15] when she shares a newly generated idea in t and all $t' > t$ are

$$EU_i(share@t) = (1-\theta)\sum_{q=0}^{\infty}(p_i p_j \tilde{\sigma}_j)^q \left[\,(1-p_j\tilde{\sigma}_j)\,v(t+2q) + p_j\tilde{\sigma}_j\,(1-p_i)\,v(t+1+2q)\right]. \tag{5}$$

[15] In the Online Appendix, we provide the details of how we construct expression (5). Note that we assume that FM i shares in all $t' > t$ if she shares in t. This is the same as saying $\sigma_i = 1$. The assumption is a first step toward characterization of a pure-strategy equilibrium. For a mixed-strategy equilibrium, we assume stationary strategies and allow for FM i to randomize in each round, $\sigma_i \in [0,1]$. We provide these equilibrium characterizations in the Online Appendix.

In any round t, FM i expects with probability $\pi_j \equiv p_j\tilde{\sigma}_j$ to receive feedback from FM j in $t+1$. This probability is the (objective) probability that FM j generates a new idea in $t+1$ multiplied by the conditional (subjective) probability that FM j shares this new idea.

At any given t, FM i shares the idea if

$$EU_i(share@t) \geq U_i(conceal@t), \tag{6}$$

given her expectations $\tilde{\sigma}_j$ of FM j's future actions. This condition depends on both FMs' probabilities of success (i.e., *abilities*), as well as FM j's expected behavior (i.e., *intentions*).

In order to simplify the analysis, we follow Stein (2008) and use a geometric-decay valuation function $v(n) = 1 - \beta^n$. Condition (6) can be simplified to read

$$\phi_i(p_i, p_j, \tilde{\sigma}_j) \equiv \frac{1+\beta p_i}{1+\beta p_j\tilde{\sigma}_j}\beta p_j\tilde{\sigma}_j - \theta \geq 0. \tag{7}$$

The term $\phi_i \equiv \phi_i(p_i, p_j, \tilde{\sigma}_j)$ denotes FM i's expected net payoffs from sharing. It is positive (so that FM i shares) when the expected payoffs from sharing exceed the immediate payoffs from concealing the idea, and vice versa.

For our empirical analysis, we obtain a set of key observations from expression ϕ_i: the value of ϕ_i increases in p_i, p_j, and σ_j, rendering the sharing condition in (7) less restrictive. This means that FM i is more willing, and thus more likely, to share an idea when her own probability p_i of generating new ideas in future rounds is high, when FM i's probability p_j of generating new ideas in future rounds is high, and when FM i expects FM j to share these new ideas with high probability $\tilde{\sigma}_j$.

Proposition 1. *FM i's sharing condition* (7) *is less restrictive and FM i is more willing and more likely to share a newly generated idea in t when the following holds:*

1. *FM j's probability of success (ability) p_j is high;*

2. *FM i's expectations $\tilde{\sigma}_j$ that FM j is sharing a new idea (expected intentions) are high;*

3. FM i's own probability of success (ability) p_i is high.

Moreover, the effect of FM j's probability of success p_j on FM i's decision is stronger than FM i's own probability of success p_i if p_i is not too low.

Proof. FM i's sharing condition is less restrictive and i is more likely to share a newly generated idea when ϕ_i is higher. The first derivatives of ϕ_i with respect to p_i, p_j, and $\tilde{\sigma}_j$ are

$$\begin{aligned}
\frac{\partial \phi_i}{\partial p_j} &= \frac{\beta\left(1+\beta p_i\right)\tilde{\sigma}_j}{\left(1+\beta\tilde{\sigma}_j p_j\right)^2} > 0; \\
\frac{\partial \phi_i}{\partial \tilde{\sigma}_j} &= \frac{\beta\left(1+\beta p_i\right)p_j}{\left(1+\beta\tilde{\sigma}_j p_j\right)^2} > 0; \\
\frac{\partial \phi_i}{\partial p_i} &= \frac{\beta^2\tilde{\sigma}_j p_j}{1+\beta\sigma_j p_j} > 0.
\end{aligned}$$

From the cross-probability effect of p_j and the own-probability effect of p_i we can see that

$$\frac{\partial \phi_i}{\partial p_j} > \frac{\partial \phi_i}{\partial p_i} \iff \frac{1+\beta p_i}{1+\beta p_j\tilde{\sigma}_j} > \beta p_j. \tag{8}$$

This means that the effect of FM j's probability of success p_j is stronger than the effect of FM i's own probability of success p_i if p_i is not too low. Q.E.D.

The success probabilities p_i and p_j reflect FMs' respective abilities to give feedback, whereas the subjective expectations $\tilde{\sigma}_j$ capture FM j's intention to give feedback. For an FM, expecting to receive feedback (with probability π_j) is therefore not simply a matter of the other FM's ability to do so, but also about expecting the other FM to be willing to share an idea. As we can see from condition (7), the ability and intention of the other FM are substitutes. Our experimental design allows us to disentangle the effects of ability and intention and better understand their empirical substitutability.

3 Motivating the Assumptions about Market Structure and Communication

For our results to be valid and relevant, we must ensure that the features of the experimental design are a reasonable representation of the hedge fund market. First, we believe that our stylized division of the market into a monopolistic segment and a competitive segment is a good representation of real hedge fund markets. For instance, when a manager creates a fund, the initial investors often agree to a significant lock-in period (sometimes for several years) in which they cannot withdraw any invested money from the fund (Agarwal and Naik, 2000). In the context of our model, these initial investors are fully captured by the fund manager and represent the monopolist portion (of size $1-\theta$) of the capital market.[16] However, the majority of hedge funds are not closed to new investors for a significant amount of time after creation. This means that the fund manager will continue to compete to raise additional capital either from the fund's existing investors or from new investors. Available (or not yet committed) capital represents the competitive portion (of size θ) of the capital market.[17]

Second, because of data limitations, there is little empirical evidence of how and why hedge fund managers communicate. The relevant literature typically does not observe communication but infers it from the observation of correlated trading behavior. However, some of it is suggestive of managers collaborating in the manner we describe. For instance, Hong, Kubik, and Stein (2004) argue that stock-market participation is strongly influenced by social interaction. They further show that individual investors are more likely to participate

[16] Even for funds that do not lock in capital, it is quite common to invest in relatively illiquid assets to form what are called "side pockets" (McCrary, 2002:192). These are pockets of capital that are frozen by managers so that redemptions do not force the inefficient early liquidation of assets. Ben-David, Franzoni, and Moussawi (2012) argue that there is significant evidence that this happens increasingly often during liquidity crises.

[17] Goetzmann, Ingersoll, and Ross (2003) formally model the hedge fund relationship and argue that there may be decreasing returns to scale for capital within the structure of a hedge fund. They show empirically that large hedge funds have relatively small or even negative fund flows, while small funds have positive flows.

in the stock market when more of their peers also participate. Cohen, Frazzini, and Malloy (2008) extend this basic idea and claim that social networks may be important mechanisms through which asset prices incorporate private information. Their findings suggest that fund managers and corporate board members from the same university cohort use these contacts to pass private information from board to fund. Pool, Stoffman, and Yonker (2015) show that managers who live in the same neighborhood have significantly higher overlap in their portfolio holdings than managers who live in the same city but are not neighbors. They argue that managers who are neighbors have a greater chance of being socially connected.

This literature provides evidence that salient information flows between members of social networks; however, these flows are not directly observable. Crawford, Gray, and Kern (forthcoming) analyze a unique dataset from a social network website and do not face this problem of unobservable communication. They show that managers share valuable information with others within their social network, and posit that these managers do so to receive constructive feedback and to attract additional capital flows to the strategies they recommend. Their analysis, however, does not control for payoff conflicts between fund managers. In other words, they do not know if the communicating fund managers are indeed competing for the same pool of potential capital. With our experimental approach, we are able to design a market situation that ensures a distributional conflict between fund managers.

Third, our assumption that communication ends when a new idea is not shared (because of a lack of ability or intention) is a strong but not a critical assumption. Numerous authors have provided more detailed models of communication in financial markets. The modeled tradeoffs, however, are similar to the one in our reduced form view of communication. For example, Andrei and Cujean (2015), who extend an information percolation model developed in Duffie and Manso (2007), find that communication accelerates information flows and generates momentum in asset prices. They show that "[a]gents who have little information rely more on public information broadcast through prices," whereas "agents who gather large amounts of information through random meetings build a strong knowledge of the market and find it optimal to be contrarians and bet against the market." Manela (2014) also models information diffusion in a way that can motivate competitive cooperation similar to our model. He shows that faster-diffusing information (i.e., more sharing) decreases the noise in returns but also increases competition for those profits. In this way, there is a trade-off between sharing information in order to impound this information into profits, and not over-sharing because this will eventually begin to erode profits as prices begin to accurately reflect this new information—a trade-off that parallels the tradeoff in our own model.

4 Design and Hypotheses

4.1 Experimental Design

We conducted the computerized experiments at the Center and Laboratory for Behavioral Operations and Economics (CLBOE) at the University of Texas at Dallas. The participants were registered with CLBOE and were drawn from a pool of both undergraduate and graduate students. We had 100 subjects who participated across four different treatments. All subjects participated in only one treatment. Each session lasted anywhere from 80 minutes to 120 minutes, depending on the treatment. The average payment was $19.30, ranging from $10 to $30.[18] Subjects in longer sessions generally had greater earnings.

The number of subjects ranged from 24 to 28 in each session. We randomly divided the subjects into two groups of equal size, with an even number of subjects in each group. Group membership was anonymous, meaning that subjects did not know who else was assigned to a particular group. They were informed that they had been randomly assigned to a group

[18]These figures include a show-up bonus of $5 and average payoffs of $2.5 from a Holt and Laury (2002) risk preference task.

of given size and throughout the experiment would be matched only with people from the same group.

Each session was divided into two parts: The first part consisted of a Holt-Laury risk preference task (Holt and Laury, 2002), and the second part consisted of our main experiment. We conducted the Holt-Laury risk preference task via paper and dice before the main experiment. The main experiment was programmed and executed via zTree (Fischbacher, 2007). The outcomes of the lottery in the Holt-Laury risk preference task and the respective payoffs were revealed after the computerized experiment at the end of the session. Subjects were provided with detailed printed instructions for both the Holt-Laury task and the computerized experiment, and a short quiz was conducted after the instructions had been read out by the experimenter.[19]

In the computerized experiment, at the beginning of each period, subjects are randomly matched into pairs without replacement. After the matches have been determined, the subjects in each match are randomly assigned the roles of FM A and FM B. As depicted in Figure 1, FM A begins play and is followed by FM B. In each round $t \geq 1$ of a match, after having generated a new idea (with probability p_i), FM i takes two actions. First, we survey FM i's subjective expectations $\tilde{\sigma}_j$.[20] We do so by asking FM i to report her expectation (between 0% and 100%) that FM j will decide to share an idea in the next round (provided that FM j will have generated a new idea).[21] Second, the FM decides whether to share or conceal the idea.

On their decision screens, subjects see their assigned role (FM A or FM B) and payoffs (for both FMs) for the current round and the subsequent two rounds, for all possible

[19] For the instructions of the word-of-mouth communication game, we use the fund-manager narrative from Section 2.

[20] For all odd rounds, we obtain FM A's expectations $\tilde{\sigma}_B = E(\sigma_B)$; for even rounds, we obtain FM B's expectations $\tilde{\sigma}_A = E(\sigma_A)$.

[21] We use the following wording: "If, in the next round, the other fund manager successfully generates a new idea (i.e., "chance" does not terminate the match), how likely do you think the other fund manager will share this newly generated idea with you?"

outcomes.[22] Recall from the description of the game structure in Figure 1 that, if FM i in round t decides to share an idea, the match continues. In our computerized experiment, FM j will see the decision screen in round $t+1$ (provided she has generated a new idea with probability p_j). If instead, FM i decides to conceal the idea, the match is terminated. After all matches have been terminated, the subjects observe their payoffs from the current match and their accumulated payoffs from all previous matches.[23] This concludes a match. The subjects are then rematched within their respective group, and a new game is played.

We would like to emphasize the following two design considerations. First, this experiment consists of a repeated one-shot game of *indeterminate* horizon. The game ends if one of the FMs either fails to generate a new idea or conceals an idea; thus, we do not force a match to end prematurely.[24] Second, we incentivize the formation but not the reporting of subjective expectations $\tilde{\sigma}_j$.[25] Because FM j's future actions have a direct effect on FM i's payoffs, FM i's expected payoffs increase in the accuracy of her subjective expectations $\tilde{\sigma}_j$. This means that for FM i, the formation of these subjective expectations is fully incentivized within the game itself. While our approach of surveying subjects' expectations about their match partners' next-round behavior does not provide incentives for truthful reporting of these expectations, we are confident that, on average, expectations are reported truthfully, albeit with more noise.[26]

[22] In the printed instructions for the experiment, we provide a table with FM A's and FM B's payoffs for the first 14 rounds for all possible paths of termination of a match.

[23] From the current match's payoffs, FM i is able to infer whether its match has been terminated by chance (FM j failed to generate a new idea) or by choice (FM j decided to conceal a new idea). We make this point explicit in the printed instructions.

[24] See Aghion, Bechtold, Cassar, and Herz (2014) for a similar implementation of an indeterminate horizon game. Unlike for laboratory implementations of infinitely repeated games that introduce probabilistic termination (see, e.g., Roth and Murnighan, 1978; Engle-Warnick and Slonim, 2006; Dal Bó and Fréchette, 2011; Fréchette and Yuksel, 2013), we do not need to make such adjustments because a move by chance is a central feature of this game.

[25] A similar approach is chosen, for instance, in Cohn, Engelmann, Fehr, and Maréchal (2015). We do not provide incentives in eliciting subjective expectations for practical reasons: incentivizing FM i through, for instance, a scoring rule with higher payments for lower linear, logarithmic, or squared difference between the stated expectations and FM j's actual decision is not practical when the game is terminated by chance before it is FM j's turn to share or conceal (so that no decision by FM j is observed).

[26] Trautmann and van de Kuilen (2015) find that introspective beliefs (or, as in our case, "subjective expectations") are no less accurate or additive than incentive-elicited beliefs. Their study supports the

Table 1: Calibration and Treatments

This table summarizes the calibration for our computerized experiment with $v(n) = \mu(1-\beta^n)$, $\mu = 400$, $\beta = 3/4$, and $\theta = 3/8$. The conditions for ϕ_i, $i = A, B$, are for $\tilde{\sigma}_j = 1$.

	$p_B = 90\%$	$p_B = 50\%$
$p_A = 90\%$	High ($\phi_i \gg 0$)	High-Low ($\phi_i > 0\ \forall i$)
$p_A = 50\%$	Low-High ($\phi_i > 0\ \forall i$)	Low ($\phi_i = 0$)

4.2 Model Calibration

We implement the game depicted in Figure 1 with the realized payoffs in (2) with $v(n) = \mu(1-\beta^n)$. We set $\mu = 400$, $\beta = 3/4$, and $\theta = 3/8$ but vary the success probabilities p_A and p_B, assigning values $p_i \in \{50\%, 90\%\}$. We summarize the calibrations for the four treatments of the experiment in Table 1.

For treatment High we assume symmetric success probabilities $p_A = p_B = p = 90\%$; for treatment Low, the symmetric success probabilities are $p_A = p_B = p = 90\%$. We indicate a *strong* incentive to share in treatment High by a relatively large theoretical value for the expected net payoffs from sharing, $\phi_i \gg 0$. In treatment Low, the sharing condition in equation (7) holds with equality.

For treatments Low-High and High-Low, we assume asymmetric success probabilities. In treatment Low-High, FM A has a low success probability ($p_A = 50\%$), whereas FM B has a high success probability ($p_B = 90\%$). In treatment High-Low, these numbers are reversed. In both treatments, the theoretical values for the expected net payoffs from sharing in equation (7) are positive.

notion that introspection is a valid method to measure subjective beliefs. See Palfrey and Wang (2009) for a broad set of related results.

4.3 Hypotheses

We derive our hypotheses from the theoretical results for our model of communication in Proposition 1. The main implication of the model is that FMs are more willing and more likely to share private information (i.e., ideas) when they expect feedback from rival FMs. Because this feedback depends on both the rival FM's ability and her expected intentions, we design our experiment to allow us to separate the effects of ability from those of intentions. This yields the following two hypotheses:

Hypothesis 1. *FM i's willingness to share (and likelihood of sharing) an idea increases in FM j's cross-success probability p_j.*

Hypothesis 2. *FM i's willingness to share (and likelihood of sharing) an idea increases in her subjective expectations $\tilde{\sigma}_j$ that FM j will share a new idea in the subsequent round.*

Hypothesis 1 relates to the effect of a rival FM's success probability on one's own willingness to share. A similar positive effect on sharing stems from an FM's own success probability. This effect is two-pronged. First, a higher success probability p_i allows FM i to generate more ideas in $t+2$, $t+4$, ..., and share these respective ideas with FM j to receive feedback in $t+3$, $t+5$, ... For a given feedback probability π_j, the success probability p_i increases FM i's expected payoffs $EU_i(share@t)$ from sharing in equation (5) while not affecting her payoffs $U_i(conceal@t)$ from concealing in equation (3). Second, if, as formally shown in Proposition 1 and hypothesized in Hypothesis 1, a higher cross-success probability p_j increases FM i's willingness to share an idea, then the reverse ought to hold true: a higher own-success probability p_i increases FM j's willingness to share. This, in return, increases FM i's expectations $\tilde{\sigma}_j$ that FM j shares new ideas in future rounds. In summary, an FM i's own-success probability has a positive direct effect and a positive indirect effect (through subjective expectations $\tilde{\sigma}_j$) on her willingness and likelihood to share.

Hypothesis 3. *FM i's willingness to share (and likelihood of sharing) an idea increases in her own-success probability p_i.*

The last result in Proposition 1 states that, when holding expectations $\tilde{\sigma}_j$ constant, the effect of FM j's cross-success probability on FM i's willingness to share an idea is stronger than FM i's own-success probability. This latter effect is the direct effect of p_i, whereas the indirect effect is zero because $\tilde{\sigma}_j$ is held constant.

Hypothesis 4. *Holding expectations $\tilde{\sigma}_j$ constant, the effect of the cross-success probability p_j on FM i's willingness to share (and likelihood of sharing) an idea is stronger than the direct effect of the own-success probability p_i.*

5 Experimental Results

We first provide descriptive statistics before presenting our main results from multivariate regressions.[27] Our main results suggest that, for an FM's decision to share information, the expected intentions of rival FMs play a more important role than the rival FM's ability. In the latter part of this section, we study how the FMs' past experience in the experiment (i.e., the dynamics of the experiment) affects their decisions. We close this section with a look into the determining factors of an FM's subjective expectations.

5.1 Descriptive Statistics

Table 2 presents basic descriptive statistics for the treatments of the computerized experiment. We report the total number of subjects and matches for each treatment, the average duration of each match, and the average earnings (per match) for each subject. In the bottom portion of the table, we provide information on how the matches in each treatment were terminated (either by chance or by choice) and on how FMs expected their rivals to behave.

The aggregate figures in Table 2 allow for some preliminary observations. First, the percentage of matches terminated by choice (by either FM A or FM B) varies greatly across treatment and are in line with our hypotheses. Per Hypothesis 1, FM A is more likely

[27] We provide results from simple means tests in the Online Appendix.

to share, and therefore less likely to terminate (by choice), in treatments with high p_B. We observe this by comparing Low-High with Low (25% < 40%) as well as High with High-Low (21% < 38%). Similarly, per Hypothesis 3, FM A is more likely to share and therefore less likely to terminate in treatments with high p_A. We observe this by comparing High-Low with Low (38% < 40%) as well as High with Low-High (21% < 25%). These numbers suggest that the cross-success probability p_B plays a more important role than the own-success probability p_A (Hypothesis 4). We see more direct evidence of this when comparing the fraction of matches terminated by FM A in treatment High-Low relative to treatment Low-High. High-Low, with $p_B < p_A$, exhibits shorter matches, and a larger fraction of those matches are terminated by FM A than in treatment Low-High where $p_B > p_A$.

Second, matches in treatments with a higher average success probability exhibit a longer duration (High compared to Low-High and High-Low; Low-High and High-Low compared to Low). The reason for this is both mechanic and behavioral. The expected duration of word-of-mouth communication is $1 + \frac{\sigma_A p_B}{1-\sigma_A \sigma_B p_A p_B}$.[28] Holding σ_i constant, higher success probabilities (by either FM A or FM B) mechanically increase the duration of a match. However, higher success probabilities are also likely to increase the values of σ_i. A comparison of the FMs' expectations about their match partners to share a new idea in the next round in treatments High and Low illustrates this. As a consequence, higher success probabilities also behaviorally increase the duration of a match.

In panel (a) of Figure 3, we plot the mean of sharing by FM A in Round 1 of each match. We further report the theoretical net benefits from sharing (i.e., ϕ_A) for FM A in Round 1 across the four treatments. Our model predicts more sharing by FM A when her incentives to share are stronger (i.e., when ϕ_A is higher). We report simple means tests results in the table and confirm this for all but the last treatment effect. In panel (b) of Figure 3, we provide box plots of FM A's expectations $\tilde{\sigma}_B$ in Round 1 that FM B will share

[28] We derive the expected duration of word-of-mouth communication in the Online Appendix.

Table 2: Summary Statistics

This table provides basic summary statistics for the four main treatments of the experiment (High, Low, Low-High, and High-Low) as summarized in Table 1. All treatments were conducted in one session with two groups of equal size s_g. For the calibration of the treatments, see Table 1. We list the number of subjects per treatment; the number of matches (i.e., the number of pair-wise word-of-mouth communications, $s_g\,(1 - s_g)$); the average number of rounds each match proceeds; the average earnings per match (in \$) for each subject; and the percentage of matches terminated by chance (when either FM A or FM B has failed to generate a new idea), by FM A in an odd round, or by FM B in an even round. Because a match is terminated by either chance or by choice, these percentages sum up to 100% (with rounding errors).

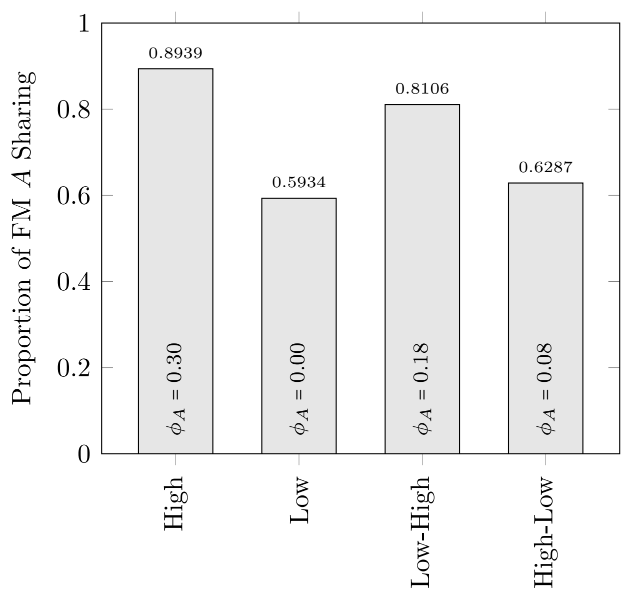
	Treatment			
	High	Low	Low-High	High-Low
Subjects	24	28	24	24
Matches	132	182	132	132
Average # of rounds (and decisions by a FM)	5.62	1.43	2.60	1.70
Average earnings (in \$) per match ...				
... for all subjects	1.57	0.75	1.16	0.83
... for FM A	1.58	0.91	1.19	0.98
... for FM B	1.56	0.59	1.13	0.67
Percentage of matches terminated by chance ...				
... b/c FM A has failed	26.5%	37.4%	8.3%	47.0%
... b/c FM B has failed	27.3%	10.4%	45.5%	4.5%
Percentage of matches terminated by choice ...				
... by FM A	21.2%	40.6%	25.0%	38.6%
... by FM B	25.0%	11.5%	21.2%	9.8%
Subjective expectations $\tilde{\sigma}_j$ ...				
... by FM A (reported $\tilde{\sigma}_B$)	82.4%	56.1%	59.7%	50.9%
... by FM B (reported $\tilde{\sigma}_A$)	78.7%	59.8%	56.4%	64.1%

Figure 3: Sharing and Expectations in Round 1

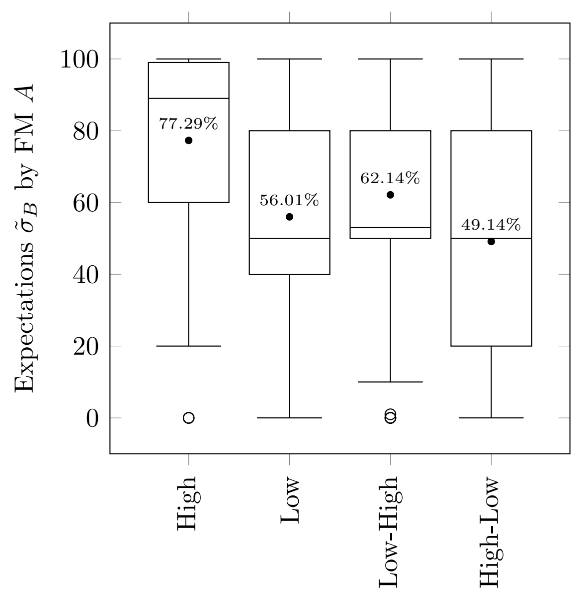
This figure plots the average level of sharing in Round 1 by FM A (panel (a)) as well as FM A's expectations $\tilde{\sigma}_B$ in Round 1 (panel (b)) for all four treatments. In panel (a), the (theoretical) expected net benefits from sharing, ϕ_i, as defined in equation (7) for $i = A, B$ and $\tilde{\sigma}_j = 1$ are provided. The table below reports the results of one-tailed unpaired two-sample t-tests of the pair-wise difference of the mean of sharing in Round 1 by FM A. The prediction is a positive average treatment effect on sharing for treatments with higher ϕ_A relative to lower ϕ_A. We rank treatments by their respective value of ϕ_A and predict that mean(HIGH) > mean(LOW-HIGH), mean(LOW-HIGH) > mean(HIGH-LOW), and mean(HIGH-LOW) > mean(LOW). The respective values are reported in brackets. We report the average treatment effects with standard errors in parentheses.

Prediction			Average treatment effect on sharing (s.e.)	
Sharing (Round 1) in HIGH [0.8939]	>	Sharing (Round 1) in LOW-HIGH [0.8106]	0.0833**	(0.043)
Sharing (Round 1) in LOW-HIGH [0.8106]	>	Sharing (Round 1) in HIGH-LOW [0.6287]	0.1818***	(0.054)
Sharing (Round 1) in HIGH-LOW [0.6287]	>	Sharing (Round 1) in LOW [0.5934]	0.0353	(0.055)

In panel (b), we provide a box plot for FM A's expectations $\tilde{\sigma}_B$ that FM B will share in Round 2.



(a) Sharing in Round 1



(b) Expectations in Round 1

a new idea in Round 2. The mean values are provided; the horizontal lines inside the boxes indicate the median. For these figures (and the main results in the next section), we restrict our data to FM A's behavior in Round 1 of each match. The reason for this is that FM A's information from $t = 1$ is not affected by the history of that respective match. In other words, we do not have to control for FM A's updating of beliefs about FM B's future actions *within* a given match, because FM A does not observe any earlier actions by FM B in Round 1.

5.2 Results for Ability and Intentions

In Table 3, we present regression results from probit models. The dependent variable is a dummy variable equal to 1 if FM A shares in Round 1, and equal to 0 if FM A does not share the idea in Round 1. We highlight four results from this table. First, FM A is more likely to share an idea when she has a higher expectation of feedback. The marginal effects of the cross-success probability p_B and of her subjective expectations $\tilde{\sigma}_B$ (about FM B's future actions) are positive and significant ($p < 0.01$)—results which support our Hypotheses 1 and 2. The marginal effects reported in Table 3 imply that FM A is 3.4% to 6.1% more likely to share an idea in Round 1 in response to a 10 percentage point increase in the cross-probability p_B. Moreover, she is 5.6% to 6.3% more likely to share in Round 1 in response to a 10 percentage point increase in her expectations $\tilde{\sigma}_B$ that FM B will share an idea in Round 2.[29]

As laid out in the model section, for an FM, expecting to receive feedback depends on both the other FM's ability (captured by success probability p_j) and intentions (captured by an FM's expectations $\tilde{\sigma}_j$). Theoretically, any combination of p_j and $\tilde{\sigma}_j$ induces the same behavior as long as $\pi_j \equiv p_j \tilde{\sigma}_j$ remains constant.[30] This implies that the predicted probabilities of sharing by FM A ought to be constant for different values of p_B and $\tilde{\sigma}_B$

[29] The standard deviations of p_B and $\tilde{\sigma}_B$ across all treatments are 19.9 and 30.1. A one-standard deviation increase in the other FM's success probability increases FM A's probability of sharing by 6.8% to 12.1%. A one-standard deviation increase of FM A's expectations $\tilde{\sigma}_B$ increase her probability to share an idea in Round 1 by 16.8% to 19.0%.

[30] We see this from the expected utility of sharing in equation (5) that can be rewritten as a function of p_i and π_j: $EU_i(share@t) = (1-\theta)\sum_{q=0}^{\infty}(p_i\pi_j)^q\left[(1-\pi_j)\,v(t+2q) + \pi_j\,(1-p_i)\,v(t+1+2q)\right]$.

Table 3: Probit Regression Results for the Effects of Ability and Intentions

We report probit results for all four treatments. The dependent variable is a dummy variable = 1 if FM A shares in Round 1, and = 0 otherwise. FM A's expectations of receiving feedback are captured by *Cross success:* p_B (FM B's cross success probability) and *Expected intentions:* $\tilde{\sigma}_B$ (FM A's expectations that FM B will share in Round 2). *Own success:* p_A is FM A's own success probability. The number of observations is the number of Round 1 decisions by FM A. Reported marginal effects are average marginal effects. We report standard errors in parentheses.

	Dependent variable = 1 if FM A shares in Round 1 and = 0 otherwise				
	(I) ME	(II) ME	(III) ME	(IV) ME	(V) ME
Cross success: p_B	0.0034***	0.0061***		0.0060***	0.0035***
	(0.0008)	(0.0008)		(0.0008)	(0.0008)
Expected intentions: $\tilde{\sigma}_B$	0.0056***		0.0063***		0.0056***
	(0.0004)		(0.0004)		(0.0004)
Own success: p_A				0.0015*	0.0014*
				(0.0009)	(0.0008)
Observations	578	578	578	578	578
pseudo R^2	0.2256	0.0645	0.2008	0.0685	0.2299
Log-likelihood	-265.54	-320.78	-274.02	-319.38	-264.05

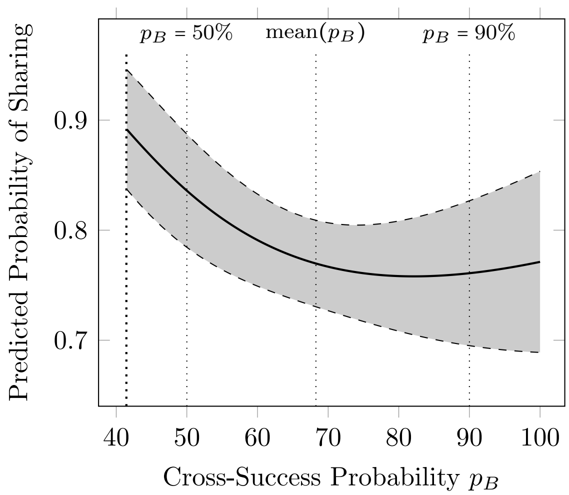
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

such that π_B is constant. Figure 4 plots predicted probabilities against p_B, keeping p_A and $\pi_B = p_B\tilde{\sigma}_B$ constant (at their sample means, with $\bar{\pi}_B = \text{mean}(p_B) \times \text{mean}(\tilde{\sigma}_B)$). Empirically, we can reject the null that the predicted values are constant. We therefore do not find conclusive evidence that the source of feedback is irrelevant. In other words, while ability and intentions are, theoretically, perfect substitutes, we do not find this result of substitutability when considering subjects' behavior. The results in Table 3 explain the downward sloping predicted values in Figure 4. If the effect of ability (through p_B) and intentions (through $\tilde{\sigma}_B$) were the same, then the effect of an increase in p_B would be just offset by a decrease in $\tilde{\sigma}_B$ (to keep π_B constant). Because the effect of intention is stronger, the negative effect of a decrease in $\tilde{\sigma}_B$ more than outweighs the positive effect of the increase in p_B, resulting in a weaker incentive for FM A to share—the predicted probability decreases. Table 4 shows the marginal effects of ability and intentions when evaluated at different combinations of p_B and $\tilde{\sigma}_B$ such that $\pi_B = \bar{\pi}_B$. The absence of empirical substitutability therefore prevails.

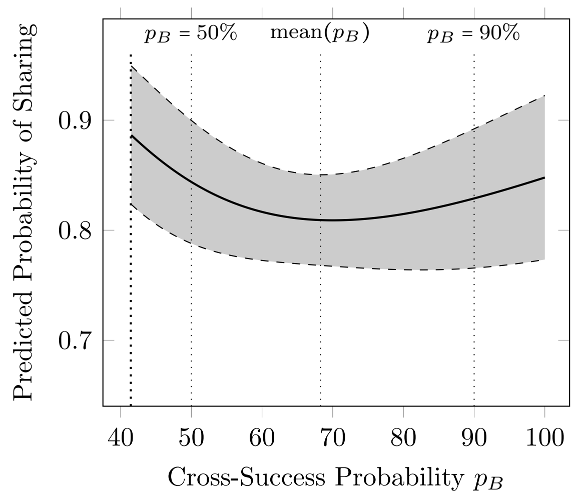
Second, FM A is more likely to share an idea in Round 1 when she expects to be

Figure 4: Are Ability and Intentions Substitutes?

This figure presents the predicted probability of sharing by FM A in Round 1. We predict probabilities at the the mean value of p_A and varying values of p_B and $\tilde{\sigma}_B$, keeping $\pi_B = p_B\tilde{\sigma}_B$ constant at $\bar{\pi}_B = \text{mean}(p_B) \times \text{mean}(\tilde{\sigma}_B)$ (i.e., the sample mean probability of feedback). The thick dotted line at 41.44% indicates the lower bound of p_B (with $\tilde{\sigma}_B = 100\%$ so that $\pi_B = \bar{\pi}_B$). The shaded area constitutes the 95% confidence band. In panel (a), we employ the specification in model (V) of Table 3. We conduct a Wald test and (1) reject the null hypothesis ($p < 0.01$) that predicted probabilities are the same at their extreme values (for $p_B = 0.43$ and $p_B = 0.80$, and their respective values of $\tilde{\sigma}_B$); (2) reject the null hypothesis ($p < 0.05$) that predicted probabilities are the same at the 25th and 75th percentile for $\tilde{\sigma}_B$ (and the respective values of p_B). In panel (b), we employ the extended specification in model (XXV) in Table 7. We conduct a Wald test and (1) reject the null hypothesis ($p < 0.05$) that predicted probabilities are the same at their extreme values; (2) cannot reject the null hypothesis (at 10% level) that predicted probabilities are the same at the 25th and 75th percentile for $\tilde{\sigma}_B$.



(a) Basic Specification



(b) Extended Specification

Table 4: Interaction Results for the Effects of Ability and Interactions

We report probit results for all four treatments. The dependent variable is a dummy variable = 1 if FM A shares in Round 1, and = 0 otherwise. FM A's expectations of receiving feedback are captured by *Cross* p_B (FM B's cross success probability) and *Expect.* $\tilde{\sigma}_B$ (FM A's expectations that FM B will share in Round 2). *Own* p_A is FM A's own success probability. Marginal effects (ME) for model (V) in Table 3 are evaluated at values of p_B and $\tilde{\sigma}_B$, keeping $\pi_B = p_B\tilde{\sigma}_B$ constant at $\bar{\pi}_B = \text{mean}(p_B) \times \text{mean}(\tilde{\sigma}_B)$ (i.e., the sample mean probability of feedback); p_A is at the sample mean. The number of observations is 578; the pseudo R^2 is 0.2299. We report standard errors in parentheses.

	Dependent variable = 1 if FM A shares in Round 1 and = 0 otherwise		
	ME evaluated at $p_B = 50\%$, $\tilde{\sigma}_B = \bar{\pi}_B/p_B$	ME evaluated at $p_B = 75\%$, $\tilde{\sigma}_B = \bar{\pi}_B/p_B$	ME evaluated at $p_B = 100\%$, $\tilde{\sigma}_B = \bar{\pi}_B/p_B$
Cross success: p_B	0.0033***	0.0042***	0.0041***
	(0.0010)	(0.0009)	(0.0007)
Expected intentions: $\tilde{\sigma}_B$	0.0054***	0.0068***	0.0066***
	(0.0004)	(0.0008)	(0.0011)
Own success: p_A	0.0014*	0.0017*	0.0017*
	(0.0008)	(0.0010)	(0.0010)
	Test of the difference in coefficients : χ^2		
$p_B - \tilde{\sigma}_B = 0$	5.62**	3.74*	2.92*
	(0.0178)	(0.0533)	(0.0874)

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

successful in generating yet another idea in Round 3. The marginal effect of own-success probability p_A is positive and significant ($p < 0.10$)—a result which supports Hypothesis 3. The marginal effects imply that FM A is 1.4% to 1.5% more likely to share an idea in Round 1 in response to a 10 percentage point increase in her own-success probability.[31] Observe that the marginal effect of p_A in model (IV) is the overall effect, whereas the effect of p_A in model (V), which controls for expected intentions $\tilde{\sigma}_B$, is the direct effect only. A comparison of these two suggests that, if there is an indirect effect of p_A on FM A's sharing, which operates through FM A's expectations of B's intentions, then this effect is, at best, small.

Third, in Hypothesis 4 we posit that, when holding expected intentions $\tilde{\sigma}_B$ constant, the effect of cross-success p_B is stronger than of own-success p_A. We observe that the marginal effects of p_B are greater than those of p_A in all specifications. To confirm, we perform a Wald test, which rejects the null that the two effects are the same.[32]

Fourth, measured by the size of the marginal effect, the effect of expectations is stronger than the effect of either p_A or p_B. A Wald test rejects the null that the effect of expectations is the same as the effect of p_A or p_B.[33] This means that expectations about the other FM's intentions to give feedback in the next round seem to matter more than the other FM's ability to give feedback. This result is indicative of—but does not necessarily imply—the importance of the strength of links in a social network (proxied by the intentions of a given link) relative to the number of links (proxied by the ability of the average link).[34]

To summarize, the expected intentions of FM B have a greater impact on FM A's decision to share information than FM B's ability. This behavior is despite the theoretical equivalence—of ability and intentions—that is a result in our model. We see this from

[31] The standard deviation of p_A is 19.9, so that a one-standard deviation increase in her own-success probability increases FM A's probability of sharing in Round 1 by roughly 3%.

[32] In model (IV), equality of the coefficients for p_B and p_A (the overall effect of p_A) can be rejected at the 10% level; in model (V), equality of the coefficients for p_B and p_A (the direct effect of p_A because $\tilde{\sigma}_B$ is controlled for) can be rejected at the 1% level.

[33] In model (V), equality of the coefficients for $\tilde{\sigma}_B$ and p_A can be rejected at the 5% level; equality of the coefficients for $\tilde{\sigma}_B$ and p_B can be rejected at the 1% level.

[34] An FM with strong links is more likely to expect another FM to respond with a generated idea (higher $\tilde{\sigma}_B$). An FM with more links (i.e., more than one FM B) is more likely to face another FM who is able to generate a new idea (higher p_B).

the marginal effects in Table 3, as well as the decreasing predicted probability in Figure 4. Moreover, an FM's own ability has a positive effect on her likelihood and willingness to share. We do not, however, find strong evidence of higher order beliefs in how one's own ability affects future behavior. The indirect effect p_A has on FM A's sharing (through the expected intentions of FM B) seems to be, at best, weak. In other words, an FM A with higher ability is not more likely, and willing, to share because she believes FM B is more likely and willing to share in the next round in response to a higher p_A.

5.3 The Effect of Past Experience

In Table 5, we provide results concerning the effect of an FM's past experience across matches. We use model (V) from Table 3 and consider the effect of two dummy variables. *Other Terminated* is equal to 1 if FM A had a match partner (either as FM A or FM B) in a previous match who terminated that specific match by choice. Likewise, *Own Terminated* is equal to 1 if FM A terminated a previous match by choice, either as FM A or FM B. In models (IX) through (XIV) we use the subsample of FMs A who vary their decision across matches, that means, who do not exhibit match-invariant decisions. We find that the effects of our feedback variables p_B and $\tilde{\sigma}_B$, as well as p_A, are robust in models (VI), (VII), and (VIII) (i.e., the full sample) to the inclusion of past experience.

The effects of *Other Terminated* and *Own Terminated* suggest that past experience has an impact on FM A's decision to share. For example, in model (VI), if FM A in an earlier match faced another FM who terminated the match by concealing an idea (*Other Terminated*), then FM A is in Round 1 of the given match 8.4 percentage points less likely to share than otherwise.[35] The results for *Other Terminated* are consistent with notions of awareness and revision of prior beliefs about a match partner's "type." At the beginning of each match, two FMs are randomly re-matched (from within each group) without replace-

[35] The unconditional mean of FM A sharing in Round 1 is 72.0% (for the full sample) and 57.4% (for the sample with match-variant behavior in models (IX) through (XIV)). The effect of *Other Terminated* in the models with the reduced sample is stronger because the sample includes only FM As who have changed behavior at some point during the experiment.

Table 5: Effect of Past Experience on Sharing

We report the results from probit models for the effect of an FM A's previous experience in model (V) in Table 3. The dependent variable is a dummy variable = 1 if FM A shares in Round 1, and = 0 otherwise. FM A's expectations of receiving feedback are captured by *Cross* p_B (FM B's cross success probability) and *Expect.* $\tilde{\sigma}_B$ (FM A's expectations that FM B will share in Round 2). *Own* p_A is FM A's own success probability. *Other Terminated* is a dummy variable = 1 if FM A has previously had a match partner (either as FM A or FM B) who terminated their match by choice (i.e., concealed an idea), and = 0 otherwise; *Own Terminated* is a dummy variable = 1 if FM A has previously terminated a match by choice (i.e., concealed an idea) either as FM A or as FM B, and = 0 otherwise. Both *Other Terminated* and *Own Terminated* are, by definition, = 0 in the very first match. *Subject Dummies* indicates whether or not subject dummies are included to control for subject-specific effects. For models (IX) through (XIV), a reduced sample with FM A who exhibit varying decisions across matches is considered, implying that 43.9% of observations are dropped (69.7% of observations in treatment High, 25.8% in Low, 55.3% in Low-High, and 31.8% in High-Low). The number of observations is the number of Round 1 decisions by FM A. Reported marginal effects in column ME are average marginal effects; reported ME for dummy variables *Other Terminated* and *Own Terminated* are for a discrete change from 0 to 1. We report standard errors in parentheses.

	Dependent variable = 1 if FM A shares in Round 1 and = 0 otherwise								
	(VI) ME	(VII) ME	(VIII) ME	(IX) ME	(X) ME	(XI) ME	(XII) ME	(XIII) ME	(XIV) ME
Cross p_B	0.0035***	0.0036***	0.0036***	-0.0002	0.0015	0.0011	-0.0088	-0.0054	-0.0077
	(0.0008)	(0.0007)	(0.0007)	(0.0013)	(0.0013)	(0.0013)	(0.0056)	(0.0058)	(0.0056)
Expect. $\tilde{\sigma}_B$	0.0055***	0.0045***	0.0045***	0.0063***	0.0058***	0.0058***	0.0062***	0.0065***	0.0060***
	(0.0004)	(0.0004)	(0.0004)	(0.0006)	(0.0006)	(0.0006)	(0.0008)	(0.0008)	(0.0008)
Own p_A	0.0013	0.0014*	0.0014*	-0.0015	-0.0008	-0.0010	-0.0008	0.0013	-0.0001
	(0.0008)	(0.0007)	(0.0007)	(0.0012)	(0.0012)	(0.0012)	(0.0057)	(0.0060)	(0.0059)
Other Terminated	-0.0837**		0.0409	-0.2005***		-0.0810	-0.2875***		-0.2142***
	(0.0361)		(0.0371)	(0.0494)		(0.0571)	(0.0573)		(0.0691)
Own Terminated		-0.2628***	-0.2782***		-0.2738***	-0.2332***		-0.2144***	-0.1092*
		(0.0271)	(0.0305)		(0.0449)	(0.0537)		(0.0457)	(0.0560)
Subject Dummies	No	No	No	No	No	No	Yes	Yes	Yes
Observations	578	578	578	324	324	324	324	324	324
pseudo R^2	0.2377	0.3386	0.3404	0.2012	0.2351	0.2395	0.3865	0.3733	0.3949
Log-likelihood	-261.36	-226.77	-226.17	-176.55	-169.06	-168.07	-135.60	-138.51	-133.73

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

ment, and at the beginning of each match, a FM forms her prior beliefs about the other FM's intentions. Because in Table 5 the dependent variable reflects the first decision of a new match, there is no scope for updating these prior beliefs about the other FM's type *within* a given match. FM A being more aware or cautious (resulting in lower expectations) explains the negative effect of *Other Terminated*.

In model (VII), if an FM A herself terminated by choice in an earlier match, then FM A is 26.3 percentage points less likely to share in Round 1 of a given match. One possible explanation for this result is that an FM's past action in fact captures the FM's own type and thus her propensity to conceal instead of to share an idea. It is as if an FM reveals her own type to herself as soon as she conceals an idea. Models (XII) and (XIV), in which we control for subject fixed effects, support this explanation. The effects of *Own Terminated* in the models without the subject fixed effects are stronger than in the models with the fixed effects.[36] Note that, if *Own Terminated* were to capture only a subject fixed effect, the marginal effects would be nil in these specifications. However, we still obtain a significant effect of *Own Terminated* in model (XIV). A possible explanation for this is an FM revising her own prior beliefs about the match partner's "type" through an effect analogous to "self-projection" in which a subject "project[s] her known behavior to guess others' behavior" (Lévy-Garboua, Meidinger, and Rapoport, 2006:574). For our context, this means, that when FM A observes herself concealing an idea, the incentives of sharing and concealing become more salient, resulting in less optimistic expectations about FM B's intentions in a given match.

5.4 Determinants of Subjective Expectations

In Table 6, we present results detailing the determinants of FM i's subjective expectations in a Round t, concerning FM j's intentions to share an idea in $t+1$. Unlike in our previous analyses, we now consider both FM A's, and FM B's, expectations in *all* rounds. This

[36] To allow for direct comparison, we use the reduced sample in models (IX), (X), and (XI) without the subject fixed effects.

gives us a total of 1,574 observations (i.e., decisions to share, or conceal, and the reported expectations $\tilde{\sigma}_j$). We report the results for tobit models with reported expectations as the dependent variable, a left-censoring limit of 0, and a right-censoring limit of 100.

We make a number of observations. First, for the specifications without subject dummies, the positive effect of a rival FM's success probability on expectations (i.e., the effect of FM j's probability p_j on FM i's expectations) is stronger than the effect of own-success probability p_A ($p < 0.01$). Our results in Table 3 suggest that the effect of an FM's own probability of success is weaker than the effect of the other FM's probability of success, and imply that the effect of p_j on FM j's sharing is weaker than the effect of p_i. We would therefore expect the effect of p_j on FM i's expectations $\tilde{\sigma}_j$ to be weaker than the effect of p_i on $\tilde{\sigma}_j$. Our results do not confirm this intuition, possibly suggesting that the first-order effects from Table 3 do not translate into the analogous effects on higher-order beliefs about other subjects' strategies.

Second, the positive effect of p_i on FM i's expectations comports with our discussion of the indirect effect of p_i on FM i's willingness, and likelihood, to share in the context of Hypothesis 3. We argued that because p_j is expected to increase FM i's willingness and likelihood to share, p_i is expected to increase FM j's willingness and likelihood to share. And in return, an increase in p_i is expected to increase FM i's expectations $\tilde{\sigma}_j$ that FM j is going to share a new idea. However, as discussed in the context of the results of Table 3 (comparing the effect of p_A in models (IV) and (V)), we do not see this particular higher-order belief to translate into FM A's behavior.

Third, the effect of the number of rounds played is consistent with updating of beliefs about the other FM's "type" *within* a match. In other words, given that FM j has shared in Round $t-1$, FM i updates her beliefs in Round t about the intentions of FM j.[37]

[37] An alternative explanation stems from the payoff structure of the experiment. The further the game of word-of-mouth communication progresses, the smaller in size are the absolute and relative costs and benefits of sharing. For instance, in Round 1 the payoff difference for FM A of terminating in the current round as opposed to in Round 3 is 65.63 (or 65.63%); in Round 7 this difference is 11.68 (or 5.23%); and in Round 11 the difference is 3.7 (or 1.5%). This means, an FM has a weaker incentive to conceal in later rounds than in earlier rounds.

Table 6: Determinants of Subjective Expectations

We report the results from tobit models for the determinants of an FM i's subjective expectations in t about FM j's intentions to share in $t+1$ in all treatments. The dependent variable is $\tilde{\sigma}_j \in [0, 100]$ in a given round t of a match. *Cross* p_j is FM j's cross-success probability; *Own* p_i is FM i's own-success probability; *Match* is the match number; *Round* is the round number, t, in a given match; *Other Terminated* is a dummy variable = 1 if FM i has previously had a match partner (either as FM i or FM j) who terminated their match by choice (i.e., concealed an idea), and = 0 otherwise; *Own Terminated* is a dummy variable = 1 if FM i has previously terminated a match by choice (i.e., concealed an idea) either as FM i or as FM j, and = 0 otherwise; *Other* × *Own Terminated* is an interaction term. Both *Other Terminated* and *Own Terminated* are, by definition, = 0 in the very first match. *Subject Dummies* indicates whether or not subject dummies are included to control for subject fixed effects. The number of observations is the total number of decisions by FM i in all t. The left-censoring limit for the tobit model is 0; the right-censoring limit is 100. We report standard errors in parentheses.

	Dependent variable: FM i's subjective expectations $\tilde{\sigma}_j \in [0, 100]$ in a given round t of a match				
	(XV) Tobit	(XVI) Tobit	(XVII) Tobit	(XVIII) Tobit	(XIX) Tobit
Cross p_j	0.4314***	0.4236***	0.4263***	-0.2115	-0.2579
	(0.0443)	(0.0434)	(0.0437)	(0.2405)	(0.2401)
Own p_i	0.1971***	0.2062***	0.2073***	-0.3673	-0.4127*
	(0.0453)	(0.0443)	(0.0443)	(0.2404)	(0.2400)
Match	-0.9082***	-0.1166	-0.1013	-0.0887	-0.1612
	(0.2391)	(0.3451)	(0.3464)	(0.2936)	(0.2934)
Round	1.6110***	1.4826***	1.4833***	0.4001**	0.4008**
	(0.2455)	(0.2402)	(0.2402)	(0.1992)	(0.1987)
Other Terminated		2.9797	2.1690	-5.7261**	-9.5313***
		(2.4343)	(2.8949)	(2.2560)	(2.5397)
Own Terminated		-15.7139***	-17.2368***	-0.4291	-8.4098**
		(1.7583)	(3.4304)	(2.2003)	(3.2932)
Other × Own Terminated			2.0060		11.7965***
			(3.8786)		(3.6334)
Subject dummies	No	No	No	Yes	Yes
Observations	1574	1574	1574	1574	1574
pseudo R^2	0.0211	0.0272	0.0272	0.1009	0.1017
Log-likelihood	-6420.43	-6380.57	-6380.44	-5896.91	-5891.65

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Fourth, the positive interaction effect in model (XIX) suggests that the two types of past experience are not cumulative. The effect of *Other Terminated* is stronger when FM i herself has not terminated an earlier match. Similarly, FM i adjusts her expectations of FM j's behavior downward in response to *Own Terminated* only if she has not already seen a rival FM terminate a match. This result is in line with our earlier discussion of the salience of one's incentives in response to one's own termination, and the effect arises only if an FM has not experienced termination before. Once an FM has faced a rival FM that terminated the match by choice, an FM's own subsequent termination has no effect on her belief formation.

6 Robustness

Our results concerning how the probability of feedback (measured by ability and intentions) affects sharing are robust to a set variables capturing trust, fairness, and personal connections; all of which have been associated with increased cooperative or pro-social behavior. We report these results in Table 7 and provide detailed descriptions and summary statistics for these control variables in Table A1 in the Appendix.

Personal Connections: Indicators of personal connections or social bonds (i.e., number of people a participant recognizes in the experimental session [*Acquaintances*] and number of people in the session a participant considers friends [*Friends*][38]) do do not affect our results for the probability of feedback (p_B and $\tilde{\sigma}_B$) or an FM's own success probability. Moreover, only *Friends* exhibits a statistically significant effect on FM A's sharing in Round 1.

A small number of papers have presented results that suggest that social interactions and peer effects influence stock market participation (Hong, Kubik, and Stein, 2004) or provide a mechanism through which asset prices incorporate private information (Cohen, Frazzini, and Malloy, 2008). To understand how personal connections or social bonds affect

[38] Recall that by the design of the experiment, subjects did not know with whom they had been grouped. The answers to the above questions therefore apply to the session (two groups) rather than the subject's group.

Table 7: Robustness Results for the Effects of Ability and Intentions

We report probit results of a set of sensitivity analyses for all four treatments. The dependent variable is a dummy variable = 1 if FM A shares in Round 1, and = 0 otherwise. FM A's expectations of receiving feedback are captured by *Cross* p_B (FM B's cross success probability) and *Expect.* $\tilde{\sigma}_B$ (FM A's expectations that FM B will share in Round 2). *Own success:* p_A is FM A's own success probability. Further co-variates are the *Match* number; the number of a participant's *Acquaintances* in the experimental session; the number of a participant's *Friends* in the experimental session; a participant's perception of general *Fairness* and *Trustworthiness* of people (ranging from 1 to 10 with higher numbers indicating more fairness or trustworthiness); and a *Risk Aversion* measure by the *Holt-Laury* risk preference task (ranging from 1 to 10 with higher numbers reflecting higher degrees of risk aversion). See Table A1 for more detailed definitions and descriptive statistics of these co-variates. We reproduce model (V) from Table 3 with the main results in the first column. The number of observations is the number of Round 1 decisions by FM A. Reported marginal effects (ME) are average marginal effects. We report standard errors in parentheses.

	Dependent variable = 1 if FM A shares in Round 1 and = 0 otherwise								
	(V) ME	(XX) ME	(XXI) ME	(XXII) ME	(XXIII) ME	(XXIV) ME	(XXV) ME	(XXVI) ME	(XXVII) ME
Cross p_B	0.0035***	0.0032***	0.0031***	0.0032***	0.0031***		0.0030***	0.0029***	0.0030***
	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0008)		(0.0009)	(0.0009)	(0.0009)
Expect. $\tilde{\sigma}_B$	0.0056***	0.0054***	0.0053***	0.0053***	0.0053***		0.0052***	0.0052***	0.0052***
	(0.0004)	(0.0004)	(0.0004)	(0.0004)	(0.0005)		(0.0005)	(0.0005)	(0.0005)
Own p_A	0.0014*	0.0011	0.0011	0.0011	0.0012		0.0018**	0.0011	0.0018**
	(0.0008)	(0.0008)	(0.0008)	(0.0008)	(0.0009)		(0.0009)	(0.0009)	(0.0009)
Match		-0.0155***	-0.0162***	-0.0159***	-0.0164***	-0.0285***	-0.0138***	-0.0135***	-0.0138***
		(0.0046)	(0.0046)	(0.0046)	(0.0046)	(0.0052)	(0.0050)	(0.0050)	(0.0050)
Acquaintances			-0.0097		-0.0080	-0.0062	-0.0150		-0.0150
			(0.0072)		(0.0075)	(0.0085)	(0.0104)		(0.0104)
Friends			0.0169*		0.0152	0.0179	0.0415***		0.0415***
			(0.0098)		(0.0100)	(0.0116)	(0.0144)		(0.0145)
Fairness				-0.0003	-0.0005	0.0120	0.0015		0.0015
				(0.0078)	(0.0077)	(0.0087)	(0.0080)		(0.0080)
Trustworthiness				0.0075	0.0056	0.0109	-0.0027		-0.0027
				(0.0085)	(0.0087)	(0.0100)	(0.0091)		(0.0091)
Risk Aversion								0.0114	0.0005
								(0.0114)	(0.0119)
Observations	578	578	578	578	578	578	481	481	481
pseudo R^2	0.2299	0.2456	0.2499	0.2473	0.2507	0.0534	0.2774	0.2571	0.2774
Log-likelihood	-265.05	-258.66	-257.20	-258.09	-256.92	-324.58	-202.10	-207.77	-202.10

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

word-of-mouth communication, we need to draw a distinction between the effect at the *extensive margin* and at the *intensive margin*. The former describes how FMs choose to form connections or a network with which to share private information (selection). The latter captures the effect on the willingness to share when a connection or network has already been formed. We find that, given an exchange network (taking the extensive margin as given), the presence of personal connections or social bonds plays little to no role in the FM's decision to share an idea. Our results are complementary to Crawford, Gray, and Kern (forthcoming), who also take a social network as given and observe word-of-mouth communication at the intensive margin.

Fairness and Trustworthiness: The experimental literature in economics has shown that considerations of fairness of others and trust toward others play an important role in how people make decisions.[39] In order to see the effect of fairness and trust on an FM's decision to share a new idea, we control for two variables obtained in an exit survey. First, we survey the participants' perception of other people's fairness (*Fairness*); second, we ask for participants' perception of other people's trustworthiness (*Trustworthiness*). These indicators are meant to capture an FM's general attitude toward other people in terms of fairness and trustworthiness. Again, our main results are robust to the inclusion of these indicators. Moreover, subjects' views of fairness and trustworthiness do not exhibit statistically significant effects on FM A's sharing in Round 1. We therefore do not find evidence for an effect of general perceptions of fairness and trustworthiness of others on an FM's decision to share private information.

Risk Aversion: We further find that risk aversion does not drive our main results because the marginal effects of *Risk Aversion* on the FM A's sharing behavior is not statistically

[39]For fairness, see, for instance, Fehr, Kirchsteiger, and Riedl (1993), Fehr and Schmidt (1999), Bolton and Ockenfels (2000), or Fehr and Schmidt (2006). In the context of information exchange, Gächter, von Krogh, and Haeflinger (2010) argue that knowledge sharing in private-collective innovation (i.e., privately funded public goods innovation) is affected by fairness. For trust, see, for instance, Berg, Dickhaut, and McCabe (1995) or Ortmann, Fitzgerald, and Boeing (2000).

significantly different from zero. Our risk-aversion measure we derive from the Holt and Laury (2002) risk preference tasks; these numbers are consistent with those in Holt and Laury (2002).[40] We take a conservative approach, and for our analyses—utilizing the Holt-Laury risk preference measure in models (XXV) through (XXVII)—we use only observations from matches with subjects making consistent choices.

7 Concluding Remarks

Recent empirical results, showing that fund managers in geographical, educational, or social networks exhibit correlated trading, have been interpreted as evidence that professional investors exchange relevant investment ideas. The *collaboration argument* in Stein (2008) posits that competing fund managers exchange valuable ideas for investment opportunities when they expect feedback, that means, receiving more ideas in return. To examine the motivations underlying this type of collaboration, we design a laboratory experiment in which competing fund managers continually share ideas. We find that managers are more willing, and likely, to share when their rival's *ability* and *intentions* to provide feedback are high. We further provide evidence that, for a fund manager's decision to share, subjective expectations about rivals' intentions matter more than objective expectations about their ability.

In our experimental design, we assume that connections between fund managers have already been made, eliminating from the fund managers' action set the decision to join a network of information exchange. Moreover, we assume that the fund managers' abilities are common knowledge. Future research should investigate the formation of networks, and how the outcomes—which we assume—arise in practice. We expect elements that are central to

[40] Most subjects are risk averse and made choices between 5, 6, and 7 in the risk-aversion elicitation task. This implies risk aversion coefficients of 0.15 and 0.97 in terms of a CARA expected utility framework. Note that about 22% of the subjects exhibit inconsistent choices (selecting back and forth between lottery A and lottery B as the probability of the higher payoff increased).

many repeated relationships to affect selection into networks and the matching of potential collaborators, as well as the dynamics of an information-exchange relationship.

There are other possible incentive structures that could motivate information sharing in this manner, and we expect that future research will also examine the motivations underlying those alternatives in a similar manner to what we do here. For instance, would the *awareness* argument raised by Dow and Gorton (1994) and Pontiff (2006) be sufficient to motivate sharing? Finally, in an environment where both collaboration and awareness are possible, which incentive would prove more salient?

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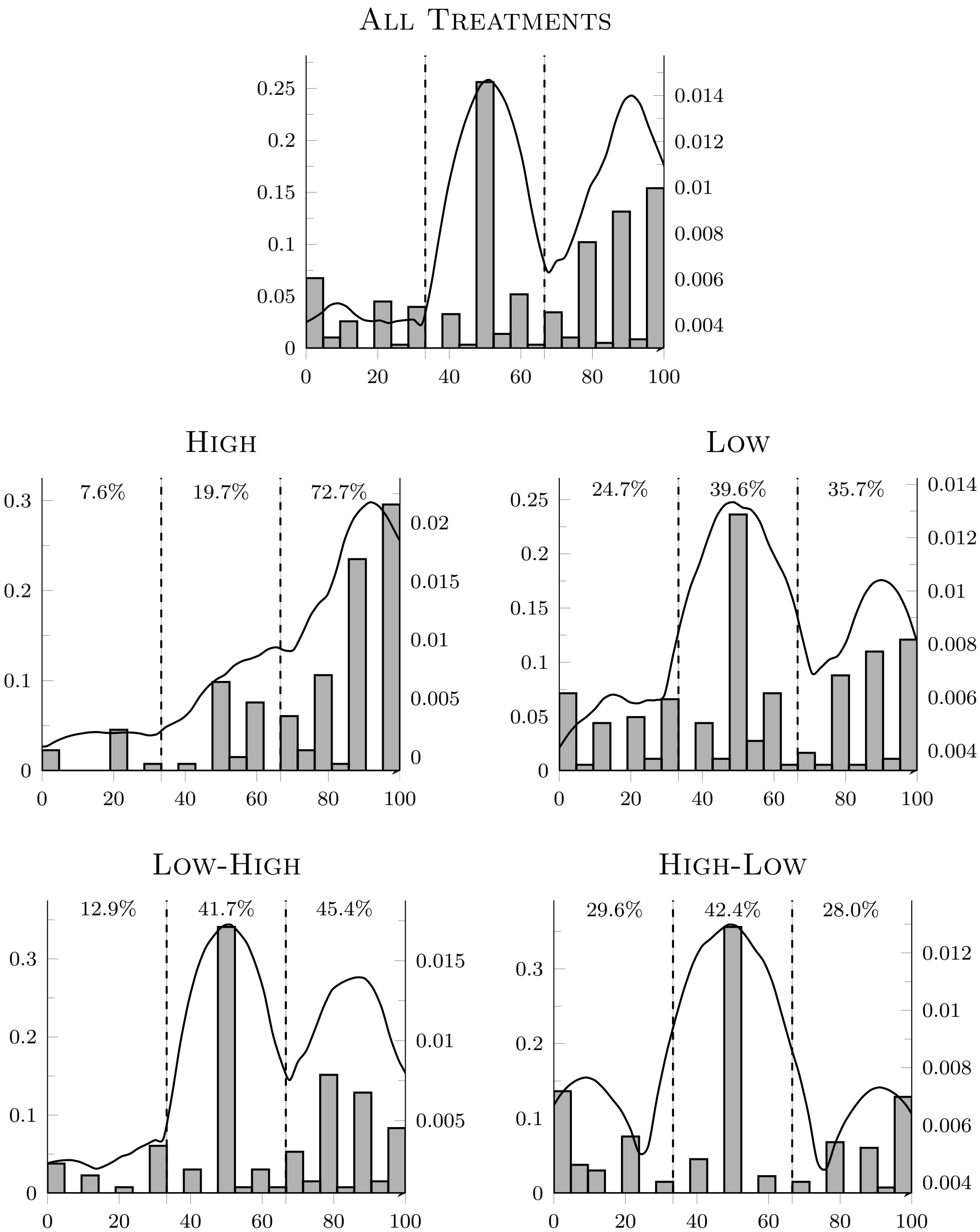
Appendix

A Additional Figures and Tables

Figure A1: FM A's Subjective Expectations

This figure provides histograms (left scale; bars) and kernel density estimates (right scale; curve) of FM A's subjective expectations in Round 1. The percentage numbers indicate the size of three subgroups of expectations: "low" expectations for $\tilde{\sigma}_B \in [0\%, 33\%]$, "medium" expectations for $\tilde{\sigma}_B \in (33\%, 66\%]$, and "high" expectations for $\tilde{\sigma}_B \in (66\%, 100\%]$.



FM A's Subjective Expectations in Round 1

Table A1: Definitions and Summary Statistics

Definitions for round-level data	
Own success p_i	FM i's success probability (i.e., the probability of generating a new idea conditional on FM j having shared an idea in the previous round). Subjects know their own and their match partner's success probability.
Cross success p_j	FM j's success probability (i.e., the probability of generating a new idea conditional on FM i having shared an idea in the previous round). Subjects know their own and their match partner's success probability.
Expected intentions $\tilde{\sigma}_j$	FM i's expectations that FM j will share a newly generated idea in the next round.
Round	Round number of a given match.
Other Terminated	Dummy variable = 1 if FM i has previously had a match partner who terminated the match by choice (i.e., concealed an idea) either as FM A (in odd rounds) or FM B (in even rounds). By definition, *Other Terminated* = 0 for the first match.
Own Terminated	Dummy variable = 1 if FM i has previously terminated a match by choice (i.e., concealed an idea) either as a FM A (in odd rounds) or FM B (in even rounds). By definition, *Own Terminated* = 0 for the first match.
Definitions for subject-level data	
Acquaintances	Number of people each participant recognized in the experimental session (Survey question: "How many people in this session do you recognize?")
Friends	Number of a participant's friends that are participating in the same session (Survey question: "How many would you consider friends?")
Fairness	Participant's perception of other people's fairness with higher values indicating more fairness (Survey question: "Do you think that most people would try to take advantage of you if they got a chance, or would they try to be fair?" This question is adapted from the World Values Survey. The questionnaire can be found at http://www.worldvaluessurvey.org/WVSDocumentationWV6.jsp.).
Trustworthiness	Participant's perception of other people's trustworthiness with higher values indicating higher levels of trust (Survey question: "Generally speaking, would you say that most people can be trusted, or that you need to be very careful in dealing with people?" This question is adapted from the World Values Survey. The questionnaire can be found at http://www.worldvaluessurvey.org/WVSDocumentationWV6.jsp.).
Risk Aversion	Risk aversion category by the Holt and Laury (2002) risk preference task, ranging from 1 to 10 with higher numbers reflecting higher degrees of risk aversion. Risk aversion results are consistent with the results from Holt and Laury (2002) in that most subjects are risk averse and choose between 5 (21.3%), 6 (14.9%), and 7 (30.3%) in the risk-aversion elicitation task. This implies risk aversion coefficients of 0.15 and 0.97 in terms of a CARA expected utility framework. Subjects that exhibit inconsistent behavior, that means, that selected back and forth between lottery A and lottery B as the probability of the higher payoff increased, are dropped from the sample when Holt-Laury is used as independent variable.

Summary Statistics

	N	Mean	Std.Dev.	Min	Max
Own success p_i (for Round 1)	578	68.27	19.94	50	90
Cross success p_j (for Round 1)	578	68.27	19.94	50	90
Expected intentions $\tilde{\sigma}_j$ (for Round 1)	578	60.70	30.10	0	100
Round	1574	3.67	3.77	1	22
Other Terminated	1574	0.72	0.45	0	1
Own Terminated	1574	0.53	0.50	0	1
Acquaintances	100	2.92	2.36	0	12
Friends	100	1.81	2.64	0	12
Fairness	100	4.85	2.36	1	10
Trustworthiness	100	5.45	2.61	1	10
Risk Aversion	82	6.95	1.51	3	10

Cutthroats or Comrades: Information Sharing Among Competing Fund Managers

Online Appendix and Supplementary Material

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Abstract

This is the Online Appendix for *"Cutthroats or Comrades: Information Sharing Among Competing Fund Managers"* (May 2016).

Approved for public release; distribution is unlimited

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Contents

1 Tables and Figures

- In Figure B1, we summarize the fraction of FM A sharing their initial idea in Round 1 as well as FM A's expectations $\tilde{\sigma}_B$ for three subsamples of matches: matches 1–3, matches 4–8, and matches 9 and higher.

- In Tables B1 and B2, we provide means tests results for our main Hypotheses 1–4 (with regression results in Table 3 in the main text).

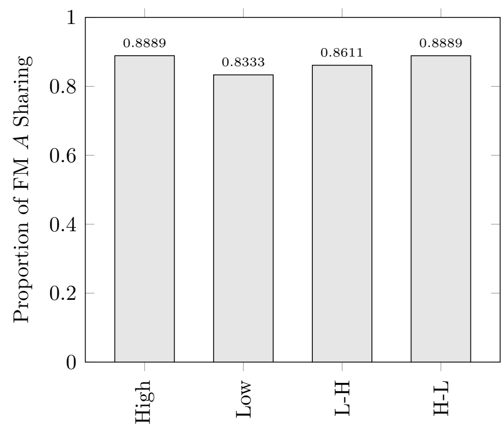
- In Table B3, we provide the main results from Table 3 in the main text for three subsamples of matches: matches 1–3, matches 4–8, and matches 9 and higher.

- In Table B4, we provide the results on the effect of past experience on sharing from Table 5 in the main text for two subsamples of matches: matches 1–6 and matches 7 and higher.

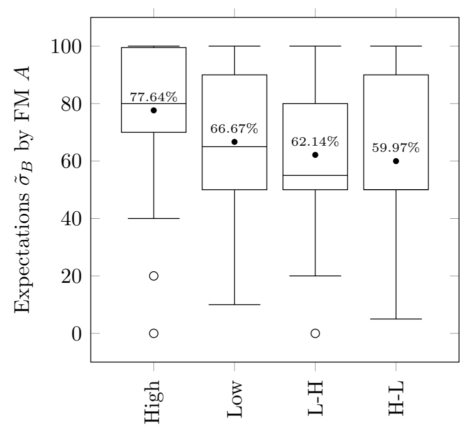
- In Table B5, we provide the results for the determinants of expectations $\tilde{\sigma}_j$ in Table 6 in the main text for two subsamples of matches: matches 1–6 and matches 7 and higher.

Figure B1: Sharing and Expectations in Round 1 by Match Groups

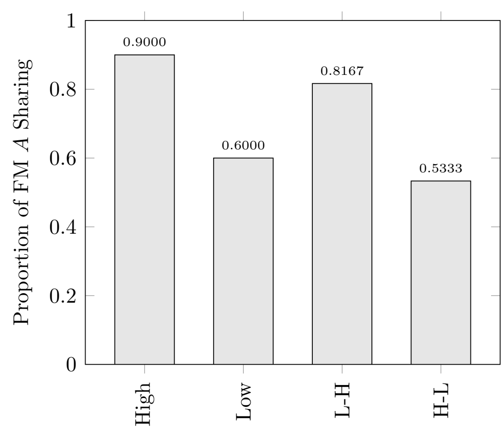
This figure plots the average level of sharing in Round 1 by FM A (panel (a)) as well as FM A's expectations $\tilde{\sigma}_B$ in Round 1 (panel (b)) for all four treatments (High, Low, Low-High [L-H], and High-Low [H-L]). We provide the graphs for three subsamples of matches: 1–3 (early matches), 4–8 (intermediate matches), and 9 or higher (late matches).



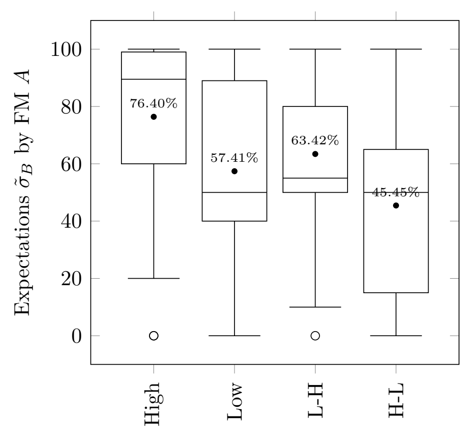
(a) Sharing (Round 1) in Matches 1–3



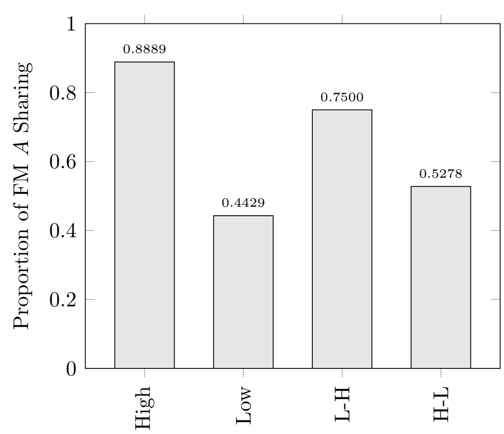
(b) Expectations in Matches 1–3



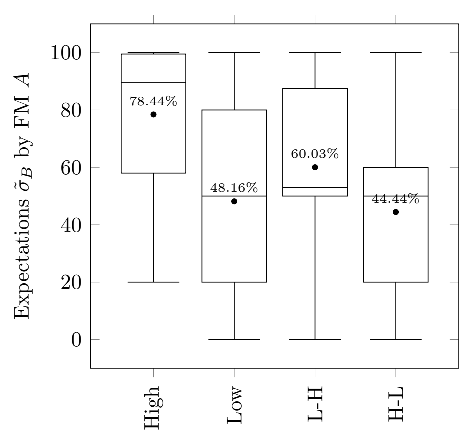
(c) Sharing (Round 1) in Matches 4–8



(d) Expectations in Matches 4–8



(e) Sharing (Round 1) in Matches ≥ 9



(f) Expectations in Matches ≥ 9

Table B1: Average Treatment Effects (Hypotheses 1, 3, and 4)

In the top portion of the table, we report the average level of sharing in Round 1 by FM A for treatments High, Low, Low-High, and High-Low. In the bottom portion of the table, we report the results of one-tailed unpaired two-sample t-tests of the pair-wise difference of the mean of sharing (in Round 1 by FM A) for Hypotheses 1, 3, and 4. We provide results for the full sample as well as by three groups of FM A's expectations $\tilde{\sigma}_B$ about B's sharing in Round 2: "Low" for $\tilde{\sigma}_B \in [0\%, 33\%]$, "Medium" for $\tilde{\sigma}_B \in (33\%, 66\%]$, and "High" for $\tilde{\sigma}_B \in (66\%, 100\%]$. The prediction is a positive average treatment effect on sharing (e.g., Sharing (Round 1) in High > Sharing (Round 1) in High-Low). We report the average treatment effects with standard errors in parentheses.

Treatment		Sharing in Round 1 (FM A) Mean (s.e.)	N
High	($p_A = 90\%$, $p_B = 90\%$)	0.8939 (0.026)	132
Low	($p_A = 50\%$, $p_B = 50\%$)	0.5934 (0.036)	182
Low-High	($p_A = 50\%$, $p_B = 90\%$)	0.8106 (0.034)	132
High-Low	($p_A = 90\%$, $p_B = 50\%$)	0.6287 (0.042)	132

Differences: Unpaired two-sample t-test

Prediction	Average treatment effect on sharing (s.e.) Full	by FM A's expectations subgroup: Low	Medium	High
Hypothesis 11: Positive effect of cross success probability				
High > High-Low	0.2651^{***}	-0.0051	0.0631	0.1849^{***}
	(0.050)	(0.145)	(0.087)	(0.051)
Low-High > Low	0.2171^{***}	0.3882^{***}	0.1247^{*}	0.1012^{*}
	(0.051)	(0.123)	(0.082)	(0.061)
Hypothesis 3: Positive effect of own success probability				
High > Low-High	0.0833^{*}	-0.3882^{**}	0.1209	0.0520^{*}
	(0.043)	(0.190)	(0.094)	(0.036)
High-Low > Low	0.0353	0.0051	0.1825^{**}	-0.0316
	(0.055)	(0.088)	(0.079)	(0.082)
Hypothesis 4: Effect of cross success probability is stronger than of own success probability				
Low-High > High-Low	0.1818^{***}	0.3831^{***}	-0.0578	0.1328^{**}
	(0.054)	(0.128)	(0.077)	(0.070)

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B2: Average Treatment Effects (Hypothesis 2)

We report the results of one-tailed unpaired two-sample t-tests of the pair-wise difference of mean sharing (in Round 1 by FM A) between different belief groups ("Low", "Medium"/"Med", and "High") treatments High, Low, Low-High, and High-Low. The three groups of FM A's beliefs $\tilde{\sigma}_B$ about B's sharing in Round 2 are: "Low" for $\tilde{\sigma}_B \in [0\%, 33\%]$, "Medium"/"Med" for $\tilde{\sigma}_B \in (33\%, 66\%]$, and "High" for $\tilde{\sigma}_B \in (66\%, 100\%]$. The prediction is a positive average treatment effect on sharing between belief groups (e.g., mean of sharing in "Med" > mean of sharing in "Low"). We report the average treatment effects (ATE) with standard errors in parentheses.

Treat-ment	Belief group	Sharing in Round 1		Prediction	Comparison across expectation groups	
		Mean (s.e.)	N		ATE	(s.e.)
High	Low	0.2000 (0.133)	10			
	Med	0.8846 (0.063)	26	Med > Low	0.6846***	(0.131)
	High	0.9687 (0.017)	96	High > Med	0.0841**	(0.047)
Low	Low	0.2000 (0.060)	45			
	Med	0.6388 (0.057)	72	Med > Low	0.4388***	(0.086)
	High	0.8153 (0.048)	65	High > Med	0.1764**	(0.075)
Low-High	Low	0.5882 (0.123)	17			
	Med	0.7636 (0.057)	55	Med > Low	0.1754*	(0.124)
	High	0.9166 (0.035)	60	High > Med	0.1530**	(0.066)
High-Low	Low	0.2051 (0.065)	39			
	Med	0.8214 (0.051)	56	Med > Low	0.6163***	(0.082)
	High	0.7837 (0.068)	37	High > Med	-0.0376	(0.084)

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B3: Effects of Ability and Intentions by Match Groups

We report probit results for all four treatments for three subsamples of matches: 1–3 (early matches), 4–8 (intermediate matches), and 9 and higher (late matches). The dependent variable is a dummy variable = 1 if FM A shares in Round 1, and = 0 otherwise. FM A's expectations of receiving feedback are captured by *Cross success* (FM B's cross success probability p_B) and *Expected intentions* (FM A's expectations $\tilde{\sigma}_B$ that FM B will share in Round 2). *Own success* is FM A's own success probability p_A. The number of observations is the number of Round 1 decisions by FM A. Reported marginal effects are average marginal effects. We report standard errors in parentheses.

	Dependent variable = 1 if FM A shares in Round 1 and = 0 o.w.				
	(I)	(II)	(III)	(IV)	(V)
Matches 1–3					
Cross success	-0.0004	0.0004		0.0004	-0.0004
	(0.0013)	(0.0014)		(0.0014)	(0.0013)
Expected intentions	0.0048***		0.0048***		0.0048***
	(0.0009)		(0.0009)		(0.0009)
Own success				0.0011	0.0006
				(0.0014)	(0.0013)
Observations	150	150	150	150	150
Matches 4–8					
Cross success	0.0045***	0.0070***		0.0070***	0.0045***
	(0.0012)	(0.0012)		(0.0012)	(0.0012)
Expected intentions	0.0052***		0.0061***		0.0053***
	(0.0007)		(0.0006)		(0.0007)
Own success				0.0003	0.0008
				(0.0014)	(0.0013)
Observations	250	250	250	250	250
Matches 9 and higher					
Cross success	0.0048***	0.0084***		0.0080***	0.0047***
	(0.0016)	(0.0015)		(0.0015)	(0.0016)
Expected intentions	0.0058***		0.0069***		0.0057***
	(0.0008)		(0.0006)		(0.0008)
Own success				0.0028	0.0021
				(0.0017)	(0.0016)
Observations	178	178	178	178	178

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table B4: Effect of Past Experience on Sharing by Match Groups

We report the results from probit models for the effect of a FM A's previous experience for two subsamples of matches: 1–6 (early matches) and 7 and higher (late matches).. The dependent variable is a dummy variable = 1 if FM A shares in Round 1, and = 0 otherwise. FM A's expectations of receiving feedback are captured by *Cross* p_B (FM B's cross success probability) and *Expect.* $\tilde{\sigma}_B$ (FM A's expectations that FM B will share in Round 2). *Own* p_A is FM A's own success probability. *Other Terminated* is a dummy variable = 1 if FM A has previously had a match partner (either as FM A or FM B) who terminated their match by choice (i.e., concealed an idea), and = 0 otherwise; *Own Terminated* is a dummy variable = 1 if FM A has previously terminated a match by choice (i.e., concealed an idea) either as FM A or as FM B, and = 0 otherwise. Both *Other Terminated* and *Own Terminated* are, by definition, = 0 in the very first match. *Subject Dummies* indicates whether or not subject dummies are included to control for subject-specific effects. The number of observations is the number of Round 1 decisions by FM A. Reported marginal effects in column ME are average marginal effects; reported ME for dummy variables *Other Terminated* and *Own Terminated* are for a discrete change from 0 to 1. We report standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	Dependent variable = 1 if FM A shares in Round 1 and = 0 otherwise								
	(VI)	(VII)	(VIII)	(IX)	(X)	(XI)	(XII)	(XIII)	(XIV)
Matches 1–6									
Cross success	0.0027**	0.0035***	0.0035***	-0.0008	0.0015	0.0009	-0.0055	-0.0014	-0.0034
	(0.0011)	(0.0010)	(0.0010)	(0.0021)	(0.0022)	(0.0022)	(0.0078)	(0.0087)	(0.0081)
Expected intentions	0.0055***	0.0041***	0.0041***	0.0046***	0.0051***	0.0044***	0.0039**	0.0062***	0.0040***
	(0.0007)	(0.0007)	(0.0007)	(0.0013)	(0.0013)	(0.0013)	(0.0016)	(0.0014)	(0.0016)
Own success	0.0008	0.0010	0.0009	-0.0016	-0.0007	-0.0012	-0.0007	0.0026	0.0005
	(0.0011)	(0.0010)	(0.0010)	(0.0021)	(0.0020)	(0.0020)	(0.0071)	(0.0080)	(0.0073)
Other Terminated	-0.0723*		-0.0089	-0.2436***		-0.1658**	-0.4686***		-0.3626***
	(0.0428)		(0.0415)	(0.0737)		(0.0798)	(0.1043)		(0.1268)
Own Terminated		-0.2340***	-0.2314***		-0.2702***	-0.2066***		-0.3416***	-0.1664
		(0.0354)	(0.0374)		(0.0725)	(0.0798)		(0.0907)	(0.1082)
Observations	300	300	300	124	124	124	124	124	124
Matches 7 and higher									
Cross success	0.0044***	0.0034***	0.0032***	-0.0015	0.0000	-0.0010	-0.0321	-0.0297	-0.0297
	(0.0012)	(0.0011)	(0.0011)	(0.0029)	(0.0026)	(0.0028)	(2.3191)	(1.8160)	(1.8160)
Expected intentions	0.0055***	0.0050***	0.0050***	0.0073***	0.0069***	0.0070***	0.0110***	0.0103***	0.0103***
	(0.0006)	(0.0006)	(0.0006)	(0.0009)	(0.0009)	(0.0009)	(0.0016)	(0.0017)	(0.0017)
Own success	0.0018	0.0022**	0.0022**	-0.0032	-0.0024	-0.0021	-0.0335	-0.0357	-0.0249
	(0.0012)	(0.0011)	(0.0011)	(0.0022)	(0.0022)	(0.0022)	(2.3191)	(1.8160)	(1.8161)
Other Terminated	-0.0460		-0.1188	-0.2577		-0.2765	-0.2051		-0.4333
	(0.2148)		(0.1822)	(0.2969)		(0.2824)	(0.4753)		(0.9362)
Own Terminated		-0.4854***	-0.4867***		-0.3490**	-0.3549**		-0.4832**	-0.4832**
		(0.0822)	(0.0819)		(0.1562)	(0.1560)		(0.2138)	(0.2138)
Observations	278	278	278	105	105	105	105	105	105

Table B5: Determinants of Subjective Expectations by Match Groups

We report the results from tobit models for the determinants of a FM i's subjective expectations in t about FM j's intentions to share in $t+1$ in all treatments. The dependent variable is $\tilde{\sigma}_j \in [0, 100]$ in a given round t of a match. *Cross* p_j is FM j's cross-success probability; *Own* p_i is FM i's own-success probability; *Match* is the match number; *Round* is the round number, t, in a given match; *Other Terminated* is a dummy variable = 1 if FM i has previously had a match partner (either as FM i or FM j) who terminated their match by choice (i.e., concealed an idea), and = 0 otherwise; *Own Terminated* is a dummy variable = 1 if FM i has previously terminated a match by choice (i.e., concealed an idea) either as FM i or as FM j, and = 0 otherwise; *Other* × *Own Terminated* is an interaction term. Both *Other Terminated* and *Own Terminated* are, by definition, = 0 in the very first match. *Subject Dummies* indicates whether or not subject dummies are included to control for subject fixed effects. The number of observations is the total number of decisions by FM i in all t. The left-censoring limit for the tobit model is 0; the right-censoring limit is 100. We report standard errors in parentheses. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

	Dependent variable: FM i's subjective expectations $\tilde{\sigma}_j \in [0, 100]$ in a given round t of a match				
	(XV) Tobit	(XVI) Tobit	(XVII) Tobit	(XVIII) Tobit	(XIX) Tobit
Matches 1–6					
Cross success	0.3091***	0.3246***	0.3216***	-0.5072*	-0.5405**
	(0.0590)	(0.0570)	(0.0572)	(0.2651)	(0.2655)
Own success	0.0868	0.1230**	0.1223**	-0.5266**	-0.5643**
	(0.0606)	(0.0583)	(0.0582)	(0.2616)	(0.2623)
Round	2.3456***	2.1750***	2.1651***	0.4795*	0.4898**
	(0.3348)	(0.3217)	(0.3219)	(0.2458)	(0.2459)
Other Terminated		3.8012*	4.7342*	-6.8050***	-9.1285***
		(2.1541)	(2.6840)	(2.0556)	(2.4978)
Own Terminated		-18.9768***	-17.4933***	-0.9366	-4.3488
		(2.2412)	(3.3894)	(2.5527)	(3.2866)
Other × Own Terminated			-2.6384		7.0477
			(4.5282)		(4.2856)
Observations	824	824	824	824	824
Matches 7 and higher					
Cross success	0.5696***	0.5453***	0.5453***	0.1247	0.1247
	(0.0662)	(0.0661)	(0.0661)	(0.3279)	(0.3279)
Own success	0.3191***	0.3079***	0.3079***	-0.1725	-0.1725
	(0.0676)	(0.0669)	(0.0669)	(0.3335)	(0.3335)
Round	0.7293**	0.6740*	0.6740*	0.3341	0.3341
	(0.3592)	(0.3566)	(0.3566)	(0.2630)	(0.2630)
Other Terminated		1.9123	1.9123	-3.2359	-3.2359
		(7.7722)	(7.7722)	(10.5794)	(10.5794)
Own Terminated		-11.3394***	-11.3394***	-5.0646	-5.0646
		(2.6640)	(2.6640)	(5.0524)	(5.0524)
Other × Own Terminated			0.0000		0.0000
			(.)		(.)
Observations	750	750	750	750	750
Subject dummies	No	No	No	Yes	Yes

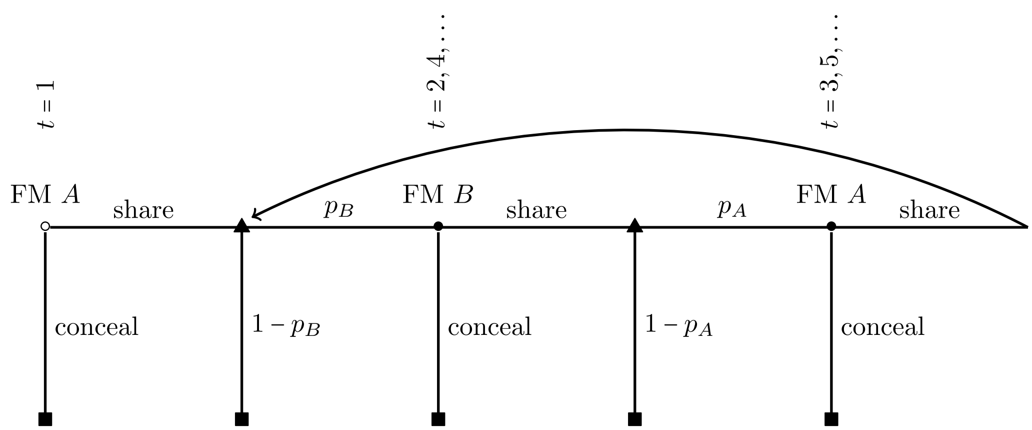
2 Additional Model Results

In this section we provide addition results for the asymmetric version of the word-of-mouth communication model (Stein, 2008) used in the main text.

2.1 Expected Duration

The communication continues for an indeterminate number of rounds. The expected duration of this game is finite as long as one of the FMs fails to generate a new idea, or decides to conceal a new idea, with strictly positive probability. Figure B2 reproduces the Figure with the timeline for the model from the main text.

Figure B2: Timeline of Word-of-Mouth Communication



For the derivations of the expected duration, suppose the FMs play time-invariant strategies, and let σ_i denote a mixed strategy played by a FM i, where $\sigma_i = \Pr(share)$ and $1 - \sigma_i = \Pr(conceal)$ in all $t \geq 1$.

Lemma B1. *The expected duration of word-of-mouth communication is*

$$1 + \frac{\sigma_A p_B}{1 - \sigma_A \sigma_B p_A p_B}$$

and finite if σ_i and p_i such that $\sigma_A \sigma_B p_A p_B < 1$. The effect of p_B on this expected duration is stronger than the effect of p_A if and only if σ_i and p_B such that $\sigma_A \sigma_B p_B < 1$.

Proof. To determine the expected duration of communication, we determine the probabilities δ_t that the game ends in a stage t (as depicted in Figure B2). Recall that σ_i is FM i's strategy with $\sigma_i = \Pr(share)$ and $1 - \sigma_i = \Pr(conceal)$.

- The game ends in Round 1 when (i) FM A conceals or (ii) when FM A shares and FM B fails. The probability of (i) or (ii) is

$$\delta_1 = 1 - \sigma_A + \sigma_A (1 - p_B) = 1 - \sigma_A p_B.$$

- The game ends in Round 2 when (i) FM A shares, FM B is successful, and FM B conceals; or (ii) FM A shares, FM B is successful, FM B shares, and FM A fails. The probability of (i) or (ii) is

$$\begin{aligned}\delta_2 &= \sigma_A p_B (1 - \sigma_B) + \sigma_A p_B \sigma_B (1 - p_A)\\ &= \sigma_A p_B (1 - \sigma_B p_A).\end{aligned}$$

- The game ends in Round 3 when (i) FM A shares, FM B is successful, FM B shares, FM A is successful, and FM A conceals; or (ii) FM A shares, FM B is successful, FM B shares, FM A is successful, FM A shares, and FM B fails. The probability of (i) or (ii) is

$$\begin{aligned}\delta_3 &= \sigma_A p_B \sigma_B p_A (1 - \sigma_A) + \sigma_A p_B \sigma_B p_A \sigma_A (1 - p_B)\\ &= \sigma_A p_B \sigma_B p_A (1 - \sigma_A p_B).\end{aligned}$$

- The probability that the game ends in Round 4 is $\delta_4 = (\sigma_A p_B)^2 \sigma_B p_A (1 - \sigma_B p_A)$; the probability that the game ends in Round 5 is $\delta_5 = (\sigma_A p_B)^2 (\sigma_B p_A)^2 (1 - \sigma_A p_B)$; the probability that the game ends in Round 6 is $\delta_6 = (\sigma_A p_B)^3 (\sigma_B p_A)^2 (1 - \sigma_B p_A)$; the probability that the game ends in Round 7 is $\delta_7 = (\sigma_A p_B)^3 (\sigma_B p_A)^3 (1 - \sigma_A p_B)$; and so forth.

The expected duration of word-of-mouth communication (i.e., the expected round in which it ends) is

$$\begin{aligned}D &= \sum_{q=0}^{\infty} \delta_{q+1} (q+1)\\ &= \sum_{q=0}^{\infty} (\sigma_A p_B)^q (\sigma_B p_A)^q \left[(1 - \sigma_A p_B)(1+q) + \sigma_A p_B (1 - \sigma_B p_A)(2+q)\right]\\ &= 1 + \frac{\sigma_A p_B}{1 - \sigma_A \sigma_B p_A p_B}. \qquad \text{(B1)}\end{aligned}$$

The derivative of the last expression, D, with respect to p_A is

$$\frac{\partial D}{\partial p_A} = \frac{p_B^2 \sigma_A^2 \sigma_B}{(1 - \sigma_A \sigma_B p_A p_B)^2} > 0$$

The derivative of D with respect to p_B is

$$\frac{\partial D}{\partial p_B} = \frac{\sigma_A}{\left(1 - \sigma_A \sigma_B p_A p_B\right)^2} > 0$$

At last,

$$\frac{\partial D}{\partial p_B} > \frac{\partial D}{\partial p_A} \iff \sigma_A \sigma_B p_B^2 < 1, \tag{B2}$$

implying that the effect of FM B's success probability is stronger than FM A's success probability if and only if σ_i and p_i such that $\sigma_A \sigma_B p_B < 1$ Q.E.D.

Lemma B1 implies that FM B's (i.e., the follower's) success probability has a larger impact on the duration of communication than FM A's (i.e., the leader whose initial idea is taken as a given).

2.2 Expected Payoffs from Sharing an Idea

Below, we provide more details on how FM i's expected payoffs from sharing a newly generated idea in t in expression (5) in the main text are generated:

Lemma B2. *FM i's expected payoffs from sharing a newly generated idea in t are:*

$$EU_i(share@t) = (1-\theta) \sum_{q=0}^{\infty} (p_i p_j \tilde{\sigma}_j)^q \left[(1 - p_j \tilde{\sigma}_j)\, v(t+2q) + p_j \tilde{\sigma}_j\, (1-p_i)\, v(t+1+2q) \right].$$

Proof. First, note that in period t, FM i holds $n_i = t$. We construct the payoffs by determining the probabilities that FM i has exactly $n_i = t + q$ ideas for $q = 0, \ldots, \infty$. With $t + q$ ideas FM i's payoffs are $v(t+q)$ in its own Segment i and $\max\{v(t+q) - v(t+q-1), 0\}$ in the competitive Segment C. We assume that once FM i chooses to share in t, she shares in all future $t' > t$. Hence, $\sigma_i = 1$.

- When FM i shares an idea in t, both FMs have t ideas and FM i's payoffs are $(1-\theta)\, v(t)$ with probability $1 - p_j \tilde{\sigma}_j$, that is, the probability that (i) FM j fails to generate a new idea in $t+1$ (probability $1 - p_j$); or (ii) FM j generates a new idea but conceals it in $t+1$ (probability $p_j\,(1 - \tilde{\sigma}_j)$).

- Both FMs have $t+1$ ideas and FM i's payoffs are $(1-\theta)\, v(t+1)$ with probability $p_j \tilde{\sigma}_j\,(1-p_i)$, that is, the probability that FM j generates and shares a new idea in $t+1$ (probability $p_j \tilde{\sigma}_j$) but FM i fails to generate a new idea in $t+2$ (probability $1 - p_i$).

- FM i has $t+2$ ideas, FM j has at least $t+2$ ideas, and FM i's payoffs are $(1-\theta)\,v(t+2)$ with probability $p_j\tilde{\sigma}_j p_i\,(1-p_j\tilde{\sigma}_j)$, that is, the probability that (i) FM j generates and shares a new idea in $t+1$ (probability $p_j\tilde{\sigma}_j$), FM i generates and shares a new idea in $t+2$ (probability p_i), but FM j fails to generate a new idea in $t+3$ (probability $1-p_j$); or (ii) FM j generates and shares a new idea in $t+1$ (probability $p_j\tilde{\sigma}_j$), FM i generates and shares a new idea in $t+2$ (probability p_i), and FM j generates a new idea but conceals it in $t+3$ (probability $p_j\,(1-\tilde{\sigma}_j)$).

- Both FMs have $t+3$ ideas and FM i's payoffs are $(1-\theta)\,v(t+3)$ with probability $(p_j\tilde{\sigma}_j)^2\,p_i\,(1-p_i)$, that is, the probability that (i) FM j generates and shares a new idea in $t+1$ (probability $p_j\tilde{\sigma}_j$), FM i generates and shares a new idea in $t+2$ (probability p_i), FM j generates and shares a new idea in $t+3$ (probability $p_j\tilde{\sigma}_j$), but FM i fails to generate a new idea in $t+4$ (probability $1-p_i$).

- FM i has $t+4$ ideas, FM j has at least $t+4$ ideas, and FM i's payoffs are $(1-\theta)\,v(t+4)$ with probability $(p_j\tilde{\sigma}_j)^2\,(p_i)^2\,(1-p_j\tilde{\sigma}_j)$, that is, the probability that (i) FM j generates and shares a new idea in $t+1$ (probability $p_j\tilde{\sigma}_j$), FM i generates and shares a new idea in $t+2$ (probability p_i), FM j generates and shares a new idea in $t+3$ (probability $p_j\tilde{\sigma}_j$), FM i generates and shares a new idea in $t+4$ (probability p_i), but FM j fails to generate a new idea in $t+5$ (probability $1-p_j$); or (ii) FM j generates and shares a new idea in $t+1$ (probability $p_j\tilde{\sigma}_j$), FM i generates and shares a new idea in $t+2$ (probability p_i), FM j generates and shares a new idea in $t+3$ (probability $p_j\tilde{\sigma}_j$), FM i generates and shares a new idea in $t+4$ (probability p_i), FM j generates a new idea but conceals it in $t+5$ (probability $p_j\,(1-\tilde{\sigma}_j)$).

- FM i's payoffs are $(1-\theta)\,v(t+5)$ with probability $(p_j\tilde{\sigma}_j)^3\,(p_i)^2\,(1-p_i)$.

- FM i's payoffs are $(1-\theta)\,v(t+6)$ with probability $(p_j\tilde{\sigma}_j)^3\,(p_i)^3\,(1-p_j\tilde{\sigma}_j)$.

- etc.

Continuing in this fashion and summing up FM i's payoffs for each $q=0,\ldots,\infty$ weighted by the respective probability yields the expression for FM i's expected payoffs from sharing.

Q.E.D.

2.3 Characterization of Equilibria

In Proposition 1 in the main text, we characterize FM i's incentive to share given success probabilities p_i and her own expectations about FM j's behavior in the following rounds, $\tilde{\sigma}_j$. In his section, we provide characterizations of the equilibria (in both pure strategies and mixed strategies) in the model of word-of-mouth communication.

We characterize the pure-strategy equilibria in Lemma B3 below using the functional form for the valuation function in the main text: $v(n) = 1 - \beta^n$. We can rewrite the sharing condition in expression (7) in the main text as:

$$\tilde{\sigma}_j \geq \frac{\theta}{(1-\theta+\beta p_i)\,\beta p_j}. \tag{B3}$$

This condition defines FM i's best response function, $s_i : [0,1] \to \{share, conceal\}$. If FM j is expected to share with sufficiently high probability, that means, if $\tilde{\sigma}_j$ is sufficiently high, then FM i will share. Conversely, if FM i expects FM j to share a newly generated idea with low probability, then FM i will in return choose to conceal her idea and end the conversation:

$$s_i(\tilde{\sigma}_j) = \begin{cases} share & \text{if } \tilde{\sigma}_j \geq \dfrac{\theta}{(1-\theta+\beta p_i)\,\beta p_j} \\ conceal & \text{if } \tilde{\sigma}_j < \dfrac{\theta}{(1-\theta+\beta p_i)\,\beta p_j}. \end{cases} \tag{B4}$$

Given this best-response function and the analogous function $s_j(\tilde{\sigma}_i)$ for FM j, we characterize the pure-strategy equilibria of word-of-mouth communication as follows:

Lemma B3. *Let $v(n) = 1 - \beta^n$:*

1. *A pure-strategy equilibrium in which both FMs never share an idea always exists.*
2. *A pure-strategy equilibrium in which both FMs always share a newly generated idea and communication continues until one of the FMs fails to generate a new idea exists only if*

$$\frac{1+\beta p_i}{1+\beta p_j}\beta p_j \geq \theta \qquad \textit{and} \qquad \frac{1+\beta p_j}{1+\beta p_i}\beta p_i \geq \theta. \tag{B5}$$

Proof. First, note that, in equilibrium, $\tilde{\sigma}_j = \sigma_j$.

1. Suppose FM j always conceals and $\sigma_j = 0$. Then FM i's sharing condition in expression (7) in the main text:,

$$\phi_i(p_i, p_j, \sigma_j) \equiv \frac{1 + \beta p_i}{1 + \beta p_j \sigma_j} \beta p_j \sigma_j - \theta \geq 0$$

is violated in all t because $\phi_i(p_i, p_j, 0) = -\theta < 0$ so that $\sigma_i = 0$. For $\sigma_i = 0$, FM j's sharing condition is violated in all t because $\phi_j(p_j, p_i, 0) = -\theta < 0$ so that $\sigma_j = 0$, inducing FM i to conceal in all t.

2. In order for a FM i to share, her necessary condition $\phi_i(p_i, p_j, \sigma_j) \geq 0$ must be satisfied, given FM j's strategy σ_j. We first show that if the two conditions in the Lemma are satisfied, then both FMs always share a newly generated idea. We then show that, if at least one of them is violated, neither FM i nor FM j will ever share a newly generated idea.

   - First, observe that if both FMs always share and $\sigma_i = \sigma_j = 1$, then the two conditions in (B5) are equivalent to $\tilde{\phi}_i := \phi_i(p_i, p_j, 1) \geq 0$ and $\tilde{\phi}_j := \phi_j(p_j, p_i, 1) \geq 0$. If $\tilde{\phi}_i \geq 0$ and FM i anticipates (in equilibrium) that FM j continues in all $t' > t$ so that $\sigma_j = 1$, then FM i continues in any t because her necessary condition $\tilde{\phi}_i \geq 0$ holds. Then $\sigma_i = 1$. If $\tilde{\phi}_j \geq 0$ and FM j anticipates (as FM i's best response to σ_j) that FM i continues in all $t' > t$ so that $\sigma_i = 1$, then FM j continues in any t because her necessary condition $\tilde{\phi}_j \geq 0$ holds. Then $\sigma_j = 1$.
   - Now suppose that $\tilde{\phi}_j \geq 0$ but $\tilde{\phi}_i < 0$. This implies that $\phi_i(p_i, p_j, 1) < 0$, and $\phi_i(p_i, p_j, \sigma_j) < 0$ for all σ_j because $\phi_i(p_i, p_j, \sigma_j)$ increases in σ_j (see Proposition 1 in the main text). This means that for any strategy σ_j, FM i conceals an idea in t. Anticipating this, FM j expects in $t{-}1$ payoffs of $EU_i(share@t{-}1) = (1 - \theta)\, v(t{-}1)$ when it shares and $U_i(conceal@t{-}1) = v(t{-}1) {-} \theta v(t{-}2)$ when it conceals. It decides to conceal because $EU_i(share@t - 1) < U_i(conceal@t - 1)$ as $v(t - 1) > v(t - 2)$. Because FM i conceals in any t, FM j will respond by concealing in any $t - 1$. The game therefore unravels and FM A conceals in $t = 1$.
   - The analogous argument applies to the case of $\tilde{\phi}_i \geq 0$ but $\tilde{\phi}_j < 0$. Q.E.D.

The first result in Lemma B3 suggests that, irrespective of the underlying parameters, there is always an equilibrium in which communication is not sustainable and new ideas are not shared. In the scenario in which an equilibrium with communication exists (i.e., the conditions in the Lemma hold), the no-communication equilibrium (part 1) is payoff-dominated by the communication equilibrium (part 2).

Observe that, if $p_i > p_j$, then FM i's sharing condition is the binding condition for word-of-mouth communication to be sustained in equilibrium. More generally, the binding condition is the condition for the FM with the higher success probability.

In Lemma B4, we characterize the mixed-strategy equilibrium when the two necessary conditions (B5) for a sharing equilibrium in Lemma B3 are satisfied.

Lemma B4. *Let the two conditions in Lemma B3 be satisfied. The communication game has a mixed strategy equilibrium in which FM $i = A, B$, $i \neq j$, shares newly arrived ideas with probability*

$$\sigma_i = \frac{\theta}{(1 - \theta + \beta p_j)\, \beta p_i}. \tag{B6}$$

Proof. In equilibrium, a FM's expectations about the rival's strategy are correct, that means, $\tilde{\sigma}_j = \sigma_j$. Moreover, in a mixed-strategy equilibrium, FM i chooses a mixed strategy if she is indifferent between *share* and *conceal*. By the expression in (B4), FM i is indifferent if $\tilde{\sigma}_j = \sigma_j = \frac{\theta}{(1-\theta+\beta p_i)\beta p_j}$, and therefore indifferent between the pure actions and any mixture, σ_i. If $\sigma_i = \frac{\theta}{(1-\theta+\beta p_j)\beta p_i}$, then FM j is indifferent and willing to play a strategy σ_j as above. Q.E.D.

Lemma B4 characterizes the time-invariant mixed-strategy equilibrium for the communication game when the conditions for a sharing equilibrium in Lemma B3 are satisfied. For $\theta > 0$, FM i will share with strictly positive probability. Moreover, FM i shares with probability strictly less than unity if

$$\frac{1 + \beta p_j}{1 + \beta p_i} \beta p_i > \theta.$$

This means that only when the sharing condition for FM j in Lemma B3 holds with strict inequality will FM i randomize between sharing and concealing a new idea.

3 Material for Experiment

3.1 Instructions (for Treatment Low-High)

Experiment Overview

You are about to participate in an experiment on the economics of decision-making. If you listen carefully and make good decisions, you can earn a considerable amount of money. You will be paid in cash at the end of the experiment.

Please do not communicate with the other participants. If you have questions, please raise your hand. The experimenter will come to you to answer them.

It will take you about 90 minutes to complete this session. After the experiment, you will be given a short survey to complete.

You will be working with a fictitious currency called *Francs*.

Exchange rate: 100 *Francs* = 1 USD

Today's experiment consists of two tasks. In Task 1, you will be asked to choose from a pair of options. Each option involves two payments. Each payment has a specified probability (i.e., choose one of two lotteries). For Task 2, you and another player in this room will be matched to perform a computer experiment.

Detailed Instructions

Task 1: Choose a Lottery

Your decision sheet shows ten decisions listed on the right. Each decision is a paired choice between "Choice A" and "Choice B." You will make ten decisions and record these in the first column. You may choose A for some decision rows and B for other rows. You may change your decisions and make them in any order. Only one of these decisions will be used to determine your earnings upon completion of Task 2.

A ten-sided die is used to determine your earnings. The faces are numbered from 1 to 10 (the "0" face will serve as 10.) After you have made all of your Task 1 decisions and completed the computer experiment (Task 2) you will be asked to come to the front desk. The experimenter will throw the die twice: The first throw will determine which of your ten decisions is to be used. Given your choice for this decision (A or B), the second throw will determine your earnings (in Francs). The earnings for this choice will be added to your earnings from Task 2, and, when finished, you will be paid all earnings in cash.

Even though you will make ten decisions, only one of these will affect your earnings. You will not know in advance which decision will be used. Obviously, each decision has an equal chance of being used in the end.

Look at Decision 1 and Decision 2:

Your Choice	Choice A	Choice B
Write A or B	Die face 1 pays 200 (chance of 1/10) Die face 2-10 pays 160 (chance of 9/10)	Die face 1 pays 385 (chance of 1/10) Die face 2-10 pays 10 (chance of 9/10)
Write A or B	Die face 1-2 pays 200 (chance of 2/10) Die face 3-10 pays 160 (chance of 8/10)	Die face 1-2 pays 385 (chance of 2/10) Die face 3-10 pays 10 (chance of 8/10)

For Decision 1, Choice A pays 200 Francs if the throw of the ten-sided die is 1 (i.e., with a chance of 1/10), and it pays 160 Francs if the throw is 2 through 10 (i.e., with a chance of 9/10). Choice B yields 385 Francs if the throw of the die is 1 (chance of 1/10), and it pays 10 Francs if the throw is 2 through 10 (chance of 9/10).

For Decision 2, Choice A pays 200 Francs if the throw of the ten-sided die is either 1 or 2 (i.e., with a chance of 2/10), and it pays 160 Francs if the throw is 3 through 10 (i.e., with a chance of 8/10). Choice B yields 385 Francs if the throw of the die is either 1 or 2 (chance of 2/10), and it pays 10 Francs if the throw is 3 through 10 (chance of 8/10).

Decisions 3 through 10 are similar except that as you move further down the table, the chance of the higher payoff for each choice increases. Since either option in Decision 10 pays the highest with certainty (200 or 385 Francs), the die will not be needed.

Are there any questions?

You may now begin making your choices. Look at the empty boxes on the left side of the record sheet. For each decision row, decide between Choice A and B and write your decisions in these boxes until all ten decisions are complete.

Please do not talk with anyone during the experiment. If you have any questions, raise your hand. After you have completed this task, please stay in your seat. Once all participants have finished, the computer experiment (Task 2) will begin.

Task 2: Computer Experiment

Below is an explanation about the decisions you will be making in the computer experiment, the players you will be playing against, and the information you will receive and have available during this experiment.

Players: You are a fund manager. Your goal is to earn as much money as possible. Your earnings can increase in two ways: a) increase the returns from your investments and b) obtain more investors.

24 people in this room are participating in this experiment. That splits into two groups of 12 each. To begin the game, you will be randomly matched with another player from your group. Then there will be a series of matches. For the first match, you and this player will be randomly assigned roles (either Fund Manager A or Fund Manager B). There

will be several matches, all with different players from your group. You will be matched with the same person only once. During each match, you will play the game for an undetermined number of rounds. From one match to another, your assignment as either Fund Manager A or Fund Manager B is determined randomly. You may be assigned as Fund Manager A for some matches and as Fund Manager B for other matches. This is determined randomly. This means that you will not be matched with a person with whom you have previously been matched, regardless of whether you were Fund Manager A or Fund Manager B.

Your identity is kept anonymous for the entire experiment. You are only displayed as "Fund Manager A" or "Fund Manager B."

Your decision affects only you and the person with whom you are matched. Your decision does not affect the other people participating in this experiment.

Setup: The investors you are trying to attract are divided into three segments.

Fund Manager A has completely captured the investors in Segment A. These investors have already invested with Fund Manager A and are currently in a lock-up period. This means, these investors have agreed not to move their investments for a period of several years. Therefore, they are locked-up with Fund Manager A. As Fund Manager A, you charge each Segment A investor a fee. As you generate greater returns for investors in Segment A, the fee increases. Therefore, even though these investors are locked-up, Fund Manager A is better off by generating higher returns for these investors.

For the same reason, Fund Manager B has completely captured the investors in Segment B. As Fund Manager B, you charge a fee to the investors in Segment B. Even though the Segment B investors are locked-up, the Fund Manager B receives higher fees by generating higher returns for these investors.

Segment C consists of new investors. They are not locked-up by either of the managers. Therefore, Fund Manager A and Fund Manager B must compete for the investors in Segment C. Investors in Segment C will invest with the fund manager who provides the highest expected returns.

Note that none of the participants in this experiment are assigned the role of "investor." Decisions made by investors are done automatically. This means that investors will automatically choose the fund manager who offers the highest expected return.

Many of the computations are done for you and the payments will be clearly shown to you in a table format. You do not have to figure out the fees you want to charge nor the expected return of the investment. The computer will automatically compute these for you and show you your actual earnings. The only decision you, as the fund manager, will have to make is explained below.

Decision: Fund managers increase their returns as they gain more knowledge or information about potential investments. This information is referred to as "ideas." Having more ideas will give you an advantage over the other fund manager and you will be able to generate higher returns. Furthermore, if you have more ideas than the other fund manager, you will capture all the investors in Segment C. Conversely, if you have fewer ideas than the other fund manager, you will not capture any of the investors in Segment C. Essentially, the manager with the most ideas will capture all the investors in Segment C. Finally, if you and the other fund manager have the same number of ideas, then you will split the investors in Segment C evenly, but you will both have zero earnings from this segment.

Note that because Segments A and B's investments are locked-up, the competition between Fund Manager A and Fund Manager B does not affect those investments; however, having more ideas will increase the earnings the fund manager receives from Segment A or Segment B.

Your decision, as the fund manager, is to decide whether or not to share your ideas with the competing fund manager.

Fund Manager A initially starts out with one idea. Fund Manager B starts out with no ideas. Look at the diagram on the following page.

- In round 1, Fund Manager A must decide whether or not to share his one idea with Fund Manager B (starts with no ideas). If Fund Manager A chooses not to share, the match terminates and the earnings are realized. In that case, Fund Manager A has one idea and Fund Manager B has no ideas. If Fund Manager A chooses to share, then the experiment moves on to round 2.

- At the beginning of round 2, both fund managers start with one idea. Here, there is a 90% chance that Fund Manager B will generate a new idea and a 10% chance that Fund Manager B will not be able to generate a new idea (denoted as ï¿½chanceï¿½ in the following diagram). If Fund Manager B does not generate a new idea, then the match terminates with each manager having one idea and the earnings are realized. If Fund Manager B generates a new idea, then Fund Manager B has a total of two ideas while Fund Manager A has only one idea. At this time, Fund Manager B must decide whether or not to share this new idea with Fund Manager A. If Fund Manager B does not share, then the match terminates and the earnings are realized. If Fund Manager B chooses to share, then the experiment moves on to round 3.

- Similar to the previous round, at the beginning of round 3 both fund managers begin with two ideas. This time, there is a 50% chance that Fund Manager A generates a new idea and a 50% chance that Fund Manager A will not be able to generate a new idea. If Fund Manager A does not generate a new idea, then the match terminates with each manager having two ideas and the earnings are realized. If Fund Manager A generates a new idea, then Fund Manager A has a total of three ideas while Fund Manager B has only two ideas. At this time, Fund Manager A must decide whether or not to share this new idea with Fund Manager B. If Fund Manager A does not share, then the match terminates and the earnings are realized. If Fund Manager A chooses to share, then the experiment moves on to round 4.

- This process will continue until the match is terminated. Termination occurs either by one of the managers not sharing a new idea or when a new idea fails to be generated. As you may have noticed, the decisions are made in alternating sequence between Fund Manager A and Fund Manager B. Furthermore, the only way for a fund manager to generate a new idea is to have one shared with he or she by the other manager in the previous round.

- Finally, note that the chance of the Fund Manager A generating a new idea is always 50% while the chance of the Fund Manager B generating a new idea is always 90%.

Termination of a match: There are two ways your current match can terminate:

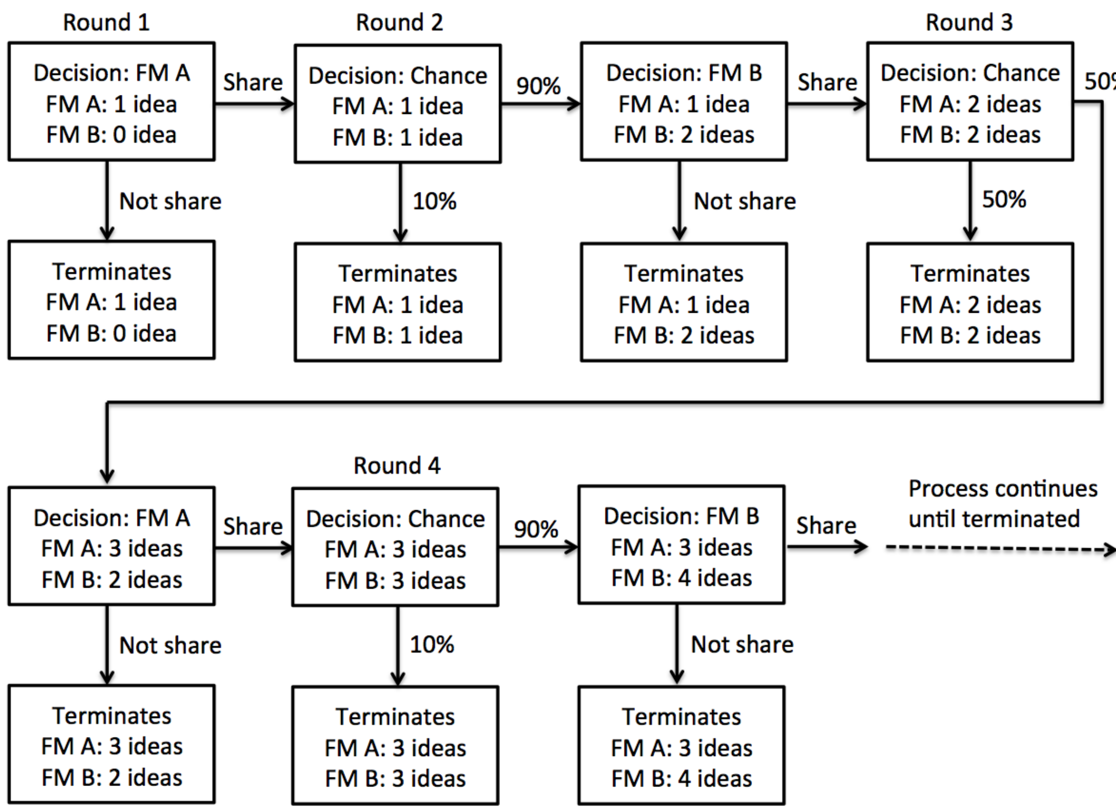
- Chance: At the beginning of each round (after the first round), there is a chance that the match terminates. This is because the fund manager (whose turn it is in this round) is not able to generate a new idea. This chance of successfully or unsuccessfully generating an idea is different between the Fund Manager A and the Fund Manager B. For Fund Manager A, there is a 50% chance of generating a new idea and 50% chance of failing to generate a new idea. This means that there is a 50% chance that the match terminates when it is Fund Manager A's round. For Fund Manager B, there is a 90% chance of generating a new idea and 10% chance of failing to generate a new idea. This means that there is a 10% chance that the match terminates when it is Fund Manager B's round.

  Think of a 10% chance as in the following analogy: There are 10 balls in a jar: 9 blue balls and 1 red ball. One ball is drawn from the jar and, if it is a red ball, the match terminates. The match continues if any one of the blue balls is drawn. In the actual experiment, the experiment's program is used to mimic this process.

  Similarly, think of 50% chance as in the following analogy: There are 2 balls in a jar: 1 blue ball and 1 red ball. One ball is drawn from the jar and, if it is a red ball, the match terminates. The match continues if the blue ball is drawn. In the actual experiment, the experiment's program is used to mimic this process.

- A fund manager decides not to share an idea: The current match terminates if the fund manager decides not to share a newly generated idea.

The figure below summarizes the above statements:



Note: "Chance" makes the move before the fund manager is able to decide to share or terminate.

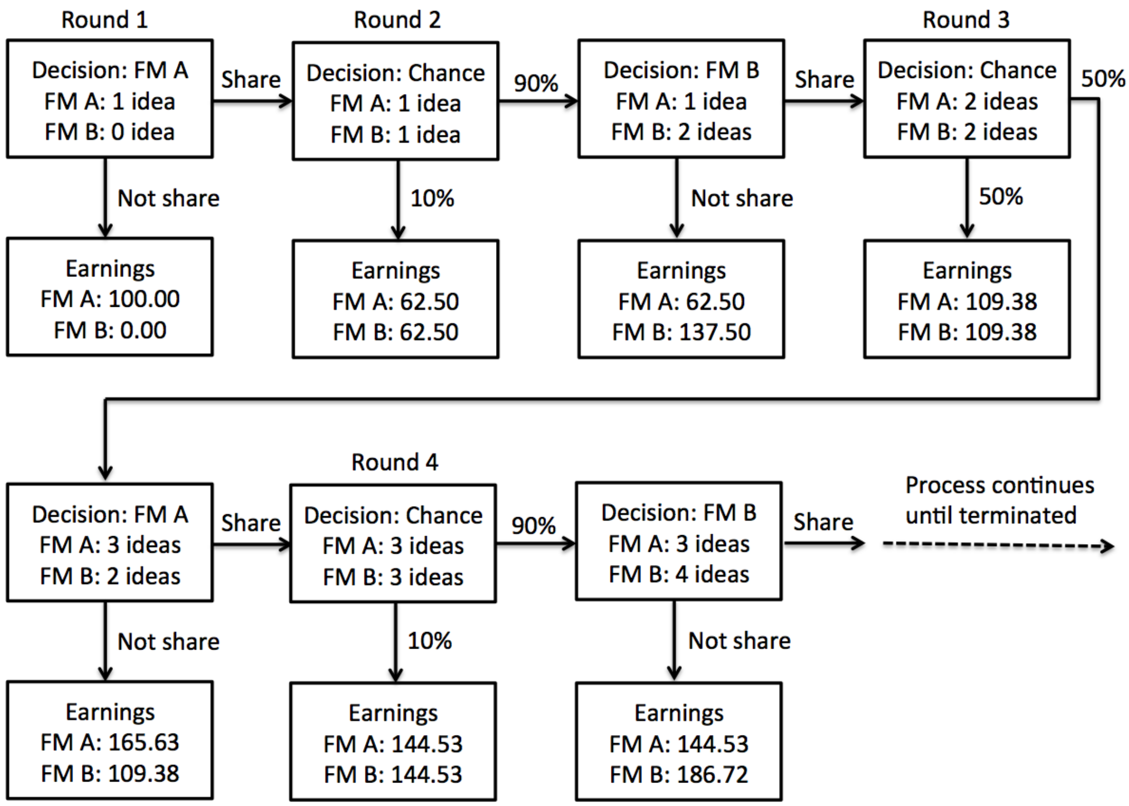
Note: The specific round of termination of a match is not set by the experimenter. The match continues (potentially indefinitely) as long as neither the fund managers nor "chance" terminates.

Note: While the other fund manager makes his or her decision you will see a screen asking you to wait until it is again your turn. Please always click the "Continue" button when you see it on the screen for the experiment to continue.

Information: You and the person with whom you are matched will both know whether the termination is due to "chance" or because the other fund manager decided not to share a newly generated idea. When you and the other fund manager have the same realized earnings, then the match is terminated by "chance." If it is not terminated by "chance," then the match is terminated by the other fund manager.

New Match: When the current match terminates, please wait until everyone else's match terminates as well. When all matches are terminated, you will be randomly matched with a new player from your group and begin again. This procedure will be repeated until you have been matched exactly once with all other players in your group.

Earnings: Earnings for each match are determined in the following manner. First, the figure below shows you the total earnings for each fund manager, conditional on how the match was terminated.



For a better understanding of earnings when the match is terminated, the following table shows each fund manager's earnings from Segment A, Segment B and Segment C. This is the information you will be provided on your computer screen.

Note: Due to rounding errors (a possible difference of 0.01), the sum of segment earnings (Segment A and Segment C for Fund Manager A and Segment B and Segment C for Fund Manager B) may not be exactly the same as the Total Earnings. Your definitive earnings is your Total Earnings.

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Round	Terminated by	Earnings Fund Manager A		Earnings Fund Manager B	
1	Fund Manager A	Segment A:	62.50	Segment B:	0.00
		Segment C:	37.50	Segment C:	0.00
		Total:	100.00	Total:	0.00
2	Chance	Segment A:	62.50	Segment B:	62.50
		Segment C:	0.00	Segment C:	0.00
		Total:	62.50	Total:	62.50
	Fund Manager B	Segment A:	62.50	Segment B:	109.38
		Segment C:	0.00	Segment C:	28.13
		Total:	62.50	Total:	137.50
3	Chance	Segment A:	109.38	Segment B:	109.38
		Segment C:	0.00	Segment C:	0.00
		Total:	109.38	Total:	109.38
	Fund Manager A	Segment A:	144.53	Segment B:	109.38
		Segment C:	21.09	Segment C:	0.00
		Total:	165.63	Total:	109.38
4	Chance	Segment A:	144.53	Segment B:	144.53
		Segment C:	0.00	Segment C:	0.00
		Total:	144.53	Total:	144.53
	Fund Manager B	Segment A:	144.53	Segment B:	170.90
		Segment C:	0.00	Segment C:	15.82
		Total:	144.53	Total:	186.72
5	Chance	Segment A:	170.90	Segment B:	170.90
		Segment C:	0.00	Segment C:	0.00
		Total:	170.90	Total:	170.90
	Fund Manager A	Segment A:	190.67	Segment B:	170.90
		Segment C:	11.87	Segment C:	0.00
		Total:	202.54	Total:	170.90
6	Chance	Segment A:	190.67	Segment B:	190.67
		Segment C:	0.00	Segment C:	0.00
		Total:	190.67	Total:	190.67
	Fund Manager B	Segment A:	190.67	Segment B:	205.51
		Segment C:	0.00	Segment C:	8.90
		Total:	190.67	Total:	214.40
7	Chance	Segment A:	205.51	Segment B:	205.51
		Segment C:	0.00	Segment C:	0.00
		Total:	205.51	Total:	205.51
	Fund Manager A	Segment A:	216.63	Segment B:	205.51
		Segment C:	6.67	Segment C:	0.00
		Total:	223.30	Total:	205.51

Round	Terminated by	Earnings Fund Manager A		Earnings Fund Manager B	
8	Chance	Segment A:	216.63	Segment B:	216.63
		Segment C:	0.00	Segment C:	0.00
		Total:	216.63	Total:	216.63
	Fund Manager B	Segment A:	216.63	Segment B:	224.97
		Segment C:	0.00	Segment C:	5.01
		Total:	216.63	Total:	229.98
9	Chance	Segment A:	224.97	Segment B:	224.97
		Segment C:	0.00	Segment C:	0.00
		Total:	224.97	Total:	224.97
	Fund Manager A	Segment A:	231.23	Segment B:	224.97
		Segment C:	3.75	Segment C:	0.00
		Total:	234.98	Total:	224.97
10	Chance	Segment A:	231.23	Segment B:	231.23
		Segment C:	0.00	Segment C:	0.00
		Total:	231.23	Total:	231.23
	Fund Manager B	Segment A:	231.23	Segment B:	235.92
		Segment C:	0.00	Segment C:	2.82
		Total:	231.23	Total:	238.74
11	Chance	Segment A:	235.92	Segment B:	235.92
		Segment C:	0.00	Segment C:	0.00
		Total:	235.92	Total:	235.92
	Fund Manager A	Segment A:	239.44	Segment B:	235.92
		Segment C:	2.11	Segment C:	0.00
		Total:	241.55	Total:	235.92
12	Chance	Segment A:	239.44	Segment B:	239.44
		Segment C:	0.00	Segment C:	0.00
		Total:	239.44	Total:	239.44
	Fund Manager B	Segment A:	239.44	Segment B:	242.08
		Segment C:	0.00	Segment C:	1.58
		Total:	239.44	Total:	243.66
13	Chance	Segment A:	242.08	Segment B:	242.08
		Segment C:	0.00	Segment C:	0.00
		Total:	242.08	Total:	242.08
	Fund Manager A	Segment A:	244.06	Segment B:	242.08
		Segment C:	1.19	Segment C:	0.00
		Total:	245.25	Total:	242.08
14	Chance	Segment A:	244.06	Segment B:	244.06
		Segment C:	0.00	Segment C:	0.00
		Total:	244.06	Total:	244.06
	Fund Manager B	Segment A:	244.06	Segment B:	245.55
		Segment C:	0.00	Segment C:	0.89
		Total:	244.06	Total:	246.44

Although the table shows the first 14 rounds, the game continues (potentially indefinitely) until the match terminates. For every round during the experiment, you will be provided on your computer screen with the current round's earnings and the next round's potential earnings for both Fund Manager A and Fund Manager B. You may reference the above chart as well.

Note: While each additional idea increases your earnings, the next additional idea adds less of an improvement than the previous idea. This means that the first idea results in the greatest earnings increase; then the second idea results in a slightly smaller earnings increase; then the third idea results in less, and so on.

In Summary, your earnings as a fund manager are determined in two parts:

The **first part** of your earnings is determined by how many ideas you have. The more ideas you collect, the greater the return (and earnings) will be for this part. In order to collect more ideas, you and the other fund manager must generate and share your respective ideas with each other. In this way, having more ideas always increases Fund Manager A earnings from Segment A or for Fund Manager B from Segment B.

The **second part** of your earnings is determined by whether you have more ideas than the fund manager you are currently matched with. Finishing the game with more ideas than the other fund manager means that you will capture all the investors in Segment C. Thus, you will capture all the earnings from Segment C as well. Conversely, finishing the game with the same number of ideas as the other fund manager, or less ideas, will result in you having no earnings from Segment C.

Expectations: During the round in which you are deciding whether or not to share a newly generated idea, you will be asked the following question:

If, in the next round, the other fund manager successfully generates a new idea (i.e., "chance" does not terminate the match), how likely do you think the other fund manager will share this newly generated idea with you?

In the field provided, fill in these expectations. Enter a number between 0% and 100% (You do not have to add the %-sign).

Note: The probability that the other fund manager generates a new idea in the next round is 50% for Fund Manager A and 90% for the Fund Manager B. You are asked to enter your expectations of the other fund manager sharing this idea given that it has been generated.

Quiz

Note: The quiz does not affect your earnings.

1. Assume that you are Fund Manager A. During Round 6, do you make a decision?

2. Assume that you are Fund Manager B. During Round 3, Fund Manager A decided not to share the new idea with you. What are your earnings?

3. Assume that you are Fund Manager B. During Round 5, Fund Manager A has decided to share his or her idea with you. At the beginning of Round 6, however, you fail to generate a new idea ("chance" terminates the match). What are your earnings? What are Fund Manager A's earnings?

4. In question 3, do you, as Fund Manager B, get to make a decision after "chance" terminates the match in Round 5 (i.e., when Fund Manager A fails to generate a new idea)?

5. Assume that you are Fund Manager B. During Round 5, Fund Manager A has decided to share the new idea with you. At the beginning of Round 6, "chance" does not terminate your match (i.e., you generate a new idea). What are your earnings if you do not share the new idea? What are Fund Manager A's earnings?

6. In question 5, if you, as Fund Manager B, decide to share the new idea, then "chance" will determine whether the game terminates or not. If "chance" does not terminate (i.e., Fund Manager A generates a new idea), does Fund Manager A get to make his or her decision on whether to share the new idea with you?

7. Assume that you are Fund Manager B. In any round when it is your turn to make a decision, "chance" will first determine whether the game terminates or not. What is the probability that you fail to generate a new idea (the game terminates) and prevents you from making your decision?

8. Assume that you are Fund Manager A. After the first round, in any round when it is your turn to make a decision, "chance" will first determine whether the game terminates or not. What is the probability that you successfully generate a new idea (game does not terminate) and allows you the make your decision?

Procedural Summary

Here is what will happen after the instructions:

1. The first match will begin and you will be told what role you are assigned (Fund Manager A or Fund Manager B).

2. When it is your turn to make a decision (i.e., you have generated a new idea), you will be shown the earnings for this and the next several rounds; asked whether you wish to share your idea or not; and also asked to estimate the probability that the matched fund manager will choose to share his or her idea in next round. This continues until the match is terminated, but there is no predetermined end point for any given match: the match can be terminated only by "chance" (i.e., a fund manager fails to generate a new idea) or by the fund manager (he or she decides not to share). You will then be shown your earnings and the other fund manager's earnings. Because there are other matches simultaneously participating in this experiment, you must wait until everyone else's matches are also terminated.

3. When all matches are terminated, you will be randomly matched with another person and randomly assigned a new role (A or B). Then you and the new match will play the game again.

4. This continues until there are no more possible matches with the people in your group. You will know that the experiment has ended when you see a final survey showing up on your screen.

5. The experimenter will then ask you individually to come to the front. You will be paid in cash. Your total cash will be based upon the outcome of your decision in Task 1; and how much you earned in your matches combined during today's computer experiment (Task 2). In other words, you will be paid the total of Task 1 and Task 2 earnings.

3.2 Record Sheet for Holt-Laury Task

Task 1: Choose a Lottery

Please write your choices in the box provided on the left. Select either **Choice A** or **Choice B**, and write **"A"** or **"B"** to indicate your selection.

Your Choice:	Choice A	Choice B
	Die face 1 pays 200 (chance of $^{1}/_{10}$) Die face 2-10 pays 160 (chance of $^{9}/_{10}$)	Die face 1 pays 385 (chance of $^{1}/_{10}$) Die face 2-10 pays 10 (chance of $^{9}/_{10}$)
	Die face 1-2 pays 200 (chance of $^{2}/_{10}$) Die face 3-10 pays 160 (chance of $^{8}/_{10}$)	Die face 1-2 pays 385 (chance of $^{2}/_{10}$) Die face 3-10 pays 10 (chance of $^{8}/_{10}$)
	Die face 1-3 pays 200 (chance of $^{3}/_{10}$) Die face 4-10 pays 160 (chance of $^{7}/_{10}$)	Die face 1-3 pays 385 (chance of $^{3}/_{10}$) Die face 4-10 pays 10 (chance of $^{7}/_{10}$)
	Die face 1-4 pays 200 (chance of $^{4}/_{10}$) Die face 5-10 pays 160 (chance of $^{6}/_{10}$)	Die face 1-4 pays 385 (chance of $^{4}/_{10}$) Die face 5-10 pays 10 (chance of $^{6}/_{10}$)
	Die face 1-5 pays 200 (chance of $^{5}/_{10}$) Die face 6-10 pays 160 (chance of $^{5}/_{10}$)	Die face 1-5 pays 385 (chance of $^{5}/_{10}$) Die face 6-10 pays 10 (chance of $^{5}/_{10}$)
	Die face 1-6 pays 200 (chance of $^{6}/_{10}$) Die face 7-10 pays 160 (chance of $^{4}/_{10}$)	Die face 1-6 pays 385 (chance of $^{6}/_{10}$) Die face 7-10 pays 10 (chance of $^{4}/_{10}$)
	Die face 1-7 pays 200 (chance of $^{7}/_{10}$) Die face 8-10 pays 160 (chance of $^{3}/_{10}$)	Die face 1-7 pays 385 (chance of $^{7}/_{10}$) Die face 8-10 pays 10 (chance of $^{3}/_{10}$)
	Die face 1-8 pays 200 (chance of $^{8}/_{10}$) Die face 9-10 pays 160 (chance of $^{2}/_{10}$)	Die face 1-8 pays 385 (chance of $^{8}/_{10}$) Die face 9-10 pays 10 (chance of $^{2}/_{10}$)
	Die face 1-9 pays 200 (chance of $^{9}/_{10}$) Die face 10 pays 160 (chance of $^{1}/_{10}$)	Die face 1-9 pays 385 (chance of $^{9}/_{10}$) Die face 10 pays 10 (chance of $^{1}/_{10}$)
	Die face 1-10 pays 200 (chance of 1) No die face pays 160 (chance of 0)	Die face 1-10 pays 385 (chance of 1) No die face pays 10 (chance of 0)

References

Stein, Jeremy C., 2008, Conversations among Competitors, *American Economic Review* 98, 2150–2162. [Cited on page 9.]