

# The role of communication content and reputation in the choice of transaction partners<sup>\*</sup>

A study based on field and laboratory data

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We study the effects of communication content and its interaction with reputation on the choice of transaction partners in markets with moral hazard. We find that buyers' choices of sellers are influenced by prices and reputation information as well as by sellers' messages: buyers prefer sellers who make specific promises. If specific promises are infeasible, buyers prefer sellers whose arguments reduce the social distance. These observations do not depend on the availability of reputation information. We also find that, if specific promises are feasible, buyers' profits do not significantly differ from hypothetical profits realized under a correct expectations rule.

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*Keywords:* procurement auctions, communication, promises, social distance, reputation, moral hazard

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## 1 Introduction

Market transactions require a certain degree of trust, as defining complete contingent contracts for the exchange of goods or services is usually infeasible (see, e.g., Macaulay, 1963; Lyons, 1996). Almost 45 years ago, Nobel laureate Kenneth Arrow stressed the importance of this problem by pointing out that “Virtually every commercial transaction has within itself an element of trust ... It can be plausibly argued that much of the economic backwardness of the world can be explained by a lack of mutual confidence” (Arrow, 1972, p. 357). In the last decades, this issue has been exacerbated by the fact that more and more transactions are conducted online and with geographically distant strangers (see, e.g., MacLeod, 2007; Greiner et al., 2012). In these situations most decision makers do not rely solely on prices but often turn to communication next to reputation scores to gather information before starting a transaction (see, e.g., Gattiker et al., 2007; Spagnolo, 2012). But does communication improve the choice of a transaction partner and what communication content is decisive?

While reputation in markets has been widely studied (e.g., Dellarocas, 2003, Bolton et al., 2013, Huck et al., 2016, or Mimra et al., 2016), less research has been dedicated to the role of communication between sellers and buyers (and its interplay with reputation). From a game-theoretic point of view, communication is cheap talk and does not influence behavior whenever the interests of agents are opposed. If their interests are similar, communication can influence outcomes by helping agents to coordinate (see Crawford, 1998, for a summary). Starting with experimental work on social dilemmas, namely the prisoner’s dilemma and the public good game, cheap-talk communication has nevertheless been observed to influence human behavior in a variety of games. Among others, communication between players can increase the efficiency and equality of outcomes in bilateral bargaining (e.g., Roth, 1995). During the last decades, several potential explanations for the observed influence of communication have emerged. One popular explanation is that communication allows agents to reduce the *social distance*, thereby making the opponent’s payoff more salient or allowing for reputation building. Social distance is put forward, for example, to explain varying donations in dictator games (see, e.g., Charness and Gneezy, 2008, on the role of names). Another prominent explanation is based on the impact of (non-binding) *promises* on behavior. In trust games, for example, trustees’ non-binding promises to return money increase the investments made by first movers. This effect can be attributed to, e.g., guilt aversion (Charness and Dufwenberg, 2006) or to a preference for promise keeping per se (Vanberg,

2008). To the best of our knowledge, there is no study that tests the relative importance of promises and social distance in markets.<sup>1</sup> There is also no research on how the effects of communication content interact with reputation information.

This study aims to fill these gaps. It investigates the effects of communication content and its interaction with reputation information on the choice of transaction partners in markets with moral hazard. It combines field data and controlled laboratory data to provide evidence showing how this choice is altered by communication and reputation tools. Our research also provides a systematic analysis of communication contents in both the field and the laboratory that allows identifying the roles of non-binding promises and social distance.

To study the influences on the choice of transaction partners, we focus on a highly structured type of market: buyer-determined procurement auctions. Engelbrecht-Wiggans et al. (2007) coin this term to describe markets in which buyers can choose freely between competing bidders (potential sellers) based on prices and all the other information available. This type of market mechanism is frequently used by state authorities and companies (Jap, 2007). In recent years it has also become popular on online platforms for consumers (Heinrich, 2012). Our field data stem from one of the largest procurement websites in Europe facilitating the exchange of a variety of services, such as paintwork, transportation, moving, or web development. On this platform consumers post a project description, select a category, and set a starting price. Interested sellers are then able to submit a price for which they are willing to supply the service. In addition, sellers can communicate with consumers using an auction-specific message board. At the end of an auction, consumers can choose their preferred seller based on the submitted bids, messages, and seller profiles, which also include reputation scores. The platform granted us access to all of its auction data. We use these data to study the effects of communication content in a real-world market environment while controlling for seller reputation information.

Our field data reveal that buyers' choice of a seller is influenced not only by prices and reputation information but also by sellers' messages. We particularly find that buyers prefer sellers whose messages create social proximity, while – in contrast to previous laboratory research – non-binding promises have a rather weak effect. To find out more about the reasons for the weak effect of promises and to test the causal effect of the availability of reputation information, we addi-

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<sup>1</sup> So far, only the study by He et al. (2016) considers on the relative importance of promises and social distance but it focuses on a two-player prisoner's dilemma game. We discuss this study in more detail in section 2.2.

tionally run a series of controlled laboratory experiments with 432 subjects. In the laboratory *ce-teris paribus* changes in parameters can be implemented and their effects on behavior can be observed directly. Factors like individual values and costs can be controlled (Smith, 1976). If the behavior changes, this change can be attributed unequivocally to the modified parameter (e.g. to the availability of reputation information or to the content of communication). As such our laboratory investigations serve to complement our field results, as they provide greater internal validity and allow for more insights into the causal relationships.

In the laboratory we observe a choice pattern that is consistent with our conclusions drawn from the pattern observed in the field. When specific non-binding promises from which transaction partners can directly infer the associated payoff consequences are not feasible (which is usually the case in the field), buyers prefer sellers whose arguments reduce the social distance, while un-specific promises remain ineffective. Once specific promises are allowed (as is often the case in previous laboratory research on the effects of promises), buyers are more likely to select sellers who make specific promises, while arguments reducing the social distance remain ineffective. Our treatment variations further reveal that these choice patterns do not depend on the availability of reputation information (which is important in any case). Our controlled laboratory environment also allows us to analyze the quality of buyers' choice patterns. We find that, when specific promises are feasible, buyers' actual profits do not significantly differ from those estimated following the correct expectations rule. In particular, based on this rule, we identify specific choice patterns that would help to improve the selection of transaction partners.

## **2 Related literature**

### *2.1 Buyer-determined procurement auctions*

Including the seminal work by Vickrey (1961), economic research on auction markets usually considers procurement auctions (or “tenders”) next to standard auctions. Buyer-determined procurement auctions are procurement auctions in which buyers can freely select the winner from among the bidders (Engelbrecht-Wiggans et al., 2007). These auctions are typically applied when the procured goods and services can vary across bidders. For example, the effort exerted when providing a service or the lead time necessary for delivering a product may differ. In these cases bid attributes other than price can affect the buyer's profit from the transaction. If these attributes can be quantified and enforced easily, scoring auctions are sometimes used instead. In these auc-

tions bidders bid along several dimensions and the winner is determined based on the overall score (see, e.g., Che, 1993; Asker and Cantillon, 2008; Santamaría, 2015). However, as Jap (2002) and Haruvy and Katok (2013) point out, in most applications procurement auctions are buyer-determined. For example, important attributes such as reputation or quality may be difficult to quantify or buyers may find it impossible to commit credibly to a scoring rule *ex ante*.

Accordingly, a growing literature in economics covers behavior in buyer-determined procurement auctions. Engelbrecht-Wiggans et al. (2007), Shachat and Swarthout (2010), and Fugger et al. (2016) compare behavior in buyer-determined auctions theoretically and experimentally with behavior in price-based mechanisms. These studies consider a setting with exogenously determined quality in which buyers can choose sellers based on quality and prices. The first laboratory experiment on reputation in buyer-determined auctions is presented by Brosig-Koch and Heinrich (2014), who consider a setting with moral hazard. In their design quality cannot be contracted upon and bidders can choose endogenously how much costly quality to deliver. Brosig-Koch and Heinrich observe much higher levels of market efficiency in buyer-determined auctions with reputation than in price-based auctions in which buyers cannot consider reputation but are bound to buy from the lowest bidder.<sup>2</sup> Heinrich (2012), Yoganarasimhan (2013), Stoll and Zöttl (2017), and Ferecatu et al. (2016) consider the role of reputation in buyer-determined auctions for services in the field. All of them find that improving the reputation increases bidders' probability of being selected as a seller. Heinrich (2012) additionally analyzes the influence of communication on buyers' choices, observing that sending one or more messages increases bidders' probability of winning. This study does not consider communication content, however.

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<sup>2</sup> As observed by Fugger et al. (2015), other-regarding preferences may also improve market efficiency in buyer-determined procurement auctions (in the absence of reputation). A review of research on reputation in public procurement is provided by Spagnolo (2012). Procurement auctions with moral hazard (and without reputation) are first studied experimentally by Cox et al. (1996). In experiments reputation is observed to increase efficiency, for example in trust games (see, e.g., Bolton et al., 2004) and gift-exchange games (see, e.g. Gächter and Falk, 2002).

## 2.2 *Social distance, promises, and reputation*

In experimental economics the term *social distance*, originally coined by sociologists and psychologists, is used in connection with a range of experimental variations.<sup>3</sup> Several studies analyze the role of social distance in trust-related interaction.<sup>4</sup> The experiments by Glaeser et al. (2000) and Binzel and Fehr (2013b), for example, test the effects of subjects' relative position in existing social networks. Both studies provide evidence that a smaller social distance is positively associated with trust and trustworthiness. Other studies vary the social distance in trust games by creating artificial groups of subjects (see, e.g., Buchan et al., 2006) or varying the physical distance between players (see, e.g., Charness et al., 2007).

Most closely related to our work are studies on partner selection in trust games. In these studies, first movers can choose between potential trustees. Eckel and Wilson (2004), for example, find that first movers prefer to play with second movers who are labeled with a friendly facial icon. Fiedler et al. (2011) study partner selection in the laboratory as well as in a virtual community. In both settings, first movers can communicate with one of two potential second movers before the game. The other potential second mover cannot participate in the chat, but the money that he returns is multiplied with the larger multiplier. In the laboratory as well in the virtual community, first movers are more likely to select the communication partner as the second mover. In the virtual environment, the number of emoticons and acronyms used in the pre-game chat is positively associated with the probability of choosing the communication partner and with the amount sent to him. The amount returned by the second mover is not mediated by communication content, though.<sup>5</sup>

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<sup>3</sup> According to Liberman et al. (2007), psychological distance refers to the degree to which objects and events are present in an individual's direct experience of reality. Social distance is a form of psychological distance that measures the distance towards other people. Akerlof (1997) presents an example of how to incorporate social distance into an economic model of behavior.

<sup>4</sup> There is also evidence on the effect of social distance in other games. Early research on this topic particularly focuses on the dictator game. By varying the degree of anonymity between subjects (see, e.g., Hoffman et al., 1994, 1996) or by revealing personal information about each other to players (see, e.g., Bohnet and Frey, 1999; Burnham, 2003; Charness and Gneezy, 2008), these studies demonstrate that a smaller social distance can lead to higher donations. Other studies focus on the relationship between dictators and receivers in their social networks. Leider et al. (2009), Brañas-Garza et al. (2010), Goeree et al. (2010), Harrison et al. (2011), Brañas-Garza et al. (2012), and Binzel and Fehr (2013a) observe that altruistic behavior diminishes with increasing social distance.

<sup>5</sup> Derks et al. (2008) summarize research that compares the transmission of emotions in face-to-face and text-based computer-mediated communication. They conclude that emotions are expressed as frequently in online communication as in offline communication, because people use emoticons or verbalize their emotions. According to Fischer and Manstead (2008), emotions in humans serve as an affiliation function as well as a social distancing function in social survival (i.e. the capacity to build social bonds and to address social problems).

A recent experiment by He et al. (2016) which is also closely related to our study tests the importance of social distance for cooperation in a prisoner's dilemma game. He et al. do not find evidence that decreased social distance (implemented as visual identification of players) increases cooperativeness. Instead, the opportunity to make *promises* turns out to be decisive in this decision environment. The authors find that it creates commitment value and facilitates the assessment of the opponent's cooperativeness.

Besides prisoner's dilemma games, messages containing promises are found to influence behavior across a range of experimental settings, for example in public good games (e.g., Ostrom, 1998), in sequential bargaining (e.g., Brosig et al., 2004), or in the hold-up problem (e.g., Ellingsen and Johannesson, 2004). However, a stream of research on non-binding promises was sparked by the work of Charness and Dufwenberg (2006). In their study of a trust game with moral hazard, they observe that promises made by second movers lead to more trusting and more trustworthy behavior.<sup>6</sup> Charness and Dufwenberg (2011) extend the trust game of their previous study to analyze communication in a setting with adverse selection. Promises increase the efficiency of outcomes in this setting as well. Likewise, Beck et al. (2013) investigate the role of promises in a two-person credence good game in which the seller knows more about the quality that the consumer needs than the consumer herself. They observe that promise making by experts tends to increase the relative frequency at which consumers agree to trade. Goeree and Zhang (2014) successfully replicate the results obtained by Charness and Dufwenberg (2011) and extend the game by introducing competition between second movers based on their messages sent to first movers. With respect to efficiency, they observe that communication and competition act as substitutes. In their competitive setting, communication even decreases efficiency.

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<sup>6</sup> There is some conflicting evidence, though. Deck et al. (2013) replicate the study by Charness and Dufwenberg (2006) under single- and double-blind conditions and find no influence of communication on behavior. The authors explain this by the high baseline trustworthiness already observed without communication. Charness and Dufwenberg (2006) propose an explanation based on guilt aversion (Dufwenberg and Gneezy, 2000; Battigalli and Dufwenberg, 2007). According to this explanation, players feel guilty if they fail to fulfill another person's expectations. In the trust game, a second mover who promises to be trustworthy can shape the first mover's belief, thereby making untrustworthy behavior more costly for himself. In a follow-up study, Vanberg (2008) compares this belief-based explanation with a commitment-based explanation. The latter explanation, which is favored by his experimental evidence, instead posits a preference for keeping one's word per se. This explanation can be accounted for by assuming an individual cost of being inconsistent (Ellingsen and Johannesson, 2004) or an individual cost of lying (e.g. Gneezy, 2005; Chen et al., 2008).

Duffy and Feltovich (2002) compare the relative importance of *communication and reputation* (i.e. information about past behavior) in bilateral games, namely stag hunt, prisoner's dilemma, and chicken games. According to their results, both one-sided messages about intended play and observation of past actions increase the frequency of cooperation, the frequency of coordination, and the payoffs. The relative success of communication and observation depends on the game, though. In the stag hunt game, in which players' incentives are more aligned, cheap talk performs relatively better. In chicken and prisoner's dilemma games, observation turns out to be more effective. Bracht and Feltovich (2009) run a related experiment on the trust game. In their set-up first movers could receive a message with intended play from second movers, observe second movers' previous decisions, or learn about both. While observation substantially increases efficiency, communication has almost no effect.

To the best of our knowledge, there is neither a study investigating communication content in a market environment nor one that tests the relative importance of communication content and its interaction with reputation information.

### 2.3 *Research questions*

Based on the evidence summarized above, we formulate three research questions for our study. Since our focus is on markets in which buyers can choose freely between competing sellers, the first two research questions refer to the determinants of buyers' choice. From previous research we know that *promises* as well as arguments reducing *social distance* can be important in social interactions that involve trust. Consequently, our analyses focus particularly on the relative importance of these two types of communication content for buyers' choice.

**Research Question 1:** *How does communication affect buyers' choice of a seller and to what extent are promises and arguments that reduce the social distance decisive?*

The previous findings on bilateral games suggest that the additional effect of communication is rather limited in the case that reliable reputation information (observation of past behavior) is available. Nothing is known about whether and how the availability of reputation information changes the relative importance of communication content.

**Research Question 2:** *Does buyers' evaluation of communication content depend on the availability of reputation information?*



In buyer-determined auctions it is the buyers' own choice and not a predefined mechanism that determines how much of the offered profit they realize. Our last research question considers the quality of buyers' choices.

**Research Question 3:** *How much of the potential profits do buyers realize and how could the existing choice pattern be improved?*

Research Question 1 can be investigated based on buyers' choices observed in the field and in the laboratory. Research Question 2 is somewhat more difficult to answer with our field data, as there is always a reputation rating of transaction partners available on the procurement website. We nevertheless provide some evidence from the field, but our analyses for Research Question 2 mainly rely on a comparison of auctions with and without a reputation mechanism in the laboratory. Research Question 3 requires detailed knowledge about buyers' values. As it is difficult to infer this information in the field, our respective analyses rely on the controlled environment of the laboratory in which these values can be induced by the experimenter.

### **3 Buyers' choices in the field**

#### *3.1 Field data*

We start our analysis of buyers' choices with data obtained from a German procurement platform, which is one of the largest in Europe. On the platform's website, buyers post a project description in the respective category and select a starting price. Interested sellers are then able to place a price for which they are willing to supply the service as a bid. At the end of the auction, buyers choose their preferred seller and assign the contract. The platform collects a percentage of the final price as a fee. Trade via the platform is based not only on the project descriptions and prices but also on three other dimensions of attributes. First, sellers can create a profile page on which they describe themselves. Seller profiles also include information such as the number of employees, insurance held, and postal code. Second, the platform has a reputation system similar to eBay's that distributes information about past behavior among market participants. After a trade has taken place, buyers and sellers can rate their behavior as "positive," "neutral," or "negative." Third, sellers and buyers can exchange written messages using an auction-specific message board.

The platform granted us access to its database, enabling us to include all the information in our analyses that was available to the market participants at the time of the auction. We additionally have access to non-public information that allows us to determine whether an auction resulted in a trade and whether a transaction fee was billed by the platform. We focus on projects of this kind that had at least two potential sellers and were posted in the transportation and moving category. This was the most active category during the time span under consideration. Further, we apply the following restrictions:

- (i) The data set is limited to auctions by first-time buyers to avoid repeated interaction between sellers and buyers and learning effects.
- (ii) To limit the potential endogeneity of message contents, only auctions in which buyers sent no message and sellers sent at most one were selected (see also Heinrich, 2012).
- (iii) As an additional measure to limit potential endogeneity, only auctions that did not contain a personal message in the buyers' project description are included.<sup>7</sup>

Restrictions (i) and (ii) excluded about 51 percent of the auctions from the initial data set. From the remaining 6,171 auctions, 1,690 auctions were randomly selected for content analysis. Restriction (iii) applies to 18 percent of these auctions. The final data set covers 1,385 auctions and 7,523 bids with a trade volume of about 650,000 euros.

### 3.2 *Buyers' choices*

Our comprehensive field data allow us to study buyers' choices along several dimensions. Seller profiles can be used to identify the influence of reputation on buyers' choices while controlling for other characteristics (Research Question 2). Messages can be classified to identify the relationship of choices with social distance and promises, which are two prominent explanations for the observed influence of communication (Research Question 1). Specifically, the written messages were classified as follows:

- (i) *Empty messages*: This category identifies occasions on which no message is sent. The identification of empty messages allows testing whether sending messages as such influences behavior. We interpret empty messages as generating the lowest degree of social proximity.

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<sup>7</sup> Note that including these auctions does not alter our findings qualitatively.

- (ii) *Social proximity: Informal*: This category identifies messages that reduce the social distance by addressing the buyer informally. By our definition a message falls into this category if it contains informal pronouns like the second-person pronoun “Du” in German<sup>8</sup>, or if it contains emoticons, that is, the use of typed symbols to express emotions, typically resembling facial expressions, such as the smiley, “:-)” (Rivera et al., 1996; Kasper-Fuehrer and Ashkanasy, 2001). Emoticons are typically described as a mean to provide “additional social cues” about a person (Derks et al., 2008, p. 777).
- (iii) *Social proximity: Names*: This category identifies messages that reduce the social distance by containing the name of the buyer or the seller (see, e.g., Charness and Gneezy, 2008) and, thus, by including a more formal cue about the other person. More specifically, to fall into this category a message has to include at least the buyer’s company or username or a seller’s real name. (The seller’s user or company name is displayed automatically with all messages. Sellers only know the buyer’s user name.)
- (iv) *Social proximity: Additional channel*: This category identifies messages that reduce social distance by initiating communication through an additional and, potentially, socially ‘richer’ communication channel (in the sense that it allows communicating additional informal or formal social cues), for example by asking for a call, an email, or a meeting. Note that we neither observe how many messages were exchanged through this channel nor what content they had.<sup>9</sup>
- (v) *Promise*: This category identifies messages that contain a cheap-talk promise, for instance offering a “low price” or mentioning positive traits that are associated with high-quality work, such as “reliability” or “timeliness.” This category also includes messages that contain general praise, like “This is a great offer.”

The first category was coded automatically. The remaining four categories were coded independently by two research assistants. In total they coded 3,561 non-empty messages. After we had defined the classification scheme, they were trained on a random subsample of 90 messages. Based on this subsample, questions about the classification scheme were discussed in a joint

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<sup>8</sup> As Kretzenbacher et al. (2006) observe, social distance appears to be the overriding factor in selecting formal or informal second-person pronouns in German.

<sup>9</sup> One might also argue that initiating communication through an additional channel is not only related to social distance but also motivated by the aim to finish the transaction outside the platform (and thus to save the platform’s transaction fee). This is not an issue here, as we focus on transactions that are closed on the platform.

meeting. Additionally, examples for each category were selected. These examples served the coders as a reference during the classification of the complete data set. The resulting classification is summarized in Table 1. To check the inter-coder reliability, i.e., the extent to which the two independent coders reached an agreement, we calculated Krippendorff’s Alpha. Krippendorff’s Alpha is a common, rather conservative consensus measure in content analysis that also corrects for agreement due to chance (Krippendorff, 1980). It is applicable to any number of observers, levels of measurement, and sample sizes, and can cope with the presence or absence of missing data (Hayes and Krippendorff, 2007). The calculated reliability scores of the four categories pass the 0.70 cutoff value (Krippendorff, 1980). Table 1 also includes the share of messages falling into the categories. Note that non-empty messages could fall into multiple categories. If the coders disagreed, we used the arithmetic mean (0.5) of their classification in further analyses.<sup>10</sup>

Table 1 – Classification of messages in the field (reliability score: Krippendorff’s Alpha)

	Content categories				
	<i>Empty message</i>	<i>Social proximity</i>			<i>Promise</i>
		<i>Informal</i>	<i>Names</i>	<i>Additional channel</i>	
Share	0.527	0.004	0.194	0.071	0.130
(Krippendorff’s Alpha)	(-)	(0.896)	(0.814)	(0.855)	(0.760)

We observe that more than half of the sellers choose not to pair their bid with a written message. In Germany it is uncommon to approach strangers informally in a business setting. Accordingly, less than 1 percent of the messages include content that aims to reduce the social distance and thus to increase the social proximity by addressing the buyer informally. Instead, reducing the social distance by initiating further communication (7.1 percent) or by including names (19.4 percent) is more frequently observed. To identify the influence of message content as well as of prices and reputation, we run conditional logic regressions based on the information available to

<sup>10</sup> Independent ratings of two or more coders in text analysis have been also used in previous economic research (e.g., Cooper and Kagel, 2005, Rydval et al., 2009, Chen and Chen, 2011, or Bartling et al., 2017; the latter two studies also employ Krippendorff’s Alpha to check for intercoder-reliability). To calculate Krippendorff’s Alpha, we used the “kalpha” module for Stata by Klein (2017).

buyers. We assume an underlying random utility model in which the buyer in auction  $j$  selects the bid  $i$  offering the highest expected utility given by

$$U_{ij} = \beta_1 Bid_{ij} + \beta_2 R_{ij} + \beta_3 C_{ij} + \beta_4 X_{ij} + \varepsilon_{ij}, \quad (1)$$

where  $Bid_{ij}$  represents the bid price. A seller's reputation is captured by the variables of the reputation vector  $R_{ij}$ . The vector contains three dummies indicating the quartile of received positive ratings into which a seller falls. The lowest quartile is the baseline category. Sellers in this quartile have no or one positive rating. The three quartile dummies indicate whether a seller has 2 to 7 positive ratings, 8 to 26 positive ratings, or 27 to 178 positive ratings. The vector also includes the share of ratings that are negative or neutral. The message content is considered through the five variables in the communication vector  $C_{ij}$ : first, a dummy variable that takes the value 1 if a message is empty and 0 otherwise; and second, four variables that indicate the classification into the four content categories. Each takes the value of either 0 or 1 when the coders agreed on the content and 0.5 when they disagreed. Additional information about sellers is captured by the vector  $X_{ij}$ , which includes the length of a seller's profile text and the distance to the buyer. The unobserved error term is denoted by  $\varepsilon_{ij}$ . It is assumed to be independently identically distributed with the type 1 extreme value distribution. Table 2 displays the regression results.

First we consider the conditional logit model run on the whole sample. Not surprisingly, higher prices decrease the probability of winning. In line with previous findings, we further observe that reputation is important. Additional positive ratings significantly increase the probability of winning, while a larger share of negative or neutral ratings significantly decreases it. Communication is also associated with the probability of winning. Bids that are accompanied by a non-empty message that does not contain content falling into any of the three categories form the baseline category. Sellers who do not use the available communication channel are significantly less likely to win than those who send at least one message. Those who reduce the social distance by initiating communication through an additional communication channel are even more likely to win. Buyers are not more likely to pick sellers who reduce the social distance by addressing buyers informally or by mentioning names, however. Making cheap-talk promises yields a rather weak additional advantage.

Table 2 – Conditional logit regressions on buyers’ choices in the field

Independent variables	Whole sample	Auction-level SD of total number of received ratings			
		Quartile 1	Quartile 2	Quartile 3	Quartile 4
<i>Bid</i>	-0.019*** (0.001)	-0.027*** (0.003)	-0.019*** (0.002)	-0.019*** (0.002)	-0.017*** (0.001)
<i>Positive ratings [2, 7]</i>	0.453*** (0.106)	0.022 (0.202)	0.677*** (0.209)	0.647*** (0.212)	0.633*** (0.238)
<i>Positive ratings [8, 26]</i>	0.646*** (0.106)	0.546** (0.242)	0.799*** (0.194)	0.719*** (0.217)	0.711*** (0.230)
<i>Positive ratings [27, 178]</i>	0.994*** (0.117)	2.025 (1.358)	0.902*** (0.255)	0.970*** (0.205)	1.265*** (0.217)
<i>Share negative and neutral ratings</i>	-2.520*** (0.727)	-0.686 (1.390)	-2.978** (1.483)	-2.147* (1.153)	-5.383*** (2.040)
<i>Empty message</i>	-0.320*** (0.099)	-0.595*** (0.222)	-0.293 (0.200)	-0.283 (0.198)	-0.297 (0.191)
<i>Social proximity: Informal</i>	0.673 (0.517)	2.479* (1.456)	-1.237 (1.731)	1.260 (1.138)	0.264 (0.987)
<i>Social proximity: Names</i>	0.154 (0.108)	0.399 (0.250)	0.053 (0.215)	-0.118 (0.213)	0.244 (0.209)
<i>Social proximity: Additional channel</i>	0.393*** (0.147)	0.226 (0.321)	0.479* (0.275)	0.274 (0.295)	0.408 (0.310)
<i>Promise</i>	0.219* (0.123)	-0.020 (0.299)	0.247 (0.234)	0.402* (0.236)	0.171 (0.243)
<i>N</i>	7,523	1,267	1,902	2,281	2,073
<i>McFadden’s R<sup>2</sup></i>	0.309	0.330	0.301	0.320	0.326

Each observation represents an auction–bid pair. The regressions include additional controls. The dependent variable is an indicator that equals 1 if the bid was selected as the winning bid in the particular auction. \*: significant at 10%.

\*\*\*: significant at 5%. \*\*\*: significant at 1%. Standard errors are reported in parentheses.

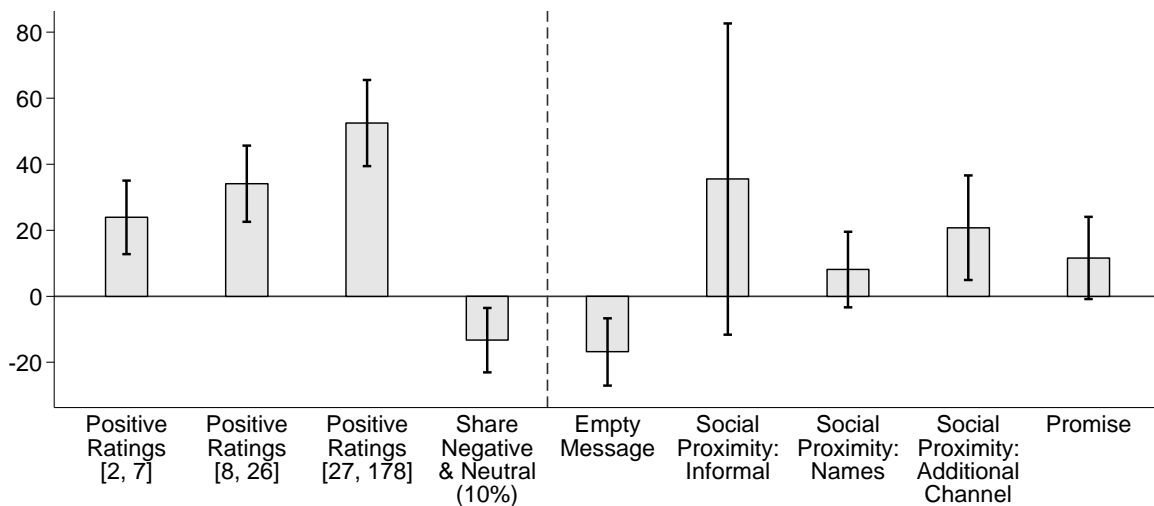
The conditional logic model provides a basis for estimating the buyers’ willingness to pay for communication and reputation as the ratio of a characteristic’s estimated coefficient and the bid coefficient. This ratio indicates the willingness to accept a higher bid  $b_i$  in the case that it is accompanied by more positive ratings, a higher share of negative and neutral ratings, a message, or certain communication content (see, e.g., Hole, 2007). As illustrated by Figure 1, buyers are willing to pay about 23.90 euros more if a seller additionally has 2 to 7 positive ratings, 34.09 euros more for 8 to 26 ratings, and 52.48 euros more for 27 to 178 ratings ( $p = 0.000$ , 1,000 bootstrap replications). These are rather large amounts given that the average final price in our auction data is 459.98 euros. The differences in willingness to pay between the three categories of positive ratings are (weakly) significantly different from 0 ( $p \leq 0.071$ , 100 bootstrap replications). If there

are 10 percent more negative or neutral evaluations instead, the willingness to pay decreases by 13.30 euros ( $p = 0.007$ ). As such, our field data clearly demonstrate that obtaining positive ratings and avoiding negative or neutral ones pay off for sellers.

However, not only reputation information but also messages have a considerable effect on buyers' willingness to pay. Sending no message at all leads to a decrease in this willingness of 16.87 euros ( $p = 0.001$ ). The effect is comparable to that of receiving 10 percent more negative or neutral evaluations; that is, the difference in willingness to pay does not differ from 0 ( $p = 0.568$ ). If the seller's message additionally includes an offer to initiate communication through an additional channel, buyers are willing to pay about 20.77 euros more ( $p = 0.010$ ). The effect size is similar to having 2 to 7 or 8 to 26 positive ratings (instead of 0 or 1) ( $p \geq 0.164$ ). However, it is lower than receiving 27 or more positive ratings ( $p = 0.001$ ). The willingness to pay for promises is only weakly significantly different from 0 ( $p = 0.068$ ). The willingness to pay for messages containing names does not differ from 0 ( $p = 0.165$ ). Our conclusions regarding Research Question 1 are as follows:

**Results for Research Question 1 (field):** *Communication significantly affects buyers' choice. Buyers prefer sellers who create social proximity by initiating communication through additional channels, while cheap-talk promises have a rather weak effect.*

Figure 1 – Buyers' willingness to pay for communication and reputation information in the field (95 percent bootstrapped confidence intervals)



The finding that the effect of promises on buyers' choice is comparatively small is surprising given that promise making is a prominent explanation for the effects of cheap-talk communication usually observed in laboratory research (cf. Section 2.3). One possible explanation for our results could be that cheap-talk promises in the laboratory are usually specific. That is, transaction partners can directly infer the payoff consequences associated with the promised behavior (e.g. "I promise that I won't cheat you and that I'll choose to roll," Charness and Dufwenberg, 2006, p. 1598). This is not the case in our field data. In the field there are many contingencies for which actions cannot be specified and payoff consequences are never common knowledge. Among others, the influence of the additional channel might also be driven by unobserved communication content or the exchange of multiple messages outside of the platform. While our field data do not allow us to test our explanation directly, in the laboratory we are able to control communication channels and can vary the opportunity to make specific promises.<sup>11</sup>

The second research question refers to the importance of the availability of reputation information for the observed results. As a reputation mechanism is always present on the procurement website, this question is more difficult to test with our field data. One possibility is to exploit the heterogeneity in the available reputation information between the auctions of our data set. It can be argued that the more homogeneous the sellers' reputation profiles in a specific auction, the less additional information is provided by a seller's rating. Based on this idea, we calculate the standard deviation (SD) of the number of received ratings (positive, neutral, and negative) by sellers for each auction. We then split the data set based on the quartiles of the standard deviation into which the auctions fall. We run four additional conditional logit regressions on buyers' choice, one for each of the resulting data sets.<sup>12</sup> The results (also presented in Table 2) reveal that positive ratings as well as the share of negative and neutral ratings are least important for buyers' choice in the lowest quartile, which is in line with our previous interpretation. There is no clear pattern resulting from an increasing standard deviation with regard to the importance of the message content. In fact, the coefficients are mostly insignificant, which might be due to the lower number of observations per regression. If at all, we find that sending no message turns out to be

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<sup>11</sup> As suggested by a referee, one may also exclude general praise from the *Promise* category to focus on more specific promises in the field. However, when coding for promises without general praise, we were not able to obtain a reliable content classification (i.e. the classification yielded a Krippendorff's Alpha of 0.541). This indicates that general praise is difficult to differentiate from other promises in the field.

<sup>12</sup> We provide two additional tables with regression results in Appendix A. In these regressions we condition on the standard deviation of the number of positive ratings and on the standard deviation of the share of negative and neutral ratings.



particularly bad for sellers when the standard deviation is low. The latter result suggests that, if it is more difficult to differentiate between sellers regarding reputation information, messages as such become more important. Our results regarding Research Question 2 can be summarized as follows:

Results for **Research Question 2** (field): *Buyers' evaluation of communication content does not appear to be systematically related to the informativeness of ratings. Reputation tends to matter for the importance of communication per se, though.*

In the next section, we present a laboratory experiment that analyzes Research Question 1 and Research Question 2 in a more controlled (and, consequently, more abstract) environment. In the laboratory we are able to implement *ceteris paribus* changes of the opportunity to make specific non-binding promises as well as of the availability of reputation information and thus can test the robustness of our conclusions drawn from field data. Moreover, by inducing specific values, we are able to assess the quality of buyers' choice patterns (Research Question 3).

## **4 Buyers' choices and profits in the laboratory**

### *4.1 Experimental design*

Our experiment employs variants of buyer-determined procurement auctions with sealed bids, independent private costs, and two sellers. All buyer-determined auctions involve human players only. Before participating in the buyer-determined auctions, all the subjects played a series of first-price sealed-bid procurement auctions bidding against a computerized seller. Before we describe the treatments of the main stage of the experiment, we will present the auction games that the subjects played repeatedly in both stages.

#### *4.1.1 Auction games*

The first-price sealed-bid procurement auctions implemented in the training stage are analogous to standard first-price sealed-bid auctions with symmetric independent private values without a reserve price (for surveys see Wolfstetter, 1995; McAfee and McMillan, 1987; Krishna, 2002; Menezes and Monteiro, 2004; on procurement auctions with private costs see Holt, 1980; Cohen and Loeb, 1990). Two sellers  $i = 1, 2$  compete for a project. Before submitting a bid, the sellers learn about their costs for completing the project. The sellers know that these costs  $c_i$  are independently drawn from a uniform distribution with support  $[100, 500]$  and that they cannot bid

above 500. (We interpret this maximum bid as the buyer's valuation of the project  $v$ .) Note that all the values are given in eurocents and the subjects in the experiment were paid accordingly. Both sellers bid a price for which they are willing to execute the project. The bidder offering the lowest price wins the contract. Ties are broken randomly. In this auction the symmetric risk-neutral Nash-equilibrium bidding function depending on the cost realization  $c_i$  is given by

$$\beta(c_i) = 250 + c_i/2.$$

The winning seller becomes the seller and earns a profit of  $\pi_S = b_i - c_i$  from completing the project, where  $b_i$  is the seller's bid and  $c_i$  is the seller's cost. The losing seller is paid nothing.

For the main stage, we modified the simple auction game described above to accommodate the situation of moral hazard that is widespread in procurement environments. After winning the auction, the seller can reduce his cost at the expense of the buyer, for example by exerting a lower level of effort or choosing a lower quality. To account for this possibility, we introduced a quality factor  $q_i$  that is chosen by the seller from the interval  $[0.5, 1]$ . It is multiplied by the winning seller's cost  $c_i$  and by the buyer's valuation  $v = 500$ . As above, the two sellers know that their costs  $c_i$  are drawn independently from a uniform distribution with support  $[100, 500]$  and that they cannot bid above 500. The winning seller choosing a bid  $b_i$  earns a profit of  $\pi_S = b_i - q_i c_i$ , while the losing seller earns a profit of zero. The buyer earns  $\pi_B = q_i v - b_i$ .

The buyer-determined procurement auctions are played repeatedly and resemble a repeated one-shot interaction. In the auctions buyers can choose freely between sellers. In all the treatments the buyer can decide based on the prices submitted by the sellers. However, depending on the treatment, additional information can be available to the buyers:

- (i) In treatments with *reputation* information, buyers learn about sellers' quality choices in previous periods. In this case, the buyer is informed about the average quality  $\bar{q}_i$  supplied in all the previous auctions and the quality choice made in the last auction  $q_i^{t-1}$ .<sup>13</sup>
- (ii) In treatments with *communication*, buyers may receive written messages from sellers. To limit the potential endogeneity of messages' content, all communication is unilateral. That is, only sellers can send a message that accompanies their bid (we place similar restric-

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<sup>13</sup> More extensive histories were not provided to preserve the repeated one-shot nature of the game. We feared that they may enable some buyers to identify previous interaction partners and thereby confound our experimental variation of reputation.

tions on our field data, cf. Section 3.1). We vary the sellers' message space by allowing specific (non-binding) profit promises or forbidding them. When forbidding specific promises, the instructions include an additional sentence that bans sellers from mentioning any specific quality, cost, or profit values.

In our experiment the total number of auctions played is common knowledge. In a finitely repeated game with complete information and common knowledge of rationality and selfishness, none of the sellers will choose a quality factor  $q_i$  above 0.5 in the last auction. Buyers will ignore reputation information and messages and will select the lowest seller. By backward induction the 0.5 quality level will be chosen in all previous auctions and the risk-neutral Nash-equilibrium bidding function is given by

$$\beta(c_i) = 125 + c_i/4.$$

The buyer and seller earn a profit of  $\pi_B = \pi_S = 125 - c_i/4$  per auction. If we relax the assumptions of rationality and selfishness, several reputation equilibria may emerge, in which subjects choose above-minimum quality.

#### 4.1.2 *Experimental procedure*

The  $2 \times 3$  design of the experiment is summarized in Table 3. The buyer-determined auction in which buyers can only decide based on prices serves as the **Baseline** treatment. This treatment is strategically equivalent to a price-based auction. To the **Baseline** treatment we added reputation information in the reputation treatment **R** or seller messages in the communication treatment **C**. In the **LC** treatment, the message space was limited and could not include specific quality, cost, or profit values. In the other two treatments, reputation information was combined with unrestricted (**C-R**) or limited seller messages (**LC-R**). Messages were restricted to 420 characters. See Appendix B for all the instructions.

Table 3 – Treatments

Treatment	Training stage	Main stage			
	Auction type	Auction type	Reputation information	Communication	Number of subjects
<b>Baseline</b>	First-price auctions	Buyer-determined auctions	-	-	72
<b>R</b>	First-price auctions	Buyer-determined auctions	Average quality and last period's quality	-	72
<b>C</b>	First-price auctions	Buyer-determined auctions	-	Seller messages	72
<b>C-R</b>	First-price auctions	Buyer-determined auctions	Average quality and last period's quality	Seller messages	72
<b>LC</b>	First-price auctions	Buyer-determined auctions	-	Limited seller messages	72
<b>LC-R</b>	First-price auctions	Buyer-determined auctions	Average quality and last period's quality	Limited seller messages	72

The training stage consisted of six fully incentivized first-price sealed-bid procurement auctions. All the subjects acted as sellers and bid against a computerized opponent programmed to bid according to the Nash-equilibrium bidding function. A preceding training stage may influence behavior in the remainder of the experiment. However, it also increases internal validity by facilitating subjects' understanding of the basic structure of the game they are playing. As buyer-determined procurement auctions present a rather complex decision environment, it was for the latter reason that we implemented the training stage and confronted subjects with a less complex environment first. Note that the training stage was the same across all treatments and that subjects did not interact with each other in this stage. Moreover, to prevent any learning from computerized bids, subjects did not receive feedback on their opponent's behavior or on the auction's outcome during or after the training stage. The subjects were informed accordingly. Not providing feedback on the outcome minimizes individual differences in learning from experiences and potential income effects.<sup>14</sup> The training stage was similar to many standard auction experiments and the results are in line with the previous evidence. Therefore, we will not discuss behavior observed in this stage in the following.

<sup>14</sup> A preceding training stage is commonly employed in experimental auction research (see, e.g., Brosig and Reiß, 2007, Brunner et al., 2010; or Brosig-Koch and Heinrich, 2012). Brosig and Reiß (2007) find that behavior in sequential procurement games is not influenced by whether subjects have participated in single first-price procurement auctions before. The single auctions in their experiment are equivalent to the ones used in the present study.

Before the start of the main stage, the subjects received new instructions, and a computerized test of understanding followed. In this test we asked the subjects to determine the buyer and seller profits in an example, in which they first had to choose three numbers representing the cost, the quality, and the price. All the participants were able to complete this task correctly. In the main stage, the subjects played 18 buyer-determined auctions. The 72 subjects in each treatment of this stage were divided into 8 matching groups yielding 8 independent observations per treatment. Within a matching group, 3 subjects took the role of buyers and 6 subjects acted as sellers. The subjects were randomly re-matched after each auction. In one auction a buyer faced two sellers and knew that she would never meet the same pair of sellers in two consecutive auctions.

Note that the sellers always submitted quality choices together with their bids, independent of whether they won the auction or not. Only at the end of the experiment were the subjects informed about their payoff in the training stage as well as about the outcomes of the 18 auctions in the main stage. This setting is similar to that in our field data: in the field data set, we only consider choices by first-time buyers, that is, choices by buyers who have never learned about the quality of work actually delivered (cf. Section 3.1). As in our experiment, however, first-time buyers in the field can learn about qualities that have been delivered previously, because they can scan sellers' reputation profiles before making a choice. The experiment concluded with a short questionnaire. The subjects received the money they earned in the auctions as well as a show-up fee in cash after completing the questionnaire.

Note that, in the training stage, we drew one series of costs for all the subjects and another for the computerized seller. In the main stage, we drew six series of costs: one for each seller of each matching group. In this stage, all the matching groups therefore faced the same set of costs to make the behavioral observations straightforwardly comparable across treatments. The average payoff was 18.79 euros including the show-up fee. The sessions took between 90 and 120 minutes and were conducted with a total of 432 participants at the Essen Laboratory for Experimental Economics (elfe) using zTree (Fischbacher, 2007). The participants were students of different subjects. We balanced majors so that roughly half of the subjects in every matching group were students of business or economics. They were recruited using ORSEE (Greiner, 2015).

## 4.2 Buyers' choices

Similar to the analyses of the field data, we classified messages sent by sellers in the laboratory to identify the relationship of choices with social distance and promises (Research Question 1 and Research Question 2). Specifically, we selected the following categories for classifying their content:

- (i) *Empty messages*: This category identifies occasions on which no message is sent.
- (ii) *Social proximity: Informal*: This category identifies messages that reduce the social distance by addressing the buyer informally. It is identical to the category used to classify the field data.
- (iii) *Unspecific promise*: This category identifies messages that contain an unspecific cheap-talk promise. It is identical to the promise category used to classify the field data.
- (iv) *Specific promise*: This category identifies messages that contain specific profit promises. All the messages that contain quantifiable information about the profit that the seller claims to deliver (directly by referring to the buyer's profit or indirectly by referring to the delivered quality) are classified accordingly.

We used the same classification procedure as for the field data (cf. Section 3.2). However, the number of categories used for content classification of laboratory data differed. We introduced the *Specific promise* category to capture specific cheap-talk promises that do not exist in the field. The categories *Social proximity: Names* and *Social proximity: Additional channel* were not used for the laboratory data. As the participants were from the same university, it was important to preserve an anonymous environment. Specifically, we had to exclude any reputational concerns that might be relevant outside the laboratory and thus can hardly be controlled. Consequently, revealing names or initiating an additional channel of communication (which would allow the identification of faces or voices) was forbidden in the experiment.

Table 4 summarizes the results of our content classification. In total 2,266 non-empty messages were coded. The reliability scores of all three categories pass the 0.70 cutoff value (Krippendorff, 1980). We observe that the content of communication does not significantly differ between the treatments with unrestricted communication **C** and **C-R** (two-sided Mann-Whitney  $U$ -tests based on independent matching groups,  $p \geq 0.462$ ). There appear to be more empty messages with unrestricted communication when reputation is available, but this difference is not significant ( $p =$

0.634). Only when the message space is limited, the presence of a reputation mechanism somewhat increases the share of empty messages ( $p = 0.074$ ) and decreases the share of unspecific promises ( $p = 0.036$ ). Ruling out specific promises (**C** vs. **LC** and **C-R** vs. **LC-R**) does not significantly change the share of empty messages or the share of messages aiming to reduce the social proximity ( $p \geq 0.127$ ). The share of unspecific promises does not differ significantly between **C-R** and **LC-R** ( $p = 0.753$ ), but it increases significantly from 27 percent in **C** to 47 percent in **LC** ( $p = 0.009$ ).<sup>15</sup>

Table 4 – Classification of messages in the laboratory (reliability score: Krippendorff’s Alpha)

Treatment	<i>Empty message</i>	Content categories		
		<i>Social proximity: Informal</i>	<i>Unspecific promise</i>	<i>Specific promise</i>
<b>C</b>				
Share	0.297	0.181	0.270	0.277
(Krippendorff’s Alpha)	(-)	(0.875)	(0.853)	(0.980)
<b>C-R</b>				
Share	0.372	0.164	0.256	0.278
(Krippendorff’s Alpha)	(-)	(0.962)	(0.818)	(0.983)
<b>LC</b>				
Share	0.264	0.247	0.473	-
(Krippendorff’s Alpha)	(-)	(0.910)	(0.791)	(-)
<b>LC-R</b>				
Share	0.440	0.219	0.296	-
(Krippendorff’s Alpha)	(-)	(0.926)	(0.895)	(-)

<sup>15</sup> Comparing communication patterns between the field and the laboratory, we observe some differences: in the laboratory there is a smaller share of empty messages, a larger share of messages addressing the buyer informally, and a larger share of unspecific promises than in the field. We discuss the differences and similarities between the field and the laboratory in Section 4.3.

To study the influence on buyers' choices, we run separate conditional logit regressions for the five treatments based on the information available to buyers. We assume an underlying random utility model, similar to that applied to the field data, in which buyers  $j$  select the bid  $i$  offering the highest expected utility in period  $t$  given by

$$U_{ijt} = \beta_1 b_{ijt} + \beta_2 R_{ijt} + \beta_3 C_{ijt} + \varepsilon_{ijt}, \quad (2)$$

where  $b_{ijt}$  represents the bid price and the vectors  $R_{ijt}$  and  $C_{ijt}$  contain the variables indicating a seller's reputation and communication profile in a specific period. The reputation vector  $R_{ijt}$  contains the seller's average quality over all the previous periods  $\bar{q}_{ijt}$  and the quality that the seller selected in the last period  $q_{ijt}^{t-1}$ . As the last variable does not become available until the second period and as there is no role for reputation in the last period, we only consider  $t = 2, \dots, 17$ . The communication vector  $C_{ijt}$  contains four independent variables: a dummy variable that takes the value 1 if a message is empty and 0 otherwise and variables that indicate the classification into the three content categories taking the values 0, 0.5, and 1 based on the coders' classification. For the laboratory data, we do not include further controls, because the buyers were not informed about any attributes of the sellers beyond price, reputation, or message. The unobserved error term is denoted by  $\varepsilon_{ijt}$ . It is assumed to be independently identically distributed with the type 1 extreme value distribution. The results are shown in Table 5.

Higher prices have a negative impact on the probability of a bid being selected across treatments. If rationality and selfishness were common knowledge, this would be the only aspect of a bid that buyers should consider. From the previous literature, we infer that reputation and communication might still be important. This is supported by our regressions: buyers also prefer sellers with a history of high quality. They take into account the average quality as well as the quality of the last period.



Table 5 – Conditional logit regressions on buyers’ choices in the laboratory

Independent variables	Baseline	R	C	C-R	LC	LC-R
<i>Bid</i>	-0.017*** (0.002)	-0.024*** (0.003)	-0.020*** (0.002)	-0.028*** (0.003)	-0.017*** (0.002)	-0.029*** (0.003)
<i>Average quality</i>		0.046*** (0.016)		0.087*** (0.017)		0.107*** (0.020)
<i>Quality last period</i>		0.062*** (0.012)		0.044*** (0.011)		0.065*** (0.014)
<i>Empty message</i>			-0.042 (0.321)	0.186 (0.459)	-0.077 (0.275)	-0.175 (0.350)
<i>Social proximity: Informal</i>			-0.329 (0.296)	0.035 (0.366)	0.532** (0.235)	0.655* (0.358)
<i>Unspecific promise</i>			0.330 (0.310)	0.228 (0.430)	0.032 (0.244)	0.247 (0.338)
<i>Specific promise</i>			1.657*** (0.317)	0.824** (0.410)		
<i>N</i>	768	768	768	768	768	768
<i>McFadden’s R<sup>2</sup></i>	0.399	0.497	0.419	0.545	0.351	0.604

Each observation represents an auction–bid pair. The dependent variable is an indicator that equals 1 if the bid was selected as the winning bid in the particular auction. \*: significant at 10%. \*\*: significant at 5%. \*\*\*: significant at 1%. Standard errors are reported in parentheses.

Analyzing the effects of communication content on buyers’ choice we observe that, in the case of restricted communication (specific promises are infeasible), social proximity has a significantly positive effect while unspecific promises have no effect. In contrast, in the case of unrestricted communication (specific promises are feasible), buyers prefer sellers who make specific promises about the profit that the buyer will make from selecting their bid. Neither attempting to increase the social proximity nor making unspecific promises generates a significant advantage in these treatments.

These observations are in line with our explanation offered for the rather weak effects of (unspecific) promises in the field: specific promises appear to be important for buyers’ choice. As long as specific promises are infeasible in the laboratory, buyers are more likely to rely on arguments that increase the social proximity. The baseline category in our regressions is made up of bids that are accompanied by a non-empty message that does not contain content falling into any of the three categories. Bids that do not fall into any of the categories are not treated significantly differently from bids with empty messages (as indicated by the insignificance of the *Empty message* dummy). Our results hold for both treatments with and treatments without reputation infor-

mation. Apparently, the availability of reputation information does not qualitatively affect the buyers' evaluation of communication content.

We also estimated the buyers' willingness to pay for communication and reputation (i.e. their willingness to accept a higher bid in return for higher previous quality or certain message content). Our results are illustrated in Figure 2. On aggregate, that is, pooling all the choices made in auctions 2 to 17, buyers are willing to pay 30.93 eurocents more in **C-R** and 37.13 eurocents more in **LC-R** if a seller has supplied 10 additional percent of average quality in previous auctions ( $p = 0.000$ , 1,000 bootstrap replications). Again, these are rather high amounts given that ten additional percent of actually supplied quality  $q_i$  increases the buyer's profits by 50 eurocents. The influence of the last auction's quality choice on buyers' choices is also significant ( $p = 0.000$ ). If a seller has provided 10 additional percent of quality in the last auction, buyers are willing to pay 15.65 eurocents more in **C-R** and 22.46 eurocents more in **LC-R**. The two kinds of reputation information – quality in the last auction and average quality in previous auctions – are strongly correlated with each other across the three treatments with reputation (Spearman's rho = 0.715,  $p = 0.000$ ). In the treatments with communication, it seems that buyers value average quality information more. However, the difference in willingness to pay between the two is weakly significant only in **C-R** ( $p = 0.083$ , 1,000 bootstrap replications).

Figure 2 – Buyers’ willingness to pay (WTP) for reputation and communication information in the laboratory (95 percent bootstrapped confidence intervals)

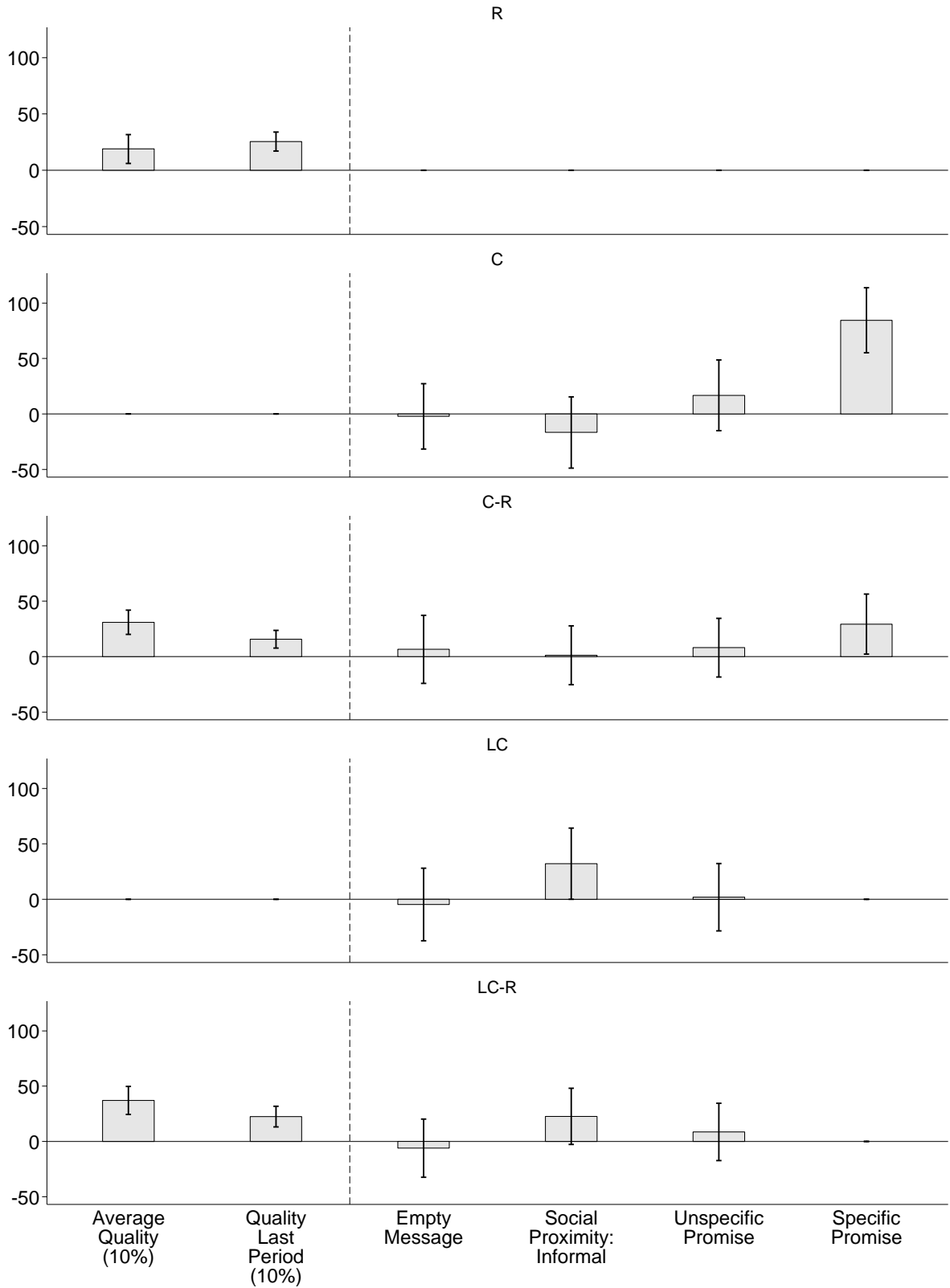


Figure 2 also summarizes our estimation results on the content of communication. If the message content is limited, approaching the buyer informally increases the buyer's willingness to pay by 32.15 eurocents in **LC** ( $p = 0.050$ ) and by 22.70 eurocents in **LC-R** ( $p = 0.081$ ). If an unrestricted message includes a specific promise, buyers are willing to pay 84.50 eurocents more in **C** ( $p = 0.000$ ) and 29.32 eurocents more in **C-R** ( $p = 0.034$ ). All the other message contents sent by sellers have no significant effect on buyers' willingness to pay ( $p \geq 0.302$ ). Despite the observation that the presence of reputation information does not qualitatively change our results, the effect of communication content seems to be more pronounced when there is no reputation information. However, only in the case of specific promises in **C** and **C-R** there is no overlap with the confidence intervals. If there is no reputation mechanism, buyers are willing to pay more than twice as much for specific promises than if there is such a mechanism. Our laboratory results regarding Research Questions 1 and 2 can be summarized as follows:

Results for **Research Question 1** (laboratory): *Buyers are more likely to select sellers who make specific promises. If specific promises are infeasible, buyers prefer sellers who increase social proximity.*

Results for **Research Question 2** (laboratory): *The relative importance of social proximity and specific promises for buyers' choice is not affected by the availability of reputation information. Buyers' willingness to pay for a specific promise is higher without reputation information, though.*

#### 4.3 Buyers' choices – laboratory versus field

The laboratory experiment was designed to study buyers' choices along dimensions that are similar to the bid characteristics observed in the field. However, the decision situation in the laboratory takes place under much more controlled and thus less complex conditions. For example, the reputation mechanism in the field is based on subjective ratings from former buyers only, and most ratings are usually positive. Fewer than 4 percent of ratings that sellers have received are neutral or negative. In the laboratory the reputation mechanism provides objective information about past choices. As such, our experimental treatments with and without a reputation mechanism resemble extreme cases in which reputation information either provides observation of past behavior or does not exist (as in the experiments by Duffy and Feltovich, 2002, or Bracht and Feltovich, 2009). The decision situation also differs along theoretical dimensions. Among others,

in the field sellers' costs are not symmetric independent private values, bids are not submitted simultaneously, and adverse selection problems exist next to moral hazard. Also the number of categories used for content classification of laboratory data differed. Among others we had to restrict communication to exclude any reputational concerns that might be relevant outside the laboratory (and, thus, are hardly controllable). Nevertheless, we believe that the analysis in the more controlled environment of the laboratory provides a first simple check of the validity of our conclusions drawn from the field data.

Overall our field and laboratory evidence provides a coherent picture. In line with the field results, in the laboratory a higher price has a negative impact on the probability of winning while a history of high quality has a positive effect. The laboratory results on the effects of communication content are also in line with those obtained in the field: If specific promises are infeasible (as it is the case in the field), there is a significantly positive effect of social proximity on winning while unspecific promises have no significant effect. This finding holds for our laboratory treatments with and without reputation information. Given the differences between the two decision environments, however, one has to be very cautious when interpreting the similarities between field and laboratory data.

#### *4.4 Buyer profits*

In the previous sections, we investigated buyers' choice pattern. In this section we focus on the quality of their choices. With their choice of sellers (each of whom has selected a quality and a price of the project), buyers determine their profit. In the field the buyers' valuations for delivered services of different quality are unknown, but we can observe them directly in the laboratory. In addition, our experimental design enables us to calculate counterfactual profits of alternative choice patterns. To judge the quality of buyers' choices, we compare the accrued profits with the profits that would have been realized under a correct expectations rule. By this we mean a linear decision rule assigning weights to all the attributes of a bid in a way that maximizes the likelihood of identifying the more profitable bid. We estimate the treatment-specific weights of this rule from our experimental data via conditional logit regressions using a model similar to equation (2). However, we replace the dependent variable and use a dummy indicating the more profitable bid within each auction instead.

Table 6 summarizes the ratio of actual buyer profits earned within treatments with the profits that would have been earned by applying the estimated correct expectations rule. As the first benchmark, we also include random behavior, that is, the profits that would have been earned in expectation by a buyer choosing randomly. As the second benchmark, we include the maximum profits, namely the profits that would have been earned by a hypothetical buyer always being able to identify the more profitable bid. The table also contains two-sided  $p$ -values of Wilcoxon signed-rank tests in parentheses. These tests compare the random profits, actual profits, and maximum profits with the hypothetical profits earned from the estimated correct expectations rule. This test is applied to each treatment considering each matching group as an independent observation.

Table 6 – Buyer profits as a share of correct expectations profits

	Treatment					
	Baseline	R	C	C-R	LC	LC-R
<i>Random profits</i>						
Share	0.244	0.642	0.454	0.632	0.028	0.579
( $p$ -value)	(0.012)	(0.012)	(0.036)	(0.012)	(0.012)	(0.012)
<i>Actual profits</i>						
Share	0.796	0.970	0.961	0.967	0.656	0.942
( $p$ -value)	(0.012)	(0.069)	(0.575)	(0.161)	(0.036)	(0.012)
<i>Maximum profits</i>						
Share	1.296	1.120	1.802	1.147	1.426	1.059
( $p$ -value)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)

For each treatment the table presents the random, actual, and maximum buyer profits as the share of correct expectations profits. Two-sided  $p$ -values from Wilcoxon signed-rank tests are given in parentheses. They test the null hypothesis that the average matching group profits equal the correct expectations profits ( $N = 8$ ).

As expected, Table 6 reveals that the profits that would result from random choice fall short of the profits from the estimated correct expectations rule in all the treatments. However, the maximum profits also exceed these profits in all the treatments. According to the Wilcoxon tests, the differences are significant in each case. In all the treatments, the buyers' actual profits are significantly higher than those that would result from random choice. Particularly in treatments with reputation information and/or specific promises, the actual profits are quite close to the profits made under the correct expectations rule. The difference is still significant in all the treatments except when specific promises are feasible (in treatments **C** and **C-R**).

We further investigate how the actual weights on bid characteristics differ from those under the correct expectations rule. For this purpose we calculate the difference between the buyers' ob-

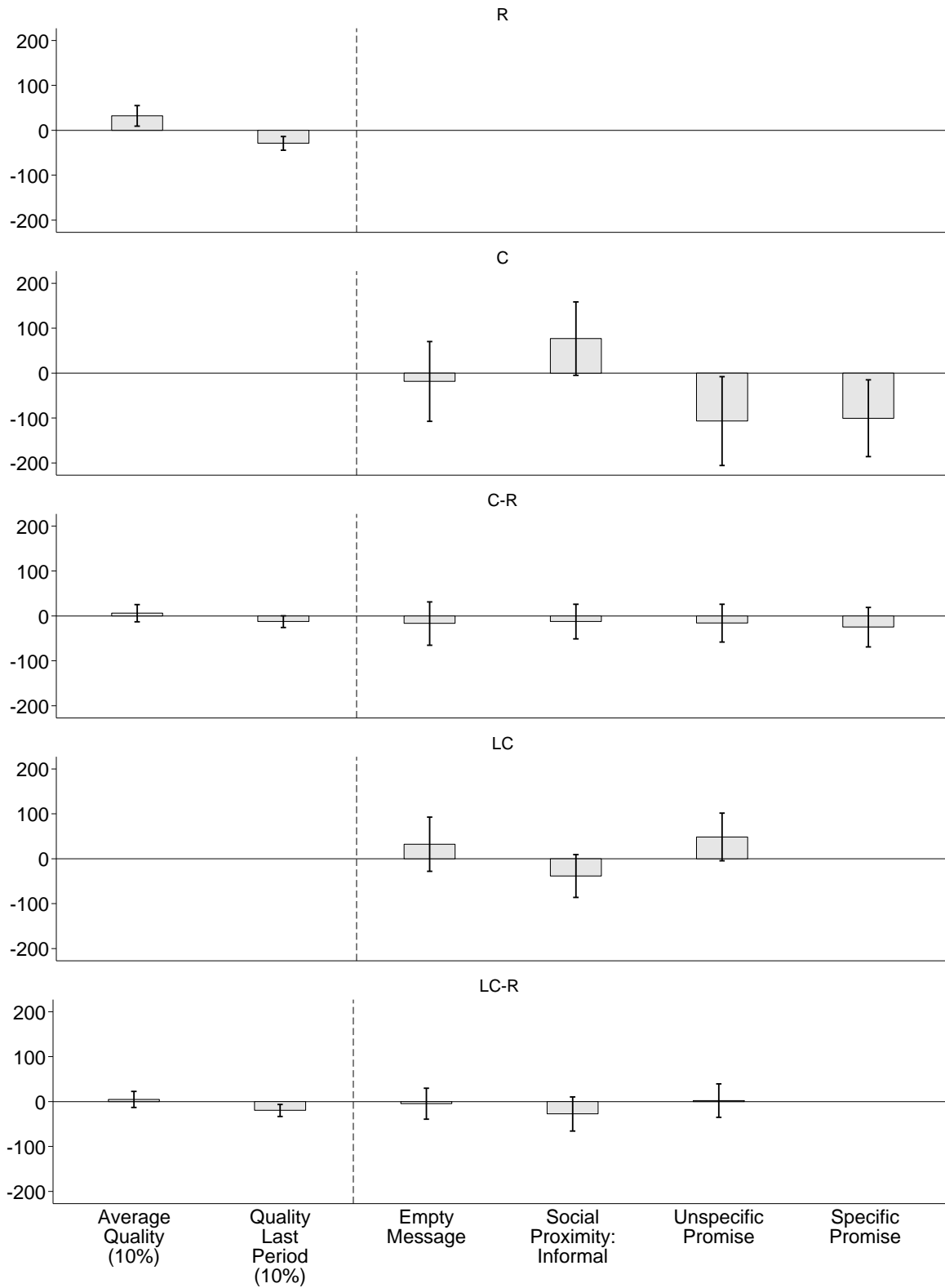
served willingness to pay (cf. Section 4.2) and the willingness to pay that results from the estimates of the correct expectations rule. Figure 3 illustrates the resulting differences indicating how buyers could improve their choices to identify the more profitable bid more often.

Across the treatments with reputation (**R**, **C-R**, and **LC-R**), buyers should pay less for an additional 10 percent of quality delivered in the last period. This difference is (weakly) significant ( $p \leq 0.055$ , 1,000 bootstrap replications). Without communication in the **R** treatment, they should also pay significantly more for an average quality supplied in previous auctions ( $p = 0.006$ ).

With respect to communication, there are no differences between the correct expectations' willingness to pay and the observed values ( $p \geq 0.155$ ) in the treatments with reputation (**C-R** and **LC-R**). However, in the treatments without reputation (**C** and **LC**), we observe (weakly) significant differences when considering the content of the messages. In treatment **C**, buyers should pay weakly significantly more for messages creating social proximity ( $p = 0.065$ ) and significantly less for messages containing unspecific promises ( $p = 0.034$ ) as well as for messages containing specific promises ( $p = 0.021$ ). In treatment **LC**, buyers should pay a weakly significantly higher amount for messages containing unspecific promises ( $p = 0.073$ ).

Overall our analysis based on the correct expectations rule suggests a somewhat different weighting of attributes, though in none of the treatments does this rule suggest a significantly lower weight on arguments reducing the social distance. This is also true for specific promises, but only in the treatment with reputation information (**C-R**). Without reputation information subjects should care somewhat less about specific promises than they actually do (**C**). Note, however, that the suggested change of weightings would not significantly increase the profits in the latter treatment (cf. Table 6).

Figure 3 – Buyers' willingness to pay (WTP) based on correct expectations minus observed willingness to pay in the laboratory (95 percent bootstrapped confidence intervals)





We summarize our observations on buyer profits as follows:

Results for **Research Question 3** (laboratory): *Buyers obtain a rather large share of the profits that would have been realized under the correct expectations rule either when sellers have the opportunity to build up a reputation or when specific promises are feasible. If neither of the two is available, buyers could increase their profits by putting somewhat more weight on unspecific promises.*<sup>16</sup>

## 5 Conclusion

This study investigates the effects of communication content and its interaction with reputation information on the choice of transaction partners in markets with moral hazard. Our focus is on markets in which buyers can select between competing sellers based on prices and all the other information available. Our field data as well as our laboratory data reveal that buyers do not just prefer sellers with lower prices. They also value a good reputation and specific message content. As such, implementing communication tools in online markets might be seen as an advantage for buyers.

In the field we particularly observe that buyers are more likely to select sellers whose arguments reduce the social distance. This result is in line with the experimental literature that finds social distance to influence behavior in trust-related interactions, but a large body of experimental work also points to the importance of non-binding promises for the effectiveness of communication. However, in the field such promises do not matter much for buyers' choice.

We therefore explore this discrepancy by creating a more controlled decision environment in the laboratory. Our results suggest that the discrepancy is due to the fact that, on the procurement website, sellers are not able to make promises that specify the profits that will result from the promised behavior in a non-binding manner. In fact, also in the laboratory, buyers only value a reduced social distance if specific non-binding promises are infeasible. If they are allowed (as is usually the case in the experimental literature), promises influence buyers' choice of sellers. Importantly, we find this effect to be independent of the presence of a reputation mechanism.

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<sup>16</sup> In fact, our field data (which are obtained in a setting in which specific promises are infeasible and in which reliable reputation information is not available) reveal a weakly significantly positive weight on unspecific promises that we do not observe in the laboratory.

These findings are not in conflict with previous work on social distance or promises, as this research does not focus on the interaction of the two. Only He et al. (2016) consider social distance and promises in their laboratory study of the prisoner's dilemma game. In line with our results, they observe that specific promises to cooperate are particularly influential in the laboratory. However, they consider neither unspecific promises, nor behavior in competitive environments, nor the influence of reputation mechanisms. Our findings underline the importance of communication for the choice of transaction partners and reveal that the influence of social distance and promises is mediated through the message space available to these partners.

Further, our laboratory study allows us to assess the quality of buyers' choices. Comparing the profits that are actually realized by buyers with those that would have been realized under the correct expectations rule reveals that the gap between them narrows when reputation information is available or when specific promises are feasible. With reliable information about past behavior, buyers earn between 94.2 and 97.0 percent of the profits that could be obtained with the correct expectation rule. When no specific promises are feasible in treatments with reputation, the actual profits still differ significantly from the profits obtained with this rule. In that case the profits could be increased further by putting somewhat less weight on the quality delivered in the last period. When specific promises are feasible, we do not find significant differences between the actual profits and the correct expectations rule profits, even when no reputation information is available. As such, our results on the quality of buyers' choice also underline the importance of the availability of reputation information and of the feasibility of specific promises. When neither of the two is available, our analysis suggests that buyers' choice could be improved by placing somewhat more weight on unspecific promises.

Finally our study demonstrates that the combination of laboratory and field data can be very fruitful as it allows generating insights which might have remained undiscovered when relying on one of the two methods alone.

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## Appendix A: Conditional logit regressions on field data

Table A1 - Conditional logit regressions on buyers' choices in the field (quartile split by auction-level SD of positive ratings)

Independent variables	Auction-level SD of total number of positive ratings			
	Quartile 1	Quartile 2	Quartile 3	Quartile 4
<i>Bid</i>	-0.027*** (0.003)	-0.019*** (0.002)	-0.019*** (0.002)	-0.016*** (0.001)
<i>Positive ratings [2, 7]</i>	0.030 (0.199)	0.641*** (0.215)	0.684*** (0.210)	0.637*** (0.238)
<i>Positive ratings [8, 26]</i>	0.526** (0.243)	0.841*** (0.194)	0.603*** (0.216)	0.755*** (0.231)
<i>Positive ratings [27, 178]</i>	0.891 (1.292)	1.003*** (0.262)	0.900*** (0.202)	1.299*** (0.218)
<i>Share negative and neutral ratings</i>	-0.462 (1.363)	-3.152** (1.526)	-1.965* (1.147)	-5.474*** (2.018)
<i>Empty message</i>	-0.577*** (0.220)	-0.305 (0.201)	-0.316 (0.196)	-0.244 (0.192)
<i>Social proximity: Informal</i>	1.438 (1.098)	-0.455 (1.364)	1.261 (1.140)	0.300 (0.982)
<i>Social proximity: Names</i>	0.386 (0.249)	0.064 (0.215)	-0.086 (0.213)	0.202 (0.209)
<i>Social proximity: Additional channel</i>	0.197 (0.314)	0.577** (0.278)	0.192 (0.296)	0.442 (0.309)
<i>Promise</i>	0.028 (0.296)	0.221 (0.232)	0.377 (0.240)	0.243 (0.240)
<i>N</i>	1,286	1,884	2,283	2,070
<i>McFadden's R<sup>2</sup></i>	0.323	0.317	0.319	0.316

Each observation represents an auction-bid pair. Regressions include additional controls. The dependent variable is an indicator that equals 1 if the bid was selected as the winning bid in the particular auction. \*: Significant at 10%.

\*\* : Significant at 5%. \*\*\* : Significant at 1%. Standard errors are reported in parentheses.

Table A2 - Conditional logit regressions on buyers' choices in the field (quartile split by auction-level SD of negative & neutral ratings)

Independent variables	Auction-level SD of total number of <u>negative &amp; neutral</u> ratings			
	Quartile 1	Quartile 2	Quartile 3	Quartile 4
<i>Bid</i>	-0.025*** (0.003)	-0.018*** (0.002)	-0.020*** (0.002)	-0.017*** (0.002)
<i>Positive ratings [2, 7]</i>	0.298 (0.194)	0.531** (0.241)	0.520** (0.215)	0.594*** (0.211)
<i>Positive ratings [8, 26]</i>	0.386* (0.223)	0.795*** (0.230)	0.810*** (0.223)	0.676*** (0.204)
<i>Positive ratings [27, 178]</i>	0.820** (0.322)	1.246*** (0.261)	0.907*** (0.239)	1.028*** (0.227)
<i>Share negative and neutral ratings</i>	- -	-3.724 (5.539)	-2.200 (2.043)	-2.543*** (0.820)
<i>Empty message</i>	-0.450** (0.208)	-0.278 (0.208)	-0.383** (0.190)	-0.265 (0.200)
<i>Social proximity: Informal</i>	1.891* (1.099)	1.834 (1.658)	0.379 (0.958)	-0.659 (1.042)
<i>Social proximity: Names</i>	0.283 (0.236)	0.078 (0.224)	0.124 (0.203)	0.029 (0.224)
<i>Social proximity: Additional channel</i>	0.082 (0.319)	0.566* (0.290)	0.373 (0.296)	0.496* (0.289)
<i>Promise</i>	-0.072 (0.297)	0.219 (0.263)	0.347 (0.226)	0.274 (0.236)
<i>N</i>	1,321	1,794	2,283	2,125
<i>McFadden's R<sup>2</sup></i>	0.299	0.318	0.332	0.314

Each observation represents an auction-bid pair. Regressions include additional controls. The dependent variable is an indicator that equals 1 if the bid was selected as the winning bid in the particular auction. \*: Significant at 10%.

\*\*: Significant at 5%. \*\*\*: Significant at 1%. Standard errors are reported in parentheses.

## Appendix B: Instructions

# *Welcome to the experiment!*

### Preface

You are taking part in an experiment about decision making in the field of experimental economics. During the experiment you and the other participants will be asked to make decisions. By doing so, you can earn money. How much you are about to earn depends on your decisions. After the experiment you will receive your earnings in cash.

The experiment is split into two different parts. Each of these parts is introduced by detailed instructions.

All participants will receive exactly the same instructions.

Please keep in mind that decisions you make in one of the two parts of the experiment do not have any influence on the other part of the experiment.

**None of the participants will receive any information concerning the identity of other participants during the experiment.**

## *Part 1*

Please read the following instructions. Five minutes after you have received the instructions, we will come to your desk to answer remaining questions. Whenever you have questions during the experiment, please put up your hand or open the door to your cabin. We will come to your desk then.

During the first part of the experiment you will participate in 6 auction rounds.

### **Description of the auction rounds**

In each of the 6 auction rounds you participate in, one project will be sold. There are exactly two bidders (= potential sellers), you and another bidder.

### **Procedure:**

The bidders want to conduct the project. For each auction round and for both bidders, we have drawn the costs for conducting the project randomly and independently of each other from the range between 100 and 500 euro cents. All sums of this range could be realized with equal probability. Each of the two bidders will only be informed about his own costs for conducting the project.

At the beginning of each auction round, each of the two bidders can decide how much he wants to bid for the project. The bid is set to a maximum of 500 euro cents.

The bidder who puts in the lowest bid wins the auction. His earnings in this round are equal to the difference between his bid and his costs for conducting the project.

The bidder who puts in the highest bid loses the auction. In this case, his earnings in this round are equal to zero.

If both bids are equal, the winner will be determined randomly (i.e. each bidder wins the auction with a probability of 50%).

### **Your fellow bidder:**

Your fellow bidder is a computer in each of the 6 auction rounds. The computer is programmed to maximize its expected earnings in each auction round (in fact, it is bidding in every auction round according to the symmetric Nash equilibrium strategy under risk neutrality). The computer expects that you behave in the same way. The computer expects that your costs for conducting the project are drawn randomly and independently of each other out of the range from 100 to 500 euro cents and that all values of this range could be realized with equal probability.

### **Pay-out**

The pay-out of all your earnings of the 6 auction rounds will take place at the end of the whole experiment.

**Please keep in mind that none of the participants will receive any information about his earnings per round during the first part of the experiment.**

**Moreover, none of the participants will receive any information about the bidding behavior and the earnings of the other participants in part 1 during the whole experiment.**

**Screen in Part 1**

Round 1 out of 6

Remaining time (for orientation):  
Please decide now!

Round 1:

You are participant number 1 and bidder in all following auctions.

Auction:

In round 1 your costs to conduct the project amount to 200 euro cents.

Please enter your bid.

Your bid is:

Confirm bid

Please keep in mind: If you win the auction your earnings in this round = your bid - 200.

## *Part 2*

Please read the following instructions. Ten minutes after you have received the instructions, we will come to your desk to answer remaining questions. Whenever you have questions during the experiment, please put up your hand or open the door to your cabin. We will come to your desk then.

During the second part of the experiment you will participate in 18 auction rounds.

### **Description of the auction rounds**

In each of the 18 auction rounds you participate in, one project will be sold. There are exactly two bidders (= potential sellers) and one buyer.

You will be informed at the beginning of the first auction round whether you decide in the role of a bidder or in the role of a buyer during the 18 auction rounds. You will maintain this role in all of the 18 auction rounds.

In each of the 18 rounds, the other two participants will be assigned to you randomly, so every time a buyer and two bidders interact. It is guaranteed that you will not meet the same group of participants in two consecutive rounds.

### **Procedure:**

The buyer wants to have the project conducted. His valuation for a conducted project (with a quality of 100%, see below) is 500 euro cents in every auction round. The valuation determines how valuable the project is for the buyer at a 100% quality rate.

The bidders want to conduct the project. For each auction round and for both bidders we have drawn the costs for conducting the project (with a quality of 100%) randomly and independently of each other from the range between 100 and 500 euro cents. All values of this range could be realized with equal probability. Each bidder will only be informed about his own costs for conducting the project. The buyer does not receive any information concerning the costs. [**C, C-R, C-L**: During each auction round, each bidder can send a message to the buyer.]

Each auction round comprises three stages: In the “auction phase” both bidders bid for conducting the project. In the “buyer choice phase”, the buyer chooses a winner (= seller) based on the bids [**C-R**: the messages] [**R, C-R**: and the information he has concerning the previous bidder’s choice of quality] [**C, C-L**: and the messages]. In the “quality choice phase”, both bidders decide about the quality they conduct the project with, in case they should win the auction and are paid their bid by the buyer. The three stages are described in more detail below.

### *Auction Phase:*

At the beginning of the auction phase, each of the two bidders can decide which bid he wants to make for conducting the project. The maximum bid is 500 euro cents.

The earnings per round are determined based on the choices made in the “seller choice phase” and the “quality choice phase” (see below).

### *Seller Choice Phase:*

In the seller choice phase, the buyer decides about the winner (= seller). [**R, C, C-R, C-L:** For this he receives the following information about each bidder:] [**R, C-R:** his bid, [**C-R:** his message,] his quality decision in the previous round and the average of his quality decisions in all previous rounds.] [**C, C-L:** his bid and his message.] [**Baseline:** For this, he receives his bid as information about each bidder.]

### *Quality Choice Phase:*

In the quality choice phase, the bidders decide about the quality they conduct the project with, in case they should win the auction and are paid their bid by the buyer.

The quality rate has to be set between 50% and 100%. Each percent of quality costs the winner of the auction (= seller) one percent of the costs for conducting the project that were drawn for him in the corresponding round. Therefore, the seller’s costs for conducting the project with 100% quality correspond to his costs and the costs for conducting the project with 50% quality correspond to half of his costs.

$$\text{Winner's earnings per round} = \text{bid} - \text{quality [\%]} * \text{costs for conducting the project}$$

The buyer’s valuation of the project decreases with each percent less quality by one percent (i.e. by 5 euro cents). Therefore the buyer’s valuation for the project at a quality of 100% is equal to 500 euro cents. At a quality of 50% it is equal to 250 euro cents.

$$\text{Buyer's earnings per round} = \text{quality [\%]} * 500 - \text{auction's price}$$

### **Pay-out**

After the 18 auction rounds the sum of your earnings per round together with your earnings of the first part of the experiment will be paid out in cash.



**[C, C-L, C-R: Note about the messages**

Basically, the content of the messages is left up to you. But it is not allowed to give personal details about oneself e.g. name, age, address, subject. [**C-L: Furthermore, if you are a bidder, you are not allowed to give further details about your costs for conducting the project, your quality decision or the resulting buyer's earnings in this round.**] In case you violate the rules of communication, you will be expelled from the experiment and won't be paid out. Each message comprises a maximum of 420 signs (about 2 lines). Please note: to send a message, you have to press the Enter-key.]

**Before we start with the second part of the experiment in a few moments, we ask you to fill out a test of understanding on the computer.**

**Screens for bidders (= potential sellers) in part 2**

**[Baseline, R:]**

Auction and quality choice phase:

Round	2 out of 18	Remaining time (for orientation): Please decide now!
You are participant No 1 and bidder in all following auctions.		
AUCTION:		
In round 2 your costs for conducting the project are 200 euro cents at a quality rate of 100%.		
AUCTION PHASE:	QUALITY CHOICE PHASE:	
Please decide on the bid.	Please decide on the quality.	
Your bid is:	Your quality is:	
[R: The buyer in this round receives the following information about you:		
The bidder's quality was 100 in the previous round.		
The average bidder's quality in the previous auctions was 100. ]		
Please keep in mind: If you win an auction your earnings in this round = your bid - quality [%]*200 [euro cents].		
Confirm price and quality		

[C, C-L, C-R:]

Auction and quality choice phase:

Round

2 out of 18

Remaining time (for orientation):

Please decide now!

You are participant No 1 and bidder in all following auctions.

AUCTION:

In round 2, your costs for conducting the project are 200 euro cents at a quality rate of 100%.

AUCTION PHASE:

Please decide on the bid.

Your bid is:

QUALITY CHOICE PHASE:

Please decide on the quality.

Your quality is:

[C-R: The buyer in this round receives the following information about you:

The bidder's quality was 100 in the previous round.

The average bidder's quality in the previous auctions was 100. ]

MESSAGE:

Please enter a message that is shown to the buyer in the seller choice phase in the field below.

Your message will be sent by pressing the Enter-key.

The message comprises a maximum of 420 signs (about 2 lines).

Please keep in mind: If you win an auction, your earnings in this round = your bid - quality [%]\*200 [euro cents].

Confirm price and quality

## Screens for buyer in part 2

[Baseline, R:]

Seller choice phase:

Round	2 out of 18	Remaining time (for orientation): Please decide now!
You are participant No 3 and buyer in all following auctions.		
SELLER CHOICE PHASE:		
<b>BIDDER A:</b>		<b>BIDDER B:</b>
Bidder A, who you are randomly matched with in this round, bids a price of 300 euro cents.		Bidder B, who you are randomly matched with in this round, bids a price of 200 euro cents.
[R: The bidder's quality in the previous round was 100.		The bidder's quality in the previous round was 50.
The bidder's average quality was 100.		The bidder's average quality was 50.]
Please keep in mind: your earnings in this round = quality [%]*500 [euro cents] - bid		
Please decide between the bidders:		
Bidder A Bidder B		
OK		

[C, C-L, C-R]  
Seller choice phase:

Round	2 out of 18	Remaining time (for orientation): Please decide now!
You are participant No 3 and buyer in all following auctions.		
SELLER CHOICE PHASE:		
<b>BIDDER A:</b>		<b>BIDDER B:</b>
Bidder A, who you are randomly matched with in this round, bids a price of 300 euro cents.		Bidder B, who you are randomly matched with in this round, bids a price of 200 euro cents.
[C-R: The bidder's quality in the previous round was 100		The bidder's quality in the previous round was 50.
The bidder's average quality was 100.		The bidder's average quality was 50.]
Bidder A's message is:		Bidder B's message is:
[BIDDER A'S MESSAGE]		[BIDDER B'S MESSAGE]
Please keep in mind: your earnings in this round = quality [%]*500[euro cents] - bid		
Please decide between the bidders:		
Bidder A		
Bidder B		
OK		