Information Asymmetry and Deception in the Investment Game[1]

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Abstract:

Several situations in our daily interactions are characterized by uncertainty and asymmetric information regarding the final outcomes. For example, an investor may overstate a project's value, or a superior may choose to under, or over, state the gains from a project to a subordinate. We modify the standard investment game to study the effect of possible deception, i.e. over-, or under-, statement of the true value, on investee (and investor) behavior. We find that deception is prevalent and around 66% of the investors send false messages. Investors both over-, and under-, state the true value of the multiplier, *k*. We elicit investee beliefs and find that investees are naive in that almost half of them believe the message they receive. Meanwhile, a large proportion of investors think that sending a message was useful. The introduction of the possibility of deception does not affect trust or trustworthiness on average, but deceivers make the deceived worse off, return less and are more likely to report lying to avoid harming others. Finally, an increase in information asymmetry increases deception.

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I. Introduction:

The presence of information asymmetry leaves the door open to deceptive acts[2]. Think of a typical situation in a firm where a superior proposes his subordinate to work on a project. Clearly, the superior has additional knowledge about the project and knows the potential gains it entails for himself and the subordinate, and may choose to over (or under) sell it. Another example is venture capital where the investor may oversell a project to make it look attractive[3]. In most of these examples communication involves messages regarding the return on an investment and may not be verified easily. Situations with asymmetric information are pervasive and may result in deception due to conflict of interest.

One would expect that the possibility of deception should negatively impact trust and have adverse economic (efficiency) consequences.[4] What makes problematic the study of deception is the impossibility of record keeping. However, in a controlled laboratory setting we can observe when deception takes place and quantify it. In this paper we modify the standard trust game (Berg, Dickhaut and McCabe, 1995) to allow for informational asymmetry and endogenous deception. We study a situation where it is common knowledge that the returns are drawn from a distribution with known probabilities. The investor always knows the true value of the multiplier and can choose to inform the investee truthfully, or not, through a numeric message. The possibility of communication between the investor and investee allows us to study the nature of deception. We also conduct a variation where investees have no prior information on the value the multiplier (k) can take except that the value of k is greater than one. We call this the ambiguity treatment.

Deception in economic environments has been studied by Gneezy (2005), Charness and Dufwenberg (2010), Hurkens and Kartik (2009), Sutter (2009), Rode (2010) and Sanchez-Pages and Vorstaz (2007), amongst others. In most of these papers acts of deception impose a cost upon the deceived. Gneezy (2005) studied the role of consequences in a two-person game where lying increases the payoffs to the liar at the cost to the counterpart. He finds that

[2] Deception is a common phenomenon all too prevalent in daily life. Situations such as the Madoff scandal, Enron, WorldCom, Lehman Brothers etc. highlight the fact that economic crime is prevalent at all levels of society.
[3] For example, Bloom Energy an energy startup sold their project as an “industry creator” that would eventually substitute the domestic grid.
[4] Evidence suggests that the economic loss to society can be quite large. For example, Mazar and Ariely (2006) states that the loss from returning used clothes to the fashion industry is estimated at $16 billion. The cost to the US economy from the Enron and WorldCom crisis was approximated at $37-42 billion.

people are sensitive to the harm their actions may cause when deciding to lie. People take into account not only how much they gain but also how much the other person loses. In addition, this unselfish motive diminishes with the size of the gain to the decision maker. Charness and Dufwenberg (2010) show that bare promises have no effect on trust while, the effect on trustworthiness is at an intermediate level between no communication and free-form promises. Rode (2006) employs a two-player communication game with asymmetric information to study truth telling and trust in a controlled laboratory setting. In his game decision makers face uncertainty about the consequences of their choice, but can rely on recommendations from advisors. He finds that many advisors tell the truth against their monetary self-interest, the propensity to tell the truth is unaffected by the contextual variation. In Sanchez-Pages and Vorstaz (2007) the investee implicitly decides whether to tell the truth or to lie. They find a group of subjects with preferences for truth-telling and one that only cares about material incentives.. Hurkens and Kartik (2019) modify the game in Gneezy (2005) and find that there is lying aversion but that results are also consistent with the fact that some people never lie and others lie only in their own benefit. Finally, Sutter (2009) studies how truth telling can be a strategic form of lying when the investor believes that the truthful message may not be believed by the investor. In all these papers lying, or deception, is to the detriment of the other party.

We add to this literature by employing a game where deception need not always have negative consequences (for the deceived). In the investment game the investor knows the exact value of the returns but if they return an amount exceeding the amount sent then there are no negative consequences for the deceived. Note that, this does not exclude the possibility that the investor keeps a larger proportion for himself. A second contribution to the literature is that the investor does not simply confront a choice between lying and telling the truth. Instead, the investor decides whether they want to deceive, or not, and if so how. This may be important as people may have preferences over the degree and the direction of their lies[5], i.e. overstating or understating returns, rather than simply making a choice over lying and truth telling. The investor also decides on the proportion allocated to the investee. In this sense our environment is richer in terms of the available choices.

Under information asymmetry, the investor knows the amount by which the quantity sent is multiplied. The investee, on the other hand, only has information about the distribution of

[5] For example, individuals may view small lies as more acceptable than big lies.

this amount. The investor, with better knowledge of the outcome can choose to send a message to the investee regarding the multiplier. Clearly, the nature of the message is cheap talk. In fact, in our case it is minimal cheap talk given that the message is only numeric. It can, however, have meaning if the investor believes that there is a positive probability that the message may have an impact upon the investee's choice[6].

The presence of deception through communication reflects the cheap-talk scenario in Ottaviani and Squintani (2006) and Kartik, Ottaviani and Squintani (2007). Where, naive investors (receivers of the message) believe the investees (senders of the message). Given this, there may be a tendency (on the part of the investor) to inflate the message. We can study inflation or deflation of messages in our setup. Further, we are able to see whether the message is believed or not and under what circumstances. We also elicit subject beliefs using questionnaires and find that a large proportion of investors think that sending a message was useful, while a sizeable proportion of investees believe the messages they receive.

We find that deception is common and a large proportion of subjects send deceptive messages. Subjects both over and understate the returns on the investment, which we find to be consistent with both with strategic lying and guilt aversion. Thus, investors do not always overstate the true value of *k* if investees are naive, or believed to be naive. We also find that subjects are naive in the sense that almost half the investees believe the message they receive. In addition, most investors thought that sending a message was useful, and out of these, a large proportion sent an informative message[7].

Further, the possibility of deception does not significantly affect trust or trustworthiness. However, those who lied returned less than those who told the truth. Finally, we analyse the effect of increasing the degree of information asymmetry (ambiguity treatment) on deception, trust and trustworthiness. We find that increasing the degree of information asymmetry gives very similar results, however, a larger fraction of individuals lie in the ambiguity treatment (40% vs. 64%). Also, those who lie return significantly less than truth tellers in the ambiguity treatment.

The paper is structured as follows. In Section II we outline the experimental design. Section III presents the results. Section IV concludes.

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[6] We obtain information on subject beliefs through questionnaire responses at the end of the experiment.
[7] We give the option of not sending a message. An informative message is the situation in which a message is sent and the value of k is in the distribution of k.

II. Experimental design:

A total of 694 undergraduate students from the Universidad Carlos III de Madrid were recruited for an hour and the average payoff was approximately €20 ($28). Including the instructions, the experiment lasted approximately 45 minutes. Prior to their recruitment, all subjects were given a questionnaire[8]. Responding to the questionnaire was a pre-requisite to participating in the experiments. The questionnaire contained personal information about age, studies, grades, family origin etc. Individuals were randomly selected into sessions and roles were randomly assigned. Investees and investors were assigned to separate rooms in the same building before they arrived for the experiment. Investees and investors were referred to as player A and player B, respectively, in the paper we also refer to them as senders and receivers.

All instructions were computer based. This protocol was implemented to ensure strict anonymity across subjects and to minimize the interaction with the experimenter. Investee and investors were located in separate rooms and were told they would be paired with another person (A/B) in a different location. Then our modification of the investment game (Berg, Dickhaut and McCabe, 1995) was played. After making their decisions both the investees and investors also responded to a set of questions[9]. The experiment ended after all subjects had responded to this second set of questions. They were then called out individually and paid their earnings privately. These details were common to all the treatments.

In our setting, as in the standard trust game both investees and investors get a 100 dex[10] endowment (approx. $12). The investee can send any amount (M) between 0 and 100 dex to the investor. The amount received by the investor is then multiplied by *k*. Recall that we want to study whether individuals deceive, when and how it takes place, the nature of the message (i.e. overstatement and understatement), and its effect on trust and trustworthiness. The introduction of information asymmetry is necessary for the study of deception. We do this by only giving information to the investee about the distribution of the multiplier *k*. We then introduce the possibility to send ex ante messages. For the sake of completeness, we also introduce additional treatments that we will use in order to conduct robustness checks. Our step wise design allows us to separately identify the effect of information asymmetry and the

[8] See Appendix B.
[9] See Appendix C.
[10] *Dinero experimental* (experimental money).

effect of the possibility of deception on trusting behaviour and trustworthiness in the presence of deception. Below we describe the three main treatments in detail and then provide justification for the treatment selection. The treatments are also summarized in Table 1.

Baseline Treatment: Investment game with k=3

Both investees and investors receive an endowment of 100 dex and are told that k takes a value of 3. The investee can send any amount between 0 and 100 to the investor which is then multiplied by 3 upon receipt. Upon receiving this amount the investor then decides upon the quantity to be sent back to the investee. The experiment ends at this point, with subjects being paid individually outside the room.

Treatment 234_No: *k (=2, 3 or 4)* random realization

The only difference from the Baseline treatment is that the investee is told that k can now take any value between {2, 3, 4} with equal probability. From the beginning, the investor gets to know the actual value of k, and knows that the investee does not know the value of k. All this is common knowledge for both players.

Treatment 234_ExAnte: Ex-ante message about *k (=2, 3 or 4).*

The only difference from treatment 234_No is that now the investor can decide to send a message or not. If sent, the message indicates the value of k prior to the decision of the investee. The message is numerical and the investor can input any value. Upon receiving the message the investee decides how much to send to the investor. If the investor decides not to send the message, the investor is informed that the investee has decided not to send a message.

In order to introduce the possibility of deception we first have to introduce uncertainty about the return on investment. The treatment 234_ExAnte will allow us to analyse how and when do people incur in deceptive acts. The comparison between Treatments 234_No and 234_ExAnte will allow us to study the effect of the possibility of deception on trust and trustworthiness. Finally, the comparison between the Baseline treatment and Treatment 234_No will give us the effect of uncertainty on trust and trustworthiness.

For completeness, and in order to further analyse why individuals lie, we conducted another treatment in which the investors send a message ex-post:

Treatment 234_ExPost: Ex-post message about *k (=2, 3 or 4).*

The only difference from treatment 234_ExAnte is that the investor informs (or not) the investee on the value of the *k* after the investee has decided how much to send.

Finally, and in order to analyse how the degree of information asymmetry affects deception, we also conducted two additional treatments where the investee was not informed about the distribution of *k*:

Treatment *k*>1_No:

The only difference from the Baseline treatment is that the investee is told that *k* can now take any value greater than one, and that the investor is told the actual value of *k*. From the beginning, the investor gets to know that the value of *k* is equal to 3, and is told about the information the investee has..

Treatment *k*>1_ExAnte:

The only difference between treatment *k*>1_No and this treatment is that is that now the investor can send a (numerical) message indicating the value of *k* prior to the decision of the investee.

TABLE 1. Treatments.

		Message sent by the receiver to the sender regarding the value of k		
		No message	Message ex ante	Message ex post
Information known by the senders about the value of k	k=3	Baseline		
	k={2, 3, 4}	234_No	234_ExAnte	234_ExPost
	k>1	k>1_No	k>1_ExAnte	

After making their decisions, the subjects further respond to a wide range of questions related to their deception attitudes. This helps us in analysing whether their behaviour in the lab corresponds to their answers in the survey.

The nature of pre-play communication we have is minimal. Given the value of the return on the investment (*k*), the second mover can send any numeric announcement to the first mover regarding the value *k* takes. While compromising on the richness of language[11], using only numeric values has an advantage as it enables us to clearly measure the direction of the

[11] See Charness and Dufwenberg (2006).

lie, i.e. above or below the actual value. This also enables us to measure clearly when subjects over-, and under-, state in their messages. We further avoid the difficulties associated with subjective classification of language. Note, however, that the use of language may be an important factor in reciprocity if agents have preferences on "language." That is, agents may interpret language differently and respond accordingly to it. Misinterpretation of messages is less likely in our structure.

III Deception:

We first analyze deception and study whether investees believe the messages they actually receive. We then study the relationship between deception and trust/trustworthiness.

III.1 Lies

We analyse the possibility of deception in the standard trust game. We introduce information asymmetry by giving the information on the value k takes only to the investor. The investor can inform the investee about the value taken by k by sending a message to the investee. The investor is free to state any value of k[12] and may choose to deceive the investee or not. This design captures the scenario where a superior, for example, has additional information about a project than a junior worker. As stated earlier, it is up to the superior to inform the subordinate about the returns that a project has. The superior may choose to understate or overstate the returns, or to truthfully reveal them.

Given that it is optimal for investors not to return (send) anything, in principle any message sent should be interpreted as cheap talk. In other words, if players are selfish, communication will play no role. However, if investors believe that investees may send a positive amount and are naive, i.e. believe the messages they receive, then they may overstate their messages in order to receive a higher amount from the investee (Ottaviani and Squintani, 2006). Contrarily, the investors may decide to understate the value of k if they anticipate that they will return a very small amount to the investee. In other words, understating k and subsequently returning less can be explained by guilt aversion (Charness and Dufwenberg, 2006), where decision makers feel guilty if they disappoint others. If this is the case then messages can influence what the investee will expect to receive, and to avoid

[12] Later in the paper we will show that our results are very similar once we increase the degree of information asymmetry.

disappointment, investors might report a lower value of *k* if they expect that they will return little[13].

We will now look at results from the treatment 234_ExAnte. In this treatment *k* can take any value with equal probability from the distribution {2, 3, 4}. Investors can choose to send a message, or none, regarding the value of *k.* This is followed by the investees deciding on the amount they want to send (to the investor). We have data from 134 students, organized in 67 pairs. First we identify those who lied and those who told the truth by comparing the message sent by the investor to the true value that *k* took. Of the investors in this treatment, 14.93% decided not to send any message while, 11.94% sent a message outside of the known distribution. We consider these two groups as sending an uninformative message.

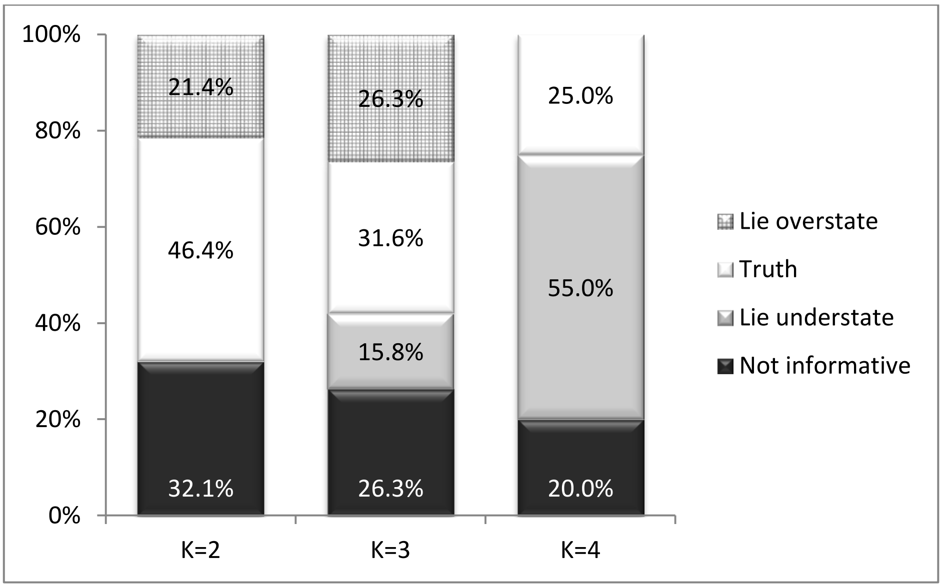

Figure 1. Distribution of messages by return.

Investors may choose not to send a message due to two reasons. One reason may be that they think that any message they send may be considered as “cheap talk”. On the other hand a message may not be sent to not transmit any information to the investee[14]. Excluding the subjects who sent an uninformative message, almost the same proportion of individuals lied and told the truth about the value of *k*: 48.98% told the truth and 51.02% lied. Meanwhile, 28.57% lied understating the value of *k*, while 22.45% overstated it.

[13] Note that this assumes that a player’s utility depends on others’ beliefs.
[14] Alternatively, those who send a message outside the distribution may have done it because they thought that any message sent may not be believable, or because they did not understand the game properly.

We classify the types of lies according to the difference between the real and the reported values of *k* for each value of *k* (Figure 1). The proportion of individuals who told the truth is higher for low values of *k*: 46% (32%) [25%] when *k* took value 2 (3) [4]. However, pairwise tests of proportions (Table 2) indicate that the differences in proportions are not statistically significant. The proportion of individuals acting strategically and overstating the true value of *k* is the same when *k* took the value of 2 or 3. Understatement of *k* is higher for *k=4* than when *k=3*.

Understatement could be due to two reasons. First, and consistent with the guilt aversion hypothesis, investees may believe that the larger the reported value of *k* the more investees are going to be likely to believe that they will be returned a large amount. As a result, if they plan on returning less, they will be more likely to understate the value of *k* when *k* is high. The second reason could be strategic. If investors are not naive and have prior beliefs on subject responses, then knowing this investees may strategically best respond. From our questionnaire responses we find that investees find smaller values more believable than large values. In this case investors may strategically understate to make their messages believable, and to induce investors to send a larger amount[15].

TABLE 2. Deception.

	Tests of proportions (p-value)		
	k=2 vs. k=3	k=2 vs. k=4	k=3 vs. k=4
Told the truth about k (k=message)	0.3086	0.1305	0.6481
Overstated the value of k (k<message)	0.6976	-	-
Understated the value of k (k>message)	-	-	0.0402

III. 2 Are messages believable?

We obtain information on investee and investor beliefs from the questionnaires we conducted after the players made their decisions. This allows us to see whether messages are believed, and whether investors thought that sending a message was useful. This information is useful as it tells us whether investees are naive.

At the end of the experiment investors were asked whether they thought that sending a message to the investee had been useful[16]. This question can help us understand whether the

[15] See the section below for further details.
[16] We did not ask them directly if they thought that the senders believed them to avoid bringing other confounders (such as personal biases, experimenter effect etc.).

investors believed that investee behaviour is affected by the message. We find that 61.19% answered yes to this question, i.e. they believed that sending a message to investees was useful. Out of these almost 80.5% sent an informative message, while, out of those who answered no, only 61.5% sent one. These proportions are significantly different with a *p* value of 0.08. These high percentages suggest that most of the investors seemed to think that the investees believed their messages. However, we should point out that whether an investor found sending a message useful or not may be conditioned by how much the investee ended up sending to them. This is due to the fact that the question was asked at the end of the experiment, when they already knew how much they had received[17].

We can, however, check whether investors were correct in thinking that their message was useful; in the questionnaire we also asked investees about the value they thought *k* took.[18] Considering only those pairs in which the investor sent an informative message, a sizeable proportion of investees (45.16%) believed the message, while 48.39% of the investees mostly believed that the investors were overstating the value of *k*. In contrast, only 6.45% believed that investors understated the value of *k*. [19] This means that most investees expected the investors to act strategically and to overstate the value of *k*.

Interestingly, investees were more likely to believe the message when the reported value of *k* was low, i.e. 89% (36%) [25%] of the investees believed a message stating that *k* was equal to 2 (3) [4]. This suggests that if investees are not naive then investors may also have incentives to understate *k*. That is, if investors thought that higher values of *k* were not credible then investees would strategically understate *k* to make their messages credible, and then induce investors to send a larger amount.

Figure 2 shows the distribution of beliefs by treatment[20]. When no message was sent (234_No), investees were more likely to believe that *k* would take low values, only 11% thought that it took the value of 4, while 50% thought it was 3 (the average). In those treatments where a message was sent (234_ExAnte and 234_ExPost), beliefs were more pessimistic, as a larger fraction of individuals thought that *k* took the values 2 or 3. The effect of the message was then to induce investees to believe that returns were lower. In fact, in the

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[17] We did not elicit this response earlier so as not to affect investor decisions.
[18] Unfortunately, and due to software problems, we could only collect 50% of the answers to this question in the questionnaire.
[19] Three individuals reported a message outside of the distribution.
[20] Restricting the sample to subjects who received informative messages and believed that *k* would take the values 2,3, or 4.

treatment “234_ExAnte”, 63% (29%) [9%] of investees thought that the value of *k* was 2 (3) [4]. This distribution is significantly different from the one corresponding to the treatment 234_No, according to a Kruskal-Wallis test (p-value=0.0547). In the treatment “234_ExPost”, 53% (44%) [3%] of investees believed that the value of *k* was 2 (3) [4]. In this case the difference with 234_No is, however, not significant, the Kruskal-Wallis test gives a p-value=0.1394.

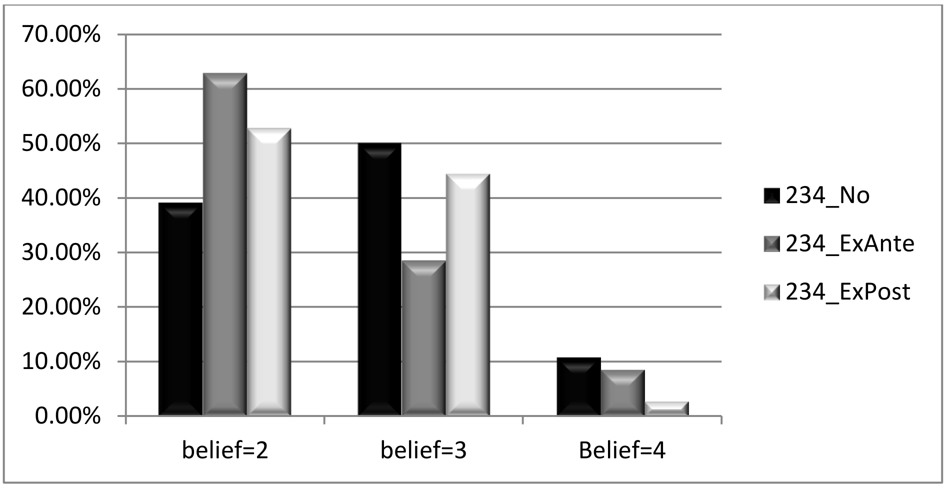

Figure 2. Distribution of Beliefs by Treatment.
Note: Proportion of subjects by treatment who believed that the value of k was 2, 3 or 4.

The questionnaire responses suggest that investees expected lies; in fact, they expected that the value of *k* would be overstated and upon low values, found them believable. It is clear that the messages were not cheap talk for a sizeable proportion of subjects in the treatment. This is important as it raises the possibility of strategic behaviour both on the part of investees and investors. In addition, the introduction of messages made the investees more pessimistic about the value of *k*.

III.3 Trust, Trustworthiness and Deception

In this section we first analyse whether the introduction of the possibility of deception affects trust. In order to do this we compare treatments 234_No and 234_ExAnte and check the effect upon trust when we introduce messages. We also compare the treatment 234_No to the Baseline treatment.

The standard measure of trust is the proportion of the endowment that the investee sends to the investor. In Table 3 we report the mean and median of the variable trust for the three treatments. Even though the median is lower when we introduce uncertainty, a Kolmogorov-

Smirnov test confirms that the distributions are not significantly different *(p=0.622)*. Average trust does not change significantly when we compare the Baseline treatment with treatment 234_No. In order to analyse the effect of the possibility of deception on trust we compare treatments 234_No and 234_ExAnte. Again, even though average trust is slightly lower when we introduce the possibility of deception, it is not significantly different. The Kolmogorov-Smirnov test again confirms equality of distributions *(p=0.289)*.

Given that the efficiency of the outcome depends on trust, i.e., the amount sent, these results show that the introduction of the possibility of deception would not affect efficiency in this setting, as trust would not change significantly. Importantly, trust is robust to informational asymmetries and communication in the investment game.

TABLE 3. Average percentage sent (Trust).

Treatment (observations)	Average (Median)	Tests: p-value
Baseline (n=61)	46% (50%)	
234_No (n=55)	44% (30%)	Compared to Baseline Wilcoxon-Mann-Whitney: 0.517 t-test: 0.688 Equality of medians: 0.445
234_ExAnte (n=67)	38% (30%)	Compared to 234_No Wilcoxon-Mann-Whitney: 0.646 t-test: 0.333 Equality of medians: 0.870

A natural question then to ask is whether naive investees that believe the message are more likely to trust (the investor) than those who do not believe the message. Considering only those investees who received an informative message, those who believed the message sent on average 43.1% (median=40%), while those who did not believe the message sent on average 35.2% (median=30%). We see that the amount sent is greater if investees believe the message received, however, these numbers are not significantly different at conventional levels.

We now analyse whether the introduction of the possibility of deception affects trustworthiness. Results are shown in Table 4. As before, neither average nor median trustworthiness are significantly different across treatments. In addition, the Kolmogorov-Smirnov test confirms that the distributions of the Baseline treatment and 234_No are the same *(p=0.725)*, and that the distributions of the treatments 234_No and 234_ExAnte are also the same *(p=0.529)*.

Now we ask whether liars return less relative to truth tellers. Restricting the sample to investors who sent an informative message we find that those who lied returned less than those who told the truth. Those who told the truth returned on average 22% (median=23.8%), while those who lied only returned on average 12% (median 5.4%). These numbers are significantly different, both using a t test *(p=0.0567)* or a Wilcoxon-Mann-Whitney test *(p=0.0985)*. Using a nonparametric equality of medians test the p value is 0.072[21]. This again confirms that those who lied about *k* returned less than the rest. In fact 39% of those who lied returned nothing to the investee versus only 22% of those who told the truth (proportion test *p-value=0.08*).

TABLE 4. Average percentage returned (Trustworthiness).

Treatment (observations)	Average (Median)	Tests: p-value	
Baseline (n=61)	19% (17%)	-	
234_No (n=55)	18% (7%)	Compared to Baseline	
		Wilcoxon-Mann-Whitney:	0.798
		t-test:	0.905
		Equality of medians:	0.917
234_ExAnte (n=67)	16% (8%)	Compared to 234_No	
		Wilcoxon-Mann-Whitney:	0.765
		t-test:	0.439
		Equality of medians:	0.383

In summary, the introduction of uncertainty leaves trust and trustworthiness unchanged, compared to the baseline treatment. Compared with truth tellers, liars return less and a greater proportion of them return nothing. Even if those who lie return less than the rest the introduction of the possibility of deception does not affect trust or trustworthiness.

III.4 Why lie?

In this section we explore the motives behind observed deception. Earlier (Figure 1) we saw that 20.8% of the investors understated the value of *k*, while 16.42% overstated it. Those who overstated *k* could have done it for strategic reasons, while those who understated it

[21] Using the "median" command in Stata.

could have done it due to guilt aversion or strategic reasons if they believed that exaggeration is not credible. In what follows we will investigate this issue further.

Strategic reasons: In the survey we asked the investors *how much they expected to receive from the investees*. We can use this question to understand whether investors who overstated the value of *k* did it to get the investee to send them a larger amount. The amount they expected to receive should be larger for those who overstated *k* than for those who told the truth and those who understated it.

In order to check whether those who believe that *k* is higher send a larger amount, we compare investees with different beliefs. Those who believed (as reported in the questionnaire) that *k*=2 sent on average (median) 33.5 (25.0), while those who believed *k*=3 sent 59.0 (55.0). This difference is significant (Mann-Whitney p-value=0.0055, t-test p-value=0.0145 and Median test p-value=0.016 for treatment 234_ExAnte). If we consider all treatments with *k*={2,3,4} (234_No, 234_ExAnte, 234_ExPost), investees who believed *k*=2 sent on average (median) 36.0 (30.0), while those who believed *k*=3 sent 53.6 (60.0), with Mann-Whitney p-value=0.0023, t-test p-value=0.0028 and Median test p-value<0.001. We do not have enough data to do the same analysis for those who believed k=4 (only 8 observations for the three treatments).

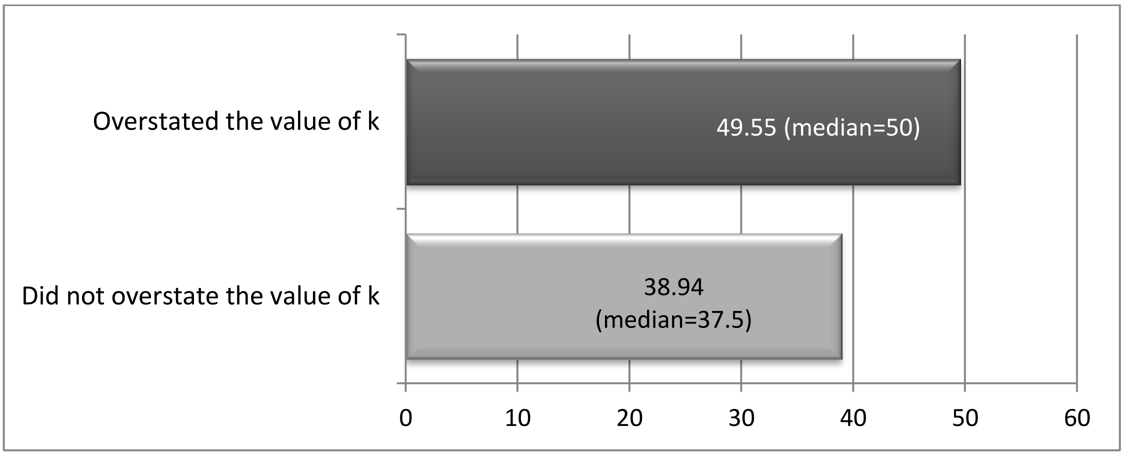

Figure 3. Amount receivers expected to receive from senders.

Now we analyse whether investors who overstated the value of *k* did it to get the investee to send them a larger amount. Results are shown in Figure 3, which shows that subjects who overstated the returns expected to receive on average 49.55 (median=50), while the amount was 38.94 (median=37.5) for subjects who told the truth or, understated the returns. A

Wilcoxon-Mann-Whitney test shows that these two numbers are statistically different (p=0.0997), in addition, a non-parametric test for differences in medians reaches the same conclusion (p=0.033)[22].

Guilt aversion: Some investors may feel guilty if they return a small amount knowing that the investee knew the true *k* when *k* is large. If investors plan to return a small amount, then they may report a smaller *k* to avoid investee disappointment. If the investees could know the exact value of *k*, the message would stop being useful. To avoid investee disappointment, investors would then be more likely to return a larger amount than the amount they actually sent.

In the questionnaire we asked investors *how much they would have returned if the investee had known the exact value of k*. Figure 4 shows that out of those who understated *k*, 54% replied that they would have returned a larger amount if the investee had known the exact value of *k*. In contrast, out of those who did not understate the returns, just 28% replied that they would have returned more to the investee if the investee had known the exact value of *k*. The first proportion is significantly larger than the second one (*p=0.0512* in a one tail difference in proportions test).[23]

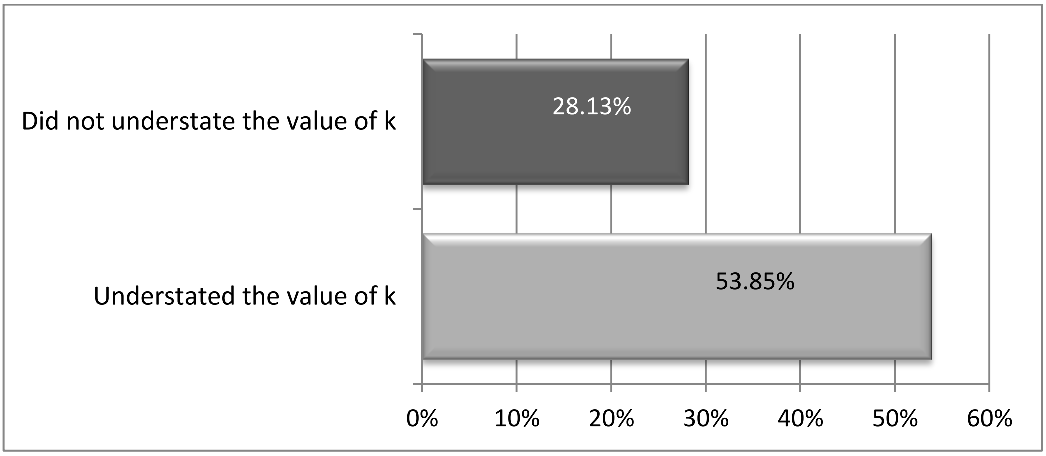

Figure 4. Guilt aversion. Proportion of receivers that would have returned more if k was known.

[22] A standard t test would give a larger p value, but the number of observations is too low to derive reliable conclusions.
[23] The two tails difference in proportions test gives p=0.1025, however, the hypothesis we test in this case is whether the proportion who would return more is larger within those who understated k than within those who did not understated the value of k.

We conducted another treatment in which investors sent the message about the value of *k* ex post (treatment 234_ExPost). The advantage of running the ex-post message treatment is that it removes the strategic motive to lie as ex-post messages have no impact on the amount sent. We have a very limited number of observations for this treatment, but it still allows us to draw some conclusions.

One can see from Figure 5 that 42% told the truth about the value of *k*, while the rest either overstated or understated its value. Out of those who overstated the value of the returns, the majority (83%) expected to receive more from the investee than what they received. In contrast, the percentage is only 56% among those who did not overstate returns. We can think of these messages as inflicting some kind of non-monetary "punishment" on the investees. That is, the investor expected to receive more from the investee and when sending the message about the value of *k* reported a larger number than the true value. However, when comparing those who understated the value of the returns to the rest, approximately half the subjects of each group report that they would have returned more if the investee had known the exact value of the returns.

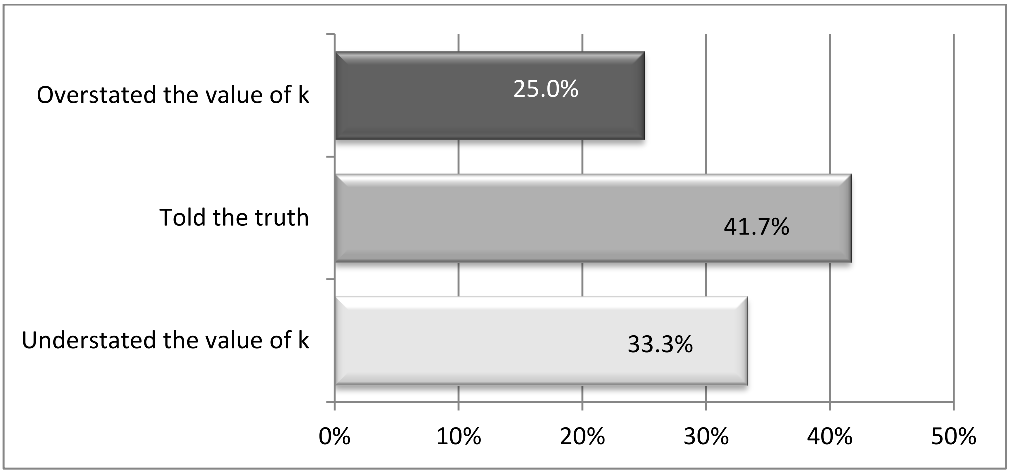

FIGURE 5. Proportion of subjects who overstated the value of k, understated it or told the truth.

IV. Ambiguity

In this section we study whether our results are robust to the introduction of ambiguity regarding the value that *k* can take. Investees are only informed that *k* is greater than one. The investor on the other hand knows the value taken by *k (=3).*

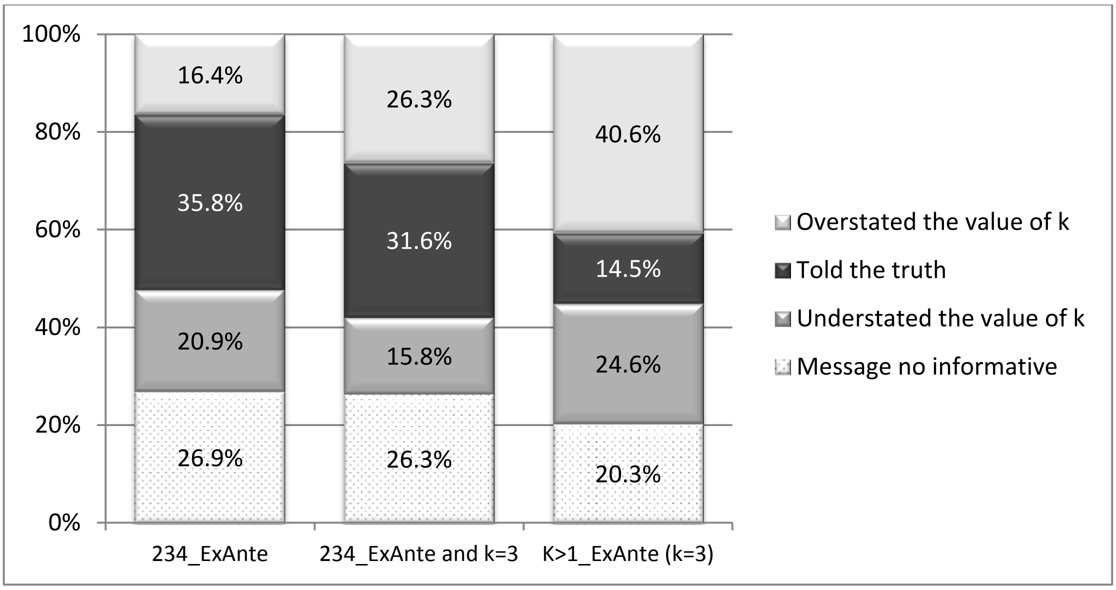

FIGURE 6. The effect of increasing information asymmetry.

We compare the results of the uncertainty treatment (234_ExAnte) with those of the ambiguity treatment (k>1_ExAnte). Both, Figure 6 and Table 5 show that the proportion of subjects who tell the truth in the latter is significantly smaller. Further, the proportion of the subjects who overstate the value of the returns is also significantly higher[24]. When comparing the subset of subjects in treatment 234_ExAnte for which *k*=3 to those in treatment k>1_ExAnte (for which *k* is always 3), the proportion of subjects who tell the truth is much smaller in the latter, but the proportion of subjects overstating returns are not significantly different. This shows that the introduction of ambiguity encourages deception.

TABLE 5. Deception and Information asymmetry.

	Tests of proportions (p-value)	
	234_ExAnte vs. k>1_ExAnte	234_ExAnte vs. k>1_ExAnte (k=3 in both cases)
Told the truth (k=message)	0.0041	0.0872
Overstated the value of k (k<message)	0.0018	0.2556
Understated the value of k (k>message)	0.6032	0.4150

We now analyse whether messages are considered cheap talk by subjects in the treatment k>1_ExAnte. Results in this case are very similar to those found earlier. Most investors thought that the message they sent could have played a role in determining the amount they received. In this treatment 59.42% of the investors responded that sending the message was

[24] Note that, this can be partially due to the fact that in the treatment k>1_ExAnte *k* is always equal to 3.

useful. Out of those who found sending the message useful, 85.37% sent an informative message. In contrast, out of those who did not find sending the message useful, 71.43% sent an informative message. A one tail difference of proportions test shows that the first proportion is significantly larger than the second (p=0.0787). However, as before, we should acknowledge that whether an investor found the fact of sending a message useful or not can depend on how much the investee ended up sending them.

When we analyse whether investees actually believed the messages, we find that with ambiguity the proportion of investees who believe the message they received is still sizable (38%). Interestingly, 15% of the investees thought that the investors were under-reporting the value of *k*. This is smaller than the proportion that believed that the message was understated by the investors in the 234_ExAnte treatment.

As shown in Figure 7, in treatment *k*>1_No, 51% of individuals thought that the value of *k* was 2. Then 29% (3%) [9%] {9%} thought that it was 3 (4) [5] {>5}. In this case the effect of the message seems to be different, as it moves the distribution of beliefs to the right. When a message was sent only 29% thought that the value of *k* was 2, while 38% (6%) [15%] {12%} thought that it was 3 (4) [5] {>5}. According to a Kruskal-Wallis test, the difference is significant (p-value=0.0903).

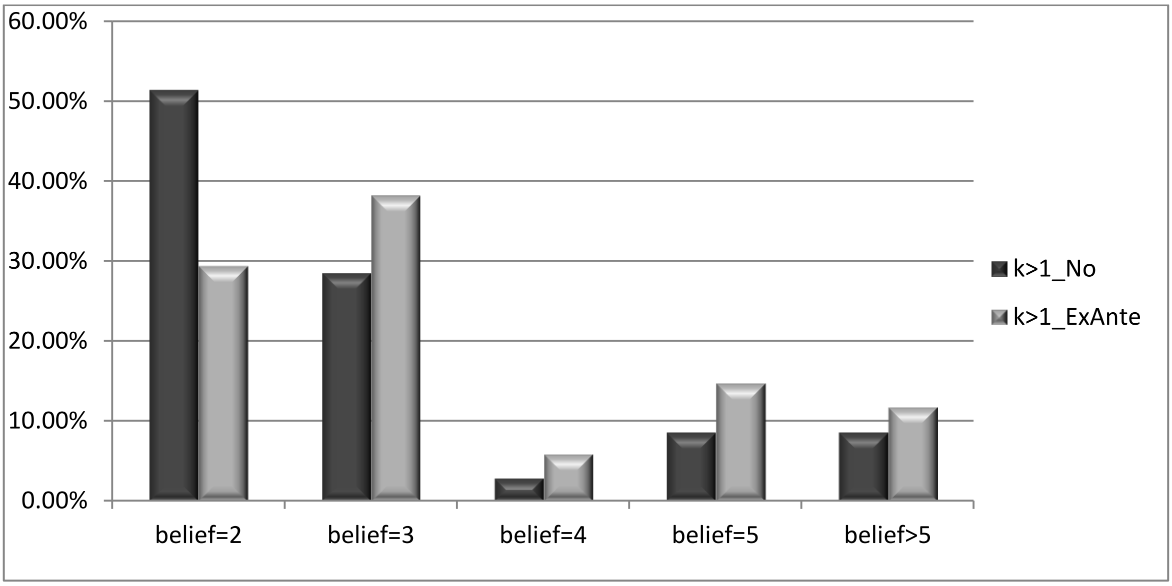

Figure 7. Distribution of beliefs by treatment.

Given that the increase in information asymmetry increased deception and decreased the number of investees who believed the message sent by the investor, we should also analyse whether trust and trustworthiness decreased with information asymmetry. We will compare the treatments where no message is sent *(234_No vs. k>1_No)* and the treatments where a message is sent ex ante *(234_ExAnte vs. k>1_ExAnte)*. Note that given that the value of *k* does not affect trust or trustworthiness in treatment *234_ExAnte*, we use all the observations from this treatment[25].

TABLE 6a. Average percentage sent (Trust).

Treatment (observations)	Average (Median)	Tests: p-value
k>1_No (n=57)	38% (35%)	
234_No (n=55)	44% (30%)	Compared to k>1_No Wilcoxon-Mann-Whitney: 0.544 t-test: 0.292 Equality of medians: 0.999
k>1_ExAnte (n=69)	40% (30%)	Compared to k>1_No Wilcoxon-Mann-Whitney: 0.922 t-test: 0.654 Equality of medians: 0.603
234_ExAnte (n=67)	38% (30%)	Compared to k>1_ExAnte Wilcoxon-Mann-Whitney: 0.894 t-test: 0.754 Equality of medians: 0.870

TABLE 6b. Average percentage returned (Trustworthiness).

Treatment (observations)	Average (Median)	Tests: p-value
k>1_No (n=57)	20% (16%)	
234_No (n=55)	19% (7%)	Compared to k>1_No Wilcoxon-Mann-Whitney: 0.515 t-test: 0.732 Equality of medians: 0.616
k>1_ExAnte (n=69)	15% (8%)	Compared to k>1_No Wilcoxon-Mann-Whitney: 0.231 t-test: 0.122 Equality of medians: 0.633
234_ExAnte (n=67)	16% (8%)	Compared to k>1_ExAnte Wilcoxon-Mann-Whitney: 0.874 t-test: 0.759 Equality of medians: 0.902

[25] A regression of trust or trustworthiness on dummies for the value of k does not yield any coefficient that is significantly different from zero; in addition the coefficients for these dummies are not jointly significant. These results are available from the authors on request.

Comparing treatments *234_No* and *k>1_No* we can see whether the increase in information asymmetry decreases trust or trustworthiness. Our results (Table 6) show that this is not the case. Further, this is also not the case when comparing treatments *234_ExAnte* and *k>1_ExAnte*. As before, the introduction of the possibility of deception also does not affect trust or trustworthiness in those treatments in which the investee just knows that k is a number larger than one.

Restricting the sample to investors who sent an informative message, we find that those who lied returned less than those who told the truth. In fact, those who told the truth returned on average 26.8% (median=27.8%), while those who lied only returned on average 12.7% (median 6.66%). These numbers are significantly different, both using a t-test (p=0.0239) or a Wilcoxon-Mann-Whitney test (p=0.0156). Using a nonparametric equality of medians test the p value is 0.046, confirming that those who lied about the value of k returned less than the rest. In this case, 31.71% of those who lied did not return anything to the investee versus (0%) of those who told the truth (proportions test, p=0.0385).

V: Questionnaire responses and lying.

We asked our subjects to respond to a questionnaire. Through the questionnaire we can relate social and/or behavioural characteristics to subject choices in the experiment. Information was obtained on subject characteristics such as whether they lie to their parents, friends, acquaintances and partners. Other questions asked them whether they lie to avoid harming other people or in their own benefit. They could answer from 1 (very frequently) to 5 (never). We create dummy variables equal to one if the individual admits lying frequently, very frequently or sometimes, and zero otherwise. Below we elaborate on whether there is a significant relationship between these variables and subject behaviour by running regressions in which we estimate the correlation between the answers to these survey questions and behaviour in the experiment. Obviously, these variables are self-reported, but at least we can analyse whether those who lied in the experiment about the value of k also admit lying in real life.

We first run a specification in which we analyse whether lying in the experiment is correlated to the subjects answering that they lie to their parents, friends, partner or acquaintances (results are reported in Table 7). Results in column 1 (without controls) and 3 (with controls) show that those individuals who admit lying to their friends, parents, acquaintances or partners are not more likely to lie in the experiment. Control variables include a gender dummy, year of birth, a dummy for whether they are currently working, whether they are in a technical degree or in Sociology, Law or Journalism (the reference category are Economics related degrees), and their average grade. We then analyse whether lying in the experiment is correlated to lying to avoid harming others or in their own benefit. Results are shown in columns 2 and 4, with and without controls, respectively. Those that lie in the experiment claim that they are more likely to lie to avoid harming others and less likely to lie in their own benefit (column 4 Table 7).

TABLE 7. Lies and questionnaire responses.

	1	2	3	4
Lies to parents	0.0509		0.0156	
	(0.0931)		(0.0956)	
Lies to friends	0.0947		0.0482	
	(0.146)		(0.147)	
Lies to partner	0.0666		0.0376	
	(0.182)		(0.187)	
Lies to acquaintances	-0.147		-0.101	
	(0.0991)		(0.104)	
Lies to avoid harming others		0.115		0.182*
		(0.0933)		(0.0940)
Lies in own benefit		-0.223*		-0.253**
		(0.112)		(0.111)
Treatment: k unknown			0.234**	0.270***
			(0.0999)	(0.0971)
Treatment: ex post message			0.0611	0.0413
			(0.158)	(0.140)
Woman			0.0865	0.0369
			(0.0923)	(0.0928)
Year of birth			-0.0123	-0.0161
			(0.0185)	(0.0173)
Currently Working			-0.117	-0.122
			(0.0933)	(0.0918)
Technical Degree			-0.124	-0.162
			(0.114)	(0.105)
Sociology, Law, Journalism			-0.0120	-0.0306
			(0.129)	(0.131)
Average grade			0.0309	0.0380
			(0.0263)	(0.0240)
Constant	0.769***	0.552***	24.87	32.27
	(0.228)	(0.0974)	(36.79)	(34.28)

Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1.
The dependent variable is a dummy equal to one if the individual lied about the value of k. The reference category is the treatment 234_ExAnte. Average grade is a number 0-10. Number of observations: 111.

VI. Conclusion:

We find a few truthful people in our experiments. However, how subjects deceive depends upon information asymmetry, subject expectations and the value taken by the multiplier (*k*). Restricting the sample to those who sent an informative message 66% of the subjects sent deceptive messages. Deception increases when we increase the degree of uncertainty in the ambiguity treatment. Those who lied returned less than those who told the truth. Interestingly, under ambiguity the proportion of liars who return zero is significantly higher (31.71%) suggesting that the lack of knowledge regarding *k* elicits purely selfish behaviour.

We elicit beliefs regarding the message investees received, or whether the message sent by investors was believable. This allows us to see whether subjects are naive and whether investors believe that they face naive investees. Almost half the investees believe the message they receive and a large proportion of investors think that the message they sent was useful. Further, messages stating a lower value of *k* are believable while messages stating a higher value of *k* are less likely to be believed.

Subjects both over, and under, -state the returns on the investment. We find this to be consistent both with strategic lying (Ottaviani M. and F. Squintani, 2006) and with guilt aversion (Charness and Dufwenberg, 2006). Understatement can also be explained by the fact that investors may know that lower values of the returns are more believable.

Finally, the existence of information asymmetry and the possibility of deception do not affect trust. This result is important in that it suggests that the possibility of deception does not affect exchange in the particular case that we study. This implies that economic efficiency is likely not to be affected by the possibility of deception in our environment. In addition, deception does not affect trustworthiness either. Our results have some consequences for the design of organizations. They suggest that a larger degree of information asymmetry opens the door for deceptive acts. Thus, institutions that decrease informational asymmetry are less likely to observe deceptive acts. More research is needed, however, on what are the institutional arrangements that minimize deception and encourage trust facilitating exchanges.

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<u>Appendix A</u>

<u>Sender instructions - Translated from Spanish</u>

Baseline: (*Part in italics vary according to treatments*)

Thanks for coming. These instructions explain how the experiment works.

You have been selected at random as individual A. Another participant, in another place (outside of this room), has been selected at random to play with you. This person will be individual B. You and your partner will each receive 100 dex (experimental money).

After the experiment you will be able to convert the experimental money into real money that will be paid in cash at the end of the experiment. The exchange rate is 1 € = 12.5 dex.

This is how the experiment works:

First, you will have the opportunity to transfer all, none, or part of the 100 dex to individual B. The amount sent to individual B will be multiplied by 3. Individual B also knows that each unit that you send will be multiplied by 3. Thus, if you send 50 dex, individual B will receive 3 x 50 = 150 dex.

The amount you send will appear on the display of individual B. Individual B will then have the possibility to send you back some of the amount received. Individual B may send any amount between zero and the amount you sent multiplied by 3.

For example, if you send 50 dex to individual B, then individual B receives 3x50 = 150 dex. Given this, individual B can send you any number between 0 and 150 dex. The amount individual B will send back will not be further multiplied.

The experiment ends after the decision of individual B. Your earnings will be calculated on the following basis. You will be earning the initial 100 dex, minus the amount transferred to individual B, plus the amount individual B sends back to you.

Thus, if you send 50 dex to individual B and individual B sends back 70 dex, then your earnings will be 100 dex- 50 dex + 70dex = 120 dex. Applying the exchange rate this will be 9.60€. This will be your profit in this example.

The game will be played only once. Once the game ends, we will ask you to answer a few questions. Your answers will not have any influence on your earnings and will be treated as strictly confidential. The results of the experiment and the questionnaire will be used only in our research.

In the experiment today you will not interact with your partner again. You will not be able to know the identity of your partner. Similarly, your partner, nor any other participant, will know any details about you. Please do not talk to anyone during the experiment and raise your hand if you have any questions.

You are participating in a science experiment funded by the Ministry of Science and Technology. The information you give will not be associated with you and will be treated as confidential.

No-Message (234_No):

First, you will have the opportunity to transfer all, none, or part of the 100 dex to individual B. The amount sent to individual B will be multiplied by X, where X can take the values 2, 3 or 4 with equal probability, and is determined at random. The different values that X can take are also known for the individual B. Thus, if you send 50 dex and, for example, X = 3, individual B will receive 3x50 = 150 dex.

The amount you send will appear on the display of individual B, with the value that X has finally taken. Individual B will then have the possibility to send you back some of the amount received. Individual B may send any amount between zero and the amount you sent multiplied by X.

For example, if you send 50 dex to individual B and X = 3, then individual B receives 3x50 = 150 dex. Given this, individual B can send you any number between 0 and 150 dex. The amount individual B will send back will not be further multiplied.

Ex-ante message (234_ExAnte):

First, you will have the opportunity to transfer all, none or part of the 100 dex to individual B. The amount sent to individual B will be multiplied by X, where X can take the *values 2, 3 or 4 with equal probability, and is determined at random. The different values that X can take are also known for the individual B.*

Before you make the transfer to individual B, individual B knows the true value of X and may decide to send a message with information about the value of X. Note that individual B may choose to send you a true, or false, message, or not send a message at all.

Thus, if you send 50 dex and, for example, X = 3 (which does not have to match the value reported by the individual B), individual B will receive 3x50 = 150 dex.

The amount you send will appear on the display of individual B, with the value that X has finally taken. Individual B will then have the possibility to send you back some of the amount received. Individual B may send any amount between zero and the amount you sent multiplied by X.

For example, if you send 50 dex to individual B and X = 3, then individual B receives 3x50 = 150 dex. Given this, individual B can send you any number between 0 and 150 dex. The amount individual B will send back will not be further multiplied.

Ex-post message (234_ExPost):

First, you will have the opportunity to transfer all, none or part of the 100 dex to individual B. The amount sent to individual B will be multiplied by X, where X can take the values 2, 3 or 4 with equal probability, and is determined at random. The different values that X can take are also known for the individual B. Thus, if you send 50 dex and, for example, X = 3, individual B will receive 3x50 = 150 dex.

The amount you send will appear on the display of individual B, with the value that X has finally taken. Individual B will then have the possibility to send you back some of the amount received. Individual B may send any amount between zero and the amount you sent multiplied by X.

Once individual B decides the amount he will send to you, individual B may decide to send a message with information about the value of X. Note that individual B may decide to send a true, or false message, or not send a message at all. This message will be shown to you at the end of the experiment along with your earnings.

For example, if you send 50 dex to individual B and X = 3, then individual B receives 3x50 = 150 dex. Given this, individual B can send you any number between 0 and 150 dex. The amount individual B will send back will not be further multiplied.

k Unknown No Message (k>1_No):

First, you will have the opportunity to transfer all, none or part of the 100 dex to individual B. The amount sent to individual B will be multiplied by X (X>1). Individual B knows that X>1. Thus, if you send 50 dex and, for example, X = 3, individual B will receive 3x50 = 150 dex.

The amount you send will appear on the display of individual B, with the value that X has finally taken. Individual B will then have the possibility to send you back some of the amount received. Individual B may send any amount between zero and the amount you sent multiplied by X.

For example, if you send 50 dex to individual B and X = 3, then individual B receives 3x50 = 150 dex. Given this, individual B can send you any number between 0 and 150 dex. The amount individual B will send back will not be further multiplied.

k Unknown Ex-ante Message (k>1_ExAnte):

First, you will have the opportunity to transfer all, none or part of the 100 dex to individual B. The amount sent to individual B will be multiplied by X (X>1). Individual B knows that X>1.

Before you make the transfer to individual B, individual B knows the true value of X and may decide to send a message with information about the value of X. Note that individual B may choose to send you a true, or false, message, or not send a message at all.

Thus, if you send 50 dex and, for example, X = 3 (which does not have to match the value reported by the individual B), individual B will receive 3x50 = 150 dex.

The amount you send will appear on the display of individual B, with the value that X has finally taken. Individual B will then have the possibility to send you back some of the amount *received. Individual B may send any amount between zero and the amount you sent multiplied by X.*

For example, if you send 50 dex to individual B and X = 3, then individual B receives 3x50 = 150 dex. Given this, individual B can send you any number between 0 and 150 dex. The amount individual B will send back will not be further multiplied.

<u>Receiver instructions - Translated from Spanish</u>

Baseline: (<u>*Part in italics vary according to treatments*</u>)

Thanks for coming. These instructions explain how the experiment works.

You have been selected at random as individual B. Another participant, in another place (outside of this room), has been selected at random to play with you. This person will be individual A. You and your partner will each receive 100 dex (experimental money).

After the experiment you will be able to convert the experimental money into real money that will be paid in cash at the end of the experiment. The exchange rate is 1 € = 12.5 dex.

The experiment works like this:

First, individual A will have the opportunity to transfer, all, none, or part of their 100 dex to you. The amount sent by individual A will be multiplied by 3. Thus, if individual A sends 50 dex, you will receive 3 x 50 = 150 dex.

The amount sent by individual A will appear on your screen. You will then have the possibility to send back some of the amount received. You may send any amount between zero, and the amount sent by individual A to you multiplied by 3.

For example, if individual A sends 50 dex to you, then you will receive 3x50 = 150 dex. Given this, you can send to individual A any number between 0 and 150 dex. The amount you send back will not be further multiplied.

The experiment ends after your decision. Your earnings will be calculated on the following basis. You will be earning the intitial 100 dex plus the difference between the amount received from individual A and the amount you send back (to individual A).

Thus, if individual A sends 50 dex to you and you send back 70 dex, then your earnings will be 100 dex + 150 dex – 70 dex = 180 dex. Applying the exchange rate this will be 14.40€. This will be your earnings in this example.

The game will be played only once. Once the game ends, we will ask you to answer a few questions. Your answers will not have any influence on your earnings and will be treated as strictly confidential. The results of the experiment and the questionnaire will be used only in our research.

In the experiment today you will not interact with your partner again. You will not be able to know the identity of your partner. Similarly, your partner, nor any other participant, will know any details about you. Please do not talk to anyone during the experiment and raise your hand if you have any questions.

You are participating in a science experiment funded by the Ministry of Science and Technology. The information you give will not be associated with you and will be treated as confidential.

No-Message (234_No):

First, individual A will have the opportunity to transfer, all, none, or part of their 100 dex to you. The amount sent by individual A will be multiplied by X, where X can take the values 2, 3, or 4 with equal probability, and it is determined at random. Thus, if individual A sends 50 dex and, for example, X=3, you will receive 3 x 50 = 150 dex.

The amount sent by individual A will appear on your screen. You will also get to know the value taken by X. This value is not known to individual A, but he or she knows that X can take the values 2, 3, or 4 with equal probability and is determined at random.

You will then have the possibility to send back some of the amount received. You may send any amount between zero, and the amount sent by individual A to you multiplied by X.

For example, if individual A sends 50 dex to you and X=3, then you will receive 3x50 = 150 dex. Given this, you can send to individual A any number between 0 and 150 dex. The amount you send back will not be further multiplied.

Ex-ante message (234_ExAnte):

First, individual A will have the opportunity to transfer, all, none, or part of their 100 dex to you. The amount sent by individual A will be multiplied by X, where X can take the values 2, 3, or 4 with equal probability, and it is determined at random. Thus, if individual A sends 50 dex and, for example, X=3, you will receive 3 x 50 = 150 dex.

Before individual A makes the transfer to you, you will know the true value of X and may decide to send a message with information about the value of X. Note that you may choose to send a true, or false, message, or not send a message at all to individual A. Individual A will get to see the message you send, or a message stating that you choose not to send a message.

The amount sent by individual A will appear on your screen, with the value that X has finally taken. This value is not known to individual A, but he or she knows that X can take the values 2, 3, or 4 with equal probability and is determined at random.

You will then have the possibility to send back some of the amount received. You may send any amount between zero, and the amount sent by individual A to you multiplied by X.

For example, if individual A sends 50 dex to you and X=3, then you will receive 3x50 = 150 dex. Given this, you can send to individual A any number between 0 and 150 dex. The amount you send back will not be further multiplied.

Ex-post message (234_ExPost):

First, individual A will have the opportunity to transfer, all, none, or part of their 100 dex to you. The amount sent by individual A will be multiplied by X, where X can take the values 2, 3, or 4 with equal probability, and it is determined at random. Thus, if individual A sends 50 dex and, for example, X=3, you will receive 3 x 50 = 150 dex.

The amount sent by individual A will appear on your screen, with the value that X has finally taken. This value is not known to individual A, but he or she knows that X can take the values 2, 3, or 4 with equal probability and is determined at random.

You will then have the possibility to send back some of the amount received. You may send any amount between zero, and the amount sent by individual A to you multiplied by X.

Once you decide the amount you will send to individual A, you may decide to send a message with information about the value of X. Note that you may decide to send a true, or false message, or not send a message at all. This message will be shown to individual A at the end of the experiment along with his or her earnings.

For example, if individual A sends 50 dex to you and X=3, then you will receive 3x50 = 150 dex. Given this, you can send to individual A any number between 0 and 150 dex. The amount you send back will not be further multiplied.

k Unknown No Message (k>1_No):

First, individual A will have the opportunity to transfer, all, none, or part of their 100 dex to you. The amount sent by individual A will be multiplied by X (X>1). Thus, if individual A sends 50 dex and, for example, X=3, you will receive 3 x 50 = 150 dex.

The amount sent by individual A will appear on your screen. You will also get to know the value taken by X. This value is not known to individual A, but he or she knows that X>1.

You will then have the possibility to send back some of the amount received. You may send any amount between zero, and the amount sent by individual A to you multiplied by X.

For example, if individual A sends 50 dex to you and X=3, then you will receive 3x50 = 150 dex. Given this, you can send to individual A any number between 0 and 150 dex. The amount you send back will not be further multiplied.

k Unknown Ex-ante Message (k>1_ExAnte):

First, individual A will have the opportunity to transfer, all, none, or part of their 100 dex to you. The amount sent by individual A will be multiplied by X (X>1). Thus, if individual A sends 50 dex and, for example, X=3, you will receive 3 x 50 = 150 dex.

Before individual A makes the transfer to you, you will know the true value of X and may decide to send a message with information about the value of X. Note that you may choose to send a true, or false, message, or not send a message at all to individual A. Individual A will get to see the message you send, or a message stating that you choose not to send a message.

The amount sent by individual A will appear on your screen, with the value that X has finally taken. This value is not known to individual A, but he or she knows that X>1.

You will then have the possibility to send back some of the amount received. You may send any amount between zero, and the amount sent by individual A to you multiplied by X.

For example, if individual A sends 50 dex to you and X=3, then you will receive 3x50 = 150 dex. Given this, you can send to individual A any number between 0 and 150 dex. The amount you send back will not be further multiplied.

Appendix B

This questionnaire was given to all subjects prior to their participation in the experiment.

1. In what year were you born?
2. Country of birth (or State in case of Spain).
3. Place of residence.
    i. Country or State
    ii. City
4. If you were born outside of Spain (or outside your present State of residence) when did you arrive in your current residence (State)?
5. Country (or State for Spain) of birth of father.
6. Country (or State for Spain) of residence of father.
7. If your father was not born in Spain (or in the State where he currently resides) when did he arrive at his present residence?
8. Country (or State for Spain) of birth of mother.
9. Country (or State for Spain) of residence of mother.
10. If your mother was not born in Spain (or in the State where she currently resides) when did she arrive at his present residence?
11. Gender.
12. What is your major?
13. Year of study.
14. Average grade (0-10).
15. Religion.
16. Father´s studies (did not study/primary school/secondary school/university).
17. Mother´s studies (did not study/primary school/secondary school/university).
18. Total number of siblings (including you).
19. Do you have a partner (yes/no)?
20. Do you work? If yes, how many hours a week?
21. Do you do voluntary work? If yes, how many hours a week?
22. How many hours did you study (alone) last week?
23. How many hours of TV did you watch last week?
24. Are you a member of any political organization (yes/no)?

Appendix C

The following questionnaire was completed by the subjects at the end of the experiment (senders didn't know their earnings). Questions were common for senders and receivers, except those indicated in square brackets.

Do you think that you responded with care to the questionnaire?
1. Yes; 2. Yes, but I could have been more careful; 3. I am not sure; 4. No

With what frequency do you lend money to your friends?
1. More than once a week; 2. Once a week; 3. Once a month; 4. Once a year (or less than that); 5. Never

With what frequency do you do you leave personal objects (CDs, clothes, videos, etc.) with friends?
1. More than once a week; 2. Once a week; 3. Once a month; 4. Once a year (or less than that); 5. Never

How many close friends do you have?

Would you leave your belongings in the university locker without locking it?
1. Yes; 2. No

Overall, can one trust people?
1. Yes; 2. No

Do you think a large majority of people will take advantage of you if they had the opportunity?
1. Yes; 2. No

With what frequency do you lie to your parents?
1. Very frequently; 2. Frequently; 3. Some times; 4. Few times; 5. Never

With what frequency do you lie to your friends?
1. Very frequently; 2. Frequently; 3. Some times; 4. Few times; 5. Never

With what frequency do you lie to the people you know?
1. Very frequently; 2. Frequently; 3. Some times; 4. Few times; 5. Never

With what frequency do you lie to your partner?
1. Very frequently; 2. Frequently; 3. Some times; 4. Few times; 5. Never

Have you ever benefitted from someone's (unknown to you) generosity?
1. Yes; 2. No

With what frequency do you lie to someone not to hurt their feelings?
1. Very frequently; 2. Frequently; 3. Some times; 4. Few times; 5. Never

With what frequency do you lie to someone for your own benefit?
1. Very frequently; 2. Frequently; 3. Some times; 4. Few times; 5. Never

A person's wealth should not depend upon the effort which they make. Do you agree with this statement?
1. Very much agree; 2. Agree; 3. Agree somehow; 4. Do not agree; 5. Very much disagree

These days one cannot trust unknown people. Do you agree with this statement?
1. Very much agree; 2. Agree; 3. Agree somehow; 4. Do not agree; 5. Very much disagree

You consider yourself to be a trustworthy individual. Do you agree with this statement?
1. Very much agree; 2. Agree; 3. Agree somehow; 4. Do not agree; 5. Very much disagree

When dealing with strangers one should always be careful (before you trust them). Do you agree with this statement?
1. Very much agree; 2. Agree; 3. Agree somehow; 4. Do not agree; 5. Very much disagree

The majority of students do not copy during the exam? Do you agree with this statement?
1. Very much agree; 2. Agree; 3. Agree somehow; 4. Do not agree; 5. Very much disagree

Do you trust other people when you do something of little importance with them?
1. A lot; 2. Sufficiently; 3. A little; 4. Never

Do you trust other people when you do something of great importance with them?
1. A lot; 2. Sufficiently; 3. A little; 4. Never

Do you trust your family?
1. A lot; 2. Sufficiently; 3. A little; 4. Never

Do you trust your friends?
1. A lot; 2. Sufficiently; 3. A little; 4. Never

Do you trust your neighbors?
1. A lot; 2. Sufficiently; 3. A little; 4. Never

Do you trust your colleagues in the University?
1. A lot; 2. Sufficiently; 3. A little; 4. Never

Can you trust the school system?
1. A lot; 2. Sufficiently; 3. A little; 4. Never

Do you trust the police?
1. A lot; 2. Sufficiently; 3. A little; 4. Never

Do you trust the judicial system?
1. A lot; 2. Sufficiently; 3. A little; 4. Never

Do you trust the big corporations?
1. A lot; 2. Sufficiently; 3. A little; 4. Never

Mr. Martinez is about to sell his car for 1,200 euros. The oil pump on his engine does not work well, and Mr. Martinez knows that if the buyer knew it he would have to reduce the price by 250 euros (the price of repair). If Mr. Martinez does not tell the buyer, the engine will overheat the first day of heat, causing damage worth 250 euros. Winter has just started and the buyer will not notice unless Mr. Martinez tells him. Mr. Martinez has decided not to mention this problem with the oil pump to the buyer. In your opinion, the behavior of Mr. Martinez is:
1. Completely acceptable; 2. Acceptable; 3. Little acceptable; 4. Inacceptable

What would have been your answer regarding Mr. Martinez's behavior if the cost of repairing the oil pump had been 1,000 euros (instead of 250 euros)?
1. Completely acceptable; 2. Acceptable; 3. Little acceptable; 4. Inacceptable

[Senders] Considering the amount you sent, how much do you think that individual B will return to you?

[Receivers] How much did you expect individual A to send?

Think about some of your college friends who have more or less the same economic position as you. Imagine that your colleague has found 20 euros on the street. It is impossible to identify the owner and, therefore, it is completely acceptable and unquestionable from the moral point of view to keep it. Could you say that if you had found the money, this money would have been ______________ beneficial to you than to your colleague?
1. much more; 2. more; 3. as much as; 4. less; 5. much less

[Senders - Baseline] If the amount sent would have been multiplied by an amount twice as much (than the actual amount), what amount would you have sent?

[Senders, all treatments except Baseline] With what value do you think the amount you have sent to individual B has been multiplied with?

[Senders, all treatments except Baseline] If you would have known that the exact value by which the amount sent was multiplied, 3 for example, how much would have sent of the 100 dex?

[Receivers, all treatments except Baseline] If individual A would have known the true value by which the amount is multiplied, what quantity would you have sent (as individual B) to individual A?

[Receivers, treatments 234_ExAnte, 234_ExPost and k>1_ExAnte] Did you find sending a message to individual A useful?
1. Yes;   2. No

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