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Grohmann, Antonia; Sakha, Sahra

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The effect of peer observation on consumption choices: evidence from a lab-in-field experiment

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Online Appendix to accompany : "The Effect of Peer Observation on Consumption Choices: Evidence from a lab-in-the-field Experiment"

by Antonia Grohmann amd Sahra Sakha

Intended for online publication only.

For Peer Review

A Appendix
Sample Design and Experimental Instructions

A.1 Sample Design

The household survey contains detailed information on many aspects of each households' living standards including: household demographics, recurrent and durable expenditures, credit and savings, landholdings, agriculture, employment, health, as well as education. It also includes information concerning village characteristics such as the number of village institutions or infrastructure (i.e. irrigation system, access to electricity, nurseries etc.), in - and outward village migration, inhabitants, but also the number of shocks occurring in a village. This data provides a representative sample of rural households in the Northeastern part of Thailand.

The sampling procedure of rural households for the peer experiment conducted in Ubon Ratchathani follows a three-stage stratified sampling procedure. It is important to know that we exclude the urban area around the provincial capital city and confine the sample to the remaining rural areas. In the first stage sub-districts within the province were chosen with probability proportional to size and implicit stratification by population density. In the second stage, from each sampled sub-district, two villages were sampled randomly with probability of selection proportional to size. In the last step, in each of those villages a systematic random sample of ten households was drawn to be interviewed from the household lists of the rural census ordered by household size. To conclude, villages as well as respondents were randomly sampled for our peer experiment.

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A.2 Experimental Instructions

The experiment was carried out by local enumerators with one of the co-authors being present at all times. Instructions were translated from English into Thai and back, and were cross-checked by a native speaking Thai economics professor to avoid semantic difficulties. Instructions were kept as simple as possible. The interviewers were trained in sessions that lasted a total of five days. During these five days, a pilot study was conducted in three villages.

The experiment was conducted by visiting two villages per day; one in the morning and one in the afternoon. For neighboring villages experiments were usually carried out simultaneously. The distance between villages was on average 18 km and respondents had to stay at the experimental site until the completion of the survey. There were two experimental sessions conducted in each village, with up to five respondents in one session at the same time. All experimental sessions took place in the village hall.

Instructions: We would now like to play a game with you in which you have to choose between some tasty goods or money. At the end of the game you can keep either the tasty goods or the money. We will ask you to choose between the two options 7 times. Each time we ask you, we increase the amount of money. The amount of tasty goods will always be the same. The enumerator will write down your choice each time we ask you. After the game, we will draw a number from a bag. This determines which of the two options you get. The tasty good will be given to you straight after the game. The money, however, will be given to you at the end of the whole survey. You will only receive one option. Either money or tasty good.

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Example: No.3 is drawn from the bag. For the third decision you chose the tasty treat, so you will get the tasty treat immediately. *Enumerator put tasty good on the table.*

Enumerator will present the tasty good and ask the following question. **Please estimate the price of the tasty treat in the market.**

Price of tasty treat _____ (THB)

Enumerator tells respondent that the price of the tasty present is THB 40 and put up the sign that shows the price.

Please choose!

Row	Tasty Good	Tick Box	Money
1	Tasty Good		10 THB
2	Tasty Good		20 THB
3	Tasty Good		30 THB
4	Tasty Good		40 THB
5	Tasty Good		50 THB
6	Tasty Good		60 THB
7	Tasty Good		70 THB

What is the maximum you would to pay for the tasty good? _____ (THB)

Now chance will decide! Please draw a number. Number drawn: _____ (THB)

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Figure A.1: Control

URL: https://mc.manuscriptcentral.com/ape

Figure A.2: Treatment

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B Appendix

Measurement of Numeracy and Overconfidence

We collected a number of math based questions. In total there were six questions, the first four are based on the hardest four out of eight math questions in Cole et al. (2011), the last two questions are based on question used in the Survey of Health, Ageing and Retirement in Europe (SHARE). In addition, we included a question that asks respondents to name as many animals as they can in 60 seconds. This is a measure of word fluency and has the advantage that it is related to more innate forms of intelligence and especially measures processing speed. This test for word fluency has also been used in a number of other studies as part of cognitive ability measures such as Dohmen et al. (2010).

Finally, we ask respondents to judge how many of these questions they answered correctly to measure overconfidence. Overconfidence results in unrealistically positive self-evaluations. In other words, people are unrealistically optimistic and overestimate personal success probabilities. Our primary measure of confidence is the difference between the predicted math score and the achieved score. Thus, a subject whose prediction is higher than her actual score is called overconfident, and a subject whose prediction is below her actual score is called underconfident.

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Details	
Questions	Description
Word fluency	I would like you to name as many different animals as you can in 60 seconds.
Numeracy Q.1	What is 45 + 72?
Numeracy Q.2	You have 4 friends and you want to give each friend four sweets. How many sweets do you need?
Numeracy Q.3	What is 5% of 200?
Numeracy Q.4	You want to buy a bag of rice that costs 270 Baht, You only have one 1000 Baht note. How much change will you get?
Numeracy Q.5	In a sale, a shop is selling all items at half price. Before the sale a mattress costs 3000 Baht. How much will the mattress cost in the sale?
Numeracy Q.6	A second-hand motorbike dealer is selling a motorbike for 12000 Baht. His is two thirds of what it costs new. How much did the motorbike cost new?
Overconfidence	How many of the 6 math's questions above, do you think you have answered correctly?

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C Appendix

Conceptual Framework

We present our conceptual framework that explores the relationship between the choice of money m, the individual choice of a tasty treat tt and the groups choice of $\bar{tt}$. In this section, we ignore the effect of individual preferences as denoted by x and $\bar{x}$ in this paper. We can justify this as we are conducting an experiment and due to personal preferences being the same across treatments. Hence each participant's utility function is defined as:

$$U(tt, m; D, \bar{tt}) = u(tt, m) - D \cdot c(tt - \bar{tt})$$

The first component $u(tt, m)$ is both increasing and concave in both tt and m. It represents the utility that an individual receives from choosing the tt or m, whereas the choice in $tt \in \{0, 1\}$ and $m \in \{10, ..., 70\}$. Because individuals have to decide between tt and m, $tt = 1$ implies $m = 0$ and $m > 0$ implies $tt = 0$. Also note that the difference $u(0, m) - u(1, 0)$ is increasing in m: the higher m, the smaller the share of individuals that will prefer tasty treat to money, i.e.

$$\frac{\partial \Pr(tt \succ m|D)}{\partial m} < 0.$$

The utility function above includes a conformity cost function $c(tt - \bar{tt}) \geq 0$. This cost function is increasing, the larger the difference between own choice tt of the respondent and average consumption of the peer group $\bar{tt}$.

$$c(tt - \bar{tt}) \begin{cases} > 0 & \text{if } tt \neq \bar{tt} \\ = 0 & \text{if } tt = \bar{tt} \end{cases}$$

In this model we do not go into the source of this cost. In our view there could be a number of reasons behind this, which we discussed in this paper. More importantly note that this conformity cost only applies to those individuals that play in a group. In the case of the experiment in the control group $D = 0$, the conformity cost function should not play a role. In single

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treatment, the tt is preferred if

$$u(1,0) > u(0,m).$$

In the group treatment, tt is chosen if

$$u(1,0) - c(1-\bar{tt}) > u(0,m) - c(0-\bar{tt}).$$

As participants possess the same utility function $U()$, average peer tasty treat consumption $\bar{tt}$ must also be decreasing in m. Therefore, $\frac{\partial c(1-\bar{tt})}{\partial m} > 0$ and $\frac{\partial c(0-\bar{tt})}{\partial m} < 0$. In other words the conformity cost of choosing tt increases the larger m is. It should be noted that $\bar{tt}$ also depends on tt and is therefore endogenous. Since choosing the tt is synonymous with not choosing m, it is easier to think of a cost function that looks at the cost of choosing tt at different levels of m. In this case the cost of choosing tt would be positive for high values of m, but negative for low m. **Figure C.1** shows the relationship between m, $Pr(tt)$ and $c(1-\bar{tt})$.

C. APPENDIXCONCEPTUAL FRAMEWORK

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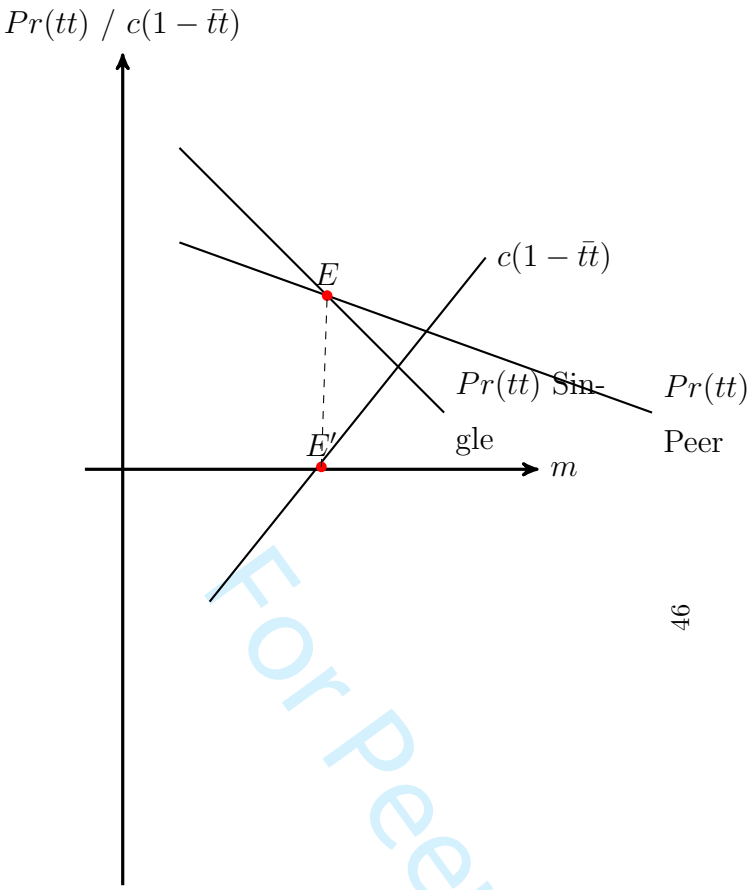

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C. APPENDIXCONCEPTUAL FRAMEWORK

At point E the conformity cost for those that played with peer observation is 0. They, therefore, make the same decision on average as those that play without peer observation. It becomes clear from **Figure C.1** that the respondents under peer treatment react more strongly to a change in m than respondents under single treatment

$$\frac{\partial \Pr(tt \succ m | D = 0)}{\partial m} < \frac{\partial \Pr(tt \succ m | D = 1)}{\partial m}.$$

Intuitively, this seems logical as there in an extra benefit from choosing the tt when m is small and an extra cost in choosing tt when m is large. This means that in the peer treatment, we expect that fewer people switch from m to tt at an early or late stage. In turn, we expect this to lower standard deviation within a group. So far we have shown the different reactions of tt to a change in m, between the peer and the single treatment. We now need to show that the aforementioned conformity cost leads to a positive relationship between tt and $\bar{tt}$ which can be defined as peer effects. From the original utility function

we can see that

$$\frac{\partial \Pr(tt \succ m | D = 0)}{\partial \bar{tt}} = 0$$

Hence there is no change in tt as $\bar{tt}$ change in the single treatment. Whereas under peer treatment

$$\frac{\partial \Pr(tt \succ m | D = 1)}{\partial \bar{tt}} > 0$$

There is a positive relationship between the number of people that choose tt and the average peer decision $\bar{tt}$.

As previously mentioned there are two conclusions arising from including a conformity cost function into a standard utility function. Firstly, as there is a cost involved with not doing what everyone also is doing, we expect there to be fewer extreme choices under peer observation. At the same time, we expect there to be a clear positive relationship between tt and $\bar{tt}$ when the experiment is performed under peer observation, but not when the experiment is performed alone.

D Appendix

Robustness

We start our robustness analysis by checking if the main results hold when we use different dependent variables to see whether individual consumption decisions are still affected by the group, even for those individuals that may lean towards extreme choices. In **Table D1** we use a dummy dependent variable that takes the value of 1 if the respondent chooses the tasty treat in every round. In **Table D2**, we also use an indicator variable that is 1 if the respondent never chooses the tasty treat – preferring the money from round 1 through round 7. Both tables exhibit the same pattern as **Table 6**. The groups average consumption choice still influences the individual's consumption choice. Afterwards, we create another set of dependent variables. We want to investigate if results remain robust if the respondent switched before and after 40 THB (see **Table D3** and **Table D4**). Finally, we test our outcome variable further we rerun the results shown in Table**Table 6**, but using dummies for people that switch when the cash alternative to the TT is larger

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than 50THB and 60THB, respectively. Results are shown in **Table D5, D6**. None of these changes in outcome variables has an effect on the patterns of our results.

Moreover, we test whether the unfamiliarity with the tasty treat is counteracted by peer effects if instead of the continuous variable, we use a dummy. The indicator variable is one if the respondent wrongly estimates the price. Our robustness test shows that gaining information from peer effects continues to play a significant role (see **Table ??**).

In addition, we check whether the distance of the villages to Ubon, the provincial capital city, or the nearest district capital impacts the demand for tasty treat, since it is conceivable that villages close to urban areas could get the tasty treat more easily, thus, affecting the impact of peer effect. We do not find that the distance to the provincial capital or the district capital has any impact on the peer effects and results found in **Table 6** stay the same. We also control for a number of other village characteristics such as village shocks or their intensity. They do not seem to make a difference.

We also check whether there are further personal characteristics that may influence the demand for the tasty treat and the strength of the peer effect. We check if those that have particularly high food consumption, low food consumption or high general consumption are more likely to choose the tasty treat in higher rounds. This may either indicate being particularly rich or poor or alternatively, those with high food consumption, may have a particular high demand for food. We find no effects using any of these consumption variables.

Finally, we test whether our results are driven by one or several settings of the experiment (i.e. morning or afternoon sessions, first or second session, variations in the size of the peer groups). We find that results of **Table 6** remains the same (see **TableD88**)

Lastly, most of our groups contained five people, however, it was not always possible to get five people together. We also check if group size has an effect on our results. In order to do this we exclude all groups that did not contain five people. Again, we find that results do not change. Overall, our results seem robust to a large number of alterations and changes to outcome variables, village and individual characteristics.

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D. APPENDIXROBUSTNESS

Table D1: Choosing the Tasty Treat in every round and Group Average without Self

	(1) **Always TT** All	(2) **Always TT** All	(3) **Always TT** Peer Treatment	(4) **Always TT** Peer Treatment	(5) **Always TT** Single Treatment	(6) **Always TT** Single Treatment	(7) **Always TT** All
Group Mean without Self	0.156**	0.186**	0.261***	0.468***	-0.006	0.072	0.141*
	(0.05)	(0.06)	(0.06)	(0.12)	(0.09)	(0.09)	(0.07)
Peer*Group Mean Without Self							0.077
							(0.05)
Group Average Characteristics (excluding the individual)	No	Yes	No	Yes	No	Yes	Yes
Individual Characteristics	No	Yes	No	Yes	No	Yes	Yes
Constant	-1.71***	0.66	-2.09***	5.95	-1.24***	0.29	0.92
	(0.17)	(1.71)	(0.25)	(3.45)	(0.26)	(2.73)	(1.77)
Pseudo R-Squared	0.03	0.13	0.11	0.36	0.00	0.17	0.13
Observations	537	442	256	203	278	236	439

This table reports Probit regression results with clustered standard errors in parenthesis. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively.The outcome variable is one if the respondent always chooses the tasty treat. Group Average controls include all the controls from Table 2 but excluding the individual.

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Table D2: Never Choosing the Tasty Treat and Group average without Self

	(1) **Never TT** All	(2) **Never TT** All	(3) **Never TT** Peer Treatment	(4) **Never TT** Peer Treatment	(5) **Never TT** Single Treatment	(6) **Never TT** Single Treatment	(7) **Never TT** All
Group Mean without Self	-0.147**	-0.153**	-0.247***	-0.276**	0.023	-0.006	-0.115
	(0.05)	(0.06)	(0.07)	(0.09)	(0.08)	(0.09)	(0.07)
Peer*Group Mean Without Self							-0.078
							(0.05)
Group Average Characteristics (excluding the individual)	No	Yes	No	Yes	No	Yes	Yes
Individual Characteristics	No	Yes	No	Yes	No	Yes	Yes
Constant	-0.28	-0.32	-0.02	0.87	-0.79***	-2.53	-0.36
	(0.15)	(1.32)	(0.20)	(1.78)	(0.24)	(2.81)	(1.32)
Pseudo R-Squared	0.02	0.07	0.08	0.20	0.00	0.11	0.07
Observations	537	442	256	203	278	236	439

This table reports Probit regression results with clustered standard errors in parenthesis. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively. The outcome variable is one if the respondent never chooses the tasty treat. Group Average controls include all the controls from Table 2 but excluding the individual.

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Table D3: Choosing the Tasty Treat below 40 THB and Group Average without Self

	(1) **Underprice** All	(2) **Underprice** All	(3) **Underprice** Peer Treatment	(4) **Underprice** Peer Treatment	(5) **Underprice** Single Treatment	(6) **Underprice** Single Treatment	(7) **Underprice** All
Group Mean without Self	-0.222***	-0.212***	-0.351***	-0.332***	-0.006	-0.007	-0.149***
	(0.04)	(0.05)	(0.05)	(0.07)	(0.08)	(0.09)	(0.05)
Peer*Group Mean Without Self							-0.104**
							(0.04)
Group Average Characteristics (excluding the individual)	No	Yes	No	Yes	No	Yes	Yes
Individual Characteristics	No	Yes	No	Yes	No	Yes	Yes
Constant	0.85***	0.37	1.20***	0.29	-1.20	-2.53	0.12
	(0.13)	(1.47)	(0.16)	(2.61)	(0.25)	(1.81)	(1.38)
Pseudo R-Squared	0.05	0.09	0.15	0.23	0.00	0.10	0.07
Observations	554	456	246	209	287	244	453

This table reports Probit regression results with clustered standard errors in parenthesis. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively. Group Average controls include all the controls from Table 2 but excluding the individual. Underprice signifies a dummy that is one if the switching row is below 40 THB.

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Table D4: Choosing the Tasty Treat above 40 THB and Group Average without Self

	(1) **Overprice** All	(2) **Overprice** All	(3) **Overprice** Peer Treatment	(4) **Overprice** Peer Treatment	(5) **Overprice** Single Treatment	(6) **Overprice** Single Treatment	(7) **Overprice** All
Group Mean without Self	0.156***	0.164***	0.278***	0.298***	-0.052	-0.042	-0.091*
	(0.04)	(0.05)	(0.05)	(0.07)	(0.09)	(0.09)	(0.05)
Peer*Group Mean Without Self							0.077***
							(0.04)
Group Average Characteristics (exluding the individual)	No	Yes	No	Yes	No	Yes	Yes
Individual Characteristics	No	Yes	No	Yes	No	Yes	Yes
Constant	-1.08***	-0.45	-1.45***	-0.17	-0.51*	0.18	-0.32
	(0.14)	(1.51)	(0.17)	(2.17)	(0.26)	(2.59)	(1.45)
Pseudo R-Squared	0.02	0.07	0.11	0.21	0.00	0.07	0.06
Observations	554	456	264	209	287	244	453

This table reports Probit regression results with clustered standard errors in parenthesis. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively. Group Average controls include all the controls from Table 3 but excluding the individual. Overprice is a dummy that is one if the switching row is above 40 THB.

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Table D5: Choosing the Tasty Treat if cash alternative is larger than 50 THB

	(1) **Money>50THB** All	(2) **Money>50THB** All	(3) **Money>50THB** Peer	(4) **Money>50THB** Peer	(5) **Money>50THB** Single	(6) **Money>50THB** Single	(7)
Group mean without self	0.181***	0.195***	0.313***	0.350***	-0.037	-0.015	
	(0.047)	(0.052)	(0.048)	(0.068)	(0.098)	(0.102)	
Group Average Characteristics (exluding the individual)	No	Yes	No	Yes	No	Yes	
Individual Characteristics	No	Yes	No	Yes	No	Yes	
Constant	-1.216***	0.371	-1.613***	0.534	-0.616**	1.049	
	(0.154)	(1.103)	(0.187)	(1.653)	(0.288)	(1.713)	

This table reports Probit regression results with clustered standard errors in parenthesis. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively. Group Average controls include all the controls from Table 3 but excluding the individual.

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Table D6: Choosing the Tasty Treat if cash alternative is larger than 60 THB

	(1) **Money>60THB** All	(2) **Money>60THB** All	(3) **Money>60THB** Peer	(4) **Money>60THB** Peer	(5) **Money>60THB** Single	(6) **Money>60THB** Single
Group mean without self	0.136***	0.145***	0.241***	0.253***	-0.020	0.014
	(0.047)	(0.052)	(0.051)	(0.070)	(0.098)	(0.097)
Group Average Characteristics (exluding the individual)	No	Yes	No	Yes	No	Yes
Individual Characteristics	No	Yes	No	Yes	No	Yes
Constant	-1.320***	0.259	-1.711***	0.046	-0.830***	0.661
	(0.159)	(1.167)	(0.212)	(1.906)	(0.284)	(1.722)

This table reports Probit regression results with clustered standard errors in parenthesis. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively. Group Average controls include all the controls from Table 3 but excluding the individual.

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Table D7: Familiarity with the Tasty Treat

	(1) **Last row TT** All	(2) **Last row TT** All	(3) **Last row TT** Peer Treatment	(4) **Last row TT** Peer Treatment	(5) **Last row TT** Single Treatment	(6) **Last row TT** Single Treatment
Group Mean without Self	0.442**	0.331*	0.827***	0.841***	-0.384*	-0.482*
	(0.15)	(0.17)	(0.13)	(0.17)	(0.22)	(0.26)
Unfamiliarity (dummy)	-0.125	-0.452	0.917	1.05	-2.101***	-2.591***
	(0.58)	(0.66)	(0.58)	(0.86)	(0.74)	(0.92)
Group Mean without Self*Unfamiliarity	-0.008	0.081	-0.203	-0.164	0.479**	0.55**
	(0.16)	(0.18)	(0.18)	(0.25)	(0.22)	(0.29)
Group Average Characteristics (exluding the individual)	No	Yes	No	Yes	No	Yes
Individual Characteristics	No	Yes	No	Yes	No	Yes
Constant	1.7	3.35	0.66	1.59	3.37	7.37
	(0.34)	(2.39)	(0.33)	(3.96)	(0.64)	(4.00)
R-Squared	0.08	0.13	0.26	0.31	0.02	0.15
Observations	537	442	256	203	278	235

This table reports OLS regression results with clustered standard errors in parenthesis. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively. Group Mean controls include all the controls from Table 2. Unfamiliarity is an indicator variable that is 1 if the individual wrongly estimates the price prior to the experiment.

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Table D8: Robustness, Morning, Experimental Sessions, Group Size

	(1) **Last row TT** Peer Treatment	(2) **Last row TT** Peer Treatment	(3) **Last row TT** Peer Treatment	(4) **Last row TT** Peer Treatment
Group Mean without Self	0.58***	0.39*	0.62***	0.59***
	(0.13)	(0.21)	(0.12)	(0.17)
Morning Dummy	-0.36	-1.47		
	(0.35)	(0.93)		
Morning*Peer		0.37		
		(0.25)		
Session 1 Dummy			-0.21	-0.43
			(0.27)	(0.53)
Session 1*Peer				0.08
				(0.17)
Group Average Controls	Yes	Yes	Yes	Yes
Individual Characteristics	Yes	Yes	Yes	Yes
R-Squared	0.29	0.30	0.30	0.30
Observations	264	203	197	197

This table reports regression results with standard errors in parenthesis. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively. Morning dummy is a dummy that is one if the experiment was performed in the morning, Session 1 Dummy is a dummy that is one if the experiment was performed during the first experimental session in a village, the last column shows results for groups with five members only

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