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The effect of peer observation on consumption choices: experimental evidence

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Non-technical summary

Research Question

Do peers have an impact on the consumption choice of the individual? What are the mechanisms behind it? Are certain individuals with certain characteristics (i.e. cognitive ability, overconfidence etc.) more affected?

Contribution

Most previous studies on peer effects rely on observational data. This, however, makes a clear identification of peer effects difficult. Measuring the extent to which peers affect decision making is challenging because social group formation is usually endogenous, meaning that observed peer effects may be due to individuals in a group being more similar than other individuals. This complicates causal inference. If belonging to a social group is a matter of deliberate choice, it is difficult to assign causality to the impact of the group itself. We try to overcome this using a novel lab-in-a-field experiment. In the experiment, we let respondents chose between a temptation good i.e. a combination of sweet and salty snacks and an increasing amount of money. In the control group every respondent makes their own decision away from their peers, while in the treatment group respondents still make their own decision, but do so while observing each other. This is the first study that uses a lab-in-the-field experiment to study the impact of peer effects on individual consumption choice.

Results

We find that individual choices are influenced by peers if they perform the experiment in the treatment group where they are able to observe their peers. In other words, we find conformity within a group as the standard deviation in groups that observe each other is lower. In further analysis we look into the possible mechanism behind this conformity. We study the effect of familiarity with the product and find that peer observation can counteract the effect of a lack of knowledge of a product. We also find evidence that respondents follow the choices of their peer group. Finally, we investigate treatment heterogeneities. We find that individuals with high cognitive ability, are less likely to choose the tasty treat, while the same effect is not to be found for overconfident or high-income individuals. We also find evidence that those that live in closer knit communities are more likely to succumb to peer effects. Hence, we provide clear evidence of peer effects and conclude that peer observation leads to conformity.

Nichttechnische Zusammenfassung

Fragestellung

Verhalten sich die Menschen anders, wenn sie von ihren Mitmenschen beobachtet werden? Treffen sie dann andere Konsumentscheidungen? Welche Mechanismen spielen dabei eine Rolle? Lassen sich bestimmte Personen mit bestimmten Fähigkeiten und Eigenschaften (z. B. kognitive Fähigkeiten, übersteigertes Selbstvertrauen) stärker als andere von ihren Mitmenschen beeinflussen?

Beitrag

Die bisherigen Studien über Peer-Effekte basieren zumeist auf Haushaltsdaten. Dadurch wird die eindeutige Identifizierung solcher Effekte jedoch erschwert. Es ist nicht einfach, den kausalen Einfluss der Peer Group auf die Entscheidungsfindung zu messen, da sich soziale Gruppen in der Regel nicht zufällig bilden. Zur Lösung dieses Problems führen wir ein neuartiges Laborexperiment durch. Dabei lassen wir die Testpersonen zwischen Genussmitteln, in diesem Fall einer Kombination aus süßen und salzigen Snacks, und einem steigenden Geldbetrag wählen. In der Kontrollgruppe treffen alle Probanden ihre eigenen Entscheidungen, ohne dem Einfluss der Peer Group ausgesetzt zu sein. In der Versuchsgruppe hingegen entscheiden die Probanden zwar auch selbstständig, beobachten sich jedoch gegenseitig. Nach unserer Kenntnis ist dies die erste Studie, die den Einfluss von Peer-Effekten auf individuelle Konsumentscheidungen im Rahmen eines Laborversuchs untersucht.

Ergebnisse

Wir kommen zu dem Ergebnis, dass sich die einzelnen Gruppenmitglieder in ihren Entscheidungen beeinflussen. Zudem wird deutlich, dass Gruppen, die sich gegenseitig im Blick haben, ähnlichere Entscheidungen treffen. Die Standardabweichung von Gruppen geringer ist. Wir prüfen, wie die Vertrautheit mit einem Produkt das Verhalten beeinflusst, und stellen fest, dass die gegenseitige Beobachtung dem durch mangelndes Wissen über ein Produkt ausgelösten Effekt entgegenwirken kann. Schließlich analysieren wir, dass Personen mit starken kognitiven Fähigkeiten weniger anfällig für Peer-Effekte sind. Diese Effekte sind bei Menschen mit übersteigertem Selbstvertrauen oder hohem Einkommen nicht zu beobachten. Zudem führen wir Belege dafür an, dass Menschen, die in engeren Gemeinschaften leben, stärker von ihrer Peer Group beeinflusst werden. Somit erbringen wir einen eindeutigen Nachweis für die Existenz von Peer-Effekten und ziehen den Schluss, dass gegenseitige Beobachtung zu Konformität führt.

Bundesbank Discussion Paper No 01/2016

The Effect of Peer Observation on Consumption Choices: Experimental Evidence*

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Abstract

This paper investigates the impact of peer observation on the consumption decisions of rural households in Thailand using a lab-in-the-field experiment. We find that those groups that observe each other show lower within group standard deviation in their decisions. Thus, we find evidence for conformity. Further, we find that individual's consumption choice is influenced by the group choice controlling for large number of individual, household, and village characteristics. We find that unfamiliarity of the product is counteracted by peer effects. Finally, we find evidence of treatment heterogeneity with regards to cognitive ability and village size.

Keywords: Consumption, Peer Effects, Conformity

JEL classification: D12, C21, C92.

*Contact address: Deutsche Bundesbank, Wilhelm-Epstein-Straße 14, 60431 Frankfurt am Main. Phone: +49 (69) 9566-8626. E-Mail: sahra.sakha@bundesbank.de, Agrohmann@diw.de. We would like to thank participants at the 2nd International Meeting on Experimental and Behavioral Social Sciences (IMEBESS), Network for Integrated Behavioral Science Conference (NIBS), Boulder Conference on Consumer Financial Decision Making, 2nd Annual Conference of the International Association for Applied Econometrics (IAAE), 30th Congress of the European Economic Association (EEA) and the German Economics Association for helpful suggestions. In particular, we thank Colin Camerer, Esther Faia, Dimitris Georgarakos, David Kiss, Stefan Klasen, Lukas Menkhoff, Susan Steiner, Dean Yang, and Juliane Zenker. Financial support by the German Research Foundation (DFG, grant RTG 1723) is gratefully acknowledged.

1 Introduction

The feeling of buying something because someone else has it is a feeling familiar to many. Despite anecdotal evidence that peers exert a very powerful influence over one's consumption behavior, there has been a surprising lack of empirical and experimental research on this topic. In traditional economic theory consumption choices are regarded as a function of budget, price and personal preferences. The effect of those around us is rarely considered. In this study we aim to change this and define peer effects as the simple effect that leads individuals to behave in a similar way to those around them.

The study of peer effects in consumption choices is not just crucial in advancing further understanding of individual decision-making, but at a second look, can also have an important effect on policy. Peer effects may influence the success of cash transfer programs. If peer effects are prevalent they could have an effect on consumption decisions taken with cash grants for instance. At the same time, policy makers who are interested in increasing the uptake of certain goods such as health services or innovative technology could use peer effects in order to increase consumption of such goods.

One reason why economists have largely ignored peer effects on consumption choice is that identifying peer effects comes with a number of challenges. Measuring the extent to which peers affect decision making is challenging because social group formation is usually endogenous, meaning that observed peer effects may be due to individuals in a group being more similar than other individuals, and hence this complicates causal inference. If belonging to a social group is a matter of deliberate choice, it is difficult to assign causality to the impact of the group itself (Manski, 1993). This effect is referred to as correlated effects. Furthermore, observed peer effects may be caused by unobserved time-varying factors, also known as contextual effects, when individuals that are part of the same group also experience the same things. In addition, since individuals may make simultaneous decisions affecting each other it becomes difficult to determine causal behavior.

Therefore, identifying peer effects from observational data is problematic. We solve this problem by using a lab-in-the-field experiment to provide clear evidence of peer effects on consumption choices in a fully controlled setting where no possible confounding factor

can hinder identification. To the best of our knowledge, no experiment of peer effects in consumption decisions has been conducted so far. Our experimental setting allows us to overcome the Manskian problem of contextual and correlated effects. Thus, we are able to isolate endogenous peer effects. In this paper, we aim to (i) identify and estimate the existence of peer effects in terms of consumption decisions; (ii) investigate some mechanisms through which peer effects operate; and (iii) test whether there are differences in the way certain people are affected by their peers.

We are able to control for a large number personal and local confounding factors because our experimental results can be complemented with a large household survey containing a wide-range of socio-economic information of the respondents and the village in which they live. We perform the experiment in rural Thailand because of the prevalence of close-knit communities. Our respondents live in relatively small villages and have often lived there for many generations. In other words, even though assignment to a group is random; groups are made up of people that actually know each other (Mangyo and Park, 2011). Hence our experiment provides more external validity than other experiments that are performed with complete strangers.

The design of our experiment is straightforward: we test consumption choices by simply offering respondents the choice between a combination of sweet and salty snacks, i.e. the temptation good[1] (called the tasty treat or TT from here on) and money. The amount of money offered increases by ten Baht in every round whereas the tasty treat stays the same. In the control group, respondents have to make their consumption choices on their own, separated from the rest of the respondents. In the treatment group, each respondent still makes his/her own decision, but all respondents observe each other. Hence, the only difference between treatment and control group is peer observation and so any difference in outcome can be attributed to peer observation.

Our experimental study has a number of advantages that enable us to tackle the problems described by Manski (1993, 2000). We are able to solve the problem of correlated effects by randomizing the village in which the experiment is performed under peer observation. Given our large sample size, we assume that our villages are the same on average

[1]Temptation goods are defined as goods that provide the current self with positive utility, but negative utility to any future self, for instance alcohol, cigarettes or unhealthy foods (Banerjee and Mullainathan, 2010).

and that effects can simply be attributed to peer observation. In addition we have very detailed information about the individual, their household and the village in which they live. Randomization of our sample in observing and non-observing groups on the village level combined with detailed information about village and household characteristics circumvents the problem of correlated effects. In addition, as we perform an experiment that lasts a short time in a relatively controlled environment, we are able to avoid problems caused by contextual or time-variant unobservables that affect all group members. Thus, our research design enables us to directly identify peer effects by comparing outcomes for those groups that performed the experiment with and without peer observation. In order to identify endogenous peer effects, we use the model of endogenous peer effects with leave-out mean in which individuals average consumption is regressed on the mean of the group ? excluding the individual himself (Angrist, 2014).

We focus in particular on the effect of peer's observation on temptation goods, since consumption choices for temptation goods are particularly susceptible to the influence of peer effects, as has been shown, especially for young people in social psychology (Gunter and Furnham, 1998; Steinberg and Cauffman, 1996). Another reason for choosing temptation goods was that there are no real economic or welfare needs for the temptation goods that are offered. The idea behind this is that playing the game with goods that are necessities may have confounding effects on the demand for the good compared to the money offered.

In order to support our experimental analysis, we develop a theoretical framework. We adjust a standard model of consumer choice with a cost imposed on the decision maker when deviating from the group choice. We argue that this cost represents a social cost – arising from not conforming to the group. We can show using this model that under the peer treatment extreme choices are more costly and therefore, the demand curve for the tasty treat is flatter. This makes extreme choices less likely.

Our experimental data confirms the prediction of the model. Specifically, we find that observing groups - those that sit in close proximity with each other - have a higher group minimum and a lower group maximum. Consequentially, the standard deviation for observing groups is lower than for those groups that simply played at the same time, but without peer observation.

In further analysis, we confirm this finding by showing that the group average, excluding the individual him/herself, has a positive and significant influence on the decisions made by the individual respondent, however, only when the experiment is performed with peer observation. Most importantly, the effect is not significant when the experiment is performed in non-observing groups. The effect being only present in the observing groups shows us that it can be attributed to the presence of peers and not to other possible effects.

Next, we aim to explore the mechanisms behind the peer effect. There are two possible reasons for this; either the respondents feel that the others in a group have better information or they are gaining some kind of psychological benefit from conforming to others. We find evidence that unfamiliarity with a product is counteracted by peer observations, indicating some evidence for the first mechanism. We can also show that the number of individuals that chose a TT previously has an effect on the likelihood of chosing the TT in a given round. Hence, we believe that there is an effect beyond information transfer.

Subsequently, we look at treatment heterogeneities to analyze whether there is a difference in peer effects for individuals with different background characteristics. We show that those with the highest cognitive ability are less susceptible to peer effects. Using the same technique, we do not find any effect for overconfident, underconfident or higher income respondents. Similarly, we find that peer effects seem to be stronger for those that live in small villages compared to those that live in large villages.

To sum up, we are able to show using a lab-in-the-field experiment that the observation of peers has a significant impact on consumption choices. We find evidence of convergence in consumption choices when observing one's peers. Our results contribute to the literature on conformity and herding behavior where conformity is defined as an intrinsic taste to follow others (Goeree and Yariv, 2010), driven by factors such as popularity, observational learning, information, esteem and respect (Bernheim, 1994). Experimental findings of Fehr and Schmidt (1999) and Bolton and Ockenfels (2000) show that a possible explanations for herding behavior is the reduction in expected inequality or inequality aversion among subjects.

A number of experimental studies use a similar experimental design to study peer effects; Falk and Ichio (2006), randomly assign participants either to a group or not in

order to study the effect of peers on productivity. In another study Baecker and Mechtel (2014) use a similar design in order to study the effect of peers on cheating behaviour. These studies have the advantage that they provide a clear counterfactual and control for contextual effects, thus providing the cleanest evidence on peer effects.

Further empirical evidence on peer-group phenomena can be found in the context of other economic behaviors. They seem to have a positive impact, for instance, in terms of workers' productivity (Guryan et al., 2009; Mas and Moretti, 2009; Bandiera et al., 2010), education (Sacerdote, 2001; Imberman et al., 2012), technology adaptation (Oster and Thornton, 2012), and saving and investment decisions (Duflo and Saez, 2003; Viscusi et al., 2011). Georgarakos et al. (2014) show that believing to be relatively worse off than one's social circle influence the amount of debt held. The link between peer effects and consumption is not new. Veblen (1898) argued that people consume certain conspicuous goods in order to increase their social standing. Luttmer (2004) shows that living amongst richer individuals leads to higher consumption while at the same time reducing happiness. These results, however, rely mostly on observational data which makes it difficult to separate peer effects from the effect of confounding factors.

Recent papers try to measure peer effects in terms of education using, for instance, natural experiments to overcome the problem of correlated effects such as the random assignment of college students to their respective dorms (Sacerdote, 2001; Chetty et al., 2015) or the exogenous influx of students in neighboring schools after the hurricane Katrina (Imberman et al., 2012). Roth (2014) looks at the effect of a random cash transfer program and shows that it leads to conspicuous consumption. However, even with 'natural' experiments when the setting offers an enhanced strategy to identify peer effects, the impossibility of controlling for all local or personal confounding factors does not provide a clean identification strategy.

Another recent strand of literature uses the existence of partially overlapping groups of peers to solve issues related to both reflection and correlated effects. The intuition is that partially overlapping groups generate peers of peers (or excluded peers) who act as instruments in the simultaneous equation model of social interactions and, thus, solve the reflection problem (de Giorgi et al., 2010).

Something that has been rarely attempted so far when looking at peer effects is to

distinguish between the different reasons that cause individuals to behave in a similar way to their peers. To our knowledge, this distinction has so far only been attempted by using carefully designed experiments. Cai et al. (2009) look at an experiment with two treatments in a restaurant setting in order to distinguish the effect of social learning from the effect of salience. Burszytyn et al. (2014) study the demand for a complex financial fund, using a brokerage firm in Brazil. The authors aim to distinguish between wanting what others have and the information effect of knowing what the other person believes.

The remainder of this article is organized as follows. In Section 2, we present our data and experimental design. Section 3 presents the conceptual framework. We discuss descriptive statistics and group level results in Section 4. Section 5 provides individual level results while further robustness tests are presented in Section 6. Section 7 concludes.

2 Data

2.1 Household Survey Data and Sampling

Our peer experiment was conducted as part of the larger household survey of the research project "Impact of shocks on the vulnerability to poverty: Consequences for development of emerging Southeast Asian economies" funded by the German Research Foundation which has been conducted in three Northeastern provinces of Thailand since 2007. The household survey contains detailed information on many aspects of households' living standards including: household demographics, recurrent and durable expenditures, credit and savings, landholdings, agriculture, employment, health, and 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.

Our peer experiment was conducted in the largest of the three provinces, Ubon Ratchathani. In addition to the experiment, we also collected a number of variables to complement the socio-demographic variables collected during the household survey. Questions designed to measure cognitive abilities were asked after the peer experiment. We collected two types of questions (Details are reported in **Appendix B**). Firstly, 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.

2.2 Experimental Design

The peer experiment was conducted in August 2013 with a total of 521 respondents from 66 villages in Ubon Ratchathani. The experiment was performed three month after the household survey.

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 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.

The experiment consists of a very simple choice task that required no previous knowledge, was easy to implement and to measure in the field with a rural sample (see **Appendix A** for detailed instructions). The respondent has to choose between the tasty treat and a certain amount of money. In the first round, for instance, the enumerator asks respondents whether they would like to choose the tasty treat or 10 THB. Respondents have to express their choices to their assigned enumerator. Once the respondent has decided in each round, the enumerator moves to the next round. Now the respondent has to choose between the tasty treat and 20 THB. Since we have seven rounds, in the last round the respondent has to choose between the tasty treat and 70 THB. In order to make the experiment as easy to follow for respondents as possible, we use showcards that display the amount of money they can chose. The tasty treat is also placed directly in front of the respondent. In round four there is no price difference between the two choices. After round four, it becomes increasingly unreasonable to choose the tasty treat because of the significant price difference. The enumerator marks the decision in each round. We did allow switching back and forth. There were 24 respondents who switched twice and were dropped in later analysis.

Before the experiment, respondents were asked to estimate the price of the tasty treat. After their prediction, all respondents were told that the tasty treat costs 40 Baht in order to avoid information asymmetries concerning the value of the product.

Another important component of our experiment was that they could receive the tasty treat right after the experiment while they had to wait for the money until the end of the session, thus enhancing temptation. Time-discounting factors can largely be ignored since the experiment, including post-experiment questions, only took between one to two hours to complete. Respondents were also reminded that they had to stay and answer further questions (risk attitude, financial literacy, overconfidence and cognitive ability) after the experiment.

The tasty treat consists of very popular items that are widely known across the country - a can of coke, a piece of custard cake, a small package of lays classic crisps, a bar of chocolate, and a small pack of candies. It had a value of 40 Thai Baht (THB) (approximately 1 Euro). We made sure that it not only included sweet but also savory items so that it appeals to a wider range of tastes. During the experiment, we made sure that the

respondents did not get any food or sweet beverages to drink.

Once all seven choices have been made, one decision was randomly played out by picking a number between 1 and 7 from a non-transparent bag. In case the respondent picked number 3 and chose the tasty treat in row 3, she received the tasty treat immediately. In case, the respondent picked money in that row, the respondent would receive 30 Baht at the end of the survey with an additional 50 Baht for participating in the survey. After the experiment, respondents were asked how much he/she would be willing to pay at most to receive the tasty treat.

For practical reasons we randomized into treatment and control group on the village level. Hence in control villages respondents played alone i.e. without peer observation, while in treatment villages respondents played in close proximity with peer observation.

In the control group, the tasty treat game was played individually and was conducted with 261 individuals in 66 groups. To avoid peer observation, we made sure that respondents were separated across the town hall so that they could neither hear nor see the choices of the other respondents. Furthermore, it is unlikely that the decisions of one respondent affects other respondents in the control group because individuals respond at different speeds.

The peer treatment was conducted with 260 individuals in 60 groups. The size of the group ranges from three to five people. The procedure of the treatment is the same as in the individual treatment with the sole exception that decisions were conducted with peer observation. Each respondent is still responsible for their own decision, but they have to sit next to each other and perform the experiment. As in the control group, all the instructions were read out loud and showcards were used to demonstrate the possible choices between tasty treat and money in each round. Enough tasty treats were on display, so that each respondent can see that there are enough for everyone to chose. The principal enumerator would read out the instructions. In each round each respondent would announce their choice out loud and the enumerator assigned to them would mark their choice. After all respondents have made their choice, the group moves on to the next round. There is no particular order in which respondents have to answer. We allowed everyone to answer in their own time.

Given our experimental design, we cannot observe an order in which participants an-

swer. What we can observe, however, is whether the spatial proximity of the peer in conjunction with their announcement of the decision to the group affects consumption choices of the individual. The difference between the treatment and the control group is simply that choices are observable to peers.

Given our random assignment of individuals to play the game alone or in a group, we are able to create counterfactual groups out of those individuals that played the game at the same time as their peers, but without directly observing their peers. We have two types of groups, those that performed the experiment directly observing each other and those that played the game at the same time in the same room, but not directly observing each other. Hence the only difference between our treatment and control group is that the treatment group observed their peers and the control group did not. Any difference in group outcomes can therefore be attributed to the only difference - peer observation.

2.3 Descriptive Statistics

Table 1 shows individual characteristics of our sample. First, we have significantly more women in our sample (60%). As we are deliberately sampling the household head, average age is relatively high at 54 years and 83% of respondents are married. Socio-demographic characteristics of our sample are typical for rural northern Thailand; education levels are still relatively low with less than six years on average. The average household has more than four members with a dependency ratio of 1.48 dependents for every working member. The vast majority of respondents name farming as their main occupation, with the rest being made up of government officials, business owners, students and housewives. As this study uses eatable goods to examine the consumption of temptation goods, it is interesting to look at BMI, a standardized measure of weight to height ratio. The average in our sample is 23 which is the normal BMI range according to the WHO. In terms of village characteristics, the average distance to the next district capital and to the provincial capital, Ubon, is 16 km and 60 km respectively. This is important to know and to control for because the demand for the temptation good may be larger the further the distance of the village to the nearest town. The average number of shocks in our 66 villages was 1.45 ranging from 1 to 3 shocks in total. The number of households

in a village varies significantly from 813 households close to the provincial capital to 55 households only which has also the highest distance to the provincial capital Ubon. Peer effects may be larger the smaller the village is because people may know each other better. Despite considerable growth in rural Thailand over the last decades, the north east is still relatively poor which is reflected in the average rate of consumption and average household wealth.

In addition to standard socio-demographic variables, we also collected a number of variables that are designed to measure cognitive ability. This allows us to study the peer effect on a sample with different levels of cognitive ability. Firstly, we collected a number of math based questions. In a first step, we awarded one point for each question answered correctly. The average score achieved is 3.6 out of six. Numeracy shows a near normal distribution with 1.99% scoring no point and only 4.81% scoring full six points. Second, we asked respondents to name as many animals as they can in 60 seconds. The average number of animals named is 17.2; however the standard deviation for this measure is rather large at 6.86. The correlation between the two cognitive ability measures, numeracy test and word fluency is 0.355 (Spearman; p-value$<$0.001). Thus, the two tests capture a similar underlying trait but also distinct aspects of cognitive ability. Third, we follow the same procedure as Dohmen et al. (2010) and use a single combined measure of cognitive ability.

Finally, we also measure overconfidence of our respondents to see whether over and underconfident respondents are more susceptible to peer effects. We define a subject whose math prediction is higher than his/her actual score as overconfident, and a subject whose prediction is below her actual score is called underconfident. Using this measure, 37% of our sample are overconfident while 33% are underconfident. Overconfidence is positively correlated with the lowest 10% of the cognitive ability test (0.26, p-value$<$0.001). In contrast, the correlation between high cognitive skills (highest 10%) and underconfidence are 0.09 with a p-value of 0.001.

Table 2 shows results of our paired t-test and Wilcoxon rank-sum test to check for differences between treatment and control groups. It shows that randomization was mostly successful and that there are no significant differences in observables between those that played the tasty treat game alone and those that played the game with peer observation.

The only difference that can be seen is that those played in a group have on average more children which is statistically significant in the t-test and in the Wilcoxon rank-sum test. The distance to Ubon, the provincial capital, is also larger in the control group, according to both tests. We will control for this difference in further analysis.

As this study not only compares the behavior of individuals but also looks at the behavior of groups, it is important to check that group composition is the same between those that played in observing and non-observing groups. There are 126 groups in total. 60 groups are observing group, while the rest played in non-observing group. **Table 3** shows that group composition stays mostly the same on average when looking at measured observables. In line with Table 2, Table 3 shows that on average respondents assigned to the treatment group have a higher number of children, which is significantly different for both the t-test and the Wilcoxon rank-sum test. We control for possible confounding effects in later regressions.

3 Conceptual Framework

In this section 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 group's choice of $\bar{tt}$. In this section, we ignore the effect of individual preferences as denoted by x and $\bar{x}$ later on 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 treatment 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 discuss later on. 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

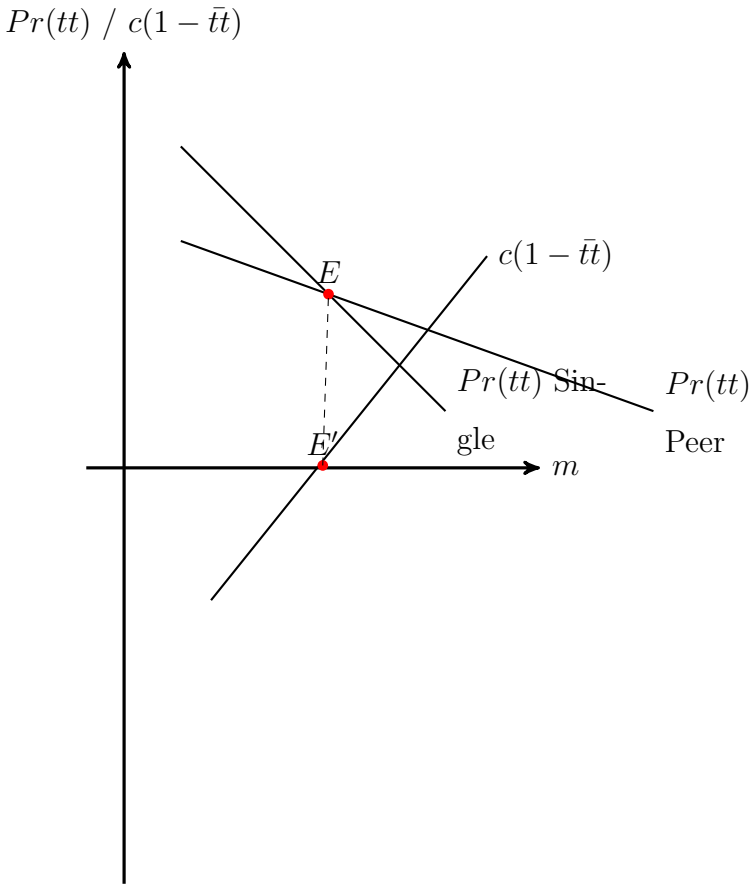
a role. In single treatment, the tt is preferred if

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

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 1** shows the relationship between m, $Pr(tt)$ and $c(1-\bar{tt})$.



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 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 $\bar{t}t$ 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 that rise 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.

4 Group Level Results

4.1 Comparing Groups

We begin our analysis of the effects of peer observation by studying the difference between those groups that played the game observing each other and those that played the game at the same time and under the same conditions but not observing each other. T-tests and Wilcoxon-rank test compare decisions between the two types of groups in **Table 4**. At first, it seems that there is no difference in the mean group choice of the last row that was chosen in each playing situation. Hence, the average last row chosen in observing as well as non-observing groups is the same.

However, we can see a difference in the standard deviation between those groups that played together and those that did not. The standard deviation within a group for those groups that observed each other is significantly lower than for those groups that did not observe each other. Those that play in the observing group are less likely to switch either very early or very late. This can also be seen when looking at the group minimum and the group maximum. The group minimum is the lowest switching point of anyone within the group, whereas the group maximum is the highest switching point within a group. We can see that the group minimum is significantly higher and the group maximum is significantly lower when the game is played with peers observing each other.

The finding is further supported by **Figure 2** which shows a kernal density plot of mean group choices for observing and non-observing groups. Here we can see that mean group choices take both higher and lower values when the game is played without peer observation. The kernal density function also shows that the standard deviation is lower in observing groups.

We further test the finding described above using regression analysis whilst controlling for group composition in **Table 5**. Outcome variables stay the same as above, namely group mean, group minimum, group maximum, and group standard deviation. The peer dummy is unity if the group played with peer observation. In these regressions we control for group level mean characteristics. We confirm our finding from above. When the experiment is played with peer observation, standard deviation of choices within the group is lower. The same can be seen when looking at the group minimum and maximum. The

coefficient on the peer dummy is positive in the regression estimating the group minimum and negative and significant in the regression estimating the group maximum. Interestingly, group composition seems to have only a limited influence on the tasty treat choice. Groups with more women switch from tasty treat to money earlier. Similarly, there seems to be an effect of groups that are richer, i.e. that have higher average consumption. Both **Table 4** and **Table 5** show that there is a significant difference in consumption choices between observing and non-observing groups. We find that consumption choices converge in the observing groups. Hence, there is evidence for conformity when respondents observe each other.

Performing the experiment in a group seems to effect those that would have chosen the money early on or stuck with the tasty treat until very late the most. This can be seen in more detail in **Table 6**. Here we again use t-test and Wilcoxon-rank tests to compare deciles between observing and non-observing groups. We can see that the first and second decile in observing groups is higher than the non-observing groups. The opposite can be seen when looking at the eighth and ninth decile. This is significantly higher in non-observing groups than in observing groups. This effect is stronger for the higher deciles. Of course, one cannot directly compare individuals, as no one performs the experiment in the treatment and in the control group, but from this it looks like peer observation particularly effects those that would have made extreme choices.

4.2 Giving in to Temptation?

We here briefly discuss our respondent's propensity to give in to temptation. This experiment was deliberately performed using temptation goods, as evidence suggests that demand for these goods is more likely to be influenced by the presence of peers. At the same time, we believe that playing the game with temptation goods and hence non-essential good gives cleaner evidence of the effect of peer observation. It is possible that playing the game with other goods that can be considered neccessities, would have had a confounding effect on choices made by individuals.

We here define giving in to temptations as choosing the tasty treat far beyond its value of 40 Baht. From the tables discussed above and especially from **Figure 2** we can

see that giving in to temptation does not happen a lot. Indeed, the mean of the average group choice for both the treatment and control group is just below three, meaning that the average respondent switches from the amount of money offered well below the purchasing value of the tasty treat. The same applies to median choice, which lies just below three for both the treatment and the control group. Moreover, when looking at **Figure 2**, it becomes clear that there is considerable variation between choices made. Some group average choices are below the point whereas some are far above the point where the amount offered is equal to the money. From here we can clearly see that some people do give in to temptation, but also that peer observation seems to prevent people from giving in to temptation. However, peer observation not only reduces the switching point of those that would otherwise have given in to temptation, but it also raises the switching point of those that would have switched very early. Therefore, our results are caused by conformity to the group, and less likely by peer observation preventing people from giving in to temptation.

5 Individual Level Results

5.1 Identification Strategy

We are interested in identifying causal peer effects on the individual decision-making and understanding whether consumption is affected by the observation of peers. The identification of peer effects, however, suffers from a number of econometric issues (Manski, 1993; Moffit, 2001) which can be summarized into three categories: (a) correlated effects, (b) contextual effects, and (c) endogenous effects.

Correlated effects in consumption choices may emerge if socially-related individuals under study share preferences and characteristics that make them more likely to select into a peer group and these characteristics are important determinants of the dependent variable. This means that peer groups that have evolved naturally are therefore more similar to each other than if they had been chosen randomly. This may lead to the appearance to peer effects, but in reality those observed are simply behaving similarly because they are similar. Contextual effects may emerge if individuals share common environments and unobserved shocks (i.e. rainfall in the village) that make their consumption move simultaneously independently of any genuine peer effects. These are sometimes also referred to as time-variant unobservables, while correlated effects are referred to as time invariant observables. Finally, endogenous effects represent the phenomenon where the group affects individual behavior through social interaction (i.e. is the individual's consumption choice affected by the group consumption choice). It is the third effect what we are trying to separate in this study.

Our experimental design (discussed in detail in Section 2) represents an attempt to surmount the challenge of identifying a causal peer effect. Much of the literature following Manski has focused on the econometric issue of separating the causal peer effect from that of correlated unobservables (Miguel and Kremer, 2004; Bandiera and Rasul, 2006; Conley and Udry, 2010). Two ways of disentangling these effects are to (1) randomize the peers (Sacerdote, 2001; Duflo and Saez, 2003) or (2) randomize an intervention or new technology (Kremer and Miguel, 2007; Oster and Thornton, 2012; Godlonton and Thornton, 2012). We follow the first approach.

The double randomization in our experimental design, that is, first randomly select-

ing households to perform the experiment given the sampling procedure and second randomizing peer and control treatments according to villages, circumvents the problem of correlated effects.

Since we chose randomly who plays in a peer group and who is part of that peer group, there are unlikely to be any unobservables that would systematically influence the choices made by the individual. Hence we can circumvent the problem of correlated effects. At the same time, our experiment takes place in a relatively controlled environment and only takes a short period of time. It is, hence, unlikely that unobservable time-variant characteristics influence decisions made by respondent.

For the identification of endogenous peer effects we use the so-called leave-out mean as the regressor in our main analysis in order to analyze the effect of the group average consumption on the individual consumption choice.[2]

To identify the effect of peer observation, we will estimate the main regression model in the following form using least squares estimation:

$$Y_{ij} = \beta \bar{y}_{-i,j} + \gamma \bar{x}_{-i,j} + \delta x_{i,j} + u_{i,j}$$

In our framework, Y_{ij} is the consumption choice of tasty treat for individual i who has group affiliation j (observing or non-observing group). In our main analysis Y_{ij} will be the last row in which they choose the tasty treat before switching to money. However, we also run similar regressions using a variable that is one if participants always chose tasty treat over money or if they decided not to choose tasty treat at all. The coefficient of interest is β, the coefficient on the group mean. This is the group outcome net of individual i's outcome, a quantity commonly referred to as the leave-out mean. In our analysis we split the sample into those that performed the experiment in observing and non-observing groups. We expect β to be positive when the experiment is performed with peer observation and so indicating positive peer effects. When the experiment is, on the other hand, performed without peer observation we expect β to be close to 0. This will indicate to us that we are really observing endogenous peer effects that are not caused by correlated or contextual effects.

[2]While we are able to identify endogenous peer effects, we are not able to circumvent the reflection problem entirely.

In many peer studies, researchers would often use the group mean inclusive of the individual, $\bar{y}_{ij}$. However, outcome-on-outcome peer effects are vacuous, because regressing $\bar{y}_{ij}$ on y_{ij} results in a coefficient of 1, entering unity. Therefore, any peer group measure must vary within groups in order to satisfy the rank condition. This would rule out taking the average outcome of the group as the regressor. Instead taking the leave-out mean allows inter-group correlation coefficients since there is a different group average for each respondent, calculated from the decision of the other group members. This approach has previously been used by Townsend (1994), Guryan et al. (2009), Duflo et al. (2011), Carrell et al. (2012) and advocated by Angrist (2014).

Following this, we include the variable $\bar{x}_{-i,j}$ which is the vector of average group socio-economic characteristics in group j, excluding the individual i. A set of individual characteristics such as female, age, schooling, log consumption, household size, dependency ratio, and BMI that may affect consumption decisions compose $x_{i,j}$. The error term u_{ij} is clustered on the village level.

As we assign respondents randomly into peers groups, we assume $E(u_{ij}|x_{ij}) = 0$, i.e., no correlated effects or self-selection into groups. Thus, if we observe a difference in outcomes between observing and non-observing groups we can attribute this directly to the (on average) only difference between these groups, namely peer observation.

5.2 Peer Effects

As a next step we look at peer effects and their effect on individual decisions as described in the previous section. We find an effect of the group average on the individual decision-making concerning consumption choice. We here perform the regression described above. Results are presented in **Table 7, Panel A**. The first two columns cover the entire sample. We find that there is a significant and positive relationship between the average switching point in the group and individual's switching point. When looking at these results only, however, it is conceivable that this relationship may be caused by unobserved variables as described by Manski (1993).

In the next four columns, however, we split out sample into those that played the game in observing groups and those that played in non-observing groups (denoted as Peer and Single). Here, we can clearly see that the effect observed above is caused by peers observ-

ing each other directly and not caused by unobserved correlated or contextual variables. In columns 3 and 4 we show results for those individuals that played in observing groups with and without control variables. We can see that the effect here is significant and stronger than for the full subject pool. The coefficient of interest only reduces slightly when we introduce the control variables. The only other significant relationship we find is the difference between males and females. Females seem to choose the tasty treat less compared to men. Columns 5 and 6 show the same regression but for respondents that play the game without peer observation. Here the effect of the average peer choice has no effect on the individual's switching row. Similarly, in column 7 we introduce an interaction term between the group average and a dummy that takes the value one if the game was played in an observing group. The interaction term is positive and significant and so we can conclude that the relationship between the group average and the point of switching is not the same between observing and unobserving groups.

These results in **Table 7, Panel A**, described above indicate to us that the peer effects that we observe in columns 3 and 4 above, is not caused by unobserved correlated or contextual variables but rather by peers observing each other and making the same observation at the same time.

In **Table 7, Panel B** and **Table 7, Panel C** we perform the same exercise, but with different dependent variables to see whether individuals consumption decision is still affected by the group, even for those individuals that may lean towards extreme choices. In Panel B we use a dependent term that is a dummy taking the value of 1 if the respondent chooses the tasty treat in every round. In Panel C we also use an indicator variable that is 1 if the respondent never chooses the tasty treat, hence preferring the money from row 1 until row 7. Both tables exhibit the same pattern as the previous table. The group?s average consumption choice does influence the individual's choice in both tables. In Panel B, for instance, it can be said that if the group consumption average increases in the peer treatment, the more likely is the respondent to choose the tasty treat in every round. These results are highly significant at the 1% significance level even when controlling for observable factors. Noticeable is also the relative high R^2. The socio-demographic covariates plus the group average excluding the individual seem to explain a large share of the variation in the dependent variable. Conversely in Panel C, we find that if the

group average is higher, it is less likely that the respondent never chooses the tasty treat. Most importantly, all these relationships only holds if the decisions are made under peer observation and does not hold if the game is played at the same time but without peer observation. Hence, we find that observability of the behavior of peers leads to conforming behavior, thus confirming the descriptive results in the previous section.

5.3 Mechanisms

So far, we have found strong evidence in consumption choices. We show that the standard deviation of choices is smaller, the maximum switching row is lower and the minimum switching point is higher if the experiment is conducted with peer observation. At the same time, we were able to show that individuals are clearly influenced by their groups, as group averages have an influence on the individual decision-making. However, it is not clear what the source of this group conformity is.

In this section, we will now attempt to look into the mechanism that operates these observed effects further. In the literature, a number of reasons behind peer effects are discussed (Bikhchandani et al., 1998; Cai et al., 2009). We here attempt to look at two factors. Firstly, peer effects have been argued to be caused by respondent's believe that others have better information. Hence by doing what others are doing individuals are drawing on their peer's information. Secondly, individuals could simply follow their peers because they are gaining some kind of network externality or psychological benefit from doing the same as others in their group. Due to the set up of our experiment, we are unable to provide definite answers. Nonetheless, these results provide some interesting insights into the mechanisms that are behind the observed conformity.

We will here firstly discuss the effect of information since peer effects have been extensively examined in the context of informational spillovers (Foster and Rosenzweig, 1995; Miguel and Kremer, 2004; Conley and Udry, 2010; Oster and Thornton, 2012). As described above, we asked respondent to estimate how much the tasty treat costs to buy in a shop. We use this response as a proxy for how familiar the respondents are with the product. We create a dummy that is unity if the respondent wrongly estimates the price. We introduce this dummy, together with an interaction term between the dummy and the leave-out-mean into the regression as described above. Results are shown in **Table 8**. Interestingly, unfamiliarity with the tasty treat makes the respondent less likely to choose it, but only in the single treatment. Not knowing the price of a product has no effect on the likelihood of choosing the tasty treat in the peer treatment. Hence, it seems that individual's benefit from some kind of information tranfer or social learning by following the group.

In order to look into the other possible reason behind this mechanism further, we look at the decision of respondents to switch in a certain round, depending on the proportion of his groups that has switched in a previous round. **Table 9** shows results. The right hand variable is a dummy that is one if the respondent switches from the tasty treat to the money in a certain row. The dependent variable is the proportion that chose the money i.e. had switched in previous rounds. Table 9 shows these regressions for both the single and the peer treatment and for the decision taken in rounds up to round four. Since most people only switch once, the regressions only include people that had not switched in previous rounds. All regressions include individual level and group level control variables. We can see from these regressions that the proportion of people that had switched in the previous rounds has a positive effect on the likelihood that a respondent will switch from TT to money in a given round. However, this relationship breaks down after round three, possibly because the number of people that had not switched beforehand is very small.

Table 9 indicate that the number of people that decide to switch is important for the decision made by the individual. It indicates that there is some kind of network externality at play here as it appears that people seem to benefit from doing the same as the people in their group when playing with peer observation.

These results indicate that peer observation counteract the effect of a lack of information on a product. It seems that individuals obtain some sort of information by observing each other's actions. This way they are able to optimize self-interested behavior. Gaining information from peers therefore seems to play a role in peer effects. At the same time, we find evidence of people following each other. However, we cannot draw definite conclusions about the mechanism behind peer effects. Network externalities seem to play a role here alongside information effects.

5.4 Treatment Heterogeneity

In this section, we test whether certain people are more likely to succumb to peer effects. We here look at both behavioural types and the social environment in which people live to see if some are more likely to conform than others. It is, for instance, conceivable that high (low) cognitive ability individuals within their group are more able to resist (succumb) to peer effects. There is a growing literature linking cognitive ability and financial literacy to improved financial behaviors and outcomes (see for instance Agrawal and Mazumder, 2013; Bertrand and Morse, 2011). We hypothesize that high cognitive ability individuals should be less prone to peer pressure while the opposite should be true for low skilled respondents.

As discussed above we included a number of questions designed to study cognitive ability. Now we create a dummy in our standard model for those that have the highest and lowest cognitive ability score compared to their peers within the group to test the effect of relative cognitive ability in a group. In order to test for the effect of absolute cognitive ability we generate a dummy for those that scored in the highest 10% of the distribution. We include these dummies together with an interaction term between the dummy and the leave-out-mean into our regressions above using only the peer treatment. As before standard errors are adjusted for clustering at the village level. **Table 10** shows results. We find that the high cognitive ability (both in relative term to their groups and in absolute terms) individuals are less likely to succumb to peer effects. We, however, do not find any statistically significant results for low cognitive ability people (results not reported in the table).

We also investigate the effect of other personality traits. We use the same methods to test whether overconfidence drives economic decision in our peer experiment. We hypothesize that those who are overconfident may be less susceptible to peer effects. While we do get the expected sign, that is to say, that overconfident people take tasty treat in later rounds, the results are statistically insignificant. Hence, we do not find that overconfidence matters in terms of peer decisions (Details upon request). We also use this method to test whether those with the highest consumption are more susceptible to succumb to peer effects. We do not find any significant results (Details upon request).

Another interesting question is whether people that live in closer knit communities are more susceptible to peer effects. The conformity cost of not doing what everyone else in the group is doing may be higher for those that live in communities with stronger social ties. As there is no way of measuring this directly, we test to see if the peer effect is stronger for those living in smaller villages. We hence create a dummy that is unity for those respondents that live in villages that are smaller than the median. Again, we also include an interaction term between this dummy and the leave out mean. Results are shown in **Table 10** in column five and six. We can see that the small village dummy as well as the interaction term are significant. This shows us that those that live in smaller villages are more likely to conform to the group. This indicates that stronger social ties may lead to stronger conforming behavior.

6 Robustness

Strictly speaking it is conceivable that the peer effects that we observe earlier on are not caused by peer effects since our randomization took place on the village level rather than the individual level. This, however, seems very unlikely. For this to happen the randomization would have to work in a way that those that played in observing groups are more alike than those that played in the non-observing groups. Since the number of groups is fairly large and we are also able to control for a large number of observable factors, we believe that such a concern can be neglected. However, to exclude further doubt, we test whether standard deviations of observed variables are the same between observing and non-observing groups. Results are shown in **Table 11**. From the t-test and Wilcoxon-rank test, we can see that standard deviations are the same for observing and non-observing groups. We therefore reject the idea that our results are caused by observing groups being more similar than non-observing groups.

In Table 3 we control for a large number of socio-demographic group means. Here we also check if group standard deviations in socio-demographic characteristics may make a difference to the effect of peer observation on group level results. It is possible that groups that are similar (by coincidence) make more similar decisions. This is not the case. Results stay the same when controlling for group level standard deviations in socio-demographic variables.

Next, we also check if the main results hold when we change the way the dependent variable is coded. In order to do this, we create two dummies. The first takes the value of one if the respondent switched before the money amount increased to 40 Baht, the second takes the value of one if the respondent switches after the money amount is increased to 40 Baht. We run all the regressions again and find that the results do not change. The group average still has a significant effect on these outcome variables.

Furthermore, we check whether in addition to the distance of the villages to Ubon, the provincial capital city, or the nearest district capital has an impact on the demand for temptation goods since it is assumed that villages that are close to urban areas could get the tasty treat more easily. This could determine 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 7 stay the same. We also control for a number of other village characteristics such as village shocks or their intensity. These also 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 consumption or high 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. We also include an interaction term between the female dummy and the leave out mean to see if peer effects are stronger for men or women. We find no effect.

In the next step, we test whether our results may be driven by one or several settings of the experiment. We firstly investigate whether morning or afternoon sessions would have a confounding effect on the demand of consumption good. We create an dummy variable for the morning session and interaction terms thereof with the group average excluding the individual and include this in our regression analysis (see **Table 12**). We only look at those that played in observing peer groups. We find that there is no difference between results the game is played in the morning. Hence, main results of Table 7, Panel A, remain unchanged. It is interesting to see whether the experimental session influences the results. In each village, we played two sessions. We find that whether the experiment was performed in the first or the second session does not make a difference to the results (see **Table 12**). Taking the entire or merely the observing groups, we find that regardless whether one group played before the other, peer observation seems to have an impact on the consumption choice of the individual. Lastly, most of our groups contained five people, however it was not always possible. We also check if group size has an effect on our results. In order to 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 controls to outcome variables, village charactersitics, individual charactersitics and experimental design.

7 Conclusion

In a standard economic model of consumption choice, the effect of peers is largely ignored. Our study shows that peer observation has an effect on consumption of temptation goods. We conduct a lab-in-field experiment and find that peer observation leads to conformity.

We start by introducing a conceptual framework that introduces a cost if the individual makes a decision that deviates from that of the group. From this framework we can see that the demand function of the temptation good is less steep under peer observation. We can also derive a positive relationship between the average group choice and the individual choice.

The data supports the predictions of the conceptual framework. Due to the experimental nature and the large number of control variables, we can circumvent the identification problems normally associated in studies on peer effects. In the control group, respondents perform the experiment at the same time as their peers but without observing each other. In the treatment group, peers still make individual choices, but observe each other whilst doing it. We find that standard deviations of those groups that observe each other are lower than for those groups that do not observe each other. At the same time, we show that individual choices are higher when the group choice, measured as the leave-out group mean, is higher. Most importantly, we only observe this when the experiment is performed with peer observations. Hence, we provide clear evidence of peer effects and conclude that peer observation leads to conformity.

This finding is in line with Falk and Ichino (2006) who find that the standard deviation of output of subjects in pairs is statistically significantly lower that in the single treatment. It also corresponds to theoretical models of herding (Banerjee, 1992; Bikhchandani et al., 1992). The direction of our effects is in line with those of Bandiera et al.(2010), Bursztyn et al. (2014) and de Giorgi et al. (2010) for positive and significant peer effects on individual behavior.

In further analysis we look into the possible mechanism behind this conformity. We study the effect of familiarity with the product and find that peer observation can counteract the effect of a lack of knowledge of a product. We also find some evidence that respondents follow the choices of their peer group. Finally, we investigate treatment het-

erogeneities in order to see if the tendency to conform is stronger for some behavioral traits or environments. We find that individuals with high cognitive ability, are less likely to choose the tasty treat, while the same effect is not to be found for overconfident or high-income individuals. We also find evidence that those that live in closer knit communities are more likely to succumb to peer effects.

Despite these findings, a lot of open questions remain that call for further research into peer effects and its effect on consumption choices. So far, there is no consensus on the "best" method to identify peer effects, in part because models and methods must necessarily be case-specific. However, understanding the complexity of peer effects seems yet to be insufficiently explored. Furthermore, more research is needed that looks into the mechanisms behind peer effects and what leads to conformity. In more detail, a structured experiment may be able to disentangle the effect of information and network externality and so explain why we find this conformity when peers observe each other. In addition, research should be done into the effect of key individuals within a group, that is to investigate who leads a group and who in a group follows. Another open question is whether peer effects as they are found in this experiment would persist beyond the time of observation.

Table 1: Summary Statistics of Individual and Village Characteristics

Variable	Mean	Std. Dev.	Min.	Max.	N
Panel A: Individual Characteristics					
Female	0.60	0.49	0	1	543
Age	54.21	13.84	14	86	543
Married	0.83	0.38	0	1	541
Years of Schooling	5.63	3.11	1	17	529
Household Size	4.05	1.72	1	12	502
Number of Children	1.13	1.06	0	7	513
Dependency Ratio	1.48	0.67	0	6	491
Farmer	0.69	0.47	0	1	502
Self-employed	0.06	0.23	0	1	502
Public Servant	0.02	0.14	0	1	502
Body Mass Index (BMI)	22.99	3.77	11.76	36.98	494
Per Capita Consumption	2397.43	1879.34	395.57	15638.18	548
Total Asset Value	10837.22	17783.05	-408.09	209066.23	502
Numeracy	3.56	1.39	0	6	555
Overconfidence	0.37	0.48	0	1	298
Number of Animals	17.22	6.04	4	44	553
Cognitive Ability Measure	-0.03	1.40	-3.655	4.61	553
Panel B: Village Characteristics					
Distance to District Capital	15.96	9.68	2	40	550
Distance to Ubon	59.44	35.49	2	145	550
Number of Village Shocks	1.45	0.63	1	3	265
Number of Households in Village	167.01	89.45	55	813	535

Household Size is the headcount of persons living in the household for at least 180 days. Body Mass Index is computed weight/height^2. Numeracy is the score out of six math questions (Details can be found in Appendix B). Numeracy is the sum of correct answers someone has given to the six math questions. Number of Animals is the number of animals that someone can name in 60 seconds. Overconfident is a dummy that is unity if the respondent is overconfident. Cognitive Ability Measure is a PCA generated by performing principal component analysis on the numeracy score and the number of animals named in 60 seconds. Distance to Ubon is the average distance of the village to the provincial capital.

Table 2: Comparing Individual Level Treatment and Control Group

Variable	Control Group	Treatment Group	T-Test p-value	Wilcoxon Rank p-value
Panel A: Individual Characteristics				
Female	0.57	0.62	0.28	0.27
Age	54.17	54.11	0.96	0.89
Married	0.80	0.85	0.13	0.13
Years of Schooling	5.61	5.67	0.85	0.56
Household Size	4.08	4.01	0.64	0.84
Number of Children	1.22	1.01	0.02	0.06
Dependency Ratio	1.53	1.41	0.06	0.34
Farmer	0.69	0.69	0.98	0.98
Self-employed	0.05	0.06	0.60	0.59
Public Servant	0.03	0.01	0.28	0.28
Body Mass Index (BMI)	23.03	22.93	0.77	0.75
Per Capita Consumption	2299.92	2507.79	0.20	0.48
Total Asset Value	10699.97	11095.22	0.81	0.20
Numeracy	3.55	3.57	0.85	0.58
Number of Animals	17.22	17.20	0.97	0.94
Overconfidence	0.38	0.43	0.24	0.53
Cognitive Ability Measure	-0.03	0.04	0.97	0.95
Panel B: Village Characteristics				
Distance to District Capital	16.16	15.67	0.55	0.76
Distance to Ubon	65.05	53.68	0.00	0.00
Number of Village Shocks	1.47	1.41	0.48	0.76
Number of Households in Village	163.23	171.78	0.27	0.82
N (Individuals)	552			

This table reports t-test and Wilcoxon ran sum test between treatment and control groups. Household Size is the headcount of persons living in the household for at least 180 days. Body Mass Index is computed weight/height^2. Numeracy is the score out of six math questions (Details can be found in Appendix B). Number of animals is the number of animals that someone can name in 60 seconds. Overconfident is a dummy that is unity if the respondent is overconfident. Cognitive ability, pca, is the score generated by performing principal component analysis on the numeracy score and the number of animals named in 60 seconds. Distance to District Capital/Ubon is the average distance of the village to the district/ provincial capital in kilometers.

Table 3: Comparing Observing and Non-Observing Peer Groups

Group Mean	**Observing Groups**	**Non-Observing Groups**	**T-Test p-value**	**Wilcoxon Rank p-value**
Female	0.58	0.63	0.30	0.24
Age	54.32	54.18	0.91	0.50
Married	0.81	0.85	0.14	0.12
Years of Schooling	5.73	5.68	0.69	0.86
Household Size	4.09	4.02	0.65	0.64
Number of Children	1.23	1.02	0.03	0.03
BMI	23.09	23.07	0.95	0.82
Consumption	7.55	7.62	0.26	0.22
Feeling	2.22	2.26	0.64	0.52
Overconfident	0.43	0.43	0.95	0.98
Cognitive Ability	-0.03	-0.02	0.94	0.76
N (Groups)	126			

This table reports t-test and Wilcoxon rank-sum test between observing and non-observing peer groups. Control variables stay the same with the exception of feeling which asks how the respondent feels today before the start of the experiment. It is coded from 1(very good) to 5 (very bad).

Table 4: Comparing Outcomes for Observing and Non-Observing Peer Groups

Outcome PayTT	**Observing Groups**	**Non-Observing Groups**	**T-Test p-value**	**Wilcoxon Rank p-value**
Mean	2.94	2.93	0.91	0.70
Standard Deviation	2.26	1.70	0.00	0.00
Group Maximum	5.74	4.93	0.01	0.04
Group Minimum	0.68	1.21	0.03	0.11
N (Groups)	126			

This table reports difference of the outcome choice between observing and non-observing peer groups. We use the payTT which is the last row subjects choose the tasty treat before swichting to money as the outcome variable. Group minimum is the lowest switching point within the group. Group maximum is the highest switching point within a group.

Figure 2: Mean Tasty Treat Choice between Observing and Non-Observing Groups

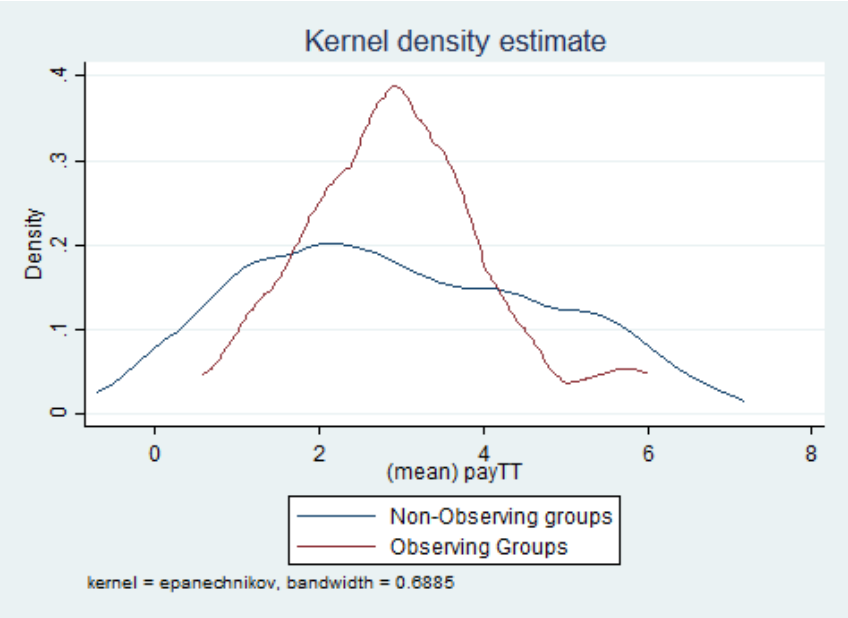


Table 5: Group Level Treatment Effect on PayTT

	(1) **Mean PayTT**	(2) **Std.Dev. PayTT**	(3) **Max PayTT**	(4) **Min PayTT**
Peer Treatment	0.042	-0.477***	-0.111*	0.635**
	(0.14)	(-2.77)	(-1.67)	(2.26)
Mean Female	-1.346**	-0.695**	-0.408***	-0.480
	(-2.40)	(-2.02)	(-2.94)	(-0.94)
Mean Consumption	0.744	-0.293	0.056	1.193**
	(1.37)	(-0.96)	(0.50)	(2.11)
Mean Age	-0.013	-0.016	-0.003	0.004
	(-0.73)	(-1.33)	(-0.84)	(0.17)
Mean Cognitive Ability	-0.106	-0.119	-0.055	0.090
	(-0.49)	(-1.06)	(-1.17)	(0.49)
Mean Married	-0.825	-0.738	-0.324**	-0.368
	(-1.06)	(-1.60)	(-1.97)	(-0.47)
Mean No. of Children	0.036	0.033	0.057	0.260
	(0.12)	(0.20)	(0.77)	(0.97)
Mean Schooling	0.072	0.084	0.032	-0.077
	(0.80)	(1.38)	(1.62)	(-0.86)
Mean Household Size	0.020	-0.057	-0.000	0.033
	(0.11)	(-0.60)	(-0.00)	(0.20)
Mean Feeling	-0.201	-0.030	-0.012	-0.132
	(-0.72)	(-0.17)	(-0.16)	(-0.56)
Mean Overconfidence	0.396	-0.185	-0.062	0.715
	(0.61)	(-0.52)	(-0.45)	(1.15)
Mean BMI	-0.015	0.045	-0.011	-0.057
	(-0.22)	(0.99)	(-0.69)	(-1.10)
Constant	-0.409	5.170**	2.03**	-7.826
	(-0.09)	(2.13)	(2.29)	(-1.53)
R-Squared	0.08	0.18		
Observations	126	126	126	126

This table reports regression results with clustered standard errors in parenthesis. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively. Peer observation is a dummy that is 1 if the game is played with peers observing each other. Mean (Variables) are the average group composition in the observing groups. Column 1 and 2 report OLS estimates. Columns 3 and 4 show poisson results.

Table 6: Comparing Deciles between Non-Observing and Observing Groups

Decile payTT	**Observing Groups**	**Non-Observing Groups**	**T-Test p-value**	**Wilcoxon Rank p-value**
1st	0.68	1.21	0.03	0.11
2nd	0.92	1.41	0.06	0.33
3rd	1.55	1.90	0.27	0.44
4th	2.25	2.39	0.67	0.96
5th	2.76	2.84	0.81	0.93
6th	3.29	3.32	0.94	0.92
7th	4.00	3.66	0.33	0.44
8th	5.20	4.54	0.04	0.12
9th	5.74	4.93	0.01	0.46
N(Groups)	126			

This table reports differences in deciles between observing and non-observing groups. We use the payTT which is the last row subjects choose the tasty treat before swicht-ing to money as the outcome variable.

Table 7, Panel A: Individual Choice of Tasty Treat and Group Average excluding Self

	(1) **Last row TT** All	(2) **Last row TT** All	(3) **Last row TT** Peer	(4) **Last row TT** Peer	(5) **Last row TT** Single	(6) **Last row TT** Single	(7) **Last row TT** All
Group Mean without Self	0.444***	0.403***	0.670***	0.627***	0.008	0.031	0.304*
	(0.08)	(0.10)	(0.07)	(0.13)	(0.18)	(0.20)	(0.12)
Peer*Group Mean Without Self							0.162*
							(0.08)
Group Average Characteristics (exluding the individual)	No	Yes	No	Yes	No	Yes	Yes
Individual Characteristics	No	Yes	No	Yes	No	Yes	Yes
Constant	1.59***	2.88	0.91***	2.47	2.84***	7.05	3.41
	(0.25)	(2.25)	(0.21)	(3.79)	(0.53)	(4.40)	(2.34)
R-Squared	0.08	0.12	0.25	0.30	0.00	0.12	0.14
Observations	537	442	256	203	278	236	439

This table reports OLS 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.

Table 7, Panel B: Choosing the Tasty Treat in every round and Group Average without Self

	(1) **Always TT** All	(2) **Always TT** All	(3) **Always TT** Peer	(4) **Always TT** Peer	(5) **Always TT** Single	(6) **Always TT** Single	(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 (exluding 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. Group Average controls include all the controls from Table 3 but excluding the individual.

Table 7, Panel C: Never Choosing the Tasty Treat and Group average without Self

	(1) **Never TT** All	(2) **Never TT** All	(3) **Never TT** Peer	(4) **Never TT** Peer	(5) **Never TT** Single	(6) **Never TT** Single	(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 (exluding 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. Group Average controls include all the controls from Table 3 but excluding the individual.

Table 8: Familiarity with the Tasty Treat

	(1) **Last row TT** All	(2) **Last row TT** All	(3) **Last row TT** Peer	(4) **Last row TT** Peer	(5) **Last row TT** Single	(6) **Last row TT** Single
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 with TT	-0.125	-0.452	0.917	1.05	-2.101***	-2.591***
	(0.58)	(0.66)	(0.58)	(0.86)	(0.74)	(0.92)
Peer*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
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 3.

Table 9: Likelihood of switching on those that switched in previous round

	(1) **Switch rd. 2** Peer	(2) **Switch rd. 2** Single	(3) **Switch rd. 3** Peer	(4) **Switch rd.3** Single	(5) **Switch rd. 4** Peer	(6) **Switch rd. 4** Single
Proportion of group switching in previous round	1.65**	-0.24	3.29**	0.92	0.14	0.15
	(0.71)	(0.79)	(1.66)	(0.69)	(0.75)	(0.63)
Group Average Controls	Yes	Yes	Yes	Yes	Yes	Yes
Individual Characteristics	Yes	Yes	Yes	Yes	Yes	Yes
R-Squared	0.26	0.19	0.50	0.21	0.30	0.23
Observations	146	178	117	155	105	131

This table reports Probit regression results with standard errors in parenthesis ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively. The dependent variable is unity if an individual switches from money to the tasty treat in that row. Only individuals that had not switched before are included in the regression. The right hand side variables is the proportion of the groups that had switched in any previous round.

Table 10: Treatment Heterogeneity: High Cognitive Ability and Living in Small Villages

	(1)	(2)	(3)	(4)	(5)	(6)
	PayTT	**PayTT**	**PayTT**	**PayTT**	**PayTT**	**PayTT**
	Peer	Peer	Peer	Peer	Peer	Peer
Group Mean without Self	0.70***	0.64***	0.78***	0.69***	0.50***	0.34
	(0.07)	(0.13)	(0.08)	(0.13)	(0.14)	(0.25)
Cognitive Ability in Top 10%	0.76	0.39				
	(0.58)	(0.70)				
Peer*Cognitive Ability in Top 10%	-0.26*	-0.05				
	(0.14)	(0.22)				
Highest Cognitive Ability in Group			(0.38)	(-0.25)		
			(0.58)	(0.78)		
Peer*Highest Cog. Ability in Group			-0.38**	(-0.19)		
			(0.16)	(0.19)		
Living in small Village					-1.04**	-1.79**
					(0.49)	(0.87)
Peer*Living in small Village					0.26*	0.49*
					(0.15)	(0.27)
Group Average Controls	No	Yes	No	Yes	No	Yes
Individual Characteristics	No	Yes	No	Yes	No	Yes
R-Squared	0.26	0.30	0.29	0.32	0.27	0.33
Observations	256	197	256	197	256	197

This table reports regression results with standard errors in parenthesis. ***, ** and * denote significance at the 1%, 5% and 10% levels, respectively. The dependent variable is the last row someone chooses the money. Cognitive Ability in top 10% is a dummy that is one if the respondent scored in the top 10% on the cognitive ability tests. Highest Cognitive Ability in groups is a dummy that is one for the respondent with the highest cognitive ability score in the group. Small village is a dummy that is one if the respondent lives in a village that is below the median village size. Peer* indicates an interaction term between group means without self and the respective dummy.

Table 11: Comparing Observing and Non-Observing Peer Groups (Std. Dev.)

Group Mean	**Observing Groups**	**Non-Observing Groups**	**T-Test p-value**	**Wilcoxon Rank p-value**
Female	0.42	0.42	0.87	0.85
Age	12.79	12.23	0.59	0.72
Married	0.31	0.25	0.18	0.22
Years of Schooling	2.24	2.22	0.95	0.95
Household Size	1.51	1.52	0.94	0.42
Number of Children	1.23	1.02	0.03	0.14
Body Mass Index	3.32	3.51	0.54	
Per Capita Consumption	0.54	0.58	0.37	0.72
Feeling	0.79	0.77	0.71	0.72
Overconfidence	0.46	0.42	0.32	0.15
Cognitive Ability Measure	1.28	1.19	0.29	0.36
N (Groups)	126			

This table reports t-Test and Wilcoxon rank-sum tests between observing and non-observing peer groups.

Table 12: Robustness, Morning, Experimental Sessions, Group Size

	(1)	(2)	(3)	(4)
	Last row TT	**Last row TT**	**Last row TT**	**Last row TT**
	Peer	Peer	Peer	Peer
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

A Appendix

Experimental 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.

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)

B Appendix

Measurement of Numeracy and Overconfidence

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 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?

References

Agarwal, S. and B. Mazumder (2013). Cognitive abilities and household financial decision making. *American Economic Journal: Applied Economics 5*(1), 193–207.

Angrist, J. (2014). The perils of peer effects. *Labour Economics 30*(1), 98–108.

Baecker, A. and M. Mechtel (2014). Peer effects in cheating on task performance. *Unpublished Manuscript*.

Bandiera, O., I. Barankay, and I. Rasul (2010). Social incentives in the workplace. *Review of Economic Studies 77*(2), 417–458.

Bandiera, O. and I. Rasul (2006). Social networks and technology adoption in northern Mozambique. *Economic Journal 116*(514), 869–902.

Banerjee, A. (1992). A simple model of herd behavior. *Quarterly Journal of Economics 107*(3), 797–817.

Banerjee, A. and S. Mullainathan (2010). The shape of temptation: Implications for the economic lives of the poor. *Working Paper No. 257*.

Bernheim, B. D. (1994). A theory of conformity. *Journal of Political Economy 102*(5), 841.

Bertrand, M. and A. Morse (2011). Information disclosure, cognitive biases, and payday borrowing. *Journal of Finance 66*(6), 1865–1893.

Bertrand, M. and A. Morse (2013). Trickle-down consumption. *NBER Working Paper Series 18883*.

Bikhchandani, S., D. Hirshleifer, and I. Welch (1998). Learning from the behavior of others: Conformity, fads, and informational cascades. *Journal of Economic Perspectives 12*(3), 151–170.

Bolton, G. E. and A. Ockenfels (2000). ERC: A theory of equity, reciprocity, and competition. *American Economic Review 90*(1), 166–193.

Bursztyn, L., F. Ederer, B. Ferman, and N. Yuchtman (2014). Understanding mechanisms underlying peer effects: Evidence from a field experiment on financial decisions. *Econometrica 82*(4), 1273–1301.

Cai, H., Y. Chen, and H. Fang (2009). Observational learning: Evidence from a randomized natural field experiment. *American Economic Review 99*(3), 864–882.

Carrell, S. E., M. Hoekstra, and J. E. West (2011). Is poor fitness contagious? *Journal of Public Economics 95*(7-8), 657–663.

Chetty, R., N. Hendren, and L. F. Katz (2015). The effects of exposure to better neighborhoods on children: New evidence from the Moving to Opportunity experiment. *American Economic Review, forthcoming*.

Cole, S., T. Sampson, and B. Zia (2011). Prices or knowledge? What drives demand for financial services in emerging markets? *Journal of Finance 66*(6), 1933–1967.

Conley, T. G. and C. R. Udry (2010). Learning about a new technology: Pineapple in Ghana. *American Economic Review 100*(1), 35–69.

Dohmen, T., A. Falk, D. Huffman, and U. Sunde (2010). Are risk aversion and impatience related to cognitive ability? *American Economic Review 100*(3), 1238–1260.

Duflo, E., P. Dupas, and M. Kremer (2011). Peer effects, teacher incentives, and the impact of tracking: Evidence from a randomized evaluation in Kenya. *American Economic Review 101*(5), 1739–1774.

Duflo, E. and E. Saez (2003). The role of information and social interactions in retirement plan decisions: Evidence from a randomized experiment. *Quarterly Journal of Economics 118*(3), 815–842.

Falk, A. and A. Ichino (2006). Clean evidence on peer effects. *Journal of Labor Economics 24*(1), 39–57.

Fehr, E. and K. Schmidt (1999). A theory of fairness, competition, and cooperation. *Quarterly Journal of Economics 114*(3), 817–868.

Foster, A. D. and M. R. Rosenzweig (1995). Learning by doing and learning from others: Human capital and technical change in agriculture. *Journal of Political Economy 103*(6), 1176–1209.

Gardner, M. and L. Steinberg (2005). Peer influence on risk taking, risk preference, and risky decision making in adolescence and adulthood: An experimental study. *Developmental psychology 41*(4), 625–635.

Georgarakos, D., M. Haliassos, and G. Pasini (2014). Household debt and social interactions. *Review of Finanical Studies 27*(5), 1404–1433.

Giorgi, G. d., M. Pellizzari, and S. Redaelli (2010). Identification of social interactions through partially overlapping peer groups. *American Economic Journal: Applied Economics 2*(2), 241–275.

Godlonton, S. and R. Thornton (2012). Peer effects in learning HIV results. *Journal of Development Economics 97*(1), 118–129.

Goeree, J. K. and L. Yariv (2011). An experimental study of collective deliberation. *Econometrica 79*(3), 893–921.

Gunter, B. and A. Furnham (1998). *Children as Consumers: A Psychological Analysis of the Young People's Market*. London: Routledge.

Guryan, J., K. Kroft, and M. J. Notowidigdo (2009). Peer effects in the workplace: Evidence from random groupings in professional golf tournaments. *American Economic Journal: Applied Economics 1*(4), 34–68.

Imberman, S. A., A. D. Kugler, and B. I. Sacerdote (2012). Katrina's children: Evidence on the structure of peer effects from hurricane evacuees. *American Economic Review 102*(5), 2048–2082.

Kremer, M. and D. Levy (2008). Peer effects and alcohol use among college students. *Journal of Economic Perspectives 22*(3), 189–206.

Kremer, M. and E. Miguel (2007). The illusion of sustainability. *Quarterly Journal of Economics 122*(3), 1007–1065.

Luttmer, Erzo. F. P. (2005). Neighbors as negatives: Relative earnings and well-being. *Quarterly Journal of Economics 120*(3), 963–1002.

Mangyo, E. and A. Park (2011). Relative deprivation and health: Which reference groups matter? *Journal of Human Resources 46*(3), 459–481.

Manski, C. F. (1993). Identification of endogenous social effects: The reflection problem. *Review of Economic Studies 60*(3), 531.

Manski, C. F. (2000). Economic analysis of social interactions. *Journal of Economic Perspectives 14*(3), 115–136.

Mas, A. and E. Moretti (2009). Peers at work. *American Economic Review 99*(1), 112–145.

Miguel, E. and M. Kremer (2004). Worms: Identifying impacts on education and health in the presence of treatment externalities. *Econometrica 72*(1), 159–217.

Moffit, R. (2001). *Policy Interventions, Low-Level Equilibria, and Social Interactions*. Washington DC: Brookings Institution Press.

Oster, E. and R. Thornton (2012). Determinants of technology adoption: Peer effects in menstrual cup take-up. *Journal of the European Economic Association 10*(6), 1263–1293.

Roth, C. (2014). Conspicuous consumption and peer effects among the poor: Evidence from a field experiment. *CSAE Working Paper Series, 29*.

Sacerdote, B. (2001). Peer effects with random assignment: Results for Dartmouth roommates. *Quarterly Journal of Economics 116*(2), 681–704.

Steinberg, L. and E. Cauffman (1996). Maturity of judgment in adolescence: Psychosocial factors in adolescent decision making. *Law and Human Behavior 20*(3), 249–272.

Townsend, R. M. (1994). Risk and insurance in village India. *Econometrica 62*(3), 539.

Veblen, T. (1899). *The Theory of the Leisure Class:An Economic Study of Institutions*. London: Macmillan Publishers.

Viscusi, W. K., O. R. Phillips, and S. Kroll (2011). Risky investment decisions: How are individuals influenced by their groups? *Journal of Risk and Uncertainty 43*(2), 81–106.