

SI 710 Assignment 4: Experiment Design

Linfeng, Merve, Rosina, Tangren

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1 Experiment Design

1.1 Motivation

The purpose of this study is to see how the presence of social networks affects trading patterns and, by extension, the efficiency of decentralized markets.

1.1.1 Social Network Implementation

Real world, existing friendships.

1.2 Experiment Procedure

1. Randomly assign subjects into two groups, treatment and control. (Please refer to section “Subjects, Control and Treatment”)
2. Elicit network of treatment group (Please refer to section “Network Elicitation Method”)
3. Computer based trading: treatment with real ID; control with changing fake ID. Subject can post unbinding offers publicly but they can negotiate (private chatting) as well. (Please refer to section “Market mechanism”)

4. At the end of each round, subject will observe the average price or distribution (we can discuss which one is better) (just like “truecar.com”)
5. Subject will be reward the surplus they earned in the experiment.

1.2.1 Subjects, Control and Treatment

The experiment will be run in a computer-based trading setting among a class of undergraduate students, such as ECON 401. The main advantage of the selected group of subjects is the easy access and the fact that we would not need parental consent. This course is chosen since it is still a mass course and provides students with enough time to establish a network in college. Hence, the measured social network will be the existing friendship network among students.

In order to measure the importance of social networks on decentralized competitive markets and the choice of trading partners, subjects are randomly selected from the course and assigned into three groups of 25 individuals. The size of each group is selected to make the elicitation mechanism possible and convenient.

In the treatment group I, students are identified with their real names which implies that the subjects are able to recognize trading partners with whom they have a closer social relationship. After the trading experiment is run, the social network of the treatment group is going to be elicited.

In the treatment group II, students are identified with their pictures (without their names) which again implies that the subjects are able to recognize each other. After the trading experiment is run, the social network of this second treatment group will be elicited.

In the control group I, subjects are not identified and are randomly assigned with a fake ID. Note that in both groups, the market design is identical except from the fact that in one group subjects are identifiable by names or picture whereas in the other they are not.

Moreover, three more groups of 24 students are going to be randomly selected from the behavioral subject pool in order to have three groups of people with a low probability of knowing each other.

In the treatment group III, students are identified again with their real names and in treatment group IV students are identified with their picture. In the control group II, subjects are not identified and are randomly assigned with a fake ID.

The choice of this methodology allows us to identify how the social network and how the method of providing identification influences the trading patterns among subjects. For instance, based on the comparison of Control I and Treatment I, we expect that subjects are more likely to trade with individuals who belong to their social network. Comparing Control I and Treatment II, we expect that subjects with similar characteristics will tend to trade with each other.

1.3 Market Mechanism

We are focusing on a computer based double auction environment. Buyers are looking for a single unit to buy, sellers have only one unit to sell in our setting. The ask and bid offers are going to be posted in a publicly available fashion. In contrast to the transparency of the prices, agents will be able to privately chat and negotiate. The transactions will be realized once both parties agree on it. Furthermore, we will shut the chatting feature for the parties who have already settled for a transaction.

We will have 5 rounds of 5 minutes long sessions. A count-down clock will be integrated into the experimental interface.

Notice that chatting has some costs incorporated in itself such as: (a) they might miss a good price in the market while chatting, (b) they might be embarrassed to ask for a lower/higher price.

1.4 Network Elicitation Method

Given the contextual setting of lab-experiment, we are restricted to a network of at most 25 subjects (max capacity of the lab in North Quad), which makes a thorough elicitation of the social network possible. The goal is to elicit the social network of subjects (both in control and treatment groups) as complete and detailed as possible, with an emphasis of measuring the strength of ties, i.e. acquaintances (weak ties), close friends (strong ties), *etc.*

Inspired by Alan's experiment design, we here have experimenter nominate each subject one at a time, and have the rest of subjects fill up a survey composed of the following list of questions:

1. How would you evaluate your relationship with him/her:
 - (a) barely know each other;
 - (b) acquaintances;
 - (c) close friend;(Note here, Linfeng has omitted the category of "friends".)
2. What is his/her major?
A drop-down manual shall follow this question;
3. Where does him/her come from?
Open question box, and later we can check the matches at various levels (State, region, county and score the matches.)
4. Are you two in the same class other than Econ 102? If so, list as many as possible.
5. What is his/her favorite (pick any one, or more, from the following)

- (a) movie;
- (b) TV Show
- (c) book

6. A collection of true-false questions, in a nutshell:

- I have never met him/her;
- I speak with him/her regularly;
- In the past week, I hang out with him/her;
- In the past week, we worked in study-group together;
- I like to talk to him/her when I have a problem or am unhappy;
- I can trust him/her to keep my secrets;
- I can get to his/her house from my house in 10 minutes;
- I wish I could be like him/her (shown only if the nominated individual is of the same gender with the subject)

This list of questions shall compose a length of one-full-screen that suits the computers in the lab.

1.4.1 Incentive structure

Minimum incentive shall be provided, so as not to interfere with the market game. Details to be settled when the full “market game” is settled, from which we may calculate the expected payoff. As of now, I can only expect the total payment from answering the survey to be less than, say, two dollars.

1.4.2 Experimenter effect

It should be well stated that, although the true names were used in the survey and the market experiment (for treatment group), the experimenters will only access the data through numeric IDs. This needs to be stated in a trust-worthy way, so that the subjects do buy the argument and shall answer truthfully to the “friendship survey”.

1.5 Hypothesis and Testing

1.5.1 Hypotheses

Hypothesis 1 Subjects will be more likely to trade with individuals who are in their social network.

Hypothesis 2 Bargaining costs will be lower when access to social networks is available.

Hypothesis 3 Efficiency will be higher in homogeneous good markets when networks are available. This is expected to be due to lower trading costs.

Hypothesis 4 Price dispersion will be greater in markets where social networks are available. In other words, the Law of One Price is less likely to hold.

Hypothesis 5 Surplus will be split more equally in markets with social networks.

1.5.2 Testing Hypothesis

Hypothesis 1 Utilizing the elicited network, compute the frequency to within network transaction of treatment group, compare it with no network effect probability.

Hypothesis 2 Compute means and standard deviations of bargaining time of control group, treatment group (a.total transactions; b.transactions within network; c. transactions outside of network), then calculate p -value to check statistic significance.

Hypothesis 3 Compute total surplus achieved in each round in both control and treatment, then calculate the statistic difference of these two.

Hypothesis 4 Compute means and standard deviations of price dispersion in each round of control group, treatment group (a.total transactions; b.transactions within network; c. transactions outside of network), then calculate p -value to check statistic significance.

Hypothesis 5 Compute means and standard deviations of surplus splitting ratio (sell surplus/buyer surplus) in each round of control group, treatment group (a.total transactions; b.transactions within network; c. transactions outside of network), then calculate p -value to check statistic significance.