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Module 12: Endogeneity, Instrumental Variables, and Experimental Design > Module 12: Homework > Experimental Design: Questions 10 - 17

Experimental Design: Questions 10 - 17

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During the lecture, Prof. Duflo discussed that thinking clearly about experimental design allows us to identify parameters beyond treatment effects, for example, General Equilibrium Effects as in the French Unemployment experiment. Another potential advantage of designing carefully experiments is the identification of potential mechanisms that drive a causal relationship. In this set of questions, we are going to discuss the identification of mechanisms. We are going to study Bursztyn et al.'s (2014) article *"Understanding Mechanisms Underlying Peer Effects: Evidence from a Field Experiment on Financial Decisions"*

For now, assume you are interested in establishing whether there is social influence on financial decisions, and that you have the following experimental design:

- You start your research project partnering with a financial company.

- You identify investor pairs using referrals to a financial company. One of the investors referred the other one to the company.

- You randomize among the pair who is investor number 1 and who is investor number 2.

- You offer to one of the investors (number 1) the possibility of purchasing a new financial asset.

- When you offer the financial asset to the second investor (number 2), you randomize whether or not you share the decision of the first investor.

Using this experimental design, you decide to estimate the following model:

$$decision_p = \beta_0 + \beta_1 information_p + \varepsilon_p \qquad \textbf{(equation 4)}$$

where $decision_p$ is a dummy variable that indicates whether investor 2 in the pair p takes the same decision as her peer; $information_p$ indicates whether pair p belongs to the treatment group and investor 2 received information on the decision of investor 1; finally, ε_{ij} is an error term.

Question 10

1/1 point (graded)
Does this experimental design allow you to identify the causal effect of what peers do on financial decisions?

- ⊙ Yes ✔
- ○ No

Explanation
You have conducted an RCT in which you have randomized whether an investor learns or not about the decision of her peer. Then, you can identify a causal treatment effect in the parameter β_1. If you see an effect on the decision, it means that his/her decision was influenced by the knowledge of what investor 1 did.

Submit	You have used 1 of 1 attempt

✔   Correct (1/1 point)

A researcher points out that equation 4 is not exploiting all the information in the data. She suggests that you can estimate the following model, which will allow you to identify not only the causal effect of knowing the peer's decision, but also the causal effect of having a peer who doesn't purchase the asset:

$$purchase_{p2} = \beta_0 + \beta_1 purchase_{p1} + \beta_2 information_p + \beta_3 purchase_{p1} \times information_p + \varepsilon_p$$
(equation 5)

where $purchase_{p2}$ is a dummy variable that indicates whether investor 2 in pair p purchased the asset; $purchase_{p1}$ indicates whether investor 1 purchased the asset; $information_p$ indicates whether the pair p belongs to the treatment group of sharing information; $purchase_{p1} \times information_p$ is the interaction; finally, ε_p is an error term.

Question 11
0/1 point (graded)
Which parameter allows you to identify the causal effect of having a peer who doesn't purchase the asset?

◉   a. It is given by the parameter β_0 ✖

○ b. It is given by the parameter β_1

○ c. It is given by the parameter β_2

○ d. It is given by the parameter β_3

○ e. It is not possible to tell in this setting.

Explanation
In this setting, the researcher has randomized whether the second investor knows about the decision of the first one. However, pairs are endogenously formed and thus it is not possible to identify the causal effect of having a peer who declined to purchase the asset.

Submit   You have used 2 of 2 attempts

✖ Incorrect (0/1 point)

Question 12
1/1 point (graded)
Which parameter allows you to identify heterogeneous effects of social influence by investor's 1 decision (whether she decided or not to purchase the asset)?

○ a. It is given by the parameter β_0

○ b. It is given by the parameter β_1

○ c. It is given by the parameter β_2

◉ d. It is given by the parameter β_3 ✔

○ e. It is not possible to tell in this setting.

Explanation

As we have discussed in the previous modules of the course, the parameter β_3 corresponds to a difference-in-differences estimator. In particular, it tells us whether investors who learn that their peers purchased the asset react differently than investors who learn that their peers decided to decline the offer.

Submit	You have used 1 of 2 attempts

✔ Correct (1/1 point)

Economic theory has identified two potential mechanisms of social influence on financial decisions. When someone learns that her peers have purchased an asset, she can be influenced via:

1. **Social learning**: she learned some information of the asset via the decision of her peers.

2. **Social utility**: she is influenced by the fact that her peers hold the asset, even under a setting where information remains constant.

Question 13

1/1 point (graded)

Instead of estimating the model in equation 5, you could use the following one:

$$purchase_{p2} = \beta_0 + \beta_1 no\ purchase_{p1} + \beta_2 information_p + \varepsilon_{ij} \qquad \textbf{(equation 6)}$$

where $no\ purchase_{p1}$ indicates whether investor 1 of pair p declined to purchase the asset.

Would any of the models given by equations 4, 5 or 6 allow you to separately identify the channels of social learning and social utility?

○ a. Yes

◉ b. No ✔

○ c. I can't tell from the given information.

Explanation

Neither the experimental design of equations 4, 5, nor 6 would allow you to separate those channels. In order to do this you need to carefully think about the experimental design. This is precisely what Bursztyn et al. (2014) did in their article and what we are going to discuss next.

<div style="border:1px solid #ccc; display:inline-block; padding:10px 40px">Submit</div>   You have used 1 of 1 attempt

✔   Correct (1/1 point)

Bursztyn et al. (2014) conduct an experiment in which they precisely try to separately identify these channels. Figure 1 presents the experimental design of their paper. Here is a brief summary of their experimental design:

(a) Partner with a financial company.

(b) Identify peer-pairs of investors using referrals to a financial company.

(c) Randomize who is investor 1 and investor 2 in each pair.

(d) Offer investor 1 the possibility of participating in a lottery to purchase a new financial asset.

(e) On those pairs in which investor 1 decided to participate in the lottery, randomize whether she can or can't purchase the asset.

(f) On the pairs in which investor 1 couldn't purchase the asset, randomize whether investor 2 learns the decision of her peer:

- No information **(group A).**

- Information that individual 1 decided to participate in the lottery and was unsuccessful in purchasing the asset **(group B).**

(g) On the pairs in which investor 1 could purchase the asset, randomize whether investor 2 learns the decision of her peer:
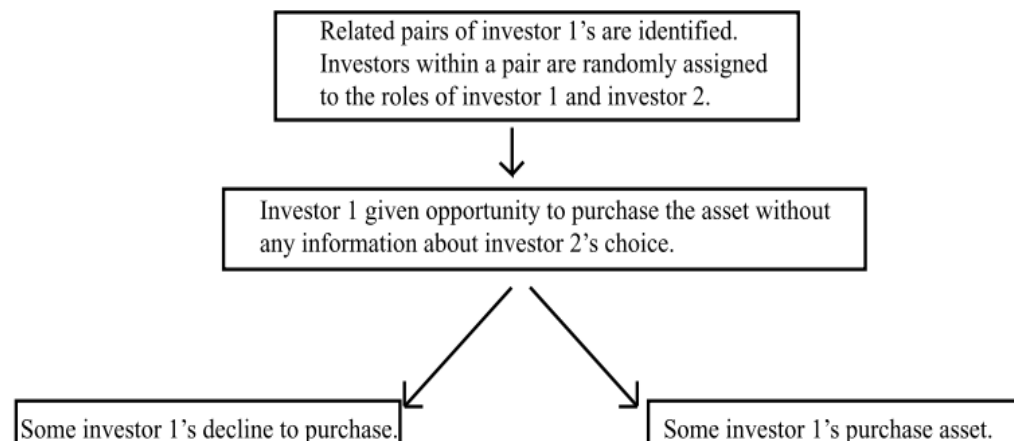
- No information **(group A)**

- Information that individual 2 decided to participate in the lottery and was successful in purchasing the asset **(group C)**.

(h) Have an additional group of individuals with no information: investors 2 in pairs in which investor 1 declined to purchase the asset **(group A^{neg}).**

(i) Their main outcome is whether investor 2 decides to purchase the asset or not.

If you want more information on this paper, you can download it from the following link: http://home.uchicago.edu/~bursztyn/Peer_Effects_ECMA.pdf.

Related pairs of investor 1's are identified. Investors within a pair are randomly assigned to the roles of investor 1 and investor 2.

Investor 1 given opportunity to purchase the asset without any information about investor 2's choice.

Some investor 1's decline to purchase.　　　　Some investor 1's purchase asset.
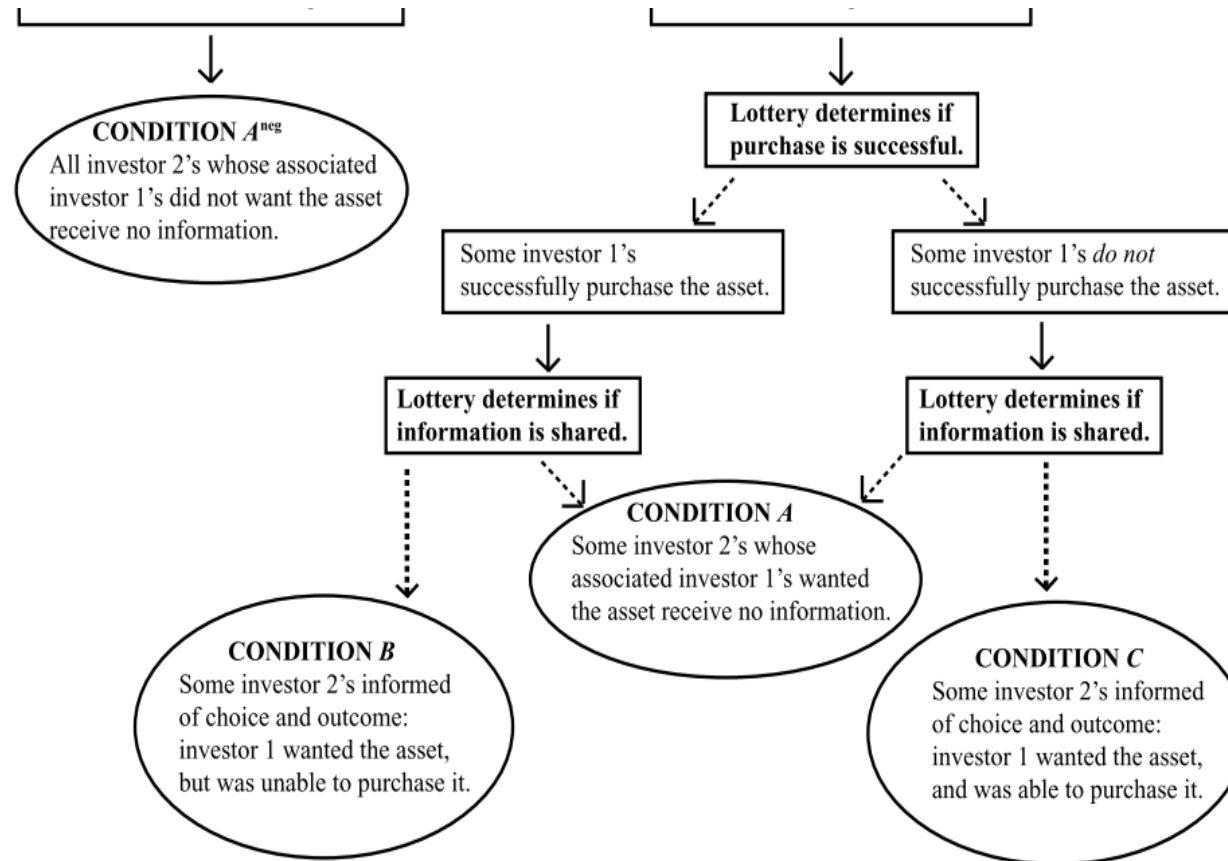
FIGURE 1.—Experimental design "roadmap."

Question 14

0/1 point (graded)

Which comparison between these groups will correspond to the treatment effect of social influence (social learning + social utility) in equation 6?

○ a. Group C vs. Group A

○ b. Group C vs. Group B

○ c. Group B vs. Group A

○ d. Group A vs. Group A^{neg}

◉ e. It is not possible to tell with this experimental design. ✖

Explanation

In equation 6, the treatment effect of social influence was in the parameter β_2. This parameter compares investors 2 who learned their peer decided to purchase the asset versus investors 2 who have a peer who purchased the asset but didn't learn this information. In Bursztyn et al.'s design, Group A are investors whose peers were interested in the asset but never learned this information. This is the control group in the design of equation 6. In the experimental design for equation 6, there is a combined effect of learning the interest of purchasing the asset from investor 1 and knowing that she indeed holds it. The analogous treatment group in Bursztyn, et al is group C.

| Submit | You have used 2 of 2 attempts

✖ Incorrect (0/1 point)

Question 15
1/1 point (graded)

Which comparison between these groups will correspond to the treatment effect of social learning without social utility?

○ a. Group C vs. Group A

○ b. Group C vs. Group B

◉ c. Group B vs. Group A ✔

○ d. Group A vs. Group A^{neg}

○ e. It is not possible to tell with this experimental design.

Explanation

Investors 2 in group B learn that their peers were interested in purchasing the asset, but do not hold it. Thus, by comparing them with investors in group A, it is possible to identify the social learning channel.

| Submit | You have used 2 of 2 attempts

✔   Correct (1/1 point)

Question 16
1/1 point (graded)

Which comparison between these groups will correspond to the treatment effect of social utility conditional on social learning?

○ a. Group C vs. Group A

◉ b. Group C vs. Group B ✔

○ c. Group B vs. Group A

○ d. Group A vs. Group A^{neg}

○ e. It is not possible to tell with this experimental design.

Explanation

Investors 2 in group C learn that their peers were interested in purchasing the asset and were able to acquire it. In contrast, investors 2 in group B learn about the interest of their peers and that they were unsuccessful acquiring it. Thus, the comparison between these two groups identify social utility after social learning.

Submit   You have used 1 of 2 attempts

✔ Correct (1/1 point)

Question 17

0/1 point (graded)

Which comparison between these groups will correspond to the treatment effect of social utility without social learning?

○ a. Group C vs. Group A

○ b. Group C vs. Group B

◉ c. Group B vs. Group A ✖

○ d. Group A vs. Group A^{neg}

○ e. It is not possible to tell with this experimental design.

Explanation

In order to identify this effect, we will need an additional group in which investor 1 is forced to hold the asset and investor 2 learns this information. She can't learn whether her peer is interested or not in the asset. The comparison with group A would give us the social utility treatment effect without social learning. However, this is very difficult to achieve as part of the experimental design.

Submit   You have used 2 of 2 attempts

✖ Incorrect (0/1 point)