TD Econometrics of Causality

Exercise 1 - RCT

In this exercise, we will be replicating and exploring some results of David ATKIN, Amit K. KHANDELWAL, and Adam OSMAN "Exporting and firm performance : Evidence from a Randomized Experiment" (Quarterly Journal of Economics 2017). This paper answers a question the literature has been wondering about for years, what is the causal effect of exportation on firm's performance? To do so, it studies the causal effect of exporting on the profits of Egyptian rug producers with an RCT.

The companies in the treatment group were given the opportunity to sell 110 square meters of carpet in a high-income market. As in a standard buyer-seller relationship, companies were offered subsequent orders if they were able to fulfill initial orders that satisfied the buyer and middleman.

A simplified subset of the data generated by this experiment can be found in the file **td1_rct_export_firm_performance.dta**

This data gathers 219 firms that were collected by two samples (sample1 and sample2). The sample1 firms were surveyed 8 times and the sample2 firms 5 times. The variables of the database characterize the situation of the firm at the time of the first survey (baseline).

Three variables are exceptions and characterize the firm 1 year and 2 months after the baseline. ever_export_t1 takes the value 1 if the firm reported having exported at t+1. takeup_t1 takes the value 1 if one of the firms in the treatment group decides to take advantage of the opportunity to export to a high-income market via the program. And log_profit_rug_business_t1 indicates the log of the firm's profit at period t+1.

Key variables:

id	Unique respondent identifier
sample	The firm is from the sample 1 or 2
strata	Strata of the respondent
treatment	=1 if the firm is in the treatment group
takeup_t1	=1 if the company has taken the order offered to it
ever_export_b	Firm already export t=0 (baseline)
ever_export_t1	The firm declare to have exported at any round
age_resp	Age of the respondent
illiterate	The ability to read or to write of the respondent
hhsize	Household size
hours_last_month	How many hours have you work last month ?
employed_weavers	Including yourself, how many weavers do you employ?
length_weaved_last_month	Total length of this product already weaved in the last 4 weeks (in m2)
product_type	Type of rug
quality_mean	Estimate of rugs quality
num_year_in_rug_industry	Since how many year the firm have been producing rug
hh_inc	Household income
rug_profits	Reported monthly profits from business (Winsorized) in dollars
profit_rug_business_b	Rug profit business at baseline in dollars
profit_rug_business_t1	Rug profit business at t+1 in dollars

Questions

Part I: Summary Statistics

The first step is to look at the summary statistics of your sample. This will tell you the sample population that you are analyzing. We will also see if there are differences between the treatment and control groups.

Replicate the results of Table 3 of the article:

1. Present the simple means, sd, p25, p50, p75, min, max, and count for the age of the respondent, the household size, the number of employees, the past exportation, literacy status, and every variable that you think is relevant in our analysis. What do you notice about the sample size for each variable? Summarize in 10 lines the most important information to keep in mind during our analysis.

2. Now, conduct a statistical test to determine whether there were pre-treatment differences for the age of the respondent, the household size, the number of employees, the past exportation, and literacy status and every variable that you think is relevant in our analysis across treatment and control groups. Do you see any differences between the treatment and control groups? If so, how could these affect the analysis?

The theory of change of this experiment hypothesizes that the treatment will lead to exportation, which will lead to an increase of the profits of the firms. The goal of the empirical analysis that we are conducting is to see if those effects do exist and to measure their size.

Part II: Intention-To-Treat Estimates (ITT)

Let's begin by estimating the effect of winning the lottery on the exportation:

    a. Regress current exportation on winning the lottery (treatment)
    b. Do the same, adding **i.strata**. Compare your result with question (a), what do you conclude?
    c. Do the same adding **ever_export_b**. Compare your result with question (b), what do you conclude?
    d. Do the same as (c) adding this time **illiterate**, (remember the result of question 2). Compare your result with question (c), what do you conclude?

Now that we have analysed the impact of winning the lottery on the probability to export, we will analyse the impact of winning the lottery on the firm's profits.

    e. Regress the profit of rug business after the treatment on treatment. Add control variables if you think they are relevant. What is the causal effect of winning the lottery on the firm's profits? (ITT)

Part III: Treatment-On-Treated Estimates (TOT)

We just estimate the impact of being in the treatment group on the firm's profits. However, it's not the same as estimating the impact of receiving the treatment on the firm's profits.

In fact, some firms in the treatment group will refuse the opportunity which is offered to them and won't try to export. If we want to know what the effect of the treatment on the firm's profit is, we have to focus on the firms that took up the order that was proposed to it.

1. Using tab show the distribution of treatment and **takeup_t1** in one table. Comment on the result.

2. For the following questions, use the command **ivreg2** and use (**takeup_t1=treatment**) to instrumentalize the takeup variable:

   a. Regress current exportation on taking up the order (takeup).
   b. Do the same, adding **i.strata**. Compare your result with question (a), what do you conclude?
   c. Do the same adding **ever_export_b**. Compare your result with question (b), what do you conclude?
   d. Do the same as question (c) adding this time **illiterate**, (remember the result of question 2). Compare your result with question (c), what do you conclude?

Now that we have analysed the impact of taking the order on the probability to export, we will analyse the impact of taking the order on the firm's profits.

   e. Regress the profit of rug business after the treatment on takeup. Add control variables if you think they are relevant. What is the causal effect of taking the order on the firm's profits ? (TOT)

   f. Check if ITT/compliance = TOT

The compliance measures the extent to which beneficiaries have participated in the program. To determine it you have to regress **takeup_t1** with treatment and the controls that you consider relevant.

Part IV: Heterogenous Treatment Effects

Now, let's try to see if the impact of exportation on profit is the same for all types of producers or if it changes according to the firm characteristic. Using a dummy variable to split the sample, find out if there is a heterogeneous export effect due to the initial production (baseline) of the firm.