

Assignment Research Lab 1

Deadline: March 26, 23:59:59 CET, 2024

This assignment is based on the 2019 paper of Arielle Bernhardt, Erica Field, Rohini Pande, and Natalia Rigol (henceforth BFPR) “Household matters: Revisiting the returns to capital among female microentrepreneurs” published in *AER: Insights*. In their paper, BFPR make use of different field experiments run in India, Sri Lanka, and Ghana. The data file for this assignment is based on the Indian experiment and drawn from the data used in BFPR. The paper, data file, and answer sheet are now available for download at CANVAS.

Before answering the questions, it is strongly recommended that you read the paper thoroughly. Please answer the questions as clearly and concisely as possible, and in accordance to the instructions. At the end of each question, the instructions are written in italics between brackets. Parts of answers that deviate from the requested format, or are difficult to decipher will reduce the grade.

The Indian experiment

BFPR evaluate an experiment among female microentrepreneurs in low-income neighborhoods who all received individual loans that ranged from Rs 4.000 up to Rs 10.000 (which is equivalent to €45 up to €112,5 at the 2023 exchange rate). These female microentrepreneurs were organized in microfinance groups of 5. All these groups had to attend a group-specific repayment meeting, in which repayment conditions were discussed. For the experiment, these groups were randomly assigned to different repayment conditions. One set of microfinance groups received a standard contract in which loan repayment was organized through bi-weekly loan installments starting two weeks after the mi-

croentrepreneurs received their loan (control groups). The other set of microfinance groups received a contract with a two-month grace period before they had to start repaying their loan through bi-weekly loan installments (treatment groups). Apart from the grace period, all other contract features were identical. The hypothesis is that microentrepreneurs who receive a grace period in their contract face weaker liquidity constraints and make, as a result of that, better business decision leading up to higher business profits.

As we already mentioned above, these female microentrepreneurs were organized in microfinance groups of 5. The randomization occurred within batches of 20 of such groups. There were in total 9 different batches. This means that treatment assignment is random within each batch (that is, treatment is random conditional upon a full set of batch group indicators).

Question 1

BFPR collected pre-treatment information of the female microentrepreneurs including their age, marital status (marriage 0/1), religion (muslim 0/1), household size, whether they experienced some unexpected household event (household shock 0/1), whether there is water nearby (no drain 0/1), whether they had financial control over their resources (financial control 0/1), years of education, whether they are homeowners (homeowner 0/1), the number of enterprises in the household, and 6 loan amount indicators for having a loan of Rs 4.000, Rs 5.000, Rs 6.000, Rs 8.000, Rs 9.000, and Rs 10.000, respectively. We refer to these pretreatment characteristics as X_{ihg} (where i, h and g stand for female microentrepreneur i in household h in batch group g). In Online Appendix Table A1, BFPR report means and standard deviations for the pretreatment characteristics female microentrepreneurs assigned to the control groups. BFPR make a distinction between households with multiple enterprise owners (column 1) and household where only the female microentrepreneur owns enterprises (column 3).

1. Replicate the results of Online Appendix Table A1 (only column 1) and report all the results with 3 *decimals* for a selected set of pretreatment characteristics in Table A in the answer sheet.¹ As example, we have already provided the first entry for the age of female microentrepreneurs

¹Note that results expressed with 2 or 4 decimals will give zero points. With results expressed with 3 decimals, we mean the exact three numbers as depicted in the STATA output. If, for example, the output reads 34.02878 we want 34.028 and not 34.029.

assigned to the control group in household with multiple enterprise owners, which equals 34.028 with standard deviation 7.322. [Complete Table A column 1 in the answer sheet]. **[8 points]**

2. Provide the STATA output and STATA code needed for generating the results reported in Table A column 1, that is, the means and standard deviations for pre-treatment characteristics of the female microentrepreneurs in families with multiple enterprise owners. [Take a screenshot of the STATA output of column 2, including the STATA command line responsible for the output, and paste it in the answer sheet]. **[3 points]**

The randomized experiment requires that the female entrepreneurs in treated and control groups are, on average, identical. To test this, BFPR estimate for each pretreatment characteristic in X_{ihg} the following OLS regression

$$X_{ihg} = \alpha_0 + \alpha_1 G_g + \delta_1 B_g + \epsilon_{ihg}, \quad (1)$$

where G_g is the treatment indicator (which is 1 for those groups who received that grace period contract, and 0 otherwise), and B_g represent a set of dummy indicators for the different batch groups, and ϵ_{ihg} is the error term. The coefficient α_1 measures the difference between pretreatment characteristics between female entrepreneurs in treated and control groups. The term δ_1 is a set of coefficients attached to the different batch group indicators. In this regression it is key to control for the batch group indicators (and not batch group number) because treatment assignment is randomly assigned within each batch group. Recall that the female microentrepreneurs were organized (and treated) in microfinance groups of 5. BFPR have clustered their standard errors at the microentrepreneurial group level. To get the correct standard errors, add the command at the end of your regression command: `cluster(group)`. In Online Appendix Table A1, BFPR report these estimates for α_1 in columns 2 and 4. Again, they make a distinction between households with multiple enterprise owners (column 2) and household where only the female microentrepreneur owns enterprises (column 4).

3. Replicate the results of Online Appendix Table A1 (only column 2) and report the results with *3 decimals* for the same set of pretreatment characteristics in Table A in the answer sheet.² As example, we have already provided the second entry for the estimated α_1 for the age of female

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microentrepreneurs in household with multiple enterprise owners, which equals -1.515 with standard error 0.946. [Complete Table A column 2 in the answer sheet.] [20 points]

4. Provide the STATA output and STATA code needed for generating the results reported in Table A column 2 for the pretreatment characteristic years of education. [Take a screenshot of the STATA output of column 2, including the STATA command line responsible for the output, and paste it in the answer sheet]. [3 points]
5. The estimate attached to the Rs. 10,000 loan indicator is statistically significant, which suggests that female entrepreneurs in the treatment groups more often loaned the highest amount than female entrepreneurs in the control groups. Is this a concern? [Circle the correct answer in the answer sheet]. [5 points]

Question 2

BFPR estimate the effect of the grace period treatment on enterprise profits by OLS, estimating the following equation:

$$Y_{ihg} = \beta_0 + \beta_1 G_g + \theta_1 B_g + \gamma_1 X_{ihg} + \mu_{ihg}, \quad (2)$$

where Y_{ihg} are the weekly enterprise profits of female entrepreneur i in household h in batch group g . The variables G_g, B_g, X_{ihg} are as defined earlier and μ_{ihg} is the error term. The coefficient β_1 is the average treatment effect of being assigned to the grace period contract. The coefficients θ_1 and γ_1 are attached the different batch group indicators and pretreatment characteristics. In Table 2, BFPR report the β_1 estimates for the female's largest enterprise profits (column 1) and all household enterprise profits (column 2). In the notes of Table 2, BFGR indicate that they want to estimate their regressions on the largest sample possible. They therefore include all controls in X_{ihg} (we list these characteristics in Question 1). In cases where a control variable (in X_{ihg}) is missing, they set its value to zero and include a dummy for whether the variable is missing.

1. Replicate the main estimation results of Table 2 (columns 1 and 2) and report all the β_1 estimates in 3 decimals in Table B in the answer sheet (together with the standard error). Do not forget to control for the dummies for whether the control variables are missing. As before, BFPR have clustered their standard errors at the microentrepreneurial group level.

To get the correct standard errors, add the command at the end of your regression command: `cluster(group)`. *[Complete Table B in the answer sheet].* **[20 points]**

2. Provide the STATA output and STATA code needed for the average treatment effect estimates presented in columns 1. *[Take a screenshot of the STATA regression results using the specification of column 1, including the STATA command line responsible for the output, and paste it in the answer sheet].* **[3 points]**

Question 3

In their experiment, BFGR measure pre-treatment characteristics in the baseline survey and profit measures in the follow-up survey. In between surveys, some of the enterprises under study got bankrupt. For these enterprises profits are missing. BFGR keep these enterprises in the analysis by coding their profits as zero.

1. If you would focus on households where only the female microentrepreneur owns enterprises, what is the share of female enterprises that went bankrupt? *[Report the bankruptcy share in 2 decimals in Table C in the answer sheet. Base your answer on the profits in the female's largest enterprise.]* **[3 points]**
2. Inspired by BFGR's solution to treat missing control variables, one team of researchers accounts for these missing profit measures by coding missing profits as zero (just as BFGR do) and including a dummy for whether profits are missing as additional control variable. What happens to the treatment effect estimate reported in Table 2 column 1 when you include this missing profit indicator as additional control variable? *[Construct the missing profit indicator yourself based on the profit measure in the female's largest enterprise. Apart from the missing profit indicator, you should use the same right hand side specification as the one you used to replicate the estimation results of Table 2 (column 1). Make sure that you use exactly the same sample as the one used in Table 2 (columns 1). Report the treatment effects estimate together with the standard error in 3 decimals in Table C column 1 in the answer sheet.]* **[15 points]**
3. Another team of researchers treats bankruptcy itself as a relevant and interesting outcome when estimating the effect of grace period treatment.

What happens to the treatment effect estimate reported in Table 2 column 1 when you switch the left-hand side variable in (2) to a bankruptcy indicator and estimate the effect of the grace period treatment on enterprise bankruptcy by OLS? *[As before, bankruptcy is based on the profit measure in the female's largest enterprise. Use the same right hand side specification as the one you used to replicate the estimation results of Table 2 (column 1). Make sure that you use exactly the same sample as the one used in Table 2 (column 1). Report the treatment effects estimate together with the standard error in 3 decimals in Table C column 2 in the answer sheet.]* **[15 points]**

4. Based on BFGR's estimation results in Table 2 column 1, BFGR conclude that the average treatment effect of the grace period contract on self-reported weekly profits for women is not different from zero. According to the regression results in Table C column 1, the first team of researchers concludes that had BFGR adequately tackled the problem of missing profits, their conclusion would have been stronger (with an average treatment effect of the grace period contract on self-reported weekly profits for women closer to zero and a p-value way above 0.10). According to the regression results in Table C column 2, the second team of researchers concludes that the average treatment effect of the grace period contract on the bankruptcy likelihood of the female's largest enterprise would have been negative and statistically significant had BFGR sampled 1800 households with at least one female entrepreneur in their experiment (keeping everything else unaltered). About the validity of these conclusions, indicate whether (1) both teams are correct, (2) the first team is correct, the second team is not, (3) the second team is correct, the first one is not, and (4) both teams are incorrect. *[Circle the correct answer in the answer sheet].* **[5 points]**