RESEARCH LAB BUSINESS ECONOMICS
ASSIGNMENT 1
DEADLINE: 30 MARCH 2020, 17.00.

ASSIGNMENT 1

This assignment is based on the 2019 paper of Uri Gneezy, John List, Jeffrey Livingston, Xiangdong Qin, Sally Sadoff and Yang Xu (henceforth GLLQSX) *Measuring success in education: The role of effort on the test itself.*

The data file for the assignment is based on the data used in GLLQSX (Data_GLLQSX). 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.

Question 1

GLLQSX conducted their incentive experiment among tenth graders in high schools in the spring and fall of 2018 in the United States and Shanghai, and in the spring of 2018 in Shanghai only. GLLQSX randomly assigned students to either the Control (no incentive) group and the Treatment (incentive) group. For *all* tenth grade students in high schools in the United States, GLLQSX collected pre-treatment information on gender, ethnicity (white, black, Asian, Hispanic white, Hispanic non-white, and other) and age. For *some* of these students, GLLQSX also have information on a standardized baseline test students took in earlier grades. For *all* tenth grade students in high schools in Shanghai, GLLQSX collected pre-treatment information on gender, age, and a standardized baseline test score. In their Table 1, GLLQSX present means of all these pre-treatment characteristics by treatment group and country.

- **a.** Replicate the results of Table 1 (apart from columns 3 and 6 with the national averages) and report all the results with *3 decimals* in Table A in the answer sheet.[1] As example, we have already provided the first entry for the control group of high school students in the United States for female, which equals 0.502. *[Complete Table A in the answer sheet]*.
- **b.** Provide the STATA output and STATA code needed for generating the results of Table 1 in column 4, that is, the means for pre-treatment characteristics of Shanghai students in the treatment group). *[Take a screenshot of the STATA output of column 4, including the STATA command line responsible for the output, and paste it in the answer sheet].*
- **c.** A randomized experiment requires that individuals in treated and control groups are, on average, identical. Is this the case in the GLLQSX study? *[Circle the correct answer in the answer sheet].*

[1] Note that results expressed with 2 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 0.7009 we want 0.700 and *not* 0.701.

Question 2

GLLQSX estimate the effects of the financial incentive on test scores in the United States and Shanghai by OLS, estimating the following equation separately in each country:

(1) $Y_{icsw}=\alpha+\beta_1 Z_c+\beta_2 X_i+\mu_s+\gamma_w+\varepsilon_{icsw,}$

where Y_{icsw} is the score (out of 25 mathematics test questions) by student *i* in class *c* school-track *s* and wave *w* (Shanghai only); Z_c is an indicator variable for the treatment in class *c* (referred to as *TREATMENT* in the data*)*; X_i is a vector of individual student characteristics which includes age, gender, and for the United States, additional indicators for missing age observations (referred to as *agemissing* in the data) and race/ethnicity indicators for black, Asian, Hispanic white, Hispanic non-white, and other; μ_s is a vector of school type indicators which are in the United States four separate indicators for school 1 regular track, school 1 honors track, school 2 regular track, and school 2 honors track and in Shanghai three indicators for school 2, school 3, school 4; γ_w is for Shanghai only an indicator for the 2018 wave (referred to as *t2018* in the data) ; and ε_{icsw} is and error term. In their Table 2, GLLQSX present their regression results. Regressions in columns 1 and 3 control for μ_s and γ_w. Regressions in columns 2 and 4 control for X_i, μ_s and γ_w.

- **a.** Replicate the main estimation results of Table 2 (apart from the last column) and report all the β_1 estimates in *3 decimals* in Table B in the answer sheet (together with the standard error). Because the randomization is on the class level, GLLQSX have clustered their standard errors also on the class 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]*.
- **b.** Provide the STATA output and STATA code needed for the treatment effect estimate presented in column 2. *[Take a screenshot of the STATA regression results using the specification of column 2, including the STATA command line responsible for the output, and paste it in the answer sheet].*
- **c.** GLLQSX measure their test score outcome as the number of correct answers out of 25 mathematics questions. It is, however, more common among researchers to measure test score outcomes as standardized test scores. What happens to the treatment effect estimate reported in column 3 when you switch the left-hand side variable in (1) to the standardized version of the test score outcome? *[Standardize the test score outcome in the Shanghai sample. Regress the standardized based on the treatment indicator Z_c controlling for μ_s and γ_w. Report the treatment effect estimate together with the standard error in* ***box 2.c*** *in the answer sheet.]*

Question 3

Use the full sample of students in the United States and Shanghai and estimate the following model:

(2) $Y_{icsw}=\alpha+\beta Z_c+\gamma US_i+\delta Z_c US_i+e_{icsw}$,

where Y_{icsw} is the score (out of 25 mathematics test questions) by student *i* in class *c* school-track *s*; Z_c is the treatment indicator; US_i is an indicator for being a student in the United States; $Z_c US_i$ represents the interaction between the two; and e_{icsw} is and error term.

a. Report the δ estimate (together with the standard error) with 3 decimals. *[Report the treatment effect estimate in **box 3.a** in the answer sheet.]*

b. According to the regression results taken from regression model (2), are students in the United States more, less, or equally responsive to financial incentives than students in Shanghai? *[Circle the correct answer in the answer sheet].*