DEPARTMENT OF ECONOMICS   DECEMBER 1, 2023
SAN JOSE STATE UNIVERSITY   6:00 P.M. TO 9:30 P.M.
MASTER'S COMPREHENSIVE EXAMINATION   PROCTOR: LIU

INSTRUCTIONS:

1. Answer ONLY the specified number of questions from the options provided in each section. Do not answer more than the required number of questions. Each section takes one hour.

2. Your answers must be on the paper provided. No more than one answer per page. Do not answer two questions on the same sheet of paper.

3. If you use more than one sheet of paper for a question, write "Page 1 of 2" and "Page 2 of 2."

4. Write ONLY on one side of each sheet. Use only pen. Answers in pencil will be disqualified.

5. Write ------ **END** ----- at the end of each answer.

6. Write your exam identification number in the upper right-hand corner of each sheet of paper.

7. Write the question number in the upper right-hand corner of each sheet of paper.

Section 3: Econometrics—Answer One Question.

3A. (Econ 203A) The following estimations use data on 408 high schools in Michigan.

- **math10:** percentage of students passing MEAP (Michigan Educational assessment program) standardized tenth-grade math test
- **enroll:** school enrollment
- **staff:** staff per 1000 students
- **expend:** expenditure per student, in dollars
- **lunchprg:** percentage of students in school lunch program
- **totcomp:** salary + benefits, in dollars
- **ltotcomp:** log(totcomp)
- **lexpend:** log(expenditure)
- **lenroll:** log(enroll)
- **lstaff:** log(staff)

```
Regression Results
===========================================================
                        Dependent variable:
             -------------------------------------------
                              math10
             (1)         (2)         (3)         (4)
-----------------------------------------------------------
staff        0.048
            (0.040)

totcomp     0.0005***
            (0.0001)

enroll      -0.0002
            (0.0002)

lstaff                   3.980
                        (4.190)

ltotcomp                21.155***
                        (4.056)

lenroll                 -1.268*     0.022      -1.255**
                        (0.693)    (0.615)     (0.581)

lexpend                            11.132***   7.746**
                                   (3.297)     (3.041)

lnchprg                                       -0.324***
                                               (0.036)

Constant     2.274   -207.665*** -69.236***  -23.138
            (6.114)   (48.703)   (26.719)    (24.993)

-----------------------------------------------------------
Observations 408        408        408         408
R2           0.054      0.065      0.030       0.189
Adjusted R2  0.047      0.058      0.025       0.183
===========================================================
Note:                        *p<0.1; **p<0.05; ***p<0.01
```

a. Consider the linear functional form (i.e., column 1). Test the hypothesis that higher enrollment leads to a lower percentage of students with a passing tenth-grade math score.

b. Consider the linear-log model (i.e., column 2). Does your previous conclusion regarding enrollment (from(a)) change? Why? Interpret the coefficient.

c. Which one of the two specifications (level-level and level-log) do you prefer and why?

d. Columns 3 and 4 contain OLS estimates of the effect of per student spending on math performance, with and without lnchprg (a proxy variable for poverty). Explain why the effect of expenditures on math10 is lower in column 4 than column 3. Justify your answer. *Hint: lnchprg is part of the error term in column 3.*

e. Looking at column 4, does it appear that pass rates are lower at larger schools, other factors being equal? Explain.

f. Interpret the coefficient on lnchprg in column 4. Is it statistically significant?

g. What do you make of the substantial increase in Adjusted-R^2 from column 3 to column 4? Interpret the value of the Adjusted-R^2 from column 4.

h. Under specific conditions, OLS is BLUE. What does the acronym BLUE stand for, and what does it tell us about OLS as an estimator?

i. What is the definition of a biased estimator?

(over)