

FINANCIAL ECONOMETRICS
SHANGAI JIAO TONG UNIVERSITY SUMMER
SCHOOL 2025-2026
PROBLEM SET - LECTURE 6

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Reference: Stock, J.H. and Watson, M.W., Introduction to Econometrics (4th Edition, Global Edition)

Chapter 10: Regression with Panel Data

Question 1. This exercise refers to the drunk driving panel data regression summarized in Table 10.1 of the textbook.

- (a) New Jersey has a population of 8.85 million people. Suppose New Jersey increased the tax on a case of beer by \$2 (in 1988 dollars). Use the results in column (5) to predict the number of lives that would be saved over the next year. Construct a 99% confidence interval for your answer.
- (b) The drinking age in New Jersey is 21. Suppose that New Jersey lowered its drinking age to 19. Use the results in column (5) to predict the change in the number of traffic fatalities in the next year. Construct a 95% confidence interval for your answer.
- (c) Suppose real income per capita in New Jersey increases by 3% in the next year. Use the results in column (6) to predict the change in the number of traffic fatalities in the next year. Construct a 95% confidence interval for your answer.
- (d) How should standard errors be clustered in the regressions in columns (2) through (7)?

- (e) How should minimum drinking age be included in the regressions? Should it enter as a continuous variable or as a series of indicator variables?

Question 2. Consider the binary variable version of the fixed effects model in Equation (10.11) except with an additional regressor, D_{1i} ; that is, let:

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \gamma_1 D_{1i} + \gamma_2 D_{2i} + \cdots + \gamma_n D_{ni} + u_{it}$$

- (a) Suppose that $n = 3$. Show that the binary regressors and the “constant” regressor are perfectly multicollinear; that is, express one of the variables D_{1i} , D_{2i} , D_{3i} , and $X_{0,it}$ as a perfect linear function of the others, where $X_{0,it} = 1$ for all i, t .
- (b) Show the result in (a) for general n .
- (c) What will happen if you try to estimate the coefficients of the regression by OLS?