**15.17**

a) Answer

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The 95% interval estimate of the coefficient of INCOMED is [-0.0284146, 0.0879082]. The

interval covers zero; we have no evidence against the hypothesis that income does not affect

liquor expenditures

b) Answer

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The 95% interval estimate for the coefficient of INCOME is [0.01283, 0.04032]. We estimate with 95% confidence that for each additional $1000 income the household will spend between $12.83 and $40.32 more on liquor. The random effects coefficient estimate is slightly smaller than the difference estimator coefficient, but the standard error of the random effects estimator is about 25% of the standard error of the difference estimator’s standard error, yielding a statistical significance.

c) Answer

R software report LM^2 = 20.68 > Chi square (0.95,1) = 3.841

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We reject the null hypothesis that sigma^2*u* = 0 and accept the alternative that sigma^2*u* > 0, indicating that there is statistically significant unobserved heterogeneity.

d) Answer

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P-value of incomem = 0.767 with t-value = 0.3. There is no evidence for correlation between income and the unobserved heterogeneity based on this Mundlak test. Based on these results the random effects estimator is preferred.

**15.20**

a) Answer - OLS

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Do students perform better in reading when they are in small classes? -> Yes

Does a teacher’s aide improve scores? -> No, coefficient is insignificant

Do the students of more experienced teachers score higher on reading tests? -> Yes

Does the student’s sex or race make a difference -> Yes, male is lower score

b) Answer - FE

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The effect of being in a small class is estimated to increase average reading score by 6.49 points, which is slightly larger than the OLS estimate.

The estimated effect of teaching experience on average reading score falls to 0.29 points per additional year of experience.

The estimated difference between boys and girls average reading scores is slightly smaller than the OLS estimates.

The estimated difference in average reading scores between white or Asian students and black students roughly doubles to 8 points

c) Answer

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Test for the significance of the school fixed effects.

Under what conditions would we expect the inclusion of significant fixed effects to have little influence on the coefficient estimates of the remaining variables

d) Answer - RE

Test for the significance of the school random effects.

Under what conditions would we expect the inclusion of significant random effects to have little influence on the coefficient estimates of the remaining variables

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e) Answer

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P-vale < 5% we reject null hypothesis, we should use fixed effect

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For the variable BOY, the same approach was applied, but its t-value does not reject the null hypothesis, indicating no difference between the effects, and the random effects model is valid

f) Answer

Test that average variables are jointly different from 0 at 5% level. This suggests that the explanatory variables (x1, x2) are correlated with the unobserved heterogeneity.

In this case, the fixed effects model is more appropriate

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