

# C15Q06

(f)

t(EXPER)	t(EXPER2)	t(SOUTH)	t(UNION)	critical value
-1.670953	1.296362	-0.7680271	-1.06118	± 2.776445

EXPER show the most difference from the fixed effects.

There is no significant differences between the random effects estimates and the fixed effects estimates.

Random effects estimation is appropriate.

# C15Q20

(d)

	Estimate	Std. Error	z-value	Pr(> z )
(Intercept)	436.1267737	2.06478223	211.221681	0.000000e+00
small	6.4587216	0.91254764	7.077682	1.465861e-12
aide	0.9921460	0.88115884	1.125956	2.601842e-01
tchexper	0.3026787	0.07029195	4.306023	1.662160e-05
boy	-5.5120812	0.72763883	-7.575298	3.583032e-14
white_asian	7.3504772	1.43137578	5.135253	2.817642e-07
freelunch	-14.5843317	0.87467623	-16.673977	2.026499e-62

Lagrange Multiplier Test - (Honda)

data: readscore ~ small + aide + tchexper + boy + white\_asian + freelunch  
normal = 81.715, p-value < 2.2e-16  
alternative hypothesis: significant effects

Reject H0, it suggests that random effects exist.

# C15Q20

(e)

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t value of b 2 : 1.146008
t value of b 3 : 0.128438
t value of b 4 : -1.937717
t value of b 5 : se(bFE)^2 - se(bRE)^2 = -7.197593e-05 → cannot be square-rooted
t value of b 6 : 1.218074
t value of b 7 : -0.09555102
critical value  : ± 2.446912
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There is no significant differences between the random effects estimates and the fixed effects estimates.  
Random effects estimation is appropriate.

# C15Q20

(f)

Coefficients:

	Estimate	Std. Error	z-value	Pr(> z )	
(Intercept)	459.462989	20.529888	22.3802	< 2.2e-16	***
small	6.637460	0.922068	7.1985	6.090e-13	***
aide	1.157620	0.889542	1.3014	0.1931	
tchexper	0.289286	0.071754	4.0316	5.539e-05	***
boy	-5.386109	0.735063	-7.3274	2.346e-13	***
white_asian	8.081423	1.550155	5.2133	1.855e-07	***
freelunch	-14.699025	0.892109	-16.4767	< 2.2e-16	***
small_avg	-18.410060	22.273923	-0.8265	0.4085	
aide_avg	16.811358	20.793685	0.8085	0.4188	
tchexper_avg	1.006007	0.625690	1.6078	0.1079	
boy_avg	-53.353521	25.221654	-2.1154	0.0344	*
white_asian_avg	-6.648191	6.320012	-1.0519	0.2928	
freelunch_avg	-3.318853	8.779553	-0.3780	0.7054	

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Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

The coefficient of BOY is statistically significant, it suggests that endogeneity exists.

# C15Q17

(b)

	Estimate	Std. Error	z-value	Pr(> z )
(Intercept)	0.96903238	0.521005199	1.859928	0.0628956525
income	0.02657547	0.007012557	3.789697	0.0001508309

	2.5 %	97.5 %
(Intercept)	-0.05211904	1.99018381
income	0.01283111	0.04031983

The interval is narrower than the one in part (a).

(c)

Lagrange Multiplier Test - (Honda)

data: liquor ~ income  
normal = 4.5475, p-value = 2.714e-06  
alternative hypothesis: significant effects

Reject  $H_0$ , it suggests that random effects exist.

# C15Q17

(d)

Coefficients:

	Estimate	Std. Error	z-value	Pr(> z )
(Intercept)	0.9163337	0.5524439	1.6587	0.09718
income	0.0207421	0.0209083	0.9921	0.32117
INCOMEM	0.0065792	0.0222048	0.2963	0.76700

Fail to reject  $H_0$ ,  $\gamma$  should be zero. It suggests that the random effect and INCOME are uncorrelated.

It is appropriate to use the random effects estimator for the model.