15.6b

Rich clients are now estimated to pay 11.6% extra instead of 8.3%.

The premium for not using a condom has declined slightly to 13.9%

There have been large changes in the coefficients of BAR and STREET. The random effects specification suggests that transactions originating in a bar are much more expensive than those originating on the street, whereas the reverse was true with the fixed effects specification

the extra pecentage premium for having unprotected sex with an attractive secondary-educated sex worker is:

100% \* (0.13898\*0.27683 \*0.21615) = **63.2 %**.

Code&output:

re1<-lm(lnprice~regular+rich+alcohol+nocondom+bar+street+age+attractive+school,

data=mexican, model='random',effect= 'individual')

summary(re1)

Coefficients:

Estimate Std. Error z-value Pr(>|z|)

(Intercept) 5.9103651 0.1303194 45.3529 < 2.2e-16 \*\*\*

regular 0.0236290 0.0161849 1.4599 0.1443

rich 0.1160067 0.0200346 5.7903 7.026e-09 \*\*\*

alcohol 0.0148896 0.0249556 0.5966 0.5507

nocondom 0.1389842 0.0250266 5.5535 2.801e-08 \*\*\*

bar 0.4642454 0.0998912 4.6475 3.360e-06 \*\*\*

street 0.1032864 0.1010769 1.0219 0.3068

age -0.0257651 0.0027534 -9.3574 < 2.2e-16 \*\*\*

attractive 0.2768274 0.0602379 4.5956 4.316e-06 \*\*\*

school 0.2161494 0.0453396 4.7673 1.867e-06 \*\*\*

15.6c

At a 5% level of significance, there is a significant difference between all coefficients except those for BAR. Thus, we **reject** a null hypothesis that the individual random effects are uncorrelated with the variables in the model. The f**ixed effects estimates are more reliable** in this instance because they are consistent

Code&output:

fenzi=fe1$coefficients[1:6]-re1$coefficients[2:7]

fenmu=sqrt((summary(fe1)$coefficients[1:6,2])^2-

(summary(re1)$coefficients[2:7,2])^2) #varfe-varre

pvalue=fenzi/fenmu

tvalue

regular rich alcohol nocondom bar street

2.901158 -7.456543 -9.224936 4.936616 -1.842273 4.265652

15.6d

The results are very similar to those obtained in part (b).

The extra pecentage premium for having unprotected sex with an attractive secondary-educated sex worker is :

100% \*(0.16099 \*0.28352 \*0.22563)= **67.0 %.**

Code&ouput:

ht <- pht(lnprice~regular+rich+alcohol+nocondom+bar+street+age+attractive+school

|regular+rich+alcohol+bar+street+age+attractive+school,

data=mexican, model = "ht")

summary(ht)

Coefficients:

Estimate Std. Error z-value Pr(>|z|)

(Intercept) 5.9314486 0.1389402 42.6907 < 2.2e-16 \*\*\*

regular 0.0264043 0.0158524 1.6656 0.09579 .

rich 0.1090938 0.0195425 5.5824 2.372e-08 \*\*\*

alcohol 0.0031476 0.0244249 0.1289 0.89746

nocondom 0.1609862 0.0253682 6.3460 2.210e-10 \*\*\*

bar 0.4650957 0.1026272 4.5319 5.846e-06 \*\*\*

street 0.1561887 0.1034276 1.5101 0.13101

age -0.0265995 0.0030863 -8.6186 < 2.2e-16 \*\*\*

attractive 0.2835196 0.0676972 4.1881 2.814e-05 \*\*\*

school 0.2256279 0.0509127 4.4317 9.351e-06 \*\*\*

15.12a

When EXPER=5,

15.2b

95%C.I. of 7.482= (6.94, 8.02)

95%C.I. of 5.08241.960.4887=(4.12, 6.04)

data("nls\_panel")

poo=plm(lwage~educ+exper+I(exper^2)+hours+black,data=nls\_panel

,model='pooling',effect='individual')

summary(poo)

Coefficients:

Estimate Std. Error t-value Pr(>|t|)

(Intercept) 0.45094015 0.06169116 7.3096 3.288e-13 \*\*\*

educ 0.07482099 0.00276462 27.0638 < 2.2e-16 \*\*\*

exper 0.06311354 0.00798898 7.9001 3.680e-15 \*\*\*

I(exper^2) -0.00122909 0.00032268 -3.8090 0.0001419 \*\*\*

hours -0.00084252 0.00083970 -1.0034 0.3157555

black -0.13471501 0.01492152 -9.0282 < 2.2e-16 \*\*\*

15.12c

95%C.I. of 7.482= (6.94, 8.02)

95%C.I. of 5.08241.960.610 =(4.12, 6.04)

library(lmtest)

library(multiwayvcov)

coeftest(poo, vcov=vcovHC(poo, type="sss", cluster="group"))

t test of coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 0.45094015 0.10303451 4.3766 1.240e-05 \*\*\*

educ 0.07482099 0.00552586 13.5402 < 2.2e-16 \*\*\*

exper 0.06311354 0.00995283 6.3413 2.564e-10 \*\*\*

I(exper^2) -0.00122909 0.00041150 -2.9868 0.002838 \*\*

hours -0.00084252 0.00192521 -0.4376 0.661686

black -0.13471501 0.02896789 -4.6505 3.431e-06 \*\*\*

15.12d

HOUR is now with bigger coefficient and is significant

re12d<-plm(lwage~educ+exper+I(exper^2)+hours+black,

data=nls\_panel, model='random',effect= 'individual')

summary(re12d)

Coefficients:

Estimate Std. Error z-value Pr(>|z|)

(Intercept) 0.62940547 0.08325359 7.5601 4.028e-14 \*\*\*

educ 0.07686678 0.00549641 13.9849 < 2.2e-16 \*\*\*

exper 0.05908203 0.00556089 10.6246 < 2.2e-16 \*\*\*

I(exper^2) -0.00114023 0.00021941 -5.1967 2.028e-07 \*\*\*

hours -0.00539038 0.00069502 -7.7557 8.786e-15 \*\*\*

black -0.12709685 0.02981791 -4.2624 2.022e-05 \*\*\*

15.12e

Those with higher ability and greater motivation are likely to have more years of education and to work longer hours So **EDUC and HOURS** might be correlated with the individual effects

We conclude therefore that the random effects estimates and the fixed effects estimates are significantly different hence **there is correlation** between the E1i and the variables in the model.

Code&Output:

fe12e<-plm(lwage~educ+exper+I(exper^2)+hours+black,

data=nls\_panel, model='within',effect= 'individual')

fenzi=fe12e$coefficients[1:3]-re12d$coefficients[3:5]

fenzi

fenmu=sqrt((summary(fe12e)$coefficients[1:3,2])^2-

(summary(re12d)$coefficients[3:5,2])^2) #varfe-varre

tvalue=fenzi/fenmu

tvalue

> tvalue

exper I(exper^2) hours

-0.4705663 0.2227904 -3.7853927

phtest(fe12e,re12d)

Hausman Test

data: lwage ~ educ + exper + I(exper^2) + hours + black

chisq = 15.804, df = 3, p-value = 0.001244

alternative hypothesis: one model is inconsistent

15.12f

To accommodate the fact that EDUC and HOURS are correlated with the random effects, we use the Hausman-Taylor estimator. We find that the estimated return to education has increased dramatically, but so has its standard error. The coefficient of BLACK has gone down (in absolute value), but its standard error has also increased. Other coefficient estimates and their standard errors are similar in magnitude.

95%C.I. of 11.0916= (2.83, 19.35)

95%C.I. of 4.72311.960.3595 =(4.02, 5.43)

ht <- pht(lwage~educ+exper+I(exper^2)+hours+black

|exper+I(exper^2)+black,

data=nls\_panel, model = "ht")

summary(ht)

Coefficients:

Estimate Std. Error z-value Pr(>|z|)

(Intercept) 0.21529566 0.55360758 0.3889 0.697353

educ 0.11091565 0.04216068 2.6308 0.008519 \*\*

exper 0.05832614 0.00573212 10.1753 < 2.2e-16 \*\*\*

I(exper^2) -0.00110952 0.00022447 -4.9428 7.7e-07 \*\*\*

hours -0.00631814 0.00073649 -8.5788 < 2.2e-16 \*\*\*

black -0.09099885 0.05288576 -1.7207 0.085311 .

---

15.13a

Fixed effects estimates for the slope coefficients are 0.11013 and 0.31003. The error variance estimate is 2530.042

15.13b

INV

Coefficients:

(Intercept) firm.f2 firm.f3 firm.f4 firm.f5 firm.f6

608.0 -197.5 -505.7 -521.9 -546.2 -552.6

firm.f7 firm.f8 firm.f9 firm.f10 firm.f11

-560.4 -565.1 -566.1 -604.9 -601.2 V

Coefficients:

(Intercept) firm.f2 firm.f3 firm.f4 firm.f5 firm.f6

4334 -2362 -2393 -3641 -4102 -3914

firm.f7 firm.f8 firm.f9 firm.f10 firm.f11

-4184 -3663 -4000 -4263 -4276

K

Coefficients:

(Intercept) firm.f2 firm.f3 firm.f4 firm.f5 firm.f6

648.4 -353.6 -248.3 -527.2 -161.7 -544.2

firm.f7 firm.f8 firm.f9 firm.f10 firm.f11

-333.5 -562.8 -350.5 -642.5 -580.4

15.13c

lm(inv~v+k,data=grunfeld11)

Coefficients:

(Intercept) v k

-38.4101 0.1145 0.2275

15.13d