15.6A

(i)  
Sex worker characteristics are omitted because they all the same in 4 transection (time invariant). The effect cannot be separated from the individual effects given by the coefficients of the fixed-effects dummy variables.

Code:

library(dplyr)

library(tidyverse)

library(magrittr)

library(plm)

Output:

fe1<-plm(lnprice~+regular+rich+alcohol+nocondom+bar+street,

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

summary(fe1)

Coefficients:

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

regular 0.037219 0.016849 2.2090 0.0272770 \*

rich 0.082636 0.020528 4.0254 5.875e-05 \*\*\*

alcohol -0.056856 0.026139 -2.1751 0.0297261 \*

nocondom 0.170282 0.025817 6.5957 5.256e-11 \*\*\*

bar 0.298455 0.134450 2.2198 0.0265299 \*

street 0.455159 0.130465 3.4887 0.0004946 \*\*\*

(ii)

All coefficient estimates are significant

(iii)

Risk premium estimated = 0.170282

The price is 3.7% higher for regular customers and 8.3% higher for rich customers. It is 5.7% lower for drunk customers. Transection at bar are 29.8% higher than in other place. Transection on streets are 45.5% higher than in other place.

15.8

(a)

The coefficient estimates for the two years and their standard errors are very similar. the coefficients have no substantial changes with time i. For these individual year estimations, we are assuming that all individuals have the same regression parameter values. The model can’t explain the different result from individual heterogeneity

code:

a=nls\_panel2[1:716,c(2,3,15,16,12,14)]

lm1=lm(lwage~exper+I(exper^2)+south+union,data=a)

summary(lm1)

b=nls\_panel2[717:1432,c(2,3,15,16,12,14)]

lm2=lm(lwage~exper+I(exper^2)+south+union,data=b)

summary(lm2)

output:

Coefficients(year1987)

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

(Intercept) 0.899282 0.240720 3.736 0.000202 \*\*\*

exper 0.126541 0.032324 3.915 9.92e-05 \*\*\*

I(exper^2) -0.003089 0.001069 -2.891 0.003957 \*\*

south -0.238422 0.034386 -6.934 9.22e-12 \*\*\*

union 0.110209 0.038738 2.845 0.004569 \*\*

Coefficients (year1988)

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

(Intercept) 0.934811 0.200990 4.651 3.94e-06 \*\*\*

exper 0.127022 0.029501 4.306 1.90e-05 \*\*\*

I(exper^2) -0.003288 0.001067 -3.083 0.002130 \*\*

south -0.212794 0.033804 -6.295 5.38e-10 \*\*\*

union 0.144536 0.038227 3.781 0.000169 \*\*\*

(b)

Assuming that all women have identical coefficients (no individual heterogeneity) and the coefficients are the same in each year. We are also assuming the variance of the error term is the same for all individuals and in both years.

Code:

poo=plm(lwage~exper+I(exper^2)+south+union,data=nls\_panel2

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

summary(poo)

Output:

Coefficients:

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

(Intercept) 0.9481779 0.1506222 6.2951 4.080e-10 \*\*\*

exper 0.1228849 0.0211092 5.8214 7.197e-09 \*\*\*

I(exper^2) -0.0030662 0.0007279 -4.2123 2.686e-05 \*\*\*

south -0.2255408 0.0240803 -9.3662 < 2.2e-16 \*\*\*

union 0.1273629 0.0271754 4.6867 3.042e-06 \*\*\*Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Total Sum of Squares: 333.49

Residual Sum of Squares: 285.53

R-Squared: 0.14383

Adj. R-Squared: 0.14143

F-statistic: 59.9293 on 4 and 1427 DF, p-value: < 2.22e-16

(c)

Fix effect model account for **different between individual,** the model have intercept for all i respectively, least square and pooled model do not have individual intercept.

Fix model assume that the **variance of the error term is all the same over time**. Least square do not have such assumption.

(d)

F=[(285.528-22.439)/715]/[22.439/(1432-716-4)]=11.675>1.31(F critical value for alpha=0.05 and d.f.=715 & 712), intercepts for all women in the sample are not all equal.  
SSE(R) is derive from pooled model in (b)

F test conclude that **there are differences in individual intercepts**, and that the data **should not be pooled** into a single model with a common intercept parameter.

Code:

library(lmtest)

library(multiwayvcov)

fe=plm(lwage~exper+I(exper^2)+south+union,data=nls\_panel2

,model='within',effect='individual')

summary(fe)

Output:

Coefficients:

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

exper 0.0574575 0.0329942 1.7414 0.082038 .

I(exper^2) -0.0012344 0.0011023 -1.1199 0.263150

south -0.3260523 0.1257964 -2.5919 0.009740 \*\*

union 0.0821949 0.0312071 2.6339 0.008626 \*\*

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

Total Sum of Squares: 23.241

Residual Sum of Squares: 22.439

R-Squared: 0.034495

Adj. R-Squared: -0.9405

F-statistic: 6.35956 on 4 and 712 DF, p-value: 4.9631e-05

(e)

Without cluster-robust standard errors we are assuming that the error variance is the same for all individuals and in both years, and that there is no correlation between errors in the different years for the same individual. Using cluster-robust standard errors allows for the variances to be different for different individuals in both 1987 and 1988, and it permits correlation between errors in 1987 and 1988 for the same individual.

Code:

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

output:

t test of coefficients:

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

exper 0.0574575 0.0327663 1.7536 0.07994 .

I(exper^2) -0.0012344 0.0010957 -1.1266 0.26030

south -0.3260523 0.2494494 -1.3071 0.19160

union 0.0821949 0.0366612 2.2420 0.02527 \*

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