Q15.6

(a)

當T=1987、T=1988時，

point estimates 和 standard errors 都差不多，但是如果允許估是有隱含時間效果是同質的，是否同質應用F檢定進行檢驗

(b) a是1987和1988的橫斷面迴歸，而panel data regression (b)考慮了個体效果，也就是heterogeneity.

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(c) 觀察到 South 這個變數的顯著性差很多，顯現有很大未觀察到的 heterogeneity across $n=716$ individuals.

(d) $F = 11.68 > 1.19$

$\Rightarrow F_{0.01}(716-1, 716\times 2-716-4)$

Reject H_0, 代表 FE 存在.

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Q15.6 (e)

Cluster Robust SE. is larger because it controlled for heteroskadasticity and autocorrelation within a cluster, and thus more conservative.

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15.20.(a)

除了aide這個變數之外

其他變數在我們

用pooled ols後，

對學生閱讀能力

有顯著影響。

```
Call:
lm(formula = readscore ~ small + aide + tchexper + boy +
white_asian +
    freelunch, data = data)

Residuals:
     Min       1Q   Median       3Q      Max
-107.220  -20.214   -3.935   14.339  185.956

Coefficients:
             Estimate Std. Error t value Pr(>|t|)
(Intercept) 437.76425    1.34622 325.180  < 2e-16
small         5.82282    0.98933   5.886 4.19e-09
aide          0.81784    0.95299   0.858    0.391
tchexper      0.49247    0.06956   7.080 1.61e-12
boy          -6.15642    0.79613  -7.733 1.23e-14
white_asian   3.90581    0.95361   4.096 4.26e-05
freelunch   -14.77134    0.89025 -16.592  < 2e-16

(Intercept) ***
small       ***
aide
tchexper    ***
boy         ***
white_asian ***
freelunch   ***
---
Signif. codes:
0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

(b)

控制住

school fixed effect

對係數的顯

著性來得更高。

```
Call:
plm(formula = readscore ~ small + aide + tchexper + b
oy + white_asian +
    freelunch, data = pdata, method = "within")

Unbalanced Panel: n = 79, T = 34-137, N = 5766

Residuals:
     Min.   1st Qu.    Median   3rd Qu.      Max.
-102.6381  -16.7834   -2.8473   12.7591  198.4169

Coefficients:
             Estimate Std. Error  t-value
small        6.490231   0.912962   7.1090
aide         0.996087   0.881693   1.1297
tchexper     0.285567   0.070845   4.0309
boy         -5.455941   0.727589  -7.4987
white_asian  8.028019   1.535656   5.2277
freelunch  -14.593572   0.880006 -16.5835
              Pr(>|t|)
small       1.313e-12 ***
aide           0.2586
tchexper    5.629e-05 ***
boy         7.440e-14 ***
white_asian 1.777e-07 ***
freelunch   < 2.2e-16 ***
---
Signif. codes:
0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

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(c) 使用部份F-Test

```
> pFtest(modfe, modpooled)

        F test for individual effects

data:  readscore ~ small + aide + tchexper + boy + wh
ite_asian + freelunch
F = 16.698, df1 = 78, df2 = 5681, p-value <
2.2e-16
alternative hypothesis: significant effects
```

reject the Ho

支持 there exist a school fixed effect.

Q15.17 (a)

$\beta_{liquor} = -1.7638$

$\beta_{Income} = 3.196$

```
Call:
lm(formula = hh ~ 0 + liquor + income, data = liquor)

Residuals:
    Min      1Q  Median      3Q     Max
-20.264  -8.597   4.639  14.819  32.323

Coefficients:
        Estimate Std. Error t value Pr(>|t|)
liquor  -1.7638     1.8379  -0.960    0.343
income   3.1960     0.4637   6.893 3.43e-08 ***
---
Signif. codes:
0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Residual standard error: 16.08 on 38 degrees of freed
om
Multiple R-squared:  0.5564,    Adjusted R-squared:
0.5331
F-statistic: 23.83 on 2 and 38 DF,  p-value: 1.959e-0
```

95% C.I. for $\beta_{liquor} = [-1.8798, -1.6478]$

```
> conf
                47.5 %     52.5 %
liquor  -1.879792 -1.647769
income   3.166770  3.225304
```

95% C.I. for $\beta_{Income} = [3.1668, 3.2253]$ #

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