```
 1 . use "/Users/imisiaiyetan/Documents/jtrain1(1).dta", clear

 2 . do "/Users/imisiaiyetan/Documents/HW_5_2.do"

 3 . * Problem 2
 4 .
 5 . * 2a(i)
 6 . use "/Users/imisiaiyetan/Documents/jtrain1(1).dta"

 7 .
 8 . * 2a(i): Constructing the 4 means
 9 .
10 . save train.dta, replace
   (note: file train.dta not found)
   file train.dta saved

11 .
12 . drop if missing(hrsemp)
   (81 observations deleted)

13 .
14 . drop if year ==1989
   (134 observations deleted)

15 .
16 . save train2.dta, replace
   (note: file train2.dta not found)
   file train2.dta saved

17 .
18 . egen E = max(grant), by(fcode)

19 .
20 . mean (hrsemp) if year==1987 & E==0

   Mean estimation                    Number of obs    =      98
```

	Mean	Std. Err.	[95% Conf. Interval]	
hrsemp	9.296744	1.663396	5.995363	12.59813

```
21 . mean (hrsemp) if year==1988 & E==0

   Mean estimation                    Number of obs    =      96
```

	Mean	Std. Err.	[95% Conf. Interval]	
hrsemp	9.671083	1.855213	5.98802	13.35415

```
22 . mean (hrsemp) if year==1987 & E==1
```

Mean estimation   Number of obs   =   31

	Mean	Std. Err.	[95% Conf. Interval]	
hrsemp	7.591087	3.650933	.1348872	15.04729

23 . mean (hrsemp) if year==1988 & E==1

Mean estimation   Number of obs   =   31

	Mean	Std. Err.	[95% Conf. Interval]	
hrsemp	35.97834	6.637497	22.42276	49.53392

24 .
25 . ttest hrsemp, by(E)

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
0	194	9.481984	1.241371	17.2903	7.033589	11.93038
1	62	21.78471	4.172989	32.85815	13.44031	30.12912
combined	256	12.46155	1.414802	22.63684	9.675366	15.24774
diff		-12.30273	3.217664		-18.63943	-5.966032

diff = mean(0) – mean(1)   t =   -3.8235
Ho: diff = 0   degrees of freedom =   254

   Ha: diff < 0   Ha: diff != 0   Ha: diff > 0
 Pr(T < t) = 0.0001   Pr(|T| > |t|) = 0.0002   Pr(T > t) = 0.9999

26 .
27 . ttest hrsemp if year==1987, by(E)

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
0	98	9.296744	1.663396	16.46678	5.995363	12.59813
1	31	7.591087	3.650933	20.32753	.1348872	15.04729
combined	129	8.886858	1.532252	17.40304	5.855035	11.91868
diff		1.705658	3.597038		-5.412231	8.823546

diff = mean(0) – mean(1)   t =   0.4742

```
    Ho: diff = 0                                          degrees of freedom =        127

      Ha: diff < 0                    Ha: diff != 0                       Ha: diff > 0
  Pr(T < t) = 0.6819          Pr(|T| > |t|) = 0.6362              Pr(T > t) = 0.3181
```

28 . ttest hrsemp if year==1988, by(E)

Two-sample t test with equal variances

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf. Interval]	
0	96	9.671083	1.855213	18.1773	5.98802	13.35415
1	31	35.97834	6.637497	36.95602	22.42276	49.53392
combined	127	16.09254	2.352765	26.51432	11.43649	20.74859
diff		-26.30726	4.970328		-36.14415	-16.47036

```
      diff = mean(0) - mean(1)                                        t =  -5.2929
    Ho: diff = 0                                          degrees of freedom =        125

      Ha: diff < 0                    Ha: diff != 0                       Ha: diff > 0
  Pr(T < t) = 0.0000          Pr(|T| > |t|) = 0.0000              Pr(T > t) = 1.0000
```

29 .
30 . * 2a(ii): Estimating the regression model
31 .
32 . reg hrsemp grant d88 E

Source	SS	df	MS		Number of obs =	256
					F(3, 252) =	14.83
Model	19608.6794	3	6536.22646		Prob > F =	0.0000
Residual	111060.074	252	440.714578		R-squared =	0.1501
					Adj R-squared =	0.1399
Total	130668.753	255	512.426483		Root MSE =	20.993

hrsemp	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
grant	28.01292	6.125444	4.57	0.000	15.94933	40.0765
d88	.374339	3.014608	0.12	0.901	-5.562698	6.311376
E	-1.705658	4.325932	-0.39	0.694	-10.22524	6.813929
_cons	9.296744	2.120634	4.38	0.000	5.120321	13.47317

33 .
34 . * 2a(iii): Estimating the fixed effect model
35 .
36 . xtset fcode year
```
        panel variable:  fcode (unbalanced)
         time variable:  year, 1987 to 1988
                 delta:  1 unit
```

37 .

```
38 . xtreg hrsemp grant d88, fe
```

Fixed-effects (within) regression   Number of obs   =   256
Group variable: **fcode**   Number of groups =   131

R-sq: within = **0.4711**   Obs per group: min =   1
        between = **0.0692**   avg =   2.0
        overall = **0.1495**   max =   2

                                           F(**2,123**)   =   54.77
corr(u_i, Xb)   = **-0.0235**   Prob > F   =   0.0000

hrsemp	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
grant	**27.87793**	**3.129216**	**8.91**	**0.000**	**21.68384**	**34.07202**
d88	**.5093233**	**1.558337**	**0.33**	**0.744**	**-2.57531**	**3.593956**
_cons	**8.833036**	**.9462108**	**9.34**	**0.000**	**6.96007**	**10.706**

sigma_u	**19.405599**					
sigma_e	**10.683421**					
rho	**.76740875**	(fraction of variance due to u_i)				

F test that all u_i=0:   F(**130, 123**) =   6.55   Prob > F = **0.0000**

```
39 .
40 . save train2.dta, replace
   file train2.dta saved

41 .
42 . * 2b(i) Estimating the fixed effect regression by adding trend in the data
43 .
44 . use train.dta

45 .
46 . egen E = max(grant), by(fcode)

47 .
48 . bys fcode: gen t = _n

49 .
50 . reg hrsemp grant d88 E t
```

Source	SS	df	MS		Number of obs =	390
					F(4, 385) =	27.18
Model	**56628.284**	4	**14157.071**		Prob > F =	0.0000
Residual	**200515.167**	385	**520.818616**		R-squared =	0.2202
					Adj R-squared =	0.2121
Total	**257143.451**	389	**661.03715**		Root MSE =	22.821

hrsemp	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
grant	**34.22998**	**3.834755**	**8.93**	**0.000**	**26.69029**	**41.76966**

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d88	-3.044337	2.527766	-1.20	0.229	-8.01429	1.925616
E	-2.505719	2.625999	-0.95	0.341	-7.668812	2.657374
t	1.835022	1.466683	1.25	0.212	-1.048689	4.718733
_cons	8.275559	3.52381	2.35	0.019	1.347237	15.20388

```
51 .
52 . xtset fcode year
         panel variable:  fcode (strongly balanced)
          time variable:  year, 1987 to 1989
                  delta:  1 unit

53 .
54 . xtreg hrsemp grant d88, fe
```

Fixed-effects (within) regression   Number of obs   =   390
Group variable: **fcode**   Number of groups   =   135

R-sq: within = **0.4802**   Obs per group: min =   1
       between = **0.0508**   avg =   2.9
       overall = **0.2144**   max =   3

                                                 F(2,253)   =   116.88
corr(u_i, Xb) = **-0.0348**   Prob > F   =   0.0000

hrsemp	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
grant	35.61143	2.333138	15.26	0.000	31.01658	40.20627
d88	-3.405845	1.594963	-2.14	0.034	-6.546941	-.2647483
_cons	10.68925	.9218616	11.60	0.000	8.873751	12.50475

sigma_u	19.46244	
sigma_e	14.345905	
rho	.64795079	(fraction of variance due to u_i)

F test that all u_i=0:   F(134, 253) =   5.44   Prob > F = 0.0000

```
55 .
56 . * 2b(ii) Estimating regression model based on the residuals from firm specific
57 . * regression with trend.
58 .
59 . drop if missing(hrsemp)
   (81 observations deleted)

60 .
61 . xtreg hrsemp t, fe
```

Fixed-effects (within) regression   Number of obs   =   390
Group variable: **fcode**   Number of groups   =   135

R-sq: within = **0.0872**   Obs per group: min =   1
       between = **0.0117**   avg =   2.9
       overall = **0.0301**   max =   3

| | | F(1,254) | | = | 24.27 |
| corr(u_i, Xb) = -0.0164 | | | Prob > F | = | 0.0000 |

hrsemp	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
t	5.825537	1.182386	4.93	0.000	3.497008	8.154066
_cons	3.241778	2.566541	1.26	0.208	-1.812633	8.296189
sigma_u	20.071123					
sigma_e	18.973517					
rho	.52808937	(fraction of variance due to u_i)				

F test that all u_i=0:   F(134, 254) =   3.27   Prob > F = 0.0000

```
62 .
63 . predict hrsemp_res
   (option xb assumed; fitted values)

64 .
65 . drop if missing(grant)
   (0 observations deleted)

66 .
67 . xtreg grant t, fe
```

Fixed-effects (within) regression   Number of obs   =   390
Group variable: **fcode**   Number of groups =   135

R-sq: within = 0.0774   Obs per group: min =   1
       between = 0.0253   avg =   2.9
       overall = 0.0564   max =   3

| | | F(1,254) | | = | 21.31 |
| corr(u_i, Xb) = -0.0251 | | | Prob > F | = | 0.0000 |

grant	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]
t	.1087379	.0235548	4.62	0.000	.0623502	.1551255
_cons	-.0675878	.0511292	-1.32	0.187	-.1682789	.0331034
sigma_u	.17032656					
sigma_e	.37797988					
rho	.16878723	(fraction of variance due to u_i)				

F test that all u_i=0:   F(134, 254) =   0.57   Prob > F = 0.9998

```
68 .
69 . predict grant_res
   (option xb assumed; fitted values)

70 .
```

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```
71 . drop if missing(d88)
   (0 observations deleted)

72 .
73 . xtreg d88 t, fe
```

Fixed-effects (within) regression   Number of obs = **390**
Group variable: **fcode**   Number of groups = **135**

R-sq: within = **0.0000**   Obs per group: min =   **1**
  between = **0.3217**   avg = **2.9**
  overall = **0.0001**   max =   **3**

                 $F(1,254)$ =   **0.00**
corr(u_i, Xb) = **0.0568**   Prob > F   = **0.9569**

d88	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
t	-.0019417	.0358725	-0.05	0.957	-.0725872	.0687037
_cons	.3295494	.0778666	4.23	0.000	.1762031	.4828957

sigma_u	.08343789	
sigma_e	.57563965	
rho	.02057762	(fraction of variance due to u_i)

F test that all u_i=0: F(**134, 254**) = **0.03**   Prob > F = **1.0000**

```
74 .
75 . predict d88_res
   (option xb assumed; fitted values)

76 .
77 . drop if missing(E)
   (0 observations deleted)

78 .
79 . xtreg E t, fe
   note: t omitted because of collinearity
```

Fixed-effects (within) regression   Number of obs = **390**
Group variable: **fcode**   Number of groups = **135**

R-sq: within =   .   Obs per group: min =   **1**
  between =   .   avg = **2.9**
  overall =   .   max =   **3**

                 $F(1,254)$ =   .
corr(u_i, Xb) =   .   Prob > F   =   .

E	Coef.	Std. Err.	t	P>|t|	[95% Conf. Interval]	
t	**0**	(omitted)				

```
            _cons        .474359          .         .         .              .               .
        ──────────────────────────────────────────────────────────────────────────────────────
          sigma_u      .50074571
          sigma_e              0
              rho              1     (fraction of variance due to u_i)
        ──────────────────────────────────────────────────────────────────────────────────────
  F test that all u_i=0:       F(134, 254) =          .                 Prob > F =       .

80 .
81 . predict E_res
   (option xb assumed; fitted values)

82 .
83 . reg hrsemp_res grant_res d88_res E_res
   note: d88_res omitted because of collinearity
   note: E_res omitted because of collinearity

        Source  │      SS        df        MS               Number of obs =        390
   ─────────────┼──────────────────────────────            F(  1,   388) =          .
        Model  │  8923.22499       1   8923.22499           Prob > F        =          .
     Residual  │          0      388            0           R-squared       =     1.0000
   ─────────────┼──────────────────────────────            Adj R-squared =     1.0000
        Total  │  8923.22499     389   22.9388817           Root MSE        =          0


    hrsemp_res  │     Coef.   Std. Err.       t     P>|t|      [95% Conf. Interval]
   ─────────────┼────────────────────────────────────────────────────────────────────
     grant_res  │   53.57414          .         .         .              .               .
      d88_res  │          0   (omitted)
        E_res  │          0   (omitted)
        _cons  │   6.862733          .         .         .              .               .
```

84 .
85 .
   end of do-file

86 .

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