Econometrics Assignment 4a

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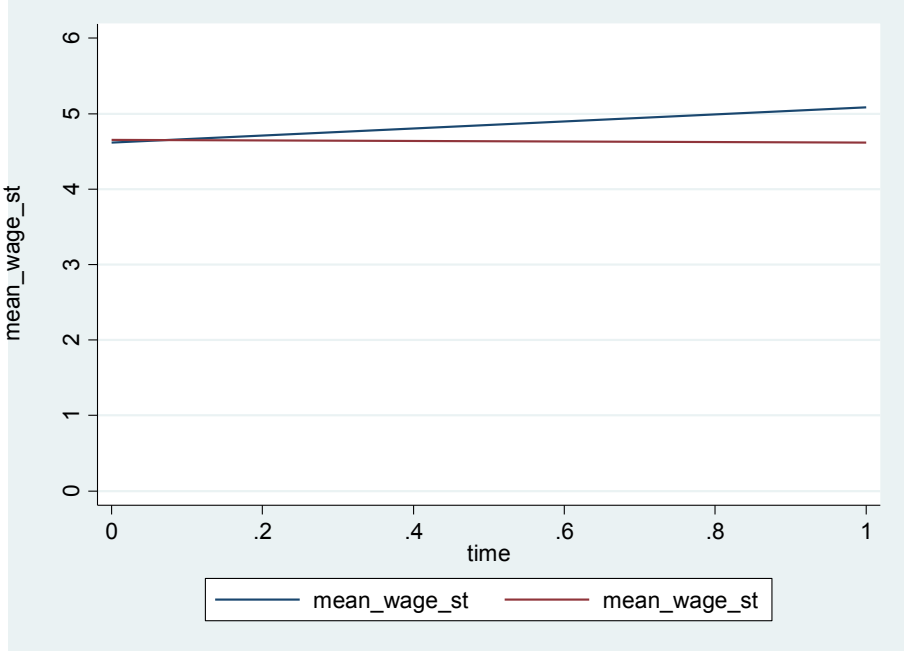
II.

a. The number of restaurants within the relevant sample is 702. The number of restaurants in New Jersey is 662 out of all 820 restaurants, so 80.73% of all restaurants. The number of restaurants in New Jersey within the relevant sample is 570.
b. The minimum number of full time equivalents in fast food restaurants within the relevant sample is 3, the maximum number is 80.
c. The minimum starting wage in restaurants within the relevant sample is 4.25, the maximum is 6.25.

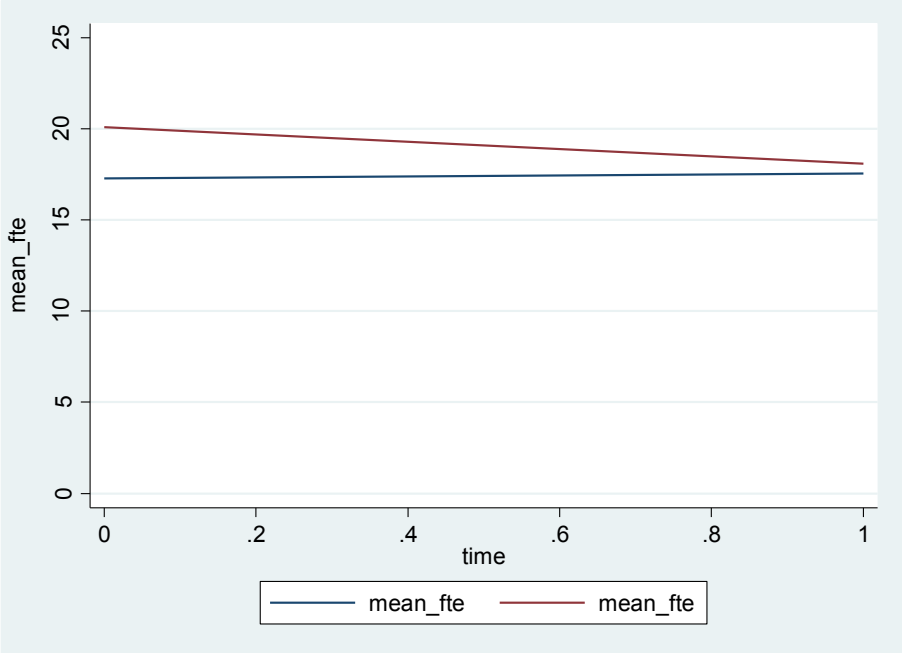
III.

a.

1. Wage changes in New Jersey (blue) and Pennsylvania (red)



2. Employment changes in New Jersey (blue) and Pennsylvania (red)



b. 1. Average starting wages

New Jersey	First wave	**4.6130**
	Second wave	**5.0821**
Pennsylvania	First wave	**4.6536**
	Second wave	**4.6188**

2. Differences between first and second wave

	First wave	*Second wave*	*Difference (Δ)*
New Jersey	4.6130	5.0821	**+ 0.4692**
Pennsylvania	4.6536	4.6188	**- 0.0349**

3. Differences in differences

New Jersey	*Pennsylvania*	*ΔΔ (NJ-PA)*
+ 0.4692	- 0.0349	**+ 0.5041**

4. The difference in difference estimate gives an indication that the policy change (min. wage increase) leads to an increase in the starting wage in New Jersey. Here Pennsylvania is used as a counterfactual to the starting wage in New Jersey, the assumption thereby is that the states have similar trends, such that if the policy was not changed, the change or trend in starting wages in New Jersey would have been similar to the change or trend observed in Pennsylvania. This difference-in-difference would provide a valid estimate in the case that the common trend assumption holds, thus under the condition that wages in New Jersey face the same trend as wages in Pennsylvania. The other two assumptions that need to hold are as follows: 1. the treatment assignment is independent from trend in outcome 2. No other policies besides the minimum wage policies are pursued.
5. We find that the difference-in-difference estimation suggests that an increase in the minimum wage from $4.25 to $5.05 per hour leads to an average starting wage increase in the fast food sector of approximately 50 cents relative to the trend if no policy was pursued, assuming that all the assumptions hold.

c.

1. Average full time equivalent employment (FTE)

New Jersey	First wave	**17.2754**
	Second wave	**17.5623**
Pennsylvania	First wave	**20.1136**
	Second wave	**18.0985**

2. Differences in average FTE between first and second wave

	First wave	*Second wave*	*Difference (Δ)*
New Jersey	17.2754	17.5623	**+ 0.2869**
Pennsylvania	20.1136	18.0985	**- 2.0151**

3. Differences in differences

New Jersey	*Pennsylvania*	*ΔΔ (NJ-PA)*
+ 0.2869	- 2.0151	**+ 2.302**

By this estimate, the minimum wage increases employment in New Jersey fast food restaurants by an average of approximately 2.3 units of full time equivalent employment relative to the common trend. Here it is assumed by the common trend assumption that if New Jersey had not seen a minimum wage increase, it would have followed the relative employment-path that can be seen in Pennsylvania, which is the state that is used as counterfactual. The other assumption stated in b.4. clearly needs to hold as well.

d.

```
. regres wage_st  state_time state time
```

Source	SS	df	MS	Number of obs	=	779
				F(3, 775)	=	177.50
Model	40.6981269	3	13.5660423	Prob > F	=	0.0000
Residual	59.2333808	775	.076430169	R-squared	=	0.4073
				Adj R-squared	=	0.4050
Total	99.9315077	778	.128446668	Root MSE	=	.27646

wage_st	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
state_time	.4813823	.0506547	9.50	0.000	.3819456	.5808189
state	-.0179978	.0353422	-0.51	0.611	-.0873755	.0513799
time	-.0126668	.0456305	-0.28	0.781	-.1022408	.0769072
_cons	4.630132	.0317121	146.00	0.000	4.56788	4.692383

```
.  regres fte  state_time state time
```

Source	SS	df	MS	Number of obs	=	801
				F(3, 797)	=	2.15
Model	524.003099	3	174.6677	Prob > F	=	0.0919
Residual	64600.6458	797	81.0547626	R-squared	=	0.0080
				Adj R-squared	=	0.0043
Total	65124.6489	800	81.4058111	Root MSE	=	9.003

fte	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
state_time	2.913982	1.610513	1.81	0.071	-.2473667	6.075331
state	-2.883534	1.134812	-2.54	0.011	-5.111107	-.6559608
time	-2.40651	1.446314	-1.66	0.097	-5.245544	.4325237
_cons	19.94872	1.019394	19.57	0.000	17.9477	21.94973

1. The regression estimates the difference-in-difference effect of the treatment (minimum wage increase) on wages to be +0.4814*** and on employment to be +2.9140*. These results are different from the results in (b) and (c). The effect on wages is almost similar (.5041 compared to .4814***) while the effect on employment differs with a greater margin (2.302 compared to 2.9140*). Overall, the signs and sizes of the different difference-in-difference estimation methods are quite comparable.
2. The new estimates are as follows:

Covariates	*Variable*	*ΔΔ*
Ownership dummy	Starting wage	**+0.4819*** **
	Employment (fte)	**+2.9571***
Ownership dummy & Chain dummies	Starting wage	**+0.4764*** **
	Employment (fte)	**+2.9590** **

3. After including restaurant-specific covariates, the regression results are still very similar. The only noticeable change is that the effect on employment is now significant at the 5% level compared to before including covariates, when it was only significant at the 10% level. We would not have expected results to change, since when we computed the distribution of ownership type and the distribution specific chain stores in New Jersey and Pennsylvania, we found Pennsylvania and New Jersey are not dramatically different from each other in terms of chain store distribution percentages and ownership percentages. This can be seen in our log file.

A full documentation of STATA commands and output can be found below, as a print of the log file.

```
      name:  <unnamed>
       log:  C:\Users\u1265889\Desktop\Logfile4a.smcl
  log type:  smcl
 opened on:  21 Sep 2017, 14:57:29

 1 . do "C:\Users\u1265889\Desktop\CA4a.do"

 2 . * Computer Assignment 4 Econometrics, Sep 2017
 3 .
 4 . use "C:\Users\u1265889\Downloads\minwage_280915.dta", clear

 5 .
 6 . * II
 7 . *a)
 8 . tab sample

     sample |      Freq.     Percent        Cum.
------------+-----------------------------------
          0 |        118       14.39       14.39
          1 |        702       85.61      100.00
------------+-----------------------------------
      Total |        820      100.00

 9 . tab state

      state |      Freq.     Percent        Cum.
------------+-----------------------------------
          0 |        158       19.27       19.27
          1 |        662       80.73      100.00
------------+-----------------------------------
      Total |        820      100.00

10 . tab sample if sample==1 & state==1

     sample |      Freq.     Percent        Cum.
------------+-----------------------------------
          1 |        570      100.00      100.00
------------+-----------------------------------
      Total |        570      100.00

11 .
12 . *b)
13 . sum fte if sample==1

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
         fte |        702    17.73611    8.982443         3         80

14 .
15 . *c)
16 . sum wage_st if sample==1

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
     wage_st |        702    4.807821    .3580375      4.25       6.25

17 .
18 . *III
19 . *a)
```

```
20 . *1)
21 . bys state time: egen mean_wage_st=mean(wage_st) if sample==1
   (118 missing values generated)

22 . graph twoway (line mean_wage_st time if state==1) (line mean_wage_st time if s
   > tate==0), yscale(range(0)) ylabel(0(1)6)

23 . *2)
24 . bys state time: egen mean_fte=mean(fte) if sample==1
   (118 missing values generated)

25 . graph twoway (line mean_fte time if state==1) (line mean_fte time if state==0)
   > , yscale(range(0)) ylabel(0(5)25)

26 . *b)
27 . *1)
28 . table state time if sample==1, contents(mean wage_st)
```

state	time 0	1
0	**4.65364**	**4.61879**
1	**4.61298**	**5.08214**

```
29 . *2)
30 . display 5.08214 - 4.61298
   .46916

31 . display 4.61879 - 4.65364
   -.03485

32 . *3)
33 . display .4692--.0349
   .5041

34 . *c)
35 . *1)
36 . table state time if sample==1, contents(mean fte)
```

state	time 0	1
0	**20.1136**	**18.0985**
1	**17.2754**	**17.5623**

```
37 . *2)
38 . display  17.5623 - 17.2754
   .2869

39 . display 18.0985 -  20.1136
   -2.0151

40 . *3)
41 . display .2869 -- 2.0151
   2.302
```

```
42 . *d)
43 . *1)
44 . regres wage_st  state_time state time
```

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				F(3, 775)	=	177.50
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_cons	4.630132	.0317121	146.00	0.000	4.56788	4.692383

```
45 . regres fte  state_time state time
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				Adj R-squared	=	0.0043
Total	65124.6489	800	81.4058111	Root MSE	=	9.003

fte	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
state_time	2.913982	1.610513	1.81	0.071	-.2473667	6.075331
state	-2.883534	1.134812	-2.54	0.011	-5.111107	-.6559608
time	-2.40651	1.446314	-1.66	0.097	-5.245544	.4325237
_cons	19.94872	1.019394	19.57	0.000	17.9477	21.94973

```
46 . *2)
47 . *Ownership dummy
48 . regres wage_st state_time state time co_owned
```

Source	SS	df	MS	Number of obs	=	779
				F(4, 774)	=	137.91
Model	41.5851676	4	10.3962919	Prob > F	=	0.0000
Residual	58.34634	774	.075382868	R-squared	=	0.4161
				Adj R-squared	=	0.4131
Total	99.9315077	778	.128446668	Root MSE	=	.27456

wage_st	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
state_time	.4819154	.0503067	9.58	0.000	.3831618	.5806691
state	-.0174203	.0350996	-0.50	0.620	-.086322	.0514814
time	-.012443	.0453168	-0.27	0.784	-.1014014	.0765155
co_owned	.0710406	.0207096	3.43	0.001	.030387	.1116941
_cons	4.604893	.0323421	142.38	0.000	4.541405	4.668382

```
49 . regres fte  state_time state time co_owned
```

Source	SS	df	MS	Number of obs	=	801
				F(4, 796)	=	4.74
Model	1513.96091	4	378.490228	Prob > F	=	0.0009
Residual	63610.688	796	79.9129246	R-squared	=	0.0232
				Adj R-squared	=	0.0183
Total	65124.6489	800	81.4058111	Root MSE	=	8.9394

fte	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
state_time	2.957076	1.599176	1.85	0.065	-.1820244	6.096177
state	-2.912398	1.12682	-2.58	0.010	-5.124288	-.7005081
time	-2.456326	1.43616	-1.71	0.088	-5.275434	.3627821
co_owned	-2.337455	.6641153	-3.52	0.000	-3.641079	-1.033831
_cons	20.7878	1.039884	19.99	0.000	18.74656	22.82904

```
50 . *Chain dummies
51 . regres wage_st  state_time state time co_owned i.chain
```

Source	SS	df	MS		
Model	43.1576073	7	6.16537248	Number of obs	= 779
Residual	56.7739003	771	.073636706	F(7, 771)	= 83.73
Total	99.9315077	778	.128446668	Prob > F	= 0.0000
				R-squared	= 0.4319
				Adj R-squared	= 0.4267
				Root MSE	= .27136

wage_st	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
state_time	.4764773	.0497428	9.58	0.000	.3788299	.5741247
state	-.0114332	.034806	-0.33	0.743	-.079759	.0568926
time	-.0068627	.0448116	-0.15	0.878	-.0948298	.0811045
co_owned	.0635358	.0231942	2.74	0.006	.0180045	.109067
chain						
2	.0210079	.0274848	0.76	0.445	-.032946	.0749617
3	.0482915	.0278068	1.74	0.083	-.0062944	.1028774
4	.1364499	.0300724	4.54	0.000	.0774163	.1954834
_cons	4.567063	.033316	137.08	0.000	4.501662	4.632463

```
52 . regres fte  state_time state time co_owned i.chain
```

Source	SS	df	MS		
Model	12393.6934	7	1770.52763	Number of obs	= 801
Residual	52730.9555	793	66.4955302	F(7, 793)	= 26.63
Total	65124.6489	800	81.4058111	Prob > F	= 0.0000
				R-squared	= 0.1903
				Adj R-squared	= 0.1832
				Root MSE	= 8.1545

fte	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
state_time	2.959047	1.458933	2.03	0.043	.0952206	5.822873
state	-2.371071	1.030224	-2.30	0.022	-4.39336	-.3487828
time	-2.426545	1.310237	-1.85	0.064	-4.998488	.1453966
co_owned	-1.064741	.6855265	-1.55	0.121	-2.410402	.2809202
chain						
2	-9.800042	.8119755	-12.07	0.000	-11.39392	-8.206166
3	-1.2423	.8233232	-1.51	0.132	-2.85845	.3738509
4	-.870672	.8885503	-0.98	0.327	-2.614861	.8735167
_cons	22.27683	.9900716	22.50	0.000	20.33335	24.2203

```
53 . *3)
54 . tab chain if state==0
```

chain	Freq.	Percent	Cum.
1	**70**	**44.30**	**44.30**
2	**24**	**15.19**	**59.49**
3	**34**	**21.52**	**81.01**
4	**30**	**18.99**	**100.00**
Total	**158**	**100.00**	

```
55 . tab chain if state==1
```

chain	Freq.	Percent	Cum.
1	**272**	**41.09**	**41.09**
2	**136**	**20.54**	**61.63**
3	**164**	**24.77**	**86.40**
4	**90**	**13.60**	**100.00**
Total	**662**	**100.00**	

```
56 . tab co_owned if state==0
```

co_owned	Freq.	Percent	Cum.
0	**102**	**64.56**	**64.56**
1	**56**	**35.44**	**100.00**
Total	**158**	**100.00**	

```
57 . tab co_owned if state==1
```

co_owned	Freq.	Percent	Cum.
0	**436**	**65.86**	**65.86**
1	**226**	**34.14**	**100.00**
Total	**662**	**100.00**	

```
58 .
59 .
60 .
61 .
62 .
63 .
   end of do-file

64 . log close
      name:  <unnamed>
       log:  C:\Users\u1265889\Desktop\Logfile4a.smcl
  log type:  smcl
 closed on:  21 Sep 2017, 14:58:20
```