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ECON 301 PS4

1.1 In this research, the impacts of the new minimum wage law on the labor market dynamics which was applied on April 1, 1992 in New Jersey, was examined. The question asked whether the rise of minimum wage from $4.25 to $5.05 per hour decreases the employment rate in New Jersey is quite important. Because, since the labor market dynamics are quite sensitive to wage changes, any policy change on minimum wage might lead to big consequences such as high unemployment rate, decline in welfare of society and etc. In this research, 410 fast-food restaurants were surveyed in New Jersey and Pennsylvania before and after the implication. Restaurants in Eastern Pennsylvania were used as a control group since New Jersey is relatively small state and it is closely linked by its nearby states. Researches interviewed with workers before (1st wage) and after (2nd wage) the policy change. Fast-food restaurant were chosen because of their high employment rate of low wage workers, their policy to fit the minimum-wage laws and their homogenous job requirements which makes collecting data easier. With these collected data, researchers conducted some econometrics models and test their hypothesis by comparing the results against the control group.

1.2

```
. ttest fte_wave2, by(state)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
Pennsylv	77	21.16558	.9432212	8.276732	19.287	23.04417
New Jers	319	21.02743	.5203094	9.293024	20.00375	22.05111
combined	396	21.05429	.4570134	9.094453	20.15581	21.95278
diff		.1381549	1.156182		-2.134902	2.411212

```
    diff = mean(Pennsylv) - mean(New Jers)                        t =   0.1195
Ho: diff = 0                                     degrees of freedom =      394

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.5475         Pr(|T| > |t|) = 0.9049          Pr(T > t) = 0.4525
```

```
. ttest fte_wave1, by(state)

Two-sample t test with equal variances
```

Group	Obs	Mean	Std. Err.	Std. Dev.	[95% Conf.	Interval]
Pennsylv	77	23.33117	1.351149	11.85628	20.64012	26.02222
New Jers	321	20.43941	.5082607	9.106239	19.43945	21.43936
combined	398	20.99887	.4887136	9.749805	20.03808	21.95966
diff		2.891761	1.230207		.4732069	5.310315

```
    diff = mean(Pennsylv) - mean(New Jers)                        t =   2.3506
Ho: diff = 0                                     degrees of freedom =      396

    Ha: diff < 0                 Ha: diff != 0                 Ha: diff > 0
 Pr(T < t) = 0.9904         Pr(|T| > |t|) = 0.0192          Pr(T > t) = 0.0096
```

```
. table state, c(mean fte_wave1 mean fte_wave2 )
```

dummy state	mean(fte_wa~1)	mean(fte_wa~2)
Pennsylvania	23.33117	21.16558
New Jersey	20.43941	21.02743

According to results, before the policy change the average number of employee is around 20 (std error: 0.50) in New Jersey and 23 (std error:1.35) in Pennsylvania. After the rise in minimum changes in New Jersey, average number of employee in fast-food restaurants increased to 21 (std error:0.52) and decreased to around 21 (std error: 0.94). These results show that an increase in the minimum wage did not lead to a decrease in the employment in New Jersey contrast to conventional economic theory. Impact of policy change of minimum wage is 2.75 increase of employment. Since the t-value is greater than 1.96 (p-value< 0.05), the result is statistically significant.

```
. reg dif_fte state
```

Source	SS	df	MS		
Model	456.408692	1	456.408692	Number of obs	= 384
Residual	30720.6883	382	80.4206501	F(1, 382)	= 5.68
				Prob > F	= 0.0177
Total	31177.097	383	81.4023421	R-squared	= 0.0146
				Adj R-squared	= 0.0121
				Root MSE	= 8.9678

dif_fte	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
state	2.75	1.154355	2.38	0.018	.480314	5.019686
_cons	-2.283333	1.035507	-2.21	0.028	-4.319341	-.2473256

1.3

```
. reg dif_fte state

      Source |       SS           df       MS      Number of obs   =       351
-------------+----------------------------------   F(1, 349)       =      3.66
       Model |  277.813658         1  277.813658   Prob > F        =    0.0566
    Residual |  26504.4967       349  75.9441167   R-squared       =    0.0104
-------------+----------------------------------   Adj R-squared   =    0.0075
       Total |  26782.3104       350  76.5208869   Root MSE        =    8.7146

------------------------------------------------------------------------------
     dif_fte |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       state |   2.276858   1.190436     1.91   0.057    -.064474    4.61819
       _cons |  -1.878788   1.072692    -1.75   0.081    -3.988542   .2309665
------------------------------------------------------------------------------
```

```
. reg dif_fte state i.chain co_owned

      Source |       SS           df       MS      Number of obs   =       351
-------------+----------------------------------   F(5, 345)       =      1.44
       Model |  545.889366         5  109.177873   Prob > F        =    0.2108
    Residual |  26236.421        345  76.0475972   R-squared       =    0.0204
-------------+----------------------------------   Adj R-squared   =    0.0062
       Total |  26782.3104       350  76.5208869   Root MSE        =    8.7205

------------------------------------------------------------------------------
     dif_fte |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       state |   2.281507   1.197044     1.91   0.057    -.0729144   4.635929
             |
       chain |
kentucky ..  |   .2345508   1.29674     0.18   0.857    -2.31596    2.785061
       roys  |  -2.084687   1.321259    -1.58   0.116    -4.683423   .5140495
     wendys  |  -.7566441   1.491088    -0.51   0.612    -3.68941    2.176122
             |
    co_owned |   .3729144   1.098762     0.34   0.735    -1.788201   2.53403
       _cons |  -1.450031   1.2099      -1.20   0.232    -3.82974    .929677
------------------------------------------------------------------------------
```

In the second model, I used state dummy variable (0 for Pennsylvania & 1 for New Jersey), chain categorical variable (Burger King 1, Kentucky Fried Chicken 2, Roy Rogers 3, Wendy's 4) and company dummy variable (Company Owned 1, Not Company Owned 0). This model investigates the effect of restaurants locations, type of the fast-food restaurants and type of ownership on the change of the employment level. The dummy variable "New Jersey" is the dummy variable which shows whether the restaurant is located in New Jersey or not. According to this model being located in New Jersey has a positive effect (~2.28) on employment with 10% significance level. It means that average number of employment is increased by 2.28 if it is located in New Jersey. Compared to basic model that conducted in previous question, this model also includes categorical variables such as chain type and ownership dummy variable. These variables' effects on state variable could be important and could lead the over/under estimation. However, as it can be seen from the results, they do no have that much high effect on state variable. By including these variables, we decrease the effect of overestimated variable in the first regression model.

1.4

```
. reg log_fullmeal_dif state

      Source |       SS           df       MS      Number of obs   =       317
-------------+----------------------------------   F(1, 315)       =      5.09
       Model |  .052112289         1  .052112289   Prob > F        =    0.0247
    Residual |  3.22203683       315  .010228688   R-squared       =    0.0159
-------------+----------------------------------   Adj R-squared   =    0.0128
       Total |  3.27414912       316  .010361231   Root MSE        =    .10114

------------------------------------------------------------------------------
log_fullme~f |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
       state |   .0325248   .0144097     2.26   0.025     .0041734    .0608762
       _cons |  -.0090863   .0129493    -0.70   0.483    -.0345643    .0163917
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```

```
. reg log_fullmeal_dif state i.chain co_owned

      Source |       SS           df       MS      Number of obs   =       317
-------------+----------------------------------   F(5, 311)       =      6.83
       Model |  .323862508         5  .064772502   Prob > F        =    0.0000
    Residual |  2.95028661       311  .009486452   R-squared       =    0.0989
-------------+----------------------------------   Adj R-squared   =    0.0844
       Total |  3.27414912       316  .010361231   Root MSE        =    .0974

------------------------------------------------------------------------------
log_fullmeal_dif |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-----------------+----------------------------------------------------------------
           state |   .0367495   .0139566     2.63   0.009     .0092882    .0642107
                 |
           chain |
kentucky fried ch |  -.007042   .0149151    -0.47   0.637    -.0363893    .0223053
            roys |  -.0004594   .0158925    -0.03   0.977    -.0317298    .0308111
          wendys |   .0851266   .0174853     4.87   0.000     .0507222    .119531
                 |
        co_owned |   .0005565   .0130868     0.04   0.966    -.0251934    .0263065
           _cons |  -.021993    .0142773    -1.54   0.124    -.0500854    .0060994
------------------------------------------------------------------------------
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In this analysis, researches asked if there is an increase in meal prices due to increase in minimum wages of workers. According to competitive model of fast-food industry, an increase in the minimum wage leads to an increase in product prices and the assumption that constant returns to scale in fast-food industry says that the increase in price should be proportional to the share of minimum-wage labor in total factor cost.
To check the validity of assumption, we used log of differences between full-meal prices(small fries + medium soda + entree prices, including tax) as dependent variable and state dummy variable, chain categorical variable and company owned dummy variable as explanatory variables (model 2).

According to results, after tax meal prices in New Jersey increased by ~3.7% as compared to prices in Pennsylvania after the change of minimum wage policy with statistical significance ($p<0.05$). This results confirm the conventional model about the wage & factor cost relationship.

2.

```
. reg prcfat t feb mar apr may jun jul aug sep oct nov dec wkends unem spdlaw beltlaw
```

Source	SS	df	MS	Number of obs	=	108
				F(16, 91)	=	14.44
Model	.764228387	16	.047764274	Prob > F	=	0.0000
Residual	.301019769	91	.00330791	R-squared	=	0.7174
				Adj R-squared	=	0.6677
Total	1.06524816	107	.00995559	Root MSE	=	.05751

prcfat	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
t	-.0022352	.0004208	-5.31	0.000	-.0030711	-.0013993
feb	.0008607	.0289967	0.03	0.976	-.0567377	.0584592
mar	.0000923	.0274069	0.00	0.997	-.0543481	.0545327
apr	.0582201	.0278195	2.09	0.039	.0029601	.11348
may	.0716392	.0276432	2.59	0.011	.0167293	.1265492
jun	.1012618	.0280937	3.60	0.001	.0454571	.1570665
jul	.1766121	.0272592	6.48	0.000	.122465	.2307592
aug	.1926117	.0274448	7.02	0.000	.1380959	.2471274
sep	.1600164	.028203	5.67	0.000	.1039947	.2160381
oct	.1010357	.0276702	3.65	0.000	.0460722	.1559991
nov	.013949	.0281436	0.50	0.621	-.0419548	.0698528
dec	.0092005	.027858	0.33	0.742	-.046136	.064537
wkends	.0006259	.0061624	0.10	0.919	-.011615	.0128668
unem	-.0154259	.0055444	-2.78	0.007	-.0264392	-.0044127
spdlaw	.0670877	.0205683	3.26	0.002	.0262312	.1079441
beltlaw	-.0295053	.0232307	-1.27	0.207	-.0756503	.0166397

According to findings, the effect of time on percentage of fatal accidents is negative and statistically significant.
In terms of months, the one with the maximum effect is August. In August percentage of fatal accidents increase by 0.19 compared to January, since t-value is 7.02 result is statistically significant. The reasons might be rooted by summer holidays effect. On the other hand, the month with the minimum effect is March, however since it is statistically insignificant its effect can be neglected.
The effect of weekends is positive on percentage of fatal accidents but it is not statistically significant. Unemployment is negatively related with the percentage change of fatal accidents (-0.015) and the effect is statistically significant. The interesting result is the impact of speed law on accident percentage. They are positively related and also statistically significant.
The effect of belt law is lead to a decrease in accident percentage but effect is not statistically significant.

Residual	8341.41206	5,334	1.56381928	R-squared	=	0.0412
				Adj R-squared	=	0.0387
Total	8699.85385	5,348	1.62674904	Root MSE	=	1.2505

ldurat	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
afchnge	.0106274	.0449167	0.24	0.813	-.0774276	.0986824
highearn	.1757598	.0517462	3.40	0.001	.0743161	.2772035
afhigh	.2308768	.0695248	3.32	0.001	.0945798	.3671738
male	-.0979407	.0445498	-2.20	0.028	-.1852766	-.0106049
married	.1220995	.0391228	3.12	0.002	.0454027	.1987962
indust						
2	.2708676	.058666	4.62	0.000	.1558581	.385877
3	.1606709	.0409038	3.93	0.000	.0804827	.2408591
injtype						
2	.7838129	.156167	5.02	0.000	.4776617	1.089964
3	.3353613	.0923382	3.63	0.000	.1543407	.516382
4	.6403517	.1008698	6.35	0.000	.4426058	.8380977
5	.5053036	.0928059	5.44	0.000	.3233661	.6872411
6	.3936092	.0935647	4.21	0.000	.2101841	.5770344
7	.7866121	.207028	3.80	0.000	.3807527	1.192472
8	.5139003	.1292776	3.98	0.000	.2604634	.7673372
_cons	.5713505	.10266	5.57	0.000	.3700949	.7726061

3.1 According to results, “afchnge”, the control group (low-income workers) are not affected by the policy change (t-value : 0.24, statistically not significant).
The “highearn” coefficient says that high-income workers are likely to benefit from duration 17.5% more as compared to low-income workers (t-value: 3.40, statistically significant).
When we examine the affect of policy change (“afhigh”), after the policy change duration of benefits increased 23% (t-value: 3.32 , statistically significant). At this point it can be said that policy change might contribute to people who are suffering from injuries and supported them in terms of their financial status. On the other hand there might be some moral issue, that may lead not critically injured people to stay out of work more by guaranteeing their income stable.

3.2 As it can be seen from the results, the R^2 and Adjusted R^2 are around 4%. It means that there are other reasons that affect the duration that we do not include in this model. And the explanatory power of this model is not sufficient. However, it does not mean that equation is useless because the most of the results are statistically significant and have impact on the duration. In addition, lower R^2 does not mean that results are biased therefore equation can be used if we do not want concrete predictive model.

3.3

When we consider the results in Michigan, the interaction term's coefficient (afhigh) is around 14.2% which is less then Kentucky's (%23). However this result is not statistically significant, t-value is 0.93 . This result might be happened because of the policy location. The policy change is occurred only in Kentucky therefore the duration is not affected by the policy change in Michigan which gives statistical insignificance.

```
. reg ldurat afchnge highearn afhigh male married i.indust i.injtype if mi==1
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Source	SS	df	MS	Number of obs	=	1,475
				F(14, 1460)	=	6.23
Model	157.402557	14	11.2430398	Prob > F	=	0.0000
Residual	2634.85251	1,460	1.8046935	R-squared	=	0.0564
				Adj R-squared	=	0.0473
Total	2792.25507	1,474	1.89433858	Root MSE	=	1.3434

ldurat	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
afchnge	.0945221	.0845739	1.12	0.264	-.0713771	.2604214
highearn	.1283726	.1106405	1.16	0.246	-.0886587	.345404
afhigh	.1426902	.1535674	0.93	0.353	-.158546	.4439265
male	-.352384	.0967692	-3.64	0.000	-.5422054	-.1625625
married	.0890124	.0772949	1.15	0.250	-.0626086	.2406334
indust						
2	.5217602	.1043794	5.00	0.000	.3170106	.7265097
3	.0840317	.0786529	1.07	0.286	-.0702531	.2383165
injtype						
2	.5427369	.3578638	1.52	0.130	-.1592453	1.244719
3	.5704354	.2152079	2.65	0.008	.1482856	.9925852
4	.8621662	.2267469	3.80	0.000	.4173817	1.306951
5	.3487954	.2172853	1.61	0.109	-.0774294	.7750202