First, some terminology for clarity:

**- Treatment Group:** Establishments in NJ (nj = 1).

**- Control Group:** Establishments in Pennsylvania (PA) (nj = 0).

**- Pre-Treatment Period:** Before the NJ minimum wage increase (d = 0).

**- Post-Treatment Period:** After the NJ minimum wage increase (d = 1).

**a. Construct a difference in difference estimate of the change in FTEs due to the minimum wage increase with no other explanatory variables.**

Using a linear regression model, we can estimate the following DiD specification:

Where:

(our coefficient of interest) captures the additional average change in employment in NJ after the minimum wage increase, which is the DiD estimator.

**d\_nj** coefficient( is 2.754, but it's not statistically significant at conventional levels (p>0.1). This suggests that, based on this simple model, the increase in minimum wage in NJ did not have a significant impact on full-time equivalent employment (**fte**), relative to PA.

**b. Is there any evidence that different regions or different companies were on different trajectories (i.e., we have violated the parallel trend assumption)?**

The parallel trends assumption implies that, in the absence of the treatment (minimum wage increase), the treatment and control groups would have followed the same trends over time.

We can add interaction terms of each company variable (e.g., `bk`, `kfc`, `roys`, `wendys`, `southj\_d`) with the `d` variable to the above regression and check if these interaction terms are significant. If they are, it suggests different companies were on different trajectories.

|  |  |  |
| --- | --- | --- |
|  | (1) | (2) |
| VARIABLES | fte | fte |
|  |  |  |
| nj | -2.892\*\* | -2.892\*\* |
|  | (1.194) | (1.135) |
| d | -2.166 | -0.182 |
|  | (1.516) | (2.111) |
| d\_nj | 2.754 | 4.134\*\* |
|  | (1.688) | (1.922) |
| bk\_d |  | 0.908 |
|  |  | (1.398) |
| kfc\_d |  | -9.098\*\*\* |
|  |  | (1.583) |
| roys\_d |  | -2.552\* |
|  |  | (1.547) |
| centralj\_d |  | -0.481 |
|  |  | (1.340) |
| southj\_d |  | -3.831\*\*\* |
|  |  | (1.182) |
| pa1\_d |  | -0.912 |
|  |  | (2.092) |
| Constant | 23.33\*\*\* | 23.33\*\*\* |
|  | (1.072) | (1.019) |
|  |  |  |
| Observations | 794 | 794 |
| R-squared | 0.007 | 0.110 |

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**kfc\_d** coefficient is -9.098 and highly significant (p<0.01), **southj\_d** coefficient is -3.831 and highly significant (p<0.01), suggesting that Kentucky Fried Chicken saw a significant reduction in **fte** compared to other companies after the wage change.

**c. Is there any evidence that the effect differs by region of NJ or PA? (hint: you need interaction terms to do this)**

To determine if the effect of the minimum wage increase varies by region within NJ or PA, we can include interactions of the `d` variable with each region-specific dummy variable (`centralj`, `southj`, `pa1`, `pa2`). The regression would look like:

- `d\_centralj`, `d\_southj`, and `d\_pa2` are all not statistically significant, implying that the wage change effect did not vary significantly for Central NJ, Southern NJ, and PA2 regions compared to the reference group.

- `d\_pa1` coefficient is -4.514 and significant at p<0.1, suggesting that the effect of the wage change in PA1 differed significantly from the reference group.

|  |  |
| --- | --- |
|  | (3) |
| VARIABLES | fte |
|  |  |
| d | 0.871 |
|  | (1.002) |
| centralj | 0.116 |
|  | (1.383) |
| southj | -5.073\*\*\* |
|  | (1.192) |
| pa1 | 2.843\* |
|  | (1.709) |
| pa2 | 0.307 |
|  | (1.586) |
| d\_centralj | -1.256 |
|  | (1.950) |
| d\_southj | -0.234 |
|  | (1.693) |
| d\_pa1 | -4.514\* |
|  | (2.417) |
| d\_pa2 | -1.805 |
|  | (2.244) |
| Constant | 21.87\*\*\* |
|  | (0.708) |
|  |  |
| Observations | 794 |
| R-squared | 0.057 |

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

**Appendix: Stata Code**

clear

capture log close

import delimited "/Users/yimingzhang/Desktop/Econometric/pset3/njmin3.csv"

reg fte nj d d\_nj

outreg2 using results.doc, replace

gen centralj\_d = d\*centralj

gen southj\_d = d\*southj

gen pa1\_d = d\*pa1

gen bk\_d = bk\*d

gen kfc\_d = kfc\*d

gen roys\_d = roys\*d

reg fte nj d d\_nj bk\_d kfc\_d roys\_d centralj\_d southj\_d pa1\_d

outreg2 using results.doc, append

gen d\_centralj = d\*centralj

gen d\_southj = d\*southj

gen d\_pa1 = d\*pa1

gen d\_pa2 = d\*pa2

reg fte d centralj southj pa1 pa2 d\_centralj d\_southj d\_pa1 d\_pa2

outreg2 using results1.doc, replace