STATA Exercise 2: The effect of limiting employment at will: applying a difference-in-difference estimator

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Autor (2013)[1] observes that the Temporary Help Supply (THS) industry employment grew over five times more rapidly than U.S. nonfarm employment over the period 1979 to 1995. Autor hypothesize that this increase has happened because 46 state courts between 1973 and 1995 have recognised exceptions to the principle of employment-at-will. The employment-at-will principle says that employers and employees have unlimited discretion to terminate their employment relationships at any time for any reason unless explicitly contracted otherwise. The rulings by the 46 state courts thus limited employers discretion to terminate workers and opened them to potentially costly litigation. This amounts to increasing the firing costs associated with regular employment contracts. Simple economic reasoning predicts that this should lead firms to substitute towards THS in order to avoid these firing costs, and Autor wants to investigate whether the exemptions from the employment-at-will principle created growth in the THS industry employment.

Two features are thought to be useful for estimating the causal impact of the laws on THS employment. Law changes are discrete, and because a court's issuance of a new precedent is a function of its list of cases for trial and the disposition of its justices, the timing of the law changes is in part unanticipated. These two features may generate discontinuous impacts on THS employment.

The data set is based on Census Bureau's County Business Patterns (CBP) files for the years 1979 - 95. These data provide a count of the total number of workers on THS payrolls during the month of March in each US state and year. The data set also includes information about total employment in each state in each year.

1. Do some initial descriptive statistics:

   (a) How many observations are contained in the data set and how are they distributed on years.

[1] David Autor (2003), "Outsourcing at Will: The Contribution of Unjust Dismissal Doctrine to the Growth of Employment Outsourcing", *Journal of Labor Economics*, 2003, vol. 21, no. 1.

(b) Plot log THS employment and the fraction of states with exception rulings by year in the same diagram. It may be useful to apply separate y-axes for the two variables

(c) Plot the the THS fraction of total employment and log total employment against year. It may be useful to apply separate y-axes for the two variables

(d) Plot log total employment and log THS employment against year

(e) What is the overall impression from the descriptive analysis?

2. Estimation of the basic Differences-in Differences model.
Consider the following model

$$lnths_{it} = \beta_0 + \beta_1 D_{it} + \beta_2 lnemp_{it} + \mu_i + \lambda_t + (\mu_i \times \tau) + u_{it} \qquad (1)$$

where $lnths$ is the log of total number of workers on THS payrolls and $lnemp$ is the log of total employment in each state in each year. μ_i is a state fixed effect, λ_t is a vector of year dummies, τ is a time trend, and so $\mu_i \times \tau$ are state specific time trends

(a) Estimate a simple version of the model that does not include the terms $\mu_i, \lambda_t, (\mu_i \times \tau)$. For inference you should calculate standard errors that are clustered at the state level.

(b) Repeat the estimation successively including $\mu_i, \lambda_t, (\mu_i \times \tau)$ and report the results in a table with four columns corresponding to the models estimated. Also here standard errors should be clustered at the state level.

(c) Describe the results in the table. How is $\hat{\beta}_1$ interpreted? How do the components $\mu_i, \lambda_t, (\mu_i \times \tau)$ affect the results?

3. On the importance of clustered errors. Estimate equation (1) calculating

(a) Simple OLS standard errors assuming

(b) Standard errors that are robust to arbitrary form of heteroskedasticity

(c) Cluster robust standard errors allowing for heteroskedasicity as well as autocorrelation between observation within states

Does the choice of standard errors impact the conclusion about the effect of exceptions to the principle of employment-at-will? What part of the error structure is important to incorporate?

4. Event study. David Autor emphasizes that law changes are discrete, and that the timing of the law changes is in part unanticipated. These two features may generate discontinuous impacts on THS employment. This motivates an event analysis.

   (a) Verify how the discreteness of the exception rulings in the data by plotting D_{it} against year for selected three states, for example state number 12, 16, and 21.

   (b) Form a sequence of event dummies covering from five periods before the exception ruling to seven years after. Estimate an event study regression and plot the estimated parameters and associated 95% confidence intervals in an event diagram. Describe the result.

   (c) Test for parallel pre-trends. Specify the null (and alternative) hypothesis and conduct a relevant test. Does the result confirm that pre-trends are parallel?

   (d) Is there an effect of exceptions to the employment-at-will principle on THS employment? Specify the hypothesis and conduct a relevant test and draw a conclusion about the effect of exceptions on THS employment.

5. Based on the evidence produced her what do you conclude about the hypothesis that firing costs has increased as a result of the exceptions to the employment-at-will principle?