

Empirical Banking and Finance

Tutorial 5

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Tutorial 5

- Overall, (very) good work!
 - Minor confusion about how to interpret the coefficient of interest/ leads and lags
 - We will start with a small exercise on artificial data to clarify this
 - Possibly some cross-group work?

This Lecture

Artificial Data Exercises

Tutorial 5 Solutions

Artificial Dataset I

```
clear all
input t y str6 state
-5 10 "b"
-4 11 "b"
-3 12 "b"
-2 13 "b"
-1 14 "b"
0 15 "b"
1 16 "b"
2 17 "b"
3 18 "b"
4 19 "b"
5 20 "b"
-5 12 "a"
-4 13 "a"
-3 14 "a"
-2 15 "a"
-1 16 "a"
0 17 "a"
1 23 "a"
2 24 "a"
3 25 "a"
4 26 "a"
5 27 "a"
end
* NOTE: the data are slightly different from the one used during the lecture
```

Artificial Dataset I

```
twoway (line y t if state == "a") (line y t if state == "b")

gen recap = 0
replace recap = 1 if t > 0 & state == "a"
reghdfe y recap, absorb(t state) savefe resid
```

Questions

Q1: Create a lead and a lag version of “recap”. Re-run the regression above including the lead and lag variables. What coefficients do you find?

Create a variable “recap_event” as follows:

```
gen recap_event = 0
replace recap_event = 1 if t == 1 & state == "a"
```

Run the following regression: *reghdfe y recap_event, absorb(t state)*

Q2: Why does this specification not make sense here?

Please enter your answers here 23 70 21

Artificial Dataset II

```
clear all

input t y str6 state
-5 10 "b"
-4 11 "b"
-3 12 "b"
-2 13 "b"
-1 14 "b"
0 15 "b"
1 16 "b"
2 17 "b"
3 18 "b"
4 19 "b"
5 20 "b"
-5 12 "a"
-4 13 "a"
-3 14 "a"
-2 15 "a"
-1 16 "a"
0 17 "a"
1 23 "a"
2 26 "a"
3 27 "a"
4 28 "a"
5 29 "a"
end
```

Artificial Dataset II

```
twoway (line y t if state == "a") (line y t if state == "b")

gen recap = 0
replace recap = 1 if t > 0 & state == "a"
reghdfe y recap, absorb(t state)
```

Questions

Q1: Again, create a lead and a lag version of “recap”. Re-run the regression above including the lead and lag variables. What coefficients do you find? How do you interpret this result?

Please enter your answers here 72 99 88

Artificial Dataset III

```
clear all

input t y str6 state
-5 10 "b"
-4 11 "b"
-3 12 "b"
-2 13 "b"
-1 14 "b"
0 15 "b"
1 16 "b"
2 17 "b"
3 18 "b"
4 19 "b"
5 20 "b"
-5 12 "a"
-4 13 "a"
-3 14 "a"
-2 15 "a"
-1 16 "a"
0 17 "a"
1 23 "a"
2 19 "a"
3 20 "a"
4 21 "a"
5 22 "a"
end
```


Artificial Dataset II

```
twoway (line y t if state == "a") (line y t if state == "b")

gen recap = 0
replace recap = 1 if t > 0 & state == "a"
reghdfe y recap, absorb(t state)
```

Questions

Q1: Why does the basic diff-in-diff specification not really make sense here?

Q2: Create an event dummy and run *reghdfe y recap_event, absorb(t state)*. What estimate do you find for *recap_event*

Please enter your answers here 17 25 20

This Lecture

Artificial Data Exercises

Tutorial 5 Solutions

Preliminary steps

a) What is the objective of this study?

- Measure the *causal* impact of financial markets on economic growth

b) How does this study improve over the previous literature?

- Previous literature:
 - Cross-country regressions, mostly cross-sectional
 - Problem 1: countries are different in many, potentially time-varying, ways (omitted variable)
 - Problem 2: the increase in the size of financial markets might happen in anticipation of high future GDP growth (reverse causality)
 - Even though the timing suggests a causality finance → GDP growth, it might actually be the other way round

Preliminary steps

b) How does this study improve over the previous literature?

- This paper:
 - Intrastate bank branch reform
 - Can use the panel dimension to include state FE: address omitted variable problem
 - This policy does not seem to be implemented in anticipation of expected GDP growth
 - 1) about half of the deregulating states experienced a decrease in GDP after deregulation (states below 0 line in Figure 1)
 - 2) Overall bank lending did not increase (Table VI), but the *quality* of bank loans does (Table VII)
 - Channel: After deregulation there is a consolidation in the banking sector with might lead to improved monitoring and screening

Preliminary steps

c) Write down the regression equation.

$$Y_{i,t}/Y_{t-1} = \alpha_t + \beta_i + \gamma D_{t,i} + \epsilon_{t,i}$$

d) Discuss the key identifying assumptions. Refer to the variables included in the regression.

- 1) The timing of the deregulation should be unrelated to the local (state-level) business cycle - “common pre-trends”
- 2) Deregulation is the only state-level time-varying factor that affects GDP - “no confounding event”
 - State fixed effects control time-invariant differences: for example tax rates, environmental regulations (p649)
 - Time fixed effects control for the national business cycle
 - One group noted that interstate lending could pose a problem
- The goal of 1) to 2) is to make sure control states provide a good *counter-factual* of what would have happened in the treated state absent treatment

Data & Descriptives

- a) Have a look at the dataset, in particular how the variables *ind_dereg* and *ind_deregYear* encode the information of the variable *deregulationInfo*.
- *ind_deregYear* equals 1 in the year of the deregulation and 0 otherwise
 - *ind_dereg* equals 1 if $\text{year} \geq \text{year of deregulation}$ and 0 otherwise
- b) How are the years of deregulation distributed over time? Please create a table or a histogram of the number of deregulations per year.
- c) Briefly comment on the distribution of deregulation over time. Does what you find make it more or less likely to find the causal effect of bank branch deregulation on GDP? Explain briefly.
- Deregulation from 1978 until 1991
 - Peaks in 1985 (4 states), 1987 (5), 1988 (6) and 1990 (4)
 - Staggered introduction
 - It helps: suppose they all deregulated at the same time: this would make it much harder to find a good counter-factual for the states that deregulated

Regression 1

- a) Replicate regression 5. in Table II of the paper. Note that you should exclude the deregulation years from the estimation.
- b) Compare the sign, size and significance of the coefficient on *ind_dereg* to the one in the paper.
 - $\gamma = 1.1747^{***}$, s.e. 0.38
 - the coefficient we obtain is larger than the one in the paper, they are both significant and positive. Note that the number of observations is the same and also the adj R² are quite similar.
 - Average growth rate is 1.8 % per year
 - “The point estimates in Tables II-IV may seem too large to reflect the long-run growth effects of branch bank reform”

Regression 1

- c) Interpret the size of the coefficient on *ind_dereg*.
- Deregulating bank branching restrictions increases annual per capita real GDP growth by 1.17 percentage points
 - Note that is a permanent effect, not a one-off increase (the variable *ind_dereg* remains one until the end of the sample after deregulation)
- d) Re-run the regression with standard errors clustered by state and year. Provide a brief comment.
- s.e. 0.55, only significant at 10% level
 - Clustering at the state-level makes a difference, the additional clustering at the year level not so much
 - Time-varying shocks at the state level might cause serial correlation in the residuals
 - Caveat: only 14 years = few clusters

Regression 2

- a) Run a Granger-Causality test specification including *ind_deregYear*, two lags and two leads of the variable.
 - Note: we lose about 100 observations
- b) Comment briefly on the coefficients of the leads. Are the results good or bad news for the paper?
 - Lead: is there a permanent impact of deregulation starting one year before the actual deregulation
 - Leads are not significant: good news, no other event that usually precedes deregulation and would increase GDP growth
 - Placebo test
- c) Comment briefly on the coefficients of the lags. Are the results good or bad news for the paper?
 - Lag: *additional* permanent effect of deregulation starting one year later
 - Lags are not significant: seems more like bad news, it seems strange that the effect of deregulation happens at once and does not build up over time (see illustration in Stata)
 - The authors emphasize the channel via increased bank competition through take-overs, this process is unlikely to have taken place overnight

Regression 3

- a) Please add state-specific time trends to Regression 1.
 - Correct: `c.year#i.state`
 - Incorrect: `c.year#c.state`
- b) Which assumption are we trying to test by adding state-specific time trends?
 - The common pre-trend assumption
- c) Comment on the sign, size and significance of the *ind_dereg* coefficient. How does it compare to Regression 1?
 - $\gamma = 1.0929^{***}$, s.e. 0.46 (without clustering)
 - Some of you tested whether the trends are jointly equal to zero. Why?

Regression 4

- a) Please add region-year fixed effects to Regression 1. Exclude states with region code =0 from your estimation.
- b) What is the rationale for adding region-year FE?
 - “many states in the South and Midwest deregulated around the same time, leading to the possibility that regional business cycle effects could drive the estimate of the growth effect”
 - regional business cycle affects 1) state-level GDP growth and might affect 2) probability of deregulation
- c) Compare your results to regression 7. in Table II of the paper.
 - $\gamma = 0.732^{**}$, s.e. 0.35
 - Our estimate is quite close to the one in the paper (0.69^{**} , s.e. 0.33)

Summary

- a) How much do you trust the results in the paper?
 - The effect of intrastate bank branch deregulation seems very large
 - States might have passed packages of other laws along with bank branch deregulation, that also promoted growth (and that are not reflected in the public investment/tax receipts)
 - One group called “coinciding political events”
 - One group noted that the dates for deregulation are somewhat arbitrary for states which deregulated slowly
- b) Can you think of other robustness checks than those already in the paper and in this exercise?
 - Already in the paper
 - Regional business cycles
 - They check for outliers: is one state alone driving the result: no, see Figure I
 - Time varying shocks: state fiscal policies (public investment/tax receipts)
 - When state deregulate only when the economy is doing poorly: mean reversion

Summary

- b) Can you think of other robustness checks than those already in the paper and in this exercise?
- Other robustness checks
 - One group noted towards the end of the sample there are very few control states left. The regression could be weighted by the quantity/quality of control states available.