

---

```
name: <unnamed>
log: /Users/rajdevb/Desktop/GIT_RajdevBrar/GitHub_are213/ARE213_Fall20
> 23/PSet 3/pset3_logfile.smcl
log type: smcl
opened on: 20 Nov 2023, 09:58:08
```

```
1 .
2 .
3 . * install programs
4 . * do "$do_loc/Stata/Code/01_programs.do"
5 .
6 . * analyze
7 . do "$do_loc/Stata/Code/02_analysis_q1.do"

8 . * =====
9 . *                                     ARE 213: Problem set 3 - Q1
10 . * =====
11 .
12 . * =====
13 . * Load datasets
14 . * =====
15 .
16 . * load datasets, save as global
17 .     global dta_lines "${dta_loc}/data/pset3_lines.dta"

18 .     * 149 unique lines
19 .
20 .     global dta_cities "${dta_loc}/data/pset3_cities.dta"

21 .     * 340 unique cities
22 .
```

```

23 .      global dta_stations "${dta_loc}/data/pset3_stations.dta"
24 .      * 565 unique city-line combinations
25 .
26 .      global dta_distance "${dta_loc}/data/pset3_distances.dta"
27 .      * 115600 unique city1-city2-dist combinations
28 .
29 .
30 . * =====
> === *
31 . * Prepare datasets
32 . * =====
> === *
33 .      * DeltaLines= number of open lines that go through city i
34 .
35 .      * using stations dataset, merge in lines
36 .      use "${dta_stations}", clear
37 .
          merge m:1 lineid using "${dta_lines}"

Result                                     # of obs.
-----
not matched                                0
matched                                  565  (_merge==3)
-----

38 .      assert _merge==3
39 .      drop _merge
40 .
41 .      * for each city, gen var for number of open lines
42 .      bys cityid: egen num_openlines_temp = sum(open)
43 .      bys cityid: egen num_openlines=max(num_openlines_temp)

```

```

44 .           lab var num_openlines "Number of open lines in city"
45 .           drop num_openlines_temp
46 .
47 .           * for each city, number of planned lines
48 .           bys cityid: gen num_plannedlines = _N
49 .           lab var num_plannedlines "Number of planned lines in city"
50 .
51 .           rename num_openlines deltalines
52 .
53 .           keep cityid deltalines num_plannedlines
54 .           duplicates drop

Duplicates in terms of all variables

(300 observations deleted)

55 .
56 .           tempfile dta_merge
57 .           save `dta_merge'
file /var/folders/fz/p35j_lbj1yx73vng__9d6ync0000gn/T//S_02572.000005 saved
58 .
59 .           * starting from city-level dataset, merge in variables we just creat
> ed
60 .           use "${dta_cities}", clear
61 .           merge 1:1 cityid using `dta_merge'

```

| Result      | # of obs.  |                      |
|-------------|------------|----------------------|
| not matched | <b>75</b>  |                      |
| from master | <b>75</b>  | ( <b>_merge==1</b> ) |
| from using  | <b>0</b>   | ( <b>_merge==2</b> ) |
| matched     | <b>265</b> | ( <b>_merge==3</b> ) |

```

62 .               replace deltalines = 0 if _merge==1
    (75 real changes made)

63 .               drop _merge

64 .

65 .               tempfile city_withdeltalines

66 .               save    `city_withdeltalines'
    file /var/folders/fz/p35j_lbjlyx73vng__9d6ync0000gn/T//S_02572.000006 saved

67 .

68 . * =====
    > === *
69 . * =====
    > === *
70 . * QUESTION 1
71 . * =====
    > === *
72 . * =====
    > === *
73 .
74 . * =====
    > === *
75 . * 1a
76 . * =====
    > === *
77 . * Represent DeltaLines_i as a shift-share variable
78 .
79 .           * Y = outcome = 2007-2016 log change in city employment
80 .           * DeltaLines= number of open lines that go through city i
81 .
82 .
83 .           * Compute DeltaLines_i for each city
84 .           * Mean/min/avg of DeltaLines_i across 340 cities?
85 .           tabstat deltalines, stats(min max mean med sd)

```

| variable   | min | max | mean     | p50 | sd       |
|------------|-----|-----|----------|-----|----------|
| deltalines | 0   | 7   | .9970588 | 1   | 1.143143 |

```

86 .      /*
>          variable |      min      max      mean      p50      sd
>          -----+-----
>          deltalines |      0      7 .9970588      1  1.143143
>          -----
>      */
87 .
88 .      * how many cities with missing data?
89 .      unique cityid if mi(empgrowth)
      Number of unique values of cityid is  65
      Number of records is  65

90 .
91 .      * and what provinces are these missing cities from?
92 .      tab province_en if mi(empgrowth)

```

| province<br>English name | Freq. | Percent | Cum.   |
|--------------------------|-------|---------|--------|
| gansu                    | 2     | 3.08    | 3.08   |
| guangdong                | 3     | 4.62    | 7.69   |
| guizhou                  | 5     | 7.69    | 15.38  |
| heilongjiang             | 1     | 1.54    | 16.92  |
| henan                    | 1     | 1.54    | 18.46  |
| hubei                    | 6     | 9.23    | 27.69  |
| hunan                    | 1     | 1.54    | 29.23  |
| inner mongolia           | 3     | 4.62    | 33.85  |
| jiangsu                  | 4     | 6.15    | 40.00  |
| jilin                    | 1     | 1.54    | 41.54  |
| qinghai                  | 7     | 10.77   | 52.31  |
| sichuan                  | 3     | 4.62    | 56.92  |
| tibet                    | 6     | 9.23    | 66.15  |
| xinjiang                 | 13    | 20.00   | 86.15  |
| yunnan                   | 9     | 13.85   | 100.00 |
| Total                    | 65    | 100.00  |        |

```

93 .
94 . * =====
    > === *
95 . * 1b
96 . * =====
    > === *
97 . * Estimate (1) by OLS without controls and also adding fixed effects of 30 C
    > hinese provinces.
98 . * Use heteroskedasticity-robust standard errors.
99 . * Is the coefficient economically large?
100 .
101 .
102 .         replace province_en=proper(province_en)
    (340 real changes made)

103 .         lab var empgrowth "Emp growth (log-change, 2007-2016)"

104 .
105 .         encode province_en, gen(province_enc)

106 .
107 .         eststo clear

108 .
109 .         eststo: reg empgrowth deltalines , vce(robust)

```

```

Linear regression               Number of obs   =       275
                               F(1, 273)        =       34.89
                               Prob > F          =       0.0000
                               R-squared          =       0.1235
                               Root MSE       =       .24025

```

| empgrowth  | Coef.    | Robust<br>Std. Err. | t    | P> t  | [95% Conf. Interval] |          |
|------------|----------|---------------------|------|-------|----------------------|----------|
| deltalines | .0764717 | .0129456            | 5.91 | 0.000 | .0509859             | .1019575 |
| _cons      | .1812033 | .0213226            | 8.50 | 0.000 | .1392256             | .2231809 |

(**est1** stored)

```
110 .      eststo: reg empgrowth deltalines i.province_enc , vce(robust)
```

```
Linear regression                Number of obs    =      275
                                F(24, 244).        =      .
                                Prob > F           =      .
                                R-squared           =      0.4801
                                Root MSE        =      .19572
```

|        |                | Coef.     | Robust<br>Std. Err. | t     | P> t  | [95% Conf. Interv |        |
|--------|----------------|-----------|---------------------|-------|-------|-------------------|--------|
| > —    | empgrowth      |           |                     |       |       |                   |        |
| > all] |                |           |                     |       |       |                   |        |
| > —    | deltalines     | .0495705  | .0147147            | 3.37  | 0.001 | .0205866          | .0785  |
| > 545  |                |           |                     |       |       |                   |        |
|        | province_enc   |           |                     |       |       |                   |        |
|        | Beijing        | .0050034  | .0690736            | 0.07  | 0.942 | -.1310531         | .14    |
| > 106  |                |           |                     |       |       |                   |        |
|        | Chongqing      | .0700398  | .0781418            | 0.90  | 0.371 | -.0838787         | .2239  |
| > 582  |                |           |                     |       |       |                   |        |
|        | Fujian         | -.0826864 | .0885755            | -0.93 | 0.351 | -.2571566         | .0917  |
| > 838  |                |           |                     |       |       |                   |        |
|        | Gansu          | -.0312127 | .0699248            | -0.45 | 0.656 | -.168946          | .1065  |
| > 206  |                |           |                     |       |       |                   |        |
|        | Guangdong      | .0222266  | .0756873            | 0.29  | 0.769 | -.1268572         | .1713  |
| > 104  |                |           |                     |       |       |                   |        |
|        | Guangxi        | -.1003566 | .0711068            | -1.41 | 0.159 | -.2404181         | .0397  |
| > 048  |                |           |                     |       |       |                   |        |
|        | Guizhou        | -.0396211 | .079218             | -0.50 | 0.617 | -.1956595         | .1164  |
| > 173  |                |           |                     |       |       |                   |        |
|        | Hebei          | -.1525531 | .0745966            | -2.05 | 0.042 | -.2994886         | -.0056 |
| > 176  |                |           |                     |       |       |                   |        |
|        | Heilongjiang   | -.5777725 | .0862798            | -6.70 | 0.000 | -.7477208         | -.4078 |
| > 242  |                |           |                     |       |       |                   |        |
|        | Henan          | .0611924  | .0692235            | 0.88  | 0.378 | -.0751596         | .1975  |
| > 443  |                |           |                     |       |       |                   |        |
|        | Hubei          | .2047972  | .11283              | 1.82  | 0.071 | -.0174478         | .4270  |
| > 423  |                |           |                     |       |       |                   |        |
|        | Hunan          | -.1973695 | .0791676            | -2.49 | 0.013 | -.3533085         | -.0414 |
| > 305  |                |           |                     |       |       |                   |        |
|        | Inner Mongolia | -.1715452 | .0987305            | -1.74 | 0.084 | -.3660181         | .0229  |
| > 277  |                |           |                     |       |       |                   |        |
|        | Jiangsu        | .1620782  | .0862199            | 1.88  | 0.061 | -.0077521         | .3319  |
| > 084  |                |           |                     |       |       |                   |        |
|        | Jiangxi        | .0926691  | .0793246            | 1.17  | 0.244 | -.0635791         | .2489  |
| > 174  |                |           |                     |       |       |                   |        |

|       |          |           |          |       |       |           |        |
|-------|----------|-----------|----------|-------|-------|-----------|--------|
| > 523 | Jilin    | -.161518  | .0777596 | -2.08 | 0.039 | -.3146836 | -.0083 |
| > 866 | Liaoning | -.2534235 | .0713989 | -3.55 | 0.000 | -.3940604 | -.1127 |
| > 324 | Ningxia  | -.1797775 | .0667367 | -2.69 | 0.008 | -.311231  | -.048  |
| > 553 | Qinghai  | .0301956  | .0583123 | 0.52  | 0.605 | -.0846641 | .1450  |
| > 756 | Shaanxi  | -.0173778 | .0788702 | -0.22 | 0.826 | -.1727312 | .1379  |
| > 542 | Shandong | -.0324671 | .0703249 | -0.46 | 0.645 | -.1709884 | .1060  |
| > 661 | Shanghai | .2785096  | .0690736 | 4.03  | 0.000 | .1424531  | .4145  |
| > 943 | Shanxi   | -.184835  | .07399   | -2.50 | 0.013 | -.3305757 | -.0390 |
| > 283 | Sichuan  | -.0777822 | .0915913 | -0.85 | 0.397 | -.2581927 | .1026  |
| > 025 | Tianjin  | -.1206159 | .0781418 | -1.54 | 0.124 | -.2745344 | .0333  |
| > 475 | Tibet    | .1290949  | .0580041 | 2.23  | 0.027 | .0148423  | .2433  |
| > 116 | Xinjiang | .0022207  | .1360058 | 0.02  | 0.987 | -.2656745 | .270   |
| > 902 | Yunnan   | -.0685086 | .0727503 | -0.94 | 0.347 | -.2118074 | .0747  |
| > 622 | Zhejiang | -.0095148 | .0980219 | -0.10 | 0.923 | -.2025918 | .1835  |
| > 353 | _cons    | .2813827  | .0580041 | 4.85  | 0.000 | .1671301  | .3956  |

---

> —  
(est2 stored)

```

111 .
112 .      esttab using "${dta_loc}/1b_reg" , nostar label tex replace se w
> ide
(output written to /Users/rajdevb/Dropbox/ARE213/Pset3/1b_reg.tex)

```



```

113 .
114 .
115 .
116 .
117 . * =====
    > === *
118 . * lc
119 . * =====
    > === *
120 .
121 .      * moving forward using nlinks at the qk
122 .      * need to merge in nlinks (nlinks unique at lineid level)
123 . preserve

124 .      * now dataset will be at city-line level
125 .      merge m:m cityid using "${dta_stations}", gen(merge1)

```

| Result      | # of obs.              |
|-------------|------------------------|
| not matched | <b>75</b>              |
| from master | <b>75</b> (merge1==1)  |
| from using  | <b>0</b> (merge1==2)   |
| matched     | <b>565</b> (merge1==3) |

```

126 .      /*
    >          Result                      # of obs.
    >          -----
    >          not matched                      75
    >                  from master              75  (_merge==1)
    >                  from using                0  (_merge==2)
    >
    >          matched                      565  (_merge==3)
    >          -----
    >      */
127 .      merge m:1 lineid using "${dta_lines}", gen(merge2)

```

| Result      | # of obs.              |
|-------------|------------------------|
| not matched | <b>75</b>              |
| from master | <b>75</b> (merge2==1)  |
| from using  | <b>0</b> (merge2==2)   |
| matched     | <b>565</b> (merge2==3) |

```

128 .
129 .      /*
>          Result                                # of obs.
>          -----
>          not matched                            75
>              from master                        75  (merge2==1)
>              from using                         0  (merge2==2)
>
>          matched                               565  (merge2==3)
>          -----
>      */
130 .      unique cityid lineid
Number of unique values of cityid lineid is  640
Number of records is  640

131 .
132 .      /*
>          Number of unique values of cityid lineid is  640
>          Number of records is  640
>      */
133 .
134 .
135 .      * Compute the city-level controls Qi corresponding to these qk.
136 .      tab nlinks, gen(nlinks_)

```

| Number of<br>cross-regio<br>nal links<br>created by<br>line | Freq.      | Percent       | Cum.          |
|---|------------|---------------|---------------|
| 1   | <b>104</b> | <b>18.41</b>  | <b>18.41</b>  |
| 2   | <b>110</b> | <b>19.47</b>  | <b>37.88</b>  |
| 3   | <b>83</b>  | <b>14.69</b>  | <b>52.57</b>  |
| 4   | <b>60</b>  | <b>10.62</b>  | <b>63.19</b>  |
| 5   | <b>40</b>  | <b>7.08</b>   | <b>70.27</b>  |
| 6   | <b>59</b>  | <b>10.44</b>  | <b>80.71</b>  |
| 7   | <b>24</b>  | <b>4.25</b>   | <b>84.96</b>  |
| 8   | <b>18</b>  | <b>3.19</b>   | <b>88.14</b>  |
| 9   | <b>48</b>  | <b>8.50</b>   | <b>96.64</b>  |
| 18  | <b>19</b>  | <b>3.36</b>   | <b>100.00</b> |
| Total   | <b>565</b> | <b>100.00</b> |               |

```

137 .      forvalues i = 1/10 {
138 .          2.          bys cityid: egen Qi_`i' = sum(nlinks_`i')
139 .          3.          }

138 .
139 .      bys cityid: egen sum_nlinks = sum(nlinks)

140 .      lab var sum_nlinks "Citylevel sum of number of links across all line
141 .      > s"

141 .
142 .      * How many of them do you have and how do you interpret them?
143 .
144 .      tab sum_nlinks

```

| Citylevel<br>sum of<br>number of<br>links<br>across all<br>lines | Freq. | Percent | Cum.  |
|--|-------|---------|-------|
| 0  | 75    | 11.72   | 11.72 |
| 1  | 11    | 1.72    | 13.44 |
| 2  | 23    | 3.59    | 17.03 |
| 3  | 35    | 5.47    | 22.50 |
| 4  | 36    | 5.62    | 28.12 |
| 5  | 38    | 5.94    | 34.06 |
| 6  | 37    | 5.78    | 39.84 |
| 7  | 23    | 3.59    | 43.44 |
| 8  | 21    | 3.28    | 46.72 |
| 9  | 29    | 4.53    | 51.25 |
| 10   | 35    | 5.47    | 56.72 |
| 11   | 22    | 3.44    | 60.16 |
| 12   | 24    | 3.75    | 63.91 |
| 13   | 14    | 2.19    | 66.09 |
| 14   | 14    | 2.19    | 68.28 |
| 15   | 17    | 2.66    | 70.94 |
| 16   | 3     | 0.47    | 71.41 |
| 17   | 14    | 2.19    | 73.59 |
| 18   | 17    | 2.66    | 76.25 |
| 19   | 3     | 0.47    | 76.72 |
| 20   | 11    | 1.72    | 78.44 |
| 21   | 14    | 2.19    | 80.62 |
| 22   | 10    | 1.56    | 82.19 |
| 23   | 10    | 1.56    | 83.75 |
| 25   | 3     | 0.47    | 84.22 |
| 26   | 17    | 2.66    | 86.88 |
| 27   | 22    | 3.44    | 90.31 |

|       |     |        |        |
|-------|-----|--------|--------|
| 28    | 10  | 1.56   | 91.88  |
| 29    | 11  | 1.72   | 93.59  |
| 32    | 9   | 1.41   | 95.00  |
| 34    | 9   | 1.41   | 96.41  |
| 36    | 5   | 0.78   | 97.19  |
| 37    | 9   | 1.41   | 98.59  |
| 39    | 9   | 1.41   | 100.00 |
| <hr/> |     |        |        |
| Total | 640 | 100.00 |        |

```

145 .
146 .     keep cityid sum_nlinks Qi_*

147 .     duplicates drop

        Duplicates in terms of all variables

        (300 observations deleted)

148 .     tempfile sumnlinks_dta

149 .     save     `sumnlinks_dta'
        file /var/folders/fz/p35j_lbjlyx73vng__9d6ync0000gn/T//S_02572.000008 saved

150 . restore

151 .
152 .     merge 1:1 cityid using `sumnlinks_dta'

        Result                                # of obs.
        -----                                -
        not matched                             0
        matched                               340  (_merge==3)
        -----                                -

153 .     assert _merge==3

```

```

154 .          drop _merge

155 .
156 .          unique sum_nlinks
      Number of unique values of sum_nlinks is  34
      Number of records is  340

157 .          * 34
158 .
159 .
160 . * =====
      > === *
161 . * 1d
162 . * =====
      > === *
163 . * Estimate (1) by OLS controlling for Qi instead of province fixed effects.
164 . * Does including Qi change the estimates?
165 . * Does your estimate rely on Assumptions A2 and A3?
166 .
167 .          eststo clear

168 .          eststo: reg empgrowth deltalines Qi_*, vce(robust)

```

```

Linear regression              Number of obs   =          275
                              F(11, 263)      =           7.35
                              Prob > F         =          0.0000
                              R-squared         =          0.2022
                              Root MSE      =          .23352

```

| empgrowth  | Coef.    | Robust<br>Std. Err. | t     | P> t  | [95% Conf. Interval] |          |
|------------|----------|---------------------|-------|-------|----------------------|----------|
| deltalines | .0209838 | .0225719            | 0.93  | 0.353 | -.0234609            | .0654285 |
| Qi_1       | -.00063  | .0232427            | -0.03 | 0.978 | -.0463954            | .0451354 |
| Qi_2       | .0076877 | .0298461            | 0.26  | 0.797 | -.05108              | .0664553 |
| Qi_3       | .0286205 | .0297012            | 0.96  | 0.336 | -.029862             | .087103  |
| Qi_4       | .0105053 | .0344413            | 0.31  | 0.761 | -.0573105            | .0783211 |
| Qi_5       | .0520196 | .0416149            | 1.25  | 0.212 | -.0299213            | .1339604 |
| Qi_6       | .1088843 | .0299937            | 3.63  | 0.000 | .049826              | .1679426 |
| Qi_7       | .2144605 | .0466879            | 4.59  | 0.000 | .1225309             | .3063902 |
| Qi_8       | .1418453 | .0733712            | 1.93  | 0.054 | -.0026244            | .286315  |
| Qi_9       | .061053  | .0441635            | 1.38  | 0.168 | -.025906             | .148012  |
| Qi_10      | .0864747 | .0471572            | 1.83  | 0.068 | -.006379             | .1793283 |
| _cons      | .1625225 | .0249329            | 6.52  | 0.000 | .113429              | .2116159 |

(est1 stored)

```

169 .      esttab using "${dta_loc}/ld_reg_1" , nostar label tex replace se
> wide
(output written to /Users/rajdevb/Dropbox/ARE213/Pset3/ld_reg_1.tex)

170 .
171 .      eststo clear

172 .      eststo: reg empgrowth deltalines Qi_*, vce(hc3) // to get same outpu
> t as python

```

```

Linear regression              Number of obs   =      275
                               F(11, 263)      =      6.50
                               Prob > F        =      0.0000
                               R-squared        =      0.2022
                               Root MSE     =      .23352

```

| empgrowth  | Robust HC3 |           |       |       |                      |          |
|------------|------------|-----------|-------|-------|----------------------|----------|
|            | Coef.      | Std. Err. | t     | P> t  | [95% Conf. Interval] |          |
| deltalines | .0209838   | .0238326  | 0.88  | 0.379 | -.0259433            | .0679108 |
| Qi_1       | -.00063    | .0243792  | -0.03 | 0.979 | -.0486333            | .0473733 |
| Qi_2       | .0076877   | .032209   | 0.24  | 0.812 | -.0557326            | .071108  |
| Qi_3       | .0286205   | .0311588  | 0.92  | 0.359 | -.032732             | .0899731 |
| Qi_4       | .0105053   | .0368555  | 0.29  | 0.776 | -.0620641            | .0830747 |
| Qi_5       | .0520196   | .0438038  | 1.19  | 0.236 | -.0342313            | .1382704 |
| Qi_6       | .1088843   | .031444   | 3.46  | 0.001 | .0469702             | .1707984 |
| Qi_7       | .2144605   | .0509585  | 4.21  | 0.000 | .1141219             | .3147991 |
| Qi_8       | .1418453   | .081052   | 1.75  | 0.081 | -.017748             | .3014386 |
| Qi_9       | .061053    | .0479879  | 1.27  | 0.204 | -.0334364            | .1555424 |
| Qi_10      | .0864747   | .0518233  | 1.67  | 0.096 | -.0155666            | .188516  |
| _cons      | .1625225   | .0257329  | 6.32  | 0.000 | .1118537             | .2131912 |

(est1 stored)

```

173 .      esttab using "${dta_loc}/ld_reg_2" , nostar label tex replace se
> wide
(output written to /Users/rajdevb/Dropbox/ARE213/Pset3/ld_reg_2.tex)

```

```

174 .
175 .
176 . tempfile clean_dta

177 . save    `clean_dta'
      file /var/folders/fz/p35j_lbjlyx73vng__9d6ync0000gn/T//S_02572.000009 saved

178 .
179 . * =====
      > === *
180 . * le
181 . * =====
      > === *
182 .
183 . * line-level balance tests
184 .      * regression of line-level covariates on shocks
185 .
186 .      use "${dta_lines}", clear

187 .
188 .      eststo clear

189 .
190 .      eststo clear

191 .
192 .      * gen standardized
193 .      summ open

      Variable |      Obs      Mean      Std. Dev.      Min      Max
      -----+-----
      open    |      149    .557047    .4984103         0         1

194 .      gen open_std =open/`r(sd)'

195 .
196 .      eststo: reg  open_std speed [aw=nlinks], vce(robust)
      (sum of wgt is 426)

```

|                   |               |   |        |
|-------------------|---------------|---|--------|
| Linear regression | Number of obs | = | 149    |
|                   | F(1, 147)     | = | 0.11   |
|                   | Prob > F      | = | 0.7461 |
|                   | R-squared     | = | 0.0012 |
|                   | Root MSE      | = | .97887 |

| open_std | Coef.           | Robust<br>Std. Err. | t           | P> t         | [95% Conf. Interval] |                 |
|----------|-----------------|---------------------|-------------|--------------|----------------------|-----------------|
| speed    | <b>.0005566</b> | <b>.0017157</b>     | <b>0.32</b> | <b>0.746</b> | <b>-.002834</b>      | <b>.0039473</b> |
| _cons    | <b>1.088448</b> | <b>.4776513</b>     | <b>2.28</b> | <b>0.024</b> | <b>.1444981</b>      | <b>2.032399</b> |

(**est1** stored)

```
197 .      esttab using "${dta_loc}/1e_panell1_reg" , nostar label tex replac
> e se wide
(output written to /Users/rajdevb/Dropbox/ARE213/Pset3/1e_panell1_reg.tex)
```

```
198 .
199 . * city-level balance test
200 .      * regressions on the shift-share instrument
201 .      use `city_withdeltalines', clear

202 .
203 .      eststo clear

204 .
205 .      summ deltalines
```

| Variable   | Obs        | Mean            | Std. Dev.       | Min      | Max      |
|------------|------------|-----------------|-----------------|----------|----------|
| deltalines | <b>340</b> | <b>.9970588</b> | <b>1.143143</b> | <b>0</b> | <b>7</b> |

```
206 .      gen deltalines_std = deltalines/`r(sd)'

207 .
208 .      eststo: reg deltalines_std dist_beijing, vce(robust)
```

|                   |               |   |               |
|-------------------|---------------|---|---------------|
| Linear regression | Number of obs | = | <b>340</b>    |
|                   | F(1, 338)     | = | <b>2.36</b>   |
|                   | Prob > F      | = | <b>0.1254</b> |
|                   | R-squared     | = | <b>0.0055</b> |
|                   | Root MSE      | = | <b>.99873</b> |

| deltalines~d | Coef.            | Robust<br>Std. Err. | t            | P> t         | [95% Conf. Interval] |                 |
|--------------|------------------|---------------------|--------------|--------------|----------------------|-----------------|
| dist_beijing | <b>-.0001127</b> | <b>.0000733</b>     | <b>-1.54</b> | <b>0.125</b> | <b>-.000257</b>      | <b>.0000316</b> |
| _cons        | <b>1.013566</b>  | <b>.1096256</b>     | <b>9.25</b>  | <b>0.000</b> | <b>.7979314</b>      | <b>1.2292</b>   |

(**est1** stored)



```

209 .          esttab using "${dta_loc}/1e_panel2_reg" , nostar label tex replac
> e se wide
(output written to /Users/rajdevb/Dropbox/ARE213/Pset3/1e_panel2_reg.tex)

210 .
211 . * =====
> === *
212 . * 1f
213 . * =====
> === *
214 .
215 .          * translate .shp file into .dta
216 .          shp2dta using "${dta_loc}/data/chn_admbnda_adm2_ocha.shp", data("ch
> ina_data") coor("china_coordinates") replace
type: 5

217 .
218 .          * Display  $\Delta$ Linesi on the map of China's regions to visualize your tr
> eatment;
219 .          set graph off

220 .
221 .          spmap deltalines using "china_coordinates", id(cityid) title("Number
> of opened railway lines per city") ///
>          legend(on) fcolor(Blues2) clbreaks(0 1 2 3 4 5 6 7 8) clmethod(cust
> om) ///
>          legend(label(1 "0 lines") label(2 "0 lines") label(3 "1 line") label
> (4 "2 lines") label (5 "3 lines") label(6 "4 lines") label(7 "5 lines") lab
> el(8 "6 lines") label(9 "7 lines"))

222 .          graph export "1f_graph1.png", replace
(file /Users/rajdevb/Downloads/1f_graph1.png written in PNG format)

223 .
224 . * =====
> === *
225 . * =====
> === *

```

```

226 . * QUESTION 2
227 . * =====
> === *
228 . * =====
> === *
229 .
230 .
231 .
232 . * =====
> === *
233 . * 2a
234 . * =====
> === *
235 .
236 .
237 . * Compute standard errors clustered by province
238 .
239 . use `clean_dta', clear

240 .
241 . * vce(cluster clustvar) is a generalization of the vce(robust) calcu
> lation
242 . eststo clear

243 . eststo: reg empgrowth deltalines Qi_* , vce(cluster province_enc)

```

```

Linear regression              Number of obs   =          275
                               F(11, 29)       =          18.32
                               Prob > F         =          0.0000
                               R-squared         =          0.2022
                               Root MSE      =          .23352

```

(Std. Err. adjusted for 30 clusters in province\_enc)

| empgrowth  | Coef.    | Robust<br>Std. Err. | t     | P> t  | [95% Conf. Interval] |          |
|------------|----------|---------------------|-------|-------|----------------------|----------|
| deltalines | .0209838 | .0234759            | 0.89  | 0.379 | -.0270298            | .0689973 |
| Qi_1       | -.00063  | .0263325            | -0.02 | 0.981 | -.0544861            | .0532261 |
| Qi_2       | .0076877 | .0374887            | 0.21  | 0.839 | -.0689854            | .0843607 |
| Qi_3       | .0286205 | .0349181            | 0.82  | 0.419 | -.0427951            | .1000361 |
| Qi_4       | .0105053 | .0286559            | 0.37  | 0.717 | -.0481025            | .0691131 |
| Qi_5       | .0520196 | .0577478            | 0.90  | 0.375 | -.066088             | .1701271 |
| Qi_6       | .1088843 | .0331563            | 3.28  | 0.003 | .041072              | .1766966 |
| Qi_7       | .2144605 | .0376289            | 5.70  | 0.000 | .1375008             | .2914202 |
| Qi_8       | .1418453 | .0816687            | 1.74  | 0.093 | -.0251859            | .3088764 |
| Qi_9       | .061053  | .0577329            | 1.06  | 0.299 | -.0570241            | .1791301 |
| Qi_10      | .0864747 | .0454591            | 1.90  | 0.067 | -.0064995            | .1794489 |
| _cons      | .1625225 | .0520617            | 3.12  | 0.004 | .0560443             | .2690006 |

---

(est1 stored)

```
244 .
245 .           esttab using "${dta_loc}/2a_reg" , nostar label tex replace se w
> ide b(4)
(output written to /Users/rajdevb/Dropbox/ARE213/Pset3/2a_reg.tex)

246 .
247 .
248 .
249 . * =====
> === *
250 . * 2b
251 . * =====
> === *
252 .
253 . * Compute spatially-clustered ("Conley") standard errors.
254 . * Describe any choices you have made.
255 .           eststo clear

256 .           eststo: acreg empgrowth deltalines Qi_* , spatial longitude(longitud
> e) latitude(latitude) dist(100)
SPATIAL CORRECTION
DistCutoff: 100
LagCutoff: 0
No HAC Correction
No Absorbed FEs
Included instruments: deltalines Qi_1 Qi_2 Qi_3 Qi_4 Qi_5 Qi_6 Qi_7 Qi_8 Qi_9
> Qi_10

Total (centered) SS      = 17.97635705      Number of obs =      275
Total (uncentered) SS   = 37.47749833      Centered R2    = 0.2022
Residual SS             = 14.34239542      Uncentered R2  = 0.6173
```

---

| empgrowth  | Coef.    | Std. Err. | z     | P> z  | [95% Conf. Interval] |          |
|------------|----------|-----------|-------|-------|----------------------|----------|
| deltalines | .0209838 | .0221476  | 0.95  | 0.343 | -.0224247            | .0643922 |
| Qi_1       | -.00063  | .0258377  | -0.02 | 0.981 | -.051271             | .050011  |
| Qi_2       | .0076877 | .029177   | 0.26  | 0.792 | -.0494983            | .0648736 |
| Qi_3       | .0286205 | .0325804  | 0.88  | 0.380 | -.0352359            | .092477  |
| Qi_4       | .0105053 | .0314412  | 0.33  | 0.738 | -.0511184            | .0721289 |
| Qi_5       | .0520196 | .0439753  | 1.18  | 0.237 | -.0341705            | .1382096 |
| Qi_6       | .1088843 | .0294766  | 3.69  | 0.000 | .0511111             | .1666575 |
| Qi_7       | .2144605 | .0440252  | 4.87  | 0.000 | .1281727             | .3007484 |
| Qi_8       | .1418453 | .0661803  | 2.14  | 0.032 | .0121343             | .2715562 |
| Qi_9       | .061053  | .0455301  | 1.34  | 0.180 | -.0281843            | .1502903 |
| Qi_10      | .0864747 | .0471772  | 1.83  | 0.067 | -.005991             | .1789403 |

---

|       |          |          |      |       |          |          |
|-------|----------|----------|------|-------|----------|----------|
| _cons | .1625225 | .0305963 | 5.31 | 0.000 | .1025548 | .2224901 |
|-------|----------|----------|------|-------|----------|----------|

(est1 stored)

```
257 .          esttab using "${dta_loc}/2b_reg" , nostar label tex replace se w
> ide b(4)
(output written to /Users/rajdevb/Dropbox/ARE213/Pset3/2b_reg.tex)
```

```
258 .
259 . * =====
> === *
260 . * 2c
261 . * =====
> === *
262 .
263 . * generate residuals
264 .          use `clean_dta', clear

265 .          drop if mi(empgrowth) | mi(deltalines)
(65 observations deleted)

266 .
267 .          regress empgrowth Qi_*
```

| Source   | SS         | df  | MS         | Number of obs | = | 275    |
|----------|------------|-----|------------|---------------|---|--------|
| Model    | 3.59107265 | 10  | .359107265 | F(10, 264)    | = | 6.59   |
| Residual | 14.3852844 | 264 | .054489714 | Prob > F      | = | 0.0000 |
| Total    | 17.976357  | 274 | .065607143 | R-squared     | = | 0.1998 |
|          |            |     |            | Adj R-squared | = | 0.1695 |
|          |            |     |            | Root MSE      | = | .23343 |

| empgrowth | Coef.    | Std. Err. | t    | P> t  | [95% Conf. Interval] |          |
|-----------|----------|-----------|------|-------|----------------------|----------|
| Qi_1      | .0076507 | .0225862  | 0.34 | 0.735 | -.0368212            | .0521227 |
| Qi_2      | .0209805 | .0226489  | 0.93 | 0.355 | -.0236149            | .0655759 |
| Qi_3      | .0382195 | .0280039  | 1.36 | 0.173 | -.0169199            | .0933588 |
| Qi_4      | .0176592 | .0351398  | 0.50 | 0.616 | -.0515307            | .0868492 |
| Qi_5      | .0748668 | .0386938  | 1.93 | 0.054 | -.0013208            | .1510544 |
| Qi_6      | .1247488 | .0304867  | 4.09 | 0.000 | .0647209             | .1847768 |
| Qi_7      | .2315522 | .0499598  | 4.63 | 0.000 | .1331817             | .3299226 |
| Qi_8      | .1592532 | .0688565  | 2.31 | 0.022 | .0236755             | .2948309 |
| Qi_9      | .0783255 | .0363013  | 2.16 | 0.032 | .0068487             | .1498023 |
| Qi_10     | .1061033 | .0590335  | 1.80 | 0.073 | -.010133             | .2223396 |
| _cons     | .16166   | .0220004  | 7.35 | 0.000 | .1183414             | .2049786 |

268 . predict res\_y, residuals

269 .

270 . regress deltalines Qi\_\*

| Source   | SS         | df  | MS         | Number of obs | = | 275    |
|----------|------------|-----|------------|---------------|---|--------|
| Model    | 282.101188 | 10  | 28.2101188 | F(10, 264)    | = | 76.46  |
| Residual | 97.4042669 | 264 | .368955556 | Prob > F      | = | 0.0000 |
|          |            |     |            | R-squared     | = | 0.7433 |
|          |            |     |            | Adj R-squared | = | 0.7336 |
| Total    | 379.505455 | 274 | 1.3850564  | Root MSE      | = | .60742 |

| deltalines | Coef.     | Std. Err. | t     | P> t  | [95% Conf. Interval] |          |
|------------|-----------|-----------|-------|-------|----------------------|----------|
| Qi_1       | .3946248  | .0587723  | 6.71  | 0.000 | .2789028             | .5103469 |
| Qi_2       | .63348    | .0589354  | 10.75 | 0.000 | .5174369             | .7495232 |
| Qi_3       | .4574445  | .0728699  | 6.28  | 0.000 | .3139643             | .6009246 |
| Qi_4       | .3409267  | .0914385  | 3.73  | 0.000 | .1608852             | .5209683 |
| Qi_5       | 1.088805  | .1006864  | 10.81 | 0.000 | .890555              | 1.287056 |
| Qi_6       | .7560382  | .0793304  | 9.53  | 0.000 | .5998373             | .912239  |
| Qi_7       | .8145171  | .1300022  | 6.27  | 0.000 | .5585439             | 1.07049  |
| Qi_8       | .8295898  | .1791738  | 4.63  | 0.000 | .4767984             | 1.182381 |
| Qi_9       | .8231357  | .0944607  | 8.71  | 0.000 | .6371434             | 1.009128 |
| Qi_10      | .9354194  | .153613   | 6.09  | 0.000 | .6329569             | 1.237882 |
| _cons      | -.0411011 | .0572481  | -0.72 | 0.473 | -.153822             | .0716198 |

271 . predict res\_d, residuals

272 .

273 . keep cityid res\_y res\_d

274 . duplicates drop

Duplicates in terms of all variables

(0 observations are duplicates)

```

275 .
276 .     count if mi(res_y)
      0

277 .     count if mi(res_d)
      0

278 .
279 .     tempfile residuals

280 .     save    `residuals' // 275 cities with data for y (empgrowth) and d
      > (deltalines)
      file /var/folders/fz/p35j_lbjlyx73vng__9d6ync0000gn/T//S_02572.00000a saved

281 .
282 .
283 . * combine all generated variables to create line-level dataset for main regr
      > ession
284 .     use "${dta_stations}", clear

285 .     gen Sik = 1

286 .     lab var Sik "Indicator: line k passes through city i"

287 .     * bys lineid: egen agg_sk = total(Sik)
288 .
289 .     merge m:1 cityid using `residuals', gen(merge_residuals)

```

| Result      | # of obs.  |                      |
|-------------|------------|----------------------|
| not matched | <b>91</b>  |                      |
| from master | <b>52</b>  | (merge_residuals==1) |
| from using  | <b>39</b>  | (merge_residuals==2) |
| matched     | <b>513</b> | (merge_residuals==3) |

```

290 .           unique cityid if merge_residuals==3
      Number of unique values of cityid is   236
      Number of records is   513

291 .           keep if merge_residuals==3
      (91 observations deleted)

292 .
293 .           bys lineid: gen num_d = Sik * res_d

294 .           bys lineid: gen num_y = Sik * res_y

295 .           bys lineid: egen d_bar = sum(num_d)

296 .           bys lineid: egen y_bar = sum(num_y)

297 .           bys lineid: egen denom = sum(Sik)

298 .           bys lineid: replace d_bar = d_bar/denom
      (501 real changes made)

299 .           bys lineid: replace y_bar = y_bar/denom
      (501 real changes made)

300 .
301 .           gen totobs = _N

302 .           gen sk = denom/totobs

303 .
304 .           keep lineid y_bar d_bar sk

305 .
306 .           duplicates drop

      Duplicates in terms of all variables

      (365 observations deleted)

```

```

307 .
308 .      * merge in open and nlinks
309 .      merge 1:1 lineid using "${dta_lines}"

```

| Result      | # of obs. |                            |
|-------------|-----------|----------------------------|
| not matched | 1         |                            |
| from master | 0         | ( <code>_merge==1</code> ) |
| from using  | 1         | ( <code>_merge==2</code> ) |
| matched     | 148       | ( <code>_merge==3</code> ) |

```

310 .
311 .      lab var y_bar "Exposure-weighted avg of residuals of empgrowth"
312 .      lab var d_bar "Exposure-weighted avg of residuals of dotalines"
313 .
314 .      eststo clear
315 .      eststo: ivregress 2sls y_bar (d_bar=open) i.nlinks [aw=sk] , robust
      (sum of wgt is 1.0000e+00)

```

|  |               |   |        |
|--|---------------|---|--------|
| Instrumental variables (2SLS) regression | Number of obs | = | 148    |
|  | Wald chi2(10) | = | 0.70   |
|  | Prob > chi2   | = | 1.0000 |
|  | R-squared     | = | 0.0152 |
|  | Root MSE      | = | .12767 |

| y_bar  | Coef.     | Robust Std. Err. | z     | P> z  | [95% Conf. Interval] |          |
|--------|-----------|------------------|-------|-------|----------------------|----------|
| d_bar  | .0209838  | .0259665         | 0.81  | 0.419 | -.0299096            | .0718772 |
| nlinks |           |                  |       |       |                      |          |
| 2      | 1.48e-09  | .0326402         | 0.00  | 1.000 | -.0639736            | .0639736 |
| 3      | 2.60e-09  | .0400932         | 0.00  | 1.000 | -.0785813            | .0785813 |
| 4      | 1.52e-09  | .0349928         | 0.00  | 1.000 | -.0685846            | .0685846 |
| 5      | 3.26e-09  | .0535652         | 0.00  | 1.000 | -.1049858            | .1049858 |
| 6      | 1.07e-09  | .0332296         | 0.00  | 1.000 | -.0651288            | .0651288 |
| 7      | 2.20e-09  | .0385387         | 0.00  | 1.000 | -.0755344            | .0755344 |
| 8      | 1.78e-09  | .0693076         | 0.00  | 1.000 | -.1358403            | .1358403 |
| 9      | 2.80e-09  | .0575285         | 0.00  | 1.000 | -.1127537            | .1127537 |
| 18     | 3.04e-09  | .024958          | 0.00  | 1.000 | -.0489168            | .0489168 |
| _cons  | -1.92e-09 | .024958          | -0.00 | 1.000 | -.0489168            | .0489168 |



```
Instrumented: d_bar
Instruments: 2.nlinks 3.nlinks
              4.nlinks 5.nlinks
              6.nlinks 7.nlinks
              8.nlinks 9.nlinks
              18.nlinks open
```

```
(est1 stored)
```

```
316 .      esttab using "${dta_loc}/2c_reg", nstar label tex replace se wi
> de b(4)
(output written to /Users/rajdevb/Dropbox/ARE213/Pset3/2c_reg.tex)
```

```
317 .
```

```
318 .
end of do-file
```

```
319 .
```

```
320 .
```

```
321 .
```

```
322 . log close
      name: <unnamed>
      log: /Users/rajdevb/Desktop/GIT_RajdevBrar/GitHub_are213/ARE213_Fall20
> 23/PSet 3/pset3_logfile.smcl
      log type: smcl
closed on: 20 Nov 2023, 09:58:20
```

---