Group Fixed Effects

June 26, 2022

1 Group Fixed Effects

Suppose that you want to include fixed effects for:

- Each author in a study of article (or patent) citations
- Each board member in a study of performance of firms
- Each team member in a measure of performance of a team

To fix ideas consider a simple dataset of publications and respective citations:

```
[1]: clear all use citations_raw, clear
```

[2]: %browse

| 1. | + |
|----|--|
| | authors AutB;AutC;AutD;AutE;AutF |
| 2. | ++ art_id journa~d citati~s x 2 12 34 3.182043 |
| | authors AutA;AutB;AutC;AutD + |
| 3. | ++ art_id journa~d citati~s x 3 4 22 2.319085 |
| | authors AutA; AutD |

| 4. | art_id 4 | journa~d 4 | citati~s 37 | |
|------------|-----------------|-----------------|------------------|----------------------------|
| | | | aut AutA; | hors AutB |
| ِ ر | | | | |
| 5. | art_id 5 | journa~d 3 | citati~s 29 | x 1263452 |
| | | | aut AutA; | hors AutB |
| 7 | | | | |
| 6. | art_id 6 | journa~d 3 | citati~s 25 | x -1.066023 |
| | | | aut AutA; | hors AutB |
| 7 | | | | |
| 7. | art_id 7 | journa~d 4 | citati~s 34 | x 2.314123 |
| | | | | hors AutB |
| 7 | | | | |
| 8. | art_id 8 | journa~d 6 | | x x 7701448. |
| ا | | | aut AutA; | hors AutB |
| 7 | , | | | |
| 9. | art_id 9 | journa~d 4 | citati~s 32 | |
| | | | aut AutA; | hors AutB |

```
+----
10. | art_id | journa~d | citati~s | x |
  | 10 | 10 | 31 | .7151871 |
                    authors
                   AutA; AutB
11. | art_id | journa~d | citati~s |
  11 | 8 | 39 | .6309603 |
  |-----|
                    authors
                AutA; AutB; AutD
12. | art_id | journa~d | citati~s | x |
  12 | 3 | 27 | .0993462 |
  |-----|
                    authors
                  AutA; AutB
13. | art_id | journa~d | citati~s | x |
  | 13 | 2 | 25 | -2.583632 |
  |-----|
                    authors
                  AutA; AutB
14. | art_id | journa~d | citati~s | x |
  | 14 | 7 | 29 | .6905127 |
                    authors
                  AutA; AutB |
    -----+
15. | art_id | journa~d | citati~s | x |
  | 15 | 8 | 25 | -2.063772 |
                    authors
                   AutA; AutB
```

```
+-----
16. | art_id | journa~d | citati~s | x |
  | 16 | 8 | 32 | -1.246508 |
                    authors
                AutA; AutB; AutE
17. | art_id | journa~d | citati~s | x |
  17 | 3 | 19 | -.6599711 |
                    authors
                   AutA; AutB
18. | art_id | journa~d | citati~s | x |
  | 18 | 6 | 32 | -1.478867 |
  |-----|
                    authors
                  AutA; AutB
19. | art_id | journa~d | citati~s | x |
  19 | 7 | 32 | .3071749 |
  |-----|
                    authors
                   AutB; AutF
20. | art_id | journa~d | citati~s | x |
  20 | 5 | 31 | -.4103581 |
                    authors
            AutB; AutC; AutD; AutE
  +-----+
     ----+
21. | art_id | journa~d | citati~s | x |
  21 | 6 | 32 | -1.235868 |
                    authors
                   AutA; AutB
```

```
+----
22. | art_id | journa~d | citati~s | x |
  | 22 | 5 |
                    34 | -.4452573 |
                     authors
23. | art_id | journa~d | citati~s |
  23 | 8 | 27 | .8285742 |
                    authors
                    AutA; AutC
24. | art_id | journa~d | citati~s | x |
  | 24 | 8 | 42 | .8201761 |
  |-----|
                     authors
25. | art_id | journa~d | citati~s | x |
     25 | 6 | 37 | -.3326353 |
  |-----|
                     authors
                      \mathtt{AutA}
26. | art_id | journa~d | citati~s | x |
  | 26 | 6 | 30 | -.5047406 |
                     authors
                AutA; AutB; AutC |
     ----+
27. | art_id | journa~d | citati~s | x |
  27 | 4 | 23 | .5701295 |
                     authors
                    AutA; AutB
```

```
+----
28. | art_id | journa~d | citati~s | x |
  | 28 | 6 |
                    26 | .5886264 |
                    authors
29. | art_id | journa~d | citati~s | x |
  29 | 6 | 30 | -1.290243 |
                    authors
                      AutA
30. | art_id | journa~d | citati~s | x |
  | 30 | 10 | 33 | -.8219085 |
  |-----|
                    authors
                  AutA; AutB
31. | art_id | journa~d | citati~s | x |
  31 | 7 | 32 | 1.148723 |
  |-----|
                    authors
                   AutA; AutB
32. | art_id | journa~d | citati~s | x |
  | 32 | 6 | 25 | .9319192 |
                    authors
                AutA; AutB; AutC |
     -----+
33. | art_id | journa~d | citati~s | x |
  33 | 5 | 36 | .4637992 |
                    authors
                      AutA
```

```
+-----
34. | art_id | journa~d | citati~s | x |
  | 34 | 3 |
                    35 | -.4446257 |
                    authors
35. | art_id | journa~d | citati~s |
  35 | 9 | 27 | 1.454637 |
                    authors
                      AutA
36. | art_id | journa~d | citati~s | x |
  | 36 | 5 | 37 | .1202357 |
  |-----|
                     authors
               AutA; AutB; AutC
37. | art_id | journa~d | citati~s | x |
  37 | 5 | 45 | .6168431 |
  |-----|
                    authors
                     \mathtt{AutA}
38. | art_id | journa~d | citati~s | x |
  38 | 7 | 28 | -1.154497 |
                    authors
                   AutA;AutB
     -----+
39. | art_id | journa~d | citati~s | x |
  39 | 4 | 39 | -.0999358 |
                     authors
                      AutA
```

```
+----
40. | art_id | journa~d | citati~s | x |
  | 40 | 9 |
                     28 | 1.416823 |
                     authors
41. | art_id | journa~d | citati~s |
   41 | 41 | 24 | 1.066625 |
                      authors
          AutA; AutB; AutC; AutD; AutE
42. | art_id | journa~d | citati~s |
  | 42 | 7 | 27 | -.9381732 |
  |-----|
                      authors
                AutA; AutB; AutC
43. | art_id | journa~d | citati~s | x |
  | 43 | 6 | 16 | -1.436606 |
   |-----|
                     authors
                       \mathtt{AutA}
44. | art id | journa~d | citati~s | x |
  | 44 | 4 | 25 | .8336254 |
                     authors
                      \mathtt{AutA}
     -----+
45. | art_id | journa~d | citati~s | x |
  45 | 4 | 34 | .9235147 |
                     authors
                    AutA; AutB
```

```
+----
46. | art_id | journa~d | citati~s | x |
  | 46 | 4 |
                     25 | .2232714 |
                      authors
                 AutB; AutC; AutD
47. | art_id | journa~d | citati~s |
   | 47 | 13 | 33 | .442765 |
                      authors
             AutA; AutB; AutC; AutD
48. | art_id | journa~d | citati~s | x |
  48 | 9 | 21 | .1972646 |
  |-----|
                      authors
49. | art_id | journa~d | citati~s | x |
  | 49 | 7 | 22 | 1.828233 |
   |-----|
                     authors
                       \mathtt{AutA}
50. | art_id | journa~d | citati~s | x |
  50 | 4 | 33 | .3725476 |
                     authors
            AutA; AutB; AutC; AutD
     -----+
51. | art_id | journa~d | citati~s | x |
  51 | 4 | 33 | -.8173643 |
                      authors
              AutA; AutB; AutC; AutD
```

```
+-----
52. | art_id | journa~d | citati~s | x |
  | 52 | 5 |
                  20 | 1.574457 |
                   authors
               AutA; AutB; AutC
53. | art_id | journa~d | citati~s |
  | 53 | 5 | 39 | 1.716935 |
  |-----|
                  authors
                  AutA; AutB
54. | art_id | journa~d | citati~s | x |
  | 54 | 6 | 34 | .338451 |
  |-----|
                   authors
           AutA; AutB; AutC; AutD
  +----+
55. | art_id | journa~d | citati~s | x |
  55 | 4 | 37 | .0942601 |
  |-----|
                  authors
               AutA; AutB; AutC
  +----+
56. | art_id | journa~d | citati~s | x |
  56 | 5 | 26 | -.914588 |
                  authors
                 AutA; AutB |
    -----+
57. | art_id | journa~d | citati~s | x |
  57 | 11 | 23 | 1.259047 |
                   authors
                     AutA
```

```
-----
58. | art_id | journa~d | citati~s | x |
  | 58 | 6 |
                    36 | -1.000023 |
                     authors
59. | art_id | journa~d | citati~s | x |
  59 | 2 | 31 | -.1631394 |
                    authors
                   AutA; AutB
60. | art_id | journa~d | citati~s | x |
  | 60 | 4 | 32 | .5729514 |
  |-----|
                     authors
               AutA;AutB;AutC
  +----+
61. | art_id | journa~d | citati~s | x |
  61 | 5 | 32 | .5039716 |
  |-----|
                    authors
                     \mathtt{AutA}
62. | art_id | journa~d | citati~s | x |
  | 62 | 4 | 33 | -.3318768 |
                    authors
            AutA; AutB; AutC; AutD
     -----+
63. | art_id | journa~d | citati~s | x |
  63 | 5 | 42 | -1.345239 |
                     authors
             AutA; AutB; AutC; AutD
```

```
-----
64. | art_id | journa~d | citati~s |
   | 64 | 9 | 37 | -.5360869 |
                       authors
                     AutA; AutB
65. | art_id | journa~d | citati~s |
   | 65 | 9 | 25 | .4335161 |
                      authors
          AutB; AutC; AutD; AutE; AutF
66. | art_id | journa~d | citati~s |
   | 66 | 3 | 34 | -.5601428 |
   |-----|
                      authors
67. | art_id | journa~d | citati~s |
   | 67 | 3 | 26 | -.7533434 |
   |-----|
                      authors
       AutA; AutB; AutC; AutD; AutE; AutF
68. | art_id | journa~d | citati~s | x |
   | 68 | 7 | 28 | -.8127742 |
                      authors
                       \mathtt{AutA}
      -----+
69. | art_id | journa~d | citati~s | x |
   69 | 5 | 39 | -.3579273 |
                       authors
                         AutA
```

```
-----
70. | art_id | journa~d | citati~s |
  70 | 7 |
                    27 | -.8320007 |
                     authors
                   AutA; AutB
71. | art_id | journa~d | citati~s | x |
  71 | 5 | 29 | -.7093763 |
                    authors
      AutA; AutB; AutC; AutD; AutE; AutF
72. | art_id | journa~d | citati~s |
  72 | 3 | 36 | -.9649825 |
  |-----|
                    authors
73. | art_id | journa~d | citati~s | x |
  73 | 9 | 26 | .1883628 |
  |-----|
                    authors
                AutA; AutB; AutC
  +----+
74. | art_id | journa~d | citati~s | x |
  74 | 7 | 31 | .7626509 |
                    authors
                AutA; AutB; AutC |
     -----+
75. | art_id | journa~d | citati~s | x |
  75 | 7 | 36 | -1.345739 |
                    authors
                AutA; AutB; AutC
```

```
+----
76. | art_id | journa~d | citati~s |
  | 76 | 2 |
                   33 | -1.415193 |
                   authors
77. | art_id | journa~d | citati~s | x |
  77 | 5 | 22 | -.5878691 |
                   authors
                     AutA
78. | art_id | journa~d | citati~s | x |
  78 | 2 | 26 | -1.290222 |
  |-----|
                    authors
              AutA; AutB; AutC
79. | art_id | journa~d | citati~s | x |
  79 | 6 | 29 | -.3055488 |
  |-----|
                   authors
               AutA; AutB; AutC
  +----+
80. | art_id | journa~d | citati~s | x |
  80 | 4 | 37 | .2425353 |
                   authors
                 AutA;AutB
     -----+
81. | art_id | journa~d | citati~s | x |
  81 | 3 | 35 | -1.138787 |
                    authors
                     AutA
```

```
+-----
82. | art_id | journa~d | citati~s | x |
   | 82 | 10 |
                     24 | 1.237919 |
                      authors
              AutA; AutB; AutC; AutD
83. | art_id | journa~d | citati~s |
   83 | 6 | 30 | 1.462004 |
                      authors
                     AutA; AutB
84. | art_id | journa~d | citati~s |
   | 84 | 7 | 20 | 2.348689 |
   |-----|
                      authors
85. | art_id | journa~d | citati~s |
  | 85 | 4 | 31 | .7492698 |
   |-----|
                      authors
                       \mathtt{AutA}
86. | art_id | journa~d | citati~s | x |
   | 86 | 5 | 30 | .9811502 |
                      authors
             AutA; AutB; AutC; AutD
      -----+
87. | art_id | journa~d | citati~s | x |
   87 | 4 | 39 | .226038 |
                      authors
              AutA; AutB; AutC; AutD
```

```
_____
88. | art_id | journa~d | citati~s | x |
  | 88 | 7 |
                     24 | 1.006857 |
                     authors
                    AutA; AutB
89. | art_id | journa~d | citati~s | x |
   89 | 5 | 24 | -.2218018 |
                     authors
                    AutA; AutB
90. | art_id | journa~d | citati~s | x |
  90 | 6 | 31 | .7223159 |
  |-----|
                     authors
                      \mathtt{AutA}
91. | art_id | journa~d | citati~s |
  91 | 6 | 30 | .2530005 |
   |-----|
                     authors
                      \mathtt{AutA}
92. | art_id | journa~d | citati~s | x |
  92 | 7 | 37 | -1.443321 |
                     authors
                 AutA; AutB; AutC |
     -----+
93. | art_id | journa~d | citati~s | x |
  93 | 4 | 37 | -.9973699 |
                     authors
                    AutA; AutB
```

```
+-----
94. | art_id | journa~d | citati~s | x |
  94 | 2 | 30 | 1.033468 |
                     authors
                AutA; AutB; AutC
95. | art_id | journa~d | citati~s | x |
  95 | 3 | 37 | -1.053058 |
                    authors
                       AutA
96. | art_id | journa~d | citati~s | x |
  96 | 2 | 23 | .3320688 |
  |-----|
                     authors
               AutA;AutB;AutC
97. | art_id | journa~d | citati~s | x |
  97 | 9 | 32 | -.476414 |
  |-----|
                    authors
                   AutA; AutB
98. | art_id | journa~d | citati~s | x |
  98 | 8 | 26 | 1.598897 |
                    authors
                     \mathtt{AutA}
     .----+
99. | art_id | journa~d | citati~s | x |
  99 | 5 | 25 | .8515619 |
                     authors
                AutA; AutB; AutC
```

We can easily run a regression of citation on our explanatory variable x:

[3]: reghdfe citations x estimates store reg_wide_yx

(MWFE estimator converged in 1 iterations)

HDFE Linear regression Number of obs = 100 Absorbing 1 HDFE group F(1, 98) = 1.82 Prob > F = 0.1805 R-squared = 0.0182 Adj R-squared = 0.0082 Within R-sq. = 0.0182 Root MSE = 5.7103

citations | Coef. Std. Err. t P>|t| [95% Conf. Interval]

x | -.7321277 .5428297 -1.35 0.181 -1.809356 .3451002

_cons | 30.50843 .5721567 53.32 0.000 29.373 31.64386

[4]: reghdfe citations x, a(journal) estimates store reg_wide_yxj

(dropped 3 singleton observations)
(MWFE estimator converged in 1 iterations)

HDFE Linear regression Number of obs = 97 Absorbing 1 HDFE group F(1, 87) = 3.76 Prob > F = 0.0556 R-squared = 0.1136 Adj R-squared = 0.0219 Within R-sq. = 0.0415 Root MSE = 5.6921

| citations | Std. Err. | • | | Interval] |
|-----------|-----------|-------|----------------------|-----------|
| x | .6104138 | 0.056 | -2.39752 29.34642 | .0290073 |

Absorbed degrees of freedom:

```
Absorbed FE | Categories - Redundant = Num. Coefs |
------|
journal_id | 9 0 9 |
```

But what if want to add a fixed effect for author? Solution: create a dummy per author. With 6 authors this is easy to do.

```
[5]: local i=1
  foreach au in AutA AutB AutC AutD AutE AutF {
    gen aut`i'=regexm(authors,"`au'")
    local ++i
    }
    save citations_wide, replace
```

(note: file citations_wide.dta not found)
file citations_wide.dta saved

[6]: %browse

```
authors | _est_r~x | _est_r~j | aut1 | aut2 |
         AutA; AutB; AutC; AutD | 1 | 0 | 1 |
                aut4 |
     aut3 |
                           aut5
                                      aut6
                       - 1
              journa~d | citati~s
3. | art_id |
                         22 | 2.319085
  |-----|
                 authors | _est_r~x | _est_r~j | aut1 | aut2 |
              AutA; AutD | 1 | 1 | 1 | 0 |
                           aut5 |
                                      aut6
     aut3
                aut4
              journa~d | citati~s
   art_id |
                      37 | .5314979
        ------
                 authors | _est_r~x | _est_r~j | aut1 | aut2 |
               AutA; AutB | 1 | 1 | 1 | 1 |
                 aut4
      aut3
                            aut5
              journa~d | citati~s | x
3 | 29 | -.1263452
     art_id
                 authors | _est_r~x | _est_r~j | aut1 | aut2 |
               AutA; AutB | 1 | 1 | 1 | 1 |
                aut4 l
                           aut5 l
      aut3
     \mathtt{art}_{\mathtt{id}}
              journa~d | citati~s |
                     | 25 | -1.066023
                 authors | _est_r~x | _est_r~j | aut1 | aut2 |
                AutA; AutB | 1 | 1 | 1 | 1 |
```

| | aut3 0 | | aut4 0 | | aut5 0 | | aut6 0 | |
|-------------|-------------------|----------------|----------------------|----------------|-----------------|----------------|------------------------|----------------------|
| - | + | | | | | | | -+ |
| 7. | art_id 7 | | journa~d 4 | c | itati~s 34 | | x 2.314123 | |
| | | | authors AutB | | _r~x _e 1 | st_r~j 1 | aut1 aut2 0 1 | - I |
| | aut3 0 | | aut4 0 | | aut5 0 | | aut6 0 | - I -+ |
| + | + | | | | | | | -+ |
| 8. | art_id 8 | | journa~d 6 | c | itati~s 35 | | x .7701448 | - |
| | | | authors AutA;AutB | | _r~x _e _1 | st_r~j 1 | aut1 aut2 1 1 | - - |
| - | aut3 0 | | aut4 0 | | aut5 0 | | aut6 0 | -+ |
| + | + | | | | | | | -+ |
| 9. | art_id 9 | | journa~d 4 | c | itati~s 32 | 1 | x .0731317 | |
| | | | authors AutA;AutB | | _r~x _e 1 | st_r~j 1 | aut1 aut2 1 1 | - I - - |
| | aut3 0 | | aut4 0 | | aut5 0 | | aut6 0 | -+ |
| - | + | | | | | | | -+ |
| 10. | art_id 10 | | journa~d 10 | | | | x .7151871 | |
| | | | | | | _ | aut1 aut2 1 1 | |
| - | aut3 0 | | aut4 0 | | aut5 0 | | aut6 0 | |

| 11. | + art_id 11 | | journa~d 8 | citati~s 39 | | x .6309603 |
|-----|---------------------------|----------------|-------------------------|----------------------------|----------------|--------------------------|
| | ' | Au | authors tA;AutB;AutD | _est_r~x | _ | aut1 aut2 1 1 |
| - | aut3 0 + | | aut4 1 | aut5 0 | | aut6 0 |
| 12. | + art_id | | journa~d | citati~s | | + x |
| | 12 | i | 3 | 27 | Ì | .0993462 |
| | | | authors AutA;AutB | _est_r~x _e 1 | _ | aut1 |
| _ | aut3 0 | | aut4 0 | aut5 0 | | aut6 0 |
| | | | | | | |
| 13. | art_id 13 | | journa~d 2 | citati~s 25 | | x -2.583632 |
| | | | authors AutA;AutB | _est_r~x | | aut1 aut2 1 1 |
| _ | aut3 0 | | aut4 0 | aut5 0 | | aut6 0 |
| | | | | | | |
| 14. | art_id 14 | | journa~d 7 | citati~s 29 | | x .6905127 |
| | | | authors AutA;AutB | _est_r~x | - | aut1 aut2 1 1 |
| _ | aut3 0 | | aut4 0 | aut5 0 | | aut6 0 |
| | | | | | | |
| 15. | + art_id 15 | | journa~d 8 | citati~s 25 | | x -2.063772 |
| | | | | r | | |

| | | | authors AutA;AutB | | st_r~x _ 1 | est_r~j 1 | aut1 aut2 1 : | 2 1 |
|-----|----------------|-----------|-------------------------|-----------|-----------------|------------------|------------------------|-----------------------|
| | aut3 0 | | aut4 0 | | aut5 0 | | aut6 0 | |
| | + | | | | | | | + |
| 16. | art_id 16 | | journa~d 8 | | citati~s 32 | | x -1.246508 | 1 |
| | | Au | authors tA;AutB;AutE | | | est_r~j 1 | aut1 aut2 | 2 1 |
| | aut3 0 | | aut4 0 | | aut5 1 | | aut6 0 | |
| | + | | | | | | | + |
| 17. | art_id 17 | | journa~d 3 | | citati~s 19 | | x 6599711 | |
| | | | authors AutA;AutB | | st_r~x _ 1 | est_r~j 1 | aut1 aut2 | 2 1 |
| | aut3 0 | | aut4 0 | | aut5 0 | | aut6 0 | + |
| | + | | | | | | | + |
| 18. | art_id 18 | | journa~d 6 | | citati~s 32 | | x -1.478867 | |
| | | | authors AutA;AutB | | | _ | aut1 aut2 1 2 | 2 1 |
| | aut3 0 | | aut4 0 | | aut5 0 | | aut6 0 | |
| | + | | | | | | | + |
| 19. | art_id 19 | | journa~d 7 | | citati~s 32 | | x .3071749 | |
| | | | authors AutB;AutF | | | est_r~j 1 | aut1 aut2 0 3 | 2 1 |
| | aut3 | | aut4 | | aut5 | I | aut6 | ı |

| | 0 | 1 | 0 | 1 | 0 | 1 | 1 |
|-----|-------------------|-----------|-------------------------|-----------|---------------|--------------|--------------------------|
| - | + | | | | | | |
| 20. | art_id 20 | | journa~d 5 | ci | tati~s 31 | | x 4103581 |
| | | AutB;Au | authors tC;AutD;AutE | | | est_r~j 1 | aut1 aut2 0 1 |
| _ | aut3 1 | | aut4 1 | | aut5 1 | | aut6 0 |
| - | + | | | | | | |
| 21. | art_id 21 | | journa~d 6 | ci | tati~s 32 | | x -1.235868 |
| | | | authors AutA;AutB | | | est_r~j 1 | aut1 aut2 1 1 |
| _ | aut3 | | aut4 0 | | aut5 0 | | aut6 0 |
| - | + | | | | | | |
| 22. | art_id 22 | | journa~d 5 | ci | tati~s 34 | l I | x 4452573 |
| | ' | | authors AutA | | r~x _6 1 | est_r~j 1 | aut1 aut2 1 0 |
| | aut3 0 | | aut4 0 | | aut5 0 | | aut6 0 |
| _ | + | | | | | | |
| 23. | art_id 23 | | journa~d 8 | | | | x .8285742 |
| | | | authors AutA;AutC | | | | aut1 aut2 1 0 |
| | aut3 1 | | aut4 0 | | aut5 0 | | aut6 0 |
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| 24. | art_id 24 | | journa~d 8 | citati~s 42 | .8 | x 201761 |
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| | aut3 0 | | aut4 0 | aut5 0 | | aut6 0 |
| 25. | · | | • | citati~s | | x |
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| 26. | art_id 26 | | journa~d 6 | citati~s 30 | 5 | x 047406 |
| | | Aut | authors A;AutB;AutC | _est_r~x _es | | |
| | aut3 1 | | aut4 0 | aut5 0 | | aut6 0 |
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| 27. | art_id 27 | | journa~d 4 | citati~s 23 | .5 | x 701295 |
| | | | authors AutA;AutB | _est_r~x _es [;] | | |
| | aut3 0 | | aut4 0 | aut5 0 | | aut6 0 |
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| 28. | art_id 28 | | journa~d 6 | citati~s 26 | | x 886264 |
| | i I | | authors | _est_r~x _es | t_r~j a | ut1 aut2 |

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| 29. | art_id 29 | 1 | journa~d 6 | | citati~s 30 | | | k 3 |
| | | | authors AutA | | t_r~x _ | est_r~j 1 | | aut2 0 |
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| 30. | art_id 30 | | journa~d 10 | | citati~s 33 | | 8219085 | k 5 |
| | | | authors AutA;AutB | | t_r~x _ | | aut1 1 | aut2 1 |
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| 31. | art_id 31 | | journa~d 7 | | citati~s 32 | | 1.148723 | k 3 |
| | | | authors AutA;AutB | | t_r~x _ | est_r~j 1 | | |
| | aut3 0 | | aut4 0 | | aut5 0 | | aut6 0 | |
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| 32. | art_id 32 | | journa~d 6 | | citati~s 25 | | .9319192 | k 2 |
| | | Au | authors tA;AutB;AutC | | t_r~x _ | _ | aut1 1 | aut2 1 |
| | aut3 1 | | aut4 0 | | aut5 0 | | aut6 0 | |

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| 33. | + art_id 33 | | journa~d 5 | citati~s 36 | | x .4637992 |
| | | | | + _est_r~x | _ | aut1 aut2 1 0 |
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| 34. | + art_id 34 | | journa~d 3 | citati~s 35 | | x 4446257 |
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| 35. | art_id 35 | l I | journa~d 9 | citati~s 27 | | x 1.454637 |
| 35. | - | | 9 authors | 27 + | est_r~j | |
| 35. | - | | 9 authors | 27 + _est_r~x _ | est_r~j 1 | 1.454637 aut1 aut2 |
| 35. | 35 | | authors AutA aut4 0 | 27 | est_r~j 1 | 1.454637 aut1 aut2 1 0 aut6 |
| 35. | 35 | | authors AutA aut4 0 journa~d 5 | 27 | est_r~j 1 | 1.454637 |
| - | 35 | | authors AutA aut4 0 journa~d 5 authors | 27 + | est_r~j 1 | 1.454637 |
| - | 35 | | 9 | 27 + | | 1.454637 aut1 aut2 1 0 0 0 0 0 0 0 0 0 |
| - | 35 | | 9 | 27 + | | 1.454637 aut1 aut2 1 0 0 0 0 0 0 0 0 0 |

| | 37 | 1 | 5 | 45 | I | .6168431 |
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| | | | authors | _est_r~x | st_r~j | aut1 aut2 |
| | <u> </u> | | AutA | 1 | 1 | 1 0 |
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| 38. | + art_id | | journa~d | citati~s | | x |
| | 38 | I | 7 | 28 | l | -1.154497 |
| | | | authors | _est_r~x | st_r~j | aut1 aut2 |
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| 39. | art_id | 1 | journa~d | citati~s | | x |
| | 39 | | 4 | 39 | | 0999358 |
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| 40. | art_id | 1 | journa~d | citati~s | | x |
| | 40 | l | 9 | 28 | | 1.416823 |
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| 41. | | | | citati~s | | x |
| | 41 | | 4 | 24 | | 1.066625 |
| | | | authors | _est_r~x | st_r~j | aut1 aut2 |
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| 42. | art_id | 1 | journa~d | citati~s | 1 | x I |
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| 43. | art_id | I | journa~d | citati~s | 1 | x I |
| | 43 | | 6 | 16 | <u> </u> | -1.436606 |
| | | | authors | est r~x | est r~i | aut1 |
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| 44. | art_id | | journa~d | citati~s | | x |
| | 44 | ĺ | 4 | 25 | | .8336254 |
| | | | authors | + Ast r~y | est r~i | aut1 |
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| 45. | art_id | 1 | journa~d | citati~s | 1 | x I |
| | 45 | I | 4 | 34 | I | .9235147 |
| | | | authors | est r~x | est r~i | aut1 |
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| 46. | art_id 46 | | journa~d 4 | citati~s 25 | | x .2232714 | |
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| | | Au | authors tB;AutC;AutD | _est_r~x _6 1 | • | | 2 L |
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| 47. | + art id | | journa~d | citati~s | I | x | + I |
| 11. | 47 | | 13 | 33 | i | .442765 | |
| | | AutA;Au | authors tB;AutC;AutD | _est_r~x | _ | | |
| | aut3 1 | | aut4 1 | aut5 0 | | aut6 0 | · - |
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| 48. | art_id 48 | | journa~d 9 | citati~s 21 | | x .1972646 | |
| | | | authors AutA | _est_r~x | _ | aut1 | |
| | aut3 0 | | aut4 0 | aut5 0 | | aut6 0 | |
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| 49. | art_id 49 | | journa~d 7 | citati~s 22 | | x 1.828233 | |
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| | aut3 0 | | aut4 0 | aut5 0 | | aut6 0 | |
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| 50. | art_id 50 | | journa~d 4 | citati~s 33 | | x .3725476 | |

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authors | _est_r~x | _est_r~j | aut1 | aut2 |
          AutA; AutB; AutC; AutD | 1 | 1 | 1 |
                aut4 |
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                           aut5
                                      aut6
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              journa~d | citati~s
51. | art_id |
                         33 | -.8173643
      51
   ______
                 authors | _est_r~x | _est_r~j | aut1 | aut2 |
         AutA; AutB; AutC; AutD | 1 | 1 | 1 | 1 |
                                      aut6
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                 aut4
                           aut5 |
    art_id |
              journa~d | citati~s
      52
               5
                      | 20
                                 1.574457
              -----|
                 authors | _est_r~x | _est_r~j | aut1 | aut2 |
             AutA; AutB; AutC | 1 | 1 | 1 | 1 |
                 aut4
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53. l
     art_id
              journa~d | citati~s |
                      39 | 1.716935
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      53
                 authors | _est_r~x | _est_r~j | aut1 | aut2 |
                AutA; AutB | 1 | 1 | 1 | 1 |
      aut3
                aut4 l
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| 34 | .338451
54.
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                 authors | _est_r~x | _est_r~j | aut1 | aut2 |
          AutA; AutB; AutC; AutD | 1 | 1 | 1 | 1 |
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| 55. | art_id 55 | l I | journa~d 4 | citat | ti~s 37 | | x .0942601 | |
| | | Au | authors tA;AutB;AutC | | κ _e: L | st_r~j 1 | aut1 aut2 1 : | 2 1 |
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| 56. | art_id 56 | | journa~d 5 | citat | zi~s 26 | | x 914588 | |
| | ' | | authors AutA;AutB | | c _e: L | st_r~j 1 | aut1 aut2 1 : | 2 1 |
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| 57. | art_id 57 | | journa~d 11 | citat | i~s 23 | | x 1.259047 | |
| | | | authors AutA | | c _e: L | st_r~j 0 | aut1 | 2 0 |
| | aut3 0 | | aut4 0 | a | aut5 0 | | aut6 0 | |
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| 58. | art_id 58 | | journa~d 6 | | | | x -1.000023 | |
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| 59. | + art_id 59 | | journa~d 2 | citati~s 31 | x 1631394 |
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| | | | authors AutA;AutB | | st_r~j aut1 aut2 1 1 1 |
| - | aut3 aut3 0 | | aut4 0 | aut5 0 | aut6 0 |
| 60. | + art_id 60 | | journa~d 4 | citati~s | x x .5729514 |
| | | Au | authors | | st_r~j aut1 aut2 1 1 1 |
| - | aut3 1 | | aut4 0 | aut5 0 | aut6 0 |
| 61. | + art_id 61 | | journa~d 5 | citati~s | x .5039716 |
| | | | authors AutA | | st_r~j aut1 aut2 1 1 0 |
| - | aut3 0 | | aut4 0 | aut5 0 | aut6 0 |
| 62. | + art_id 62 | | journa~d 4 | citati~s | x 3318768 |
| | | AutA;Au | authors tB;AutC;AutD | | st_r~j aut1 aut2 1 1 1 |
| | aut3 1 | | aut4 1 | | aut6 0 |
| 63. | + art_id 63 | | journa~d 5 | citati~s 42 | x -1.345239 |
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authors | _est_r~x | _est_r~j | aut1 | aut2 |
         AutA; AutB; AutC; AutD | 1 | 1 | 1 | 1 |
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64.
      art_id | journa~d | citati~s
           9 | 37 | -.5360869
      64
                 authors | _est_r~x | _est_r~j | aut1 | aut2 |
               AutA; AutB | 1 | 1 | 1 | 1 |
             | aut4 | aut5 | aut6 | 0 | 0
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                 authors | _est_r~x | _est_r~j | aut1 | aut2 |
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                        66. I
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     66 | 3 | 34 | -.5601428
                  authors | _est_r~x | _est_r~j | aut1 | aut2 |
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67. | art_id | journa~d | citati~s |
                  authors | _est_r~x | _est_r~j | aut1 | aut2 |
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| 68. | art_id 68 | | journa~d 7 | citati~s 28 | | x 8127742 |
| | | ' | | t | | .0127742 |
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| 69. | art_id 69 | | journa~d 5 | citati~s 39 | | x 3579273 |
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| 70. | art_id 70 | | journa~d 7 | citati~s 27 | | x 8320007 |
| | | | authors AutA;AutB | | _ | aut1 aut2 1 1 1 |
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| 71. | art_id 71 | | journa~d 5 | citati~s 29 | | x 7093763 |
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| | aut3 1 | | aut4 1 | aut5 | | aut6 1 |
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| 72. | art_id 72 | journa~d 3 | citati~s 36 | x 9649825 |
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| 73. | + art_id 73 | journa~d 9 | citati~s 26 | + x .1883628 |
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| 74. | art_id 74 | journa~d 7 | citati~s 31 | x .7626509 |
| | | autho AutA;AutB;Au | | est_r~j aut1 aut2 1 1 1 |
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| 75. | art_id 75 | journa~d 7 | citati~s 36 | x -1.345739 |
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| 76. | art_id 76 | _ | citati~s 33 | |
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| 11. | art_rd 77 | i | 5 | | 22 | İ | 5878691 | • |
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| 78. | art_id 78 | | journa~d 2 | c: | itati~s 26 | | x -1.290222 | • |
| | | Au | authors tA;AutB;AutC | | | _ | aut1 1 | |
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| 79. | art_id 79 | | journa~d 6 | c | itati~s 29 | | x 3055488 | • |
| | | Au | authors tA;AutB;AutC | | | st_r~j 1 | aut1 1 | |
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| 80. | art_id 80 | | journa~d 4 | | | | x .2425353 | • |
| | | | authors AutA;AutB | | | st_r~j 1 | aut1 1 | aut2 1 |
| | aut3 0 | | aut4 0 | | aut5 0 | | aut6 0 | |

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| 81. | + art_id 81 | | journa~d 3 | citati~s 35 | | x -1.138787 |
| | | | authors AutA | | _ | aut1 aut2 1 0 |
| | aut3 0 | | aut4 0 | aut5 0 | | aut6 0 |
| 82. | + art_id 82 | | journa~d 10 | citati~s 24 | | x 1.237919 |
| | | AutA; Au | authors tB;AutC;AutD | | est_r~j 1 | aut1 aut2 1 1 |
| _ | aut3 1 | | aut4 1 | aut5 0 | | aut6 0 |
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| 83. | art_id 83 | | journa~d 6 | citati~s 30 | | x 1.462004 |
| 83. | - | | 6 | 30 + _est_r~x _ | est_r~j 1 | 1.462004 aut1 aut2 |
| 83. | - | | 6 authors | 30 + _est_r~x _ | _ | 1.462004 aut1 aut2 |
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| 83. | 83 | | authors AutA; AutB aut4 0 journa~d 7 | 30 | 1 | 1.462004 |
| | 83 | | authors AutA; AutB aut4 0 journa~d 7 authors | 30 | 1 | 1.462004 |
| | 83 | | 6 | 30 | 1 | 1.462004 |
| | 83 | | 6 | 30 | 1 | 1.462004 |

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| 86. | art_id 86 | | journa~d 5 | citati~s 30 + | | x .9811502 | |
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| 87. | art_id 87 | | journa~d 4 | citati~s 39 | | x .226038 | |
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| 88. | art_id 88 | | journa~d 7 | citati~s 24 | | x 1.006857 | |
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| 89. | art_id 89 | | journa~d 5 | citati~s 24 | | x 2218018 | +- |
| | | | authors AutA;AutB | _est_r~x | est_r~j 1 | | 2 1 |

| - | aut3 0 | | aut4 0 | aut5 0 | | aut6 0 |
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| 90. | + art_id 90 | | journa~d 6 | | | x .7223159 |
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| 91. | + art_id 91 | | journa~d 6 | citati~s 30 | | x .2530005 |
| | | ' | authors | + | _est_r~j | aut1 aut2 1 0 |
| - | aut3 0 | | aut4 0 | aut5 | | aut6 0 |
| 92. | + art_id 92 | | journa~d 7 | citati~s 37 | | x -1.443321 |
| | | Au | authors tA;AutB;AutC | | _ | aut1 aut2 1 1 |
| _ | aut3 1 | | aut4 0 | aut5 0 | | aut6 0 |
| 93. | + art_id 93 | | journa~d 4 | | | + x 9973699 |
| | | | authors AutA;AutB | | | aut1 aut2 1 1 |
| <u>-</u> | aut3 aut3 | | aut4 0 | | | aut6 0 |

| 94. | art_id 94 | | journa~d 2 | citati~s 30 | | x 1.033468 | + |
|-----|-------------------|-----------|-------------------------|----------------------|---------------|---------------|-----------------|
| | | Au | authors tA;AutB;AutC | _est_r~x | st_r~j 1 | | 2 1 |
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| 95. | art_id 95 | | journa~d 3 | citati~s 37 | -: | x 1.053058 | |
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| | aut3 0 | | aut4 0 | aut5 0 | | aut6 0 | I |
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| 96. | art_id 96 | | journa~d 2 | citati~s 23 | | x .3320688 | |
| | | Au | authors tA;AutB;AutC | _est_r~x | - | | 2 1 |
| | aut3 1 | | aut4 0 | aut5 0 | | aut6 0 | |
| | | | | | | | |
| 97. | art_id 97 | | journa~d 9 | citati~s 32 | | x 476414 | |
| | | | authors AutA;AutB | _est_r~x _e | _ | | 2 1 |
| _ | aut3 0 | | aut4 0 | aut5 0 | | aut6 0 | |
| - | + | | | | | | + |
| 98. | art_id 98 | | journa~d 8 | citati~s 26 | I I : | x 1.598897 | |

authors | _est_r~x | _est_r~j | aut1 | aut2 | AutA | 1 | 1 | 1 | aut4 | aut5 1 aut3 aut6 - 1 journa~d | citati~s 99. I art_id 99 25 | .8515619 authors | _est_r~x | _est_r~j | aut1 | aut2 | AutA; AutB; AutC | 1 | 1 | 1 | aut3 aut4 aut5 aut6 100. art_id journa~d | citati~s | 100 ______ authors | _est_r~x | _est_r~j | aut1 | aut2 | AutA; AutB | 1 | 1 | 1 | aut4 aut5 aut6 aut3

We are now able to run the regression adding a fixed effect per author

[7]: reghdfe citations x aut1-aut6, a(journal) estimates store reg_wide_yxja

(dropped 3 singleton observations)
(MWFE estimator converged in 1 iterations)

HDFE Linear regression
Absorbing 1 HDFE group

Number of obs = 97
F(7, 81) = 0.85
Prob > F = 0.5477
R-squared = 0.1387
Adj R-squared = -0.0208
Within R-sq. = 0.0686
Root MSE = 5.8151

| _ | | | | | | | |
|---|-----------------|----------------------|----------------------|----------------|----------------|------------------------|----------------------|
| | citations | Coef. | Std. Err. | t | P> t | [95% Conf. | Interval] |
| _ | x aut1 | -1.339499 9999574 | .6417399 3.024211 | -2.09 -0.33 | 0.040 0.742 | -2.61636 -7.017189 | 062638 5.017274 |
| | aut2 | 2533989 | 1.490441 | -0.17 | 0.865 | -3.218908 | 2.71211 |
| | aut3 aut4 | 5722966 .5879442 | 1.677897 2.218738 | -0.34 0.26 | 0.734 0.792 | -3.910785 -3.826648 | 2.766192 5.002536 |
| | aut5 | -4.489337 | 3.385103 | -1.33 | 0.188 | -11.22463 | 2.245957 |
| | aut6 _cons | 2.017592 31.91177 | 3.927387 3.194075 | 0.51 9.99 | 0.609 0.000 | -5.796676 25.55656 | 9.83186 38.26698 |
| | | | | | | | |

Absorbed degrees of freedom:

| | J | - Redundant | | + |
|------------|-----|-------------|---|------------|
| journal_id | J 9 | 0 | 9 | |

Note: I need to explicitly introduce a dummy per author!

This works because we have a small dataset. But what if my dataset is large?

Solution: use **reghdfe** with the **group** option

First we need to reshape the data and put it in an article-author line format (long shape)

```
[8]: reshape long aut, i(art_id) j(j)
drop if aut==0
drop aut
rename j author_id
drop authors _est*
save citations_long, replace
```

(note: j = 1 2 3 4 5 6)

| Data | wide -> long | |
|--|-----------------------|--|
| Number of obs. | 100 -> 600 | |
| Number of variables | 14 -> 10 | |
| <pre>j variable (6 values xij variables:</pre> | -> j | |
| | aut1 aut2 aut6 -> aut | |
| | | |

(374 observations deleted)

(note: file citations_long.dta not found)
file citations_long.dta saved

[9]: %browse

| _ | + | | | | |
|------------|-------------------|----------|----------|----------|------------------------|
| | ' art_id | author~d | journa~d | citati~s | , x l |
| 1. | 1 | 2 | 4 | 38 | -1.096598 |
| 2. | 1 | 3 | 4 | 38 | -1.096598 |
| 3. | 1 | 4 | 4 | 38 | -1.096598 |
| 4. | 1 | 5 | 4 | 38 | -1.096598 |
| 5. | 1 | 6 | 4 | 38 | -1.096598 |
| C | | | | | |
| 6. | 2 | 1 | 12 | 34 | 3.182043 |
| 7. | 2 | 2 | 12 | 34 | 3.182043 |
| 8. | 2 | 3 | 12 | 34 | 3.182043 |
| 9. | 2 | 4 | 12 | 34 | 3.182043 |
| 10. | 3 | 1 | 4 | 22 | 2.319085 |
| 11. | 3 | 4 | 4 | 22 | 2.319085 |
| 12. | 4 | 1 | 4 | 37 | .5314979 |
| 13. | 4 | 2 | 4 | 37 | .5314979 |
| 14. | J 5 | 1 | 3 | 29 | 1263452 |
| 15. | J 5 | 2 | 3 | 29 | 1263452 |
| 16. | | | | | -1.066023 |
| 16. 17. | 6 | 1 2 | 3 | 25 | |
| | 6 | | 3 | 25 | -1.066023 |
| 18. | 7 | 2 | 4 | 34 | 2.314123 |
| 19. | 8 0 | 1 | 6 | 35 | .7701448 |
| 20. | 8 | 2 | 6 | 35 | .7701448 |
| 21. | 9 | 1 | 4 | 32 | .0731317 |
| 22. | 9 | 2 | 4 | 32 | .0731317 |
| 23. | 10 | 1 | 10 | 31 | .7151871 |
| 24. | 10 | 2 | 10 | 31 | .7151871 |
| 25. | 11 | 1 | 8 | 39 | .6309603 |
| 26. | 11 | 2 | 8 | 39 | .6309603 |
| 26. 27. | | | | | .6309603 |
| | 11 | 4 | 8 | 39 | |
| 28. | 12 | 1 2 | | 27 27 | .0993462 .0993462 |
| 29. | 12 | 1 | 3 2 | 27 | |
| 30. | 13 | 1 | 2 | 25 | -2.583632 |

| | l | | | | 1 |
|------------|----------|-------|-------|----------|-----------|
| 31. | | 2 | 2 | 25 | -2.583632 |
| 32. | 14 | 1 | 7 | 29 | .6905127 |
| | | 2 | | | .6905127 |
| 33. | 14 | | 7 | 29 25 | |
| 34. | 15 | 1 | 8 | 25 | -2.063772 |
| 35. | 15 | 2 | 8 | 25 | -2.063772 |
| 36. | 16 | 1 | 8 | 32 | -1.246508 |
| 37. | 16 | 2 | 8 | 32 | -1.246508 |
| 38. | 16 | 5 | 8 | 32 | -1.246508 |
| 39. | 17 | 1 | 3 | 19 | 6599711 |
| 40. | 17 | 2 | 3 | 19 | 6599711 |
| | | | | | |
| 41. | 18 | 1 | 6 | 32 | -1.478867 |
| 42. | 18 | 2 | 6 | 32 | -1.478867 |
| 43. | 19 | 2 | 7 | 32 | .3071749 |
| 44. | 19 | 6 | 7 | 32 | .3071749 |
| 45. | 20 | 2 | 5 | 31 | 4103581 |
| 46. | | າ | | 21 | 4103581 |
| 40. 47. | 20 | 3 | 5 | 31 | |
| | 20 | 4 | 5 | 31 | 4103581 |
| 48. | 20 | 5 | 5 | 31 | 4103581 |
| 49. | 21 | 1 | 6 | 32 | -1.235868 |
| 50. | 21 | 2 | 6 | 32 | -1.235868 |
| 51. | l 22 | 1 | 5 | 34 | 4452573 |
| 52. | 23 | 1 | 8 | 27 | .8285742 |
| 53. | 23 | 3 | 8 | 27 | .8285742 |
| 54. | 24 | 1 | 8 | 42 | .8201761 |
| 55. | 25 | 1 | 6 | 37 | 3326353 |
| F.0 | | | | | |
| 56. | 26 | 1 | 6 | 30 | 5047406 |
| 57. | 26 | 2 | 6 | 30 | 5047406 |
| 58. | 26 | 3 | 6 | 30 | 5047406 |
| 59. | 27 | 1 | 4 | 23 | .5701295 |
| 60. | 27 | 2 | 4 | 23 | .5701295 |
| 61. | 28 | 1 | 6 | 26 | .5886264 |
| 62. | 29 | 1 | 6 | 30 | -1.290243 |
| 63. | 30 | 1 | 10 | 33 | 8219085 |
| 64. | 30 | 2 | 10 | 33 | 8219085 |
| 65. | 31 | 1 | 7 | 32 | 1.148723 |
| | | | | | |
| 66. | 31 | 2 | 7 | 32 | 1.148723 |
| 67. | 32 | 1 | 6 | 25 | .9319192 |
| 68. | 32 | 2 | 6 | 25 | .9319192 |
| 69. | 32 | 3 | 6 | 25 | .9319192 |
| 70. | 33 | 1 | 5 | 36 | .4637992 |

| | l | | | | 1 |
|------|----------|---|----|----|-------------|
| 71. | 34 | 1 | 3 | 35 | 4446257 |
| 72. | 35 | 1 | 9 | 27 | 1.454637 |
| 73. | 36 | 1 | 5 | 37 | .1202357 |
| 74. | 36 | 2 | 5 | 37 | .1202357 |
| 75. | 36 | 3 | 5 | 37 | .1202357 |
| 10. | , 00 | | | | 1202007 |
| 76. | 37 | 1 | 5 | 45 | .6168431 |
| 77. | 38 | 1 | 7 | 28 | -1.154497 |
| 78. | 38 | 2 | 7 | 28 | -1.154497 |
| 79. | 39 | 1 | 4 | 39 | 0999358 |
| 80. | 40 | 1 | 9 | 28 | 1.416823 |
| | , | | | | |
| 81. | 41 | 1 | 4 | 24 | 1.066625 |
| 82. | 41 | 2 | 4 | 24 | 1.066625 |
| 83. | 41 | 3 | 4 | 24 | 1.066625 |
| 84. | 41 | 4 | 4 | 24 | 1.066625 |
| 85. | 41 | 5 | 4 | 24 | 1.066625 |
| | | | | | · |
| 86. | 42 | 1 | 7 | 27 | 9381732 |
| 87. | 42 | 2 | 7 | 27 | 9381732 |
| 88. | 42 | 3 | 7 | 27 | 9381732 |
| 89. | 43 | 1 | 6 | 16 | -1.436606 |
| 90. | 44 | 1 | 4 | 25 | .8336254 |
| | | | | | |
| 91. | 45 | 1 | 4 | 34 | .9235147 |
| 92. | 45 | 2 | 4 | 34 | .9235147 |
| 93. | 46 | 2 | 4 | 25 | .2232714 |
| 94. | 46 | 3 | 4 | 25 | .2232714 |
| 95. | 46 | 4 | 4 | 25 | .2232714 |
| | | | | | |
| 96. | 47 | 1 | 13 | 33 | .442765 |
| 97. | 47 | 2 | 13 | 33 | .442765 |
| 98. | 47 | 3 | 13 | 33 | .442765 |
| 99. | 47 | 4 | 13 | 33 | .442765 |
| 100. | 48 | 1 | 9 | 21 | .1972646 |
| | | | | | |
| 101. | 49 | 1 | 7 | 22 | 1.828233 |
| 102. | 50 | 1 | 4 | 33 | .3725476 |
| 103. | 50 | 2 | 4 | 33 | .3725476 |
| 104. | 50 | 3 | 4 | 33 | .3725476 |
| 105. | 50 | 4 | 4 | 33 | .3725476 |
| | | | | | |
| 106. | 51 | 1 | 4 | 33 | 8173643 |
| 107. | 51 | 2 | 4 | 33 | 8173643 |
| 108. | 51 | 3 | 4 | 33 | 8173643 |
| 109. | 51 | 4 | 4 | 33 | 8173643 |
| 110. | 52 | 1 | 5 | 20 | 1.574457 |
| | | | | | |

| ĺ | | | | | |
|------|--------------------|----------|-------|----------|-----------|
| 111. | 52 | 2 | 5 | 20 | 1.574457 |
| 112. | 52 | 3 | 5 | 20 | 1.574457 |
| 113. | 53 | 1 | 5 | 39 | 1.716935 |
| 114. | 53 | 2 | 5 | 39 | 1.716935 |
| | 54 | 1 | | | |
| 115. | 5 4 | 1 | 6 | 34 | .338451 |
| 116. | 54 | 2 | 6 | 34 | .338451 |
| 117. | 54 | 3 | 6 | 34 | .338451 |
| 118. | 54 | 4 | 6 | 34 | .338451 |
| | 55 | 1 | 4 | | .0942601 |
| 119. | | | | 37 27 | |
| 120. | 55 | 2 | 4 | 37 | .0942601 |
| 121. | 55 | 3 | 4 | 37 | .0942601 |
| 122. | 56 | 1 | 5 | 26 | 914588 |
| 123. | 56 | 2 | 5 | 26 | 914588 |
| 124. | 57 | 1 | 11 | 23 | 1.259047 |
| 125. | 58 | 1 | 6 | 36 | -1.000023 |
| 120. | | <u> </u> | | | |
| 126. | 59 | 1 | 2 | 31 | 1631394 |
| 127. | 59 | 2 | 2 | 31 | 1631394 |
| 128. | 60 | 1 | 4 | 32 | .5729514 |
| 129. | 60 | 2 | 4 | 32 | .5729514 |
| 130. | 60 | 3 | 4 | 32 | .5729514 |
| 100. | | | | | 1 |
| 131. | 61 | 1 | 5 | 32 | .5039716 |
| 132. | 62 | 1 | 4 | 33 | 3318768 |
| 133. | 62 | 2 | 4 | 33 | 3318768 |
| 134. | 62 | 3 | 4 | 33 | 3318768 |
| 135. | 62 | 4 | 4 | 33 | 3318768 |
| | | - | - | | |
| 136. | 63 | 1 | 5 | 42 | -1.345239 |
| 137. | 63 | 2 | 5 | 42 | -1.345239 |
| 138. | 63 | 3 | 5 | 42 | -1.345239 |
| 139. | 63 | 4 | 5 | 42 | -1.345239 |
| 140. | 64 | 1 | 9 | 37 | 5360869 |
| ĺ | | | | | |
| 141. | 64 | 2 | 9 | 37 | 5360869 |
| 142. | 65 | 2 | 9 | 25 | .4335161 |
| 143. | 65 | 3 | 9 | 25 | .4335161 |
| 144. | 65 | 4 | 9 | 25 | .4335161 |
| 145. | 65 | 5 | 9 | 25 | .4335161 |
| | | | | | |
| 146. | 65 | 6 | 9 | 25 | .4335161 |
| 147. | 66 | 1 | 3 | 34 | 5601428 |
| 148. | 67 | 1 | 3 | 26 | 7533434 |
| 149. | 67 | 2 | 3 | 26 | 7533434 |
| 150. | 67 | 3 | 3 | 26 | 7533434 |
| 100. | . 01 | J | O | 20 | .,555101 |

| | l | | | | |
|----------------|------------|--------|--------|----------|------------------------|
| 151. | 67 | 4 | 3 | 26 | 7533434 |
| 152. | 67 | 5 | 3 | 26 | 7533434 |
| 153. | 67 | 6 | 3 | 26 | 7533434 |
| | | | | | |
| 154. | 68 | 1 | 7 | 28 | 8127742 |
| 155. | l 69 | 1 | 5 | 39 | 3579273 |
| 156 | 70 | | 7 | 07 | 0200007 |
| 156. | 70 | 1 | 7 | 27 | 8320007 |
| 157. | 70 | 2 | 7 | 27 | 8320007 |
| 158. | 71 | 1 | 5 | 29 | 7093763 |
| 159. | 71 | 2 | 5 | 29 | 7093763 |
| 160. | 71 | 3 | 5 | 29 | 7093763 |
| 161. | 71 | 4 | 5 | 29 | 7093763 |
| 162. | 71 | 5 | 5 | 29 | 7093763 |
| 163. | 71 | 6 | 5 | 29 | 7093763 |
| 164. | 72 | 1 | 3 | 36 | 9649825 |
| 165. | 72 | 1 | 9 | 26 | .1883628 |
| 105. | , 75 | | | | 1005020 |
| 166. | , 73 | 2 | 9 | 26 | .1883628 |
| 167. | 73 | 3 | 9 | 26 | .1883628 |
| 168. | 74 | 1 | 7 | 31 | .7626509 |
| 169. | 74 | 2 | 7 | 31 | .7626509 |
| 170. | 74 | 3 | 7 | 31 | .7626509 |
| | , | | | | |
| 171. | 75 | 1 | 7 | 36 | -1.345739 |
| 172. | 75 | 2 | 7 | 36 | -1.345739 |
| 173. | 75 | 3 | 7 | 36 | -1.345739 |
| 174. | l 76 | 1 | 2 | 33 | -1.415193 |
| 175. | 77 | 1 | 5 | 22 | 5878691 |
| | | | | | · |
| 176. | 78 | 1 | 2 | 26 | -1.290222 |
| 177. | 78 | 2 | 2 | 26 | -1.290222 |
| 178. | 78 | 3 | 2 | 26 | -1.290222 |
| 179. | 79 | 1 | 6 | 29 | 3055488 |
| 180. | 79 | 2 | 6 | 29 | 3055488 |
| 1 | | | | | |
| 181. | 79 | 3 | 6 | 29 | 3055488 |
| 182. | 80 | 1 | 4 | 37 | .2425353 |
| 183. | 80 | 2 | 4 | 37 | .2425353 |
| 184. | 81 | 1 | 3 | 35 | -1.138787 |
| 185. | 82 | 1 | 10 | 24 | 1.237919 |
| 400 | | | 40 | | 4 007040 |
| 186. | 82 | 2 | 10 | 24 | 1.237919 |
| 187. | 82 | 3 | 10 | 24 | 1.237919 |
| 188. | 82 | 4 | 10 | 24 | 1.237919 |
| | | | _ | | |
| 189. 190. | 83 83 | 1 2 | 6 6 | 30 30 | 1.462004 1.462004 |

| 191. | l 84 | 1 | 7 | 20 | 2.348689 |
|--------------|------------------|-------------|--------|----------|-----------------------|
| 192. | l 85 | 1 | 4 | 31 | .7492698 |
| 193. | l 86 | 1 | 5 | 30 | .9811502 |
| 194. | l 86 | 2 | 5 | 30 | .9811502 |
| 195. | l 86 | 3 | 5 | 30 | .9811502 |
| | | | | | |
| | | | | | |
| 196. | 86 | 4 | 5 | 30 | .9811502 |
| 196. 197. | 86 87 | 4 1 | 5 4 | 30 39 | .9811502 .226038 |
| | | 4 1 2 | _ | | • |
| 197. | 87 | 1 | 4 | 39 | .226038 |
| 197. 198. | 87 87 | 1 2 | 4 | 39 39 | .226038 .226038 |

Using the long dataset we can still obtain the same results as with the wide dataset we do. For example, If we want to obtain the results of

regress citation x

as if it were run in the wide data we do:

```
[10]: reghdfe citations x, group(art_id) estimates store reg_long_yx
```

(MWFE estimator converged in 1 iterations)

| HDFE Linear regression | Number of obs | = | 100 |
|------------------------|---------------|---|--------|
| Absorbing 1 HDFE group | F(1, 98) | = | 1.82 |
| | Prob > F | = | 0.1805 |
| | R-squared | = | 0.0182 |
| | Adj R-squared | = | 0.0082 |
| | Within R-sq. | = | 0.0182 |
| | Root MSE | = | 5.7103 |

| citations | Coef. | Std. Err. | t | P> t | [95% Conf. | Interval] |
|---------------------------------------|-------|----------------------|---|------|---------------------|----------------------|
| · · · · · · · · · · · · · · · · · · · | | .5428297 .5721567 | | | -1.809356 29.373 | .3451002 31.64386 |

```
[11]: estimates table reg_wide_yx reg_long_yx, keep(x) b(%7.4f) se(%7.4f) stats(N_ \hookrightarrow r2_a)
```

| Variable | 1 | reg_w~x | reg_l~x |
|-----------|---|-------------------|-------------------|
| x | • | -0.7321 0.5428 | -0.7321 0.5428 |
| N r2_a | • | 100 0.0082 | 100 0.0082 |

legend: b/se

To obtain the same results as

reghdfe citations x, a(journal)

in the wide dataset we do:

[12]: reghdfe citations x, group(art_id) a(journal) estimates store reg_long_yxj

(dropped 3 singleton observations)
(MWFE estimator converged in 1 iterations)

HDFE Linear regression Number of obs = 97 Absorbing 1 HDFE group F(1, 87) = 3.76 Prob > F = 0.0556 R-squared = 0.1136 Adj R-squared = 0.0219

Within R-sq. = 0.0415Root MSE = 5.6921

citations | Coef. Std. Err. t P>|t| [95% Conf. Interval]

x | -1.184256 .6104138 -1.94 0.056 -2.39752 .0290073 _cons | 30.49536 .5780516 52.76 0.000 29.34642 31.6443

Absorbed degrees of freedom:

Absorbed FE | Categories - Redundant = Num. Coefs |
------|
journal_id | 9 0 9 |

[13]: estimates table reg_wide_yxj reg_long_yxj, keep(x) b(%7.4f) se(%7.4f) stats(N_ \sim r2_a)

| Variable | | U _ U | reg_l~j |
|-----------|---|---------------------|-------------------|
| X | İ | -1.1843 | -1.1843 0.6104 |
| N r2_a | ٠ | 97 0.0219 | 97 0.0219 |

legend: b/se

And finally, if we want to run the equivalent to

reghdfe citations x aut1-aut6, a(journal)

in the wide dataset we can do either:

[14]: reghdfe citations x, group(art_id) individual(author_id) a(journal_id_ →author_id) aggregation(sum) estimates store reg_long_yxja

(dropped 3 singleton observations)
(MWFE estimator converged in 14 iterations)

HDFE Linear regression

Number of obs = 97

Absorbing 2 HDFE groups F(1, 81) = 4.36 Prob > F = 0.0400 R-squared = 0.1387

Adi R-squared = -0.0208

Adj R-squared = -0.0208 Within R-sq. = 0.0510

Root MSE = 5.8151

Absorbed degrees of freedom:

| Absorbed FE | Categories | - Redundant | = Num. | Coefs | -+ - |
|-------------------------|------------|-------------|--------|-------|-----------------|
| journal_id author_id | | 0 | | 9 | ? |

^{? =} number of redundant parameters may be higher

legend: b/se

- To obtain the same values as in the "wide" data I had to specify the option "aggregation(sum)"
- By default **reghdfe** assumes the option "**aggregation(mean)**"
- The option "aggregation(sum)" assumes that the contribution of the authors to y is the summation of the author's fixed effects.
- An alternative would be to assume that the contribution to \mathbf{y} is given by the average of the author's fixed effects
- Let us run the model with the default option using two alternative specifications:

```
[16]: reghdfe citations x i.journal_id, group(art_id) individual(author_id)

→a(author_id) keepsingletons
estimates store reg_long_yxja2
reghdfe citations x, group(art_id) individual(author_id) a(journal_id_u

→author_id) keepsingletons
estimates store reg_long_yxja3
```

WARNING: Singleton observations not dropped; statistical significance is biased > (link)

(MWFE estimator converged in 6 iterations)

```
HDFE Linear regression
                                               Number of obs =
                                                                      100
Absorbing 1 HDFE group
                                               F( 12,
                                                          82) =
                                                                      1.19
                                               Prob > F
                                                                    0.3047
                                               R-squared
                                                              =
                                                                    0.1550
                                               Adj R-squared
                                                                   -0.0201
                                               Within R-sq.
                                                                   0.1482
                                               Root MSE
                                                                    5.7913
```

citations | Coef. Std. Err. t P>|t| [95% Conf. Interval]

| x | 1 | -1.296932 | .6349505 | -2.04 | 0.044 | -2.560051 | 0338135 |
|------------|---|-----------|----------|-------|-------|-----------|----------|
| | | | | | | | |
| journal_id | | | | | | | |
| 3 | | 2.059242 | 3.093768 | 0.67 | 0.508 | -4.095248 | 8.213731 |
| 4 | | 5.899507 | 2.894826 | 2.04 | 0.045 | .1407762 | 11.65824 |
| 5 | | 5.152631 | 2.879131 | 1.79 | 0.077 | 5748774 | 10.88014 |
| 6 | | 2.636606 | 2.859037 | 0.92 | 0.359 | -3.050929 | 8.324141 |
| 7 | | 1.343273 | 2.943648 | 0.46 | 0.649 | -4.51258 | 7.199126 |
| 8 | | 5.388293 | 3.505686 | 1.54 | 0.128 | -1.585632 | 12.36222 |
| 9 | | 1.34391 | 3.361434 | 0.40 | 0.690 | -5.343054 | 8.030874 |
| 10 | | 2.020704 | 3.860312 | 0.52 | 0.602 | -5.658687 | 9.700095 |
| 11 | | -3.061031 | 6.470356 | -0.47 | 0.637 | -15.93263 | 9.810568 |
| 12 | | 11.51318 | 6.859656 | 1.68 | 0.097 | -2.132861 | 25.15922 |
| 13 | | 6.960522 | 6.48879 | 1.07 | 0.287 | -5.947749 | 19.86879 |
| | | | | | | | |
| _cons | 1 | 27.1131 | 2.459724 | 11.02 | 0.000 | 22.21993 | 32.00628 |

Absorbed degrees of freedom:

| Absorbed FE | Categories | - Redundant | = Num. | Coefs | -+ |
|-------------|------------|-------------|--------|-------|--------|
| author_id | 6 | 0 | | 6 | ? |

^{? =} number of redundant parameters may be higher

WARNING: Singleton observations not dropped; statistical significance is biased > (link)

(MWFE estimator converged in 11 iterations)

| HDFE Linear regression | Number of obs | = | 100 |
|-------------------------|---------------|---|---------|
| Absorbing 2 HDFE groups | F(1, 81) | = | 4.12 |
| | Prob > F | = | 0.0456 |
| | R-squared | = | 0.1550 |
| | Adj R-squared | = | -0.0327 |
| | Within R-sq. | = | 0.0484 |
| | Root MSE | = | 5.8269 |

| citations | | | | | | Interval] |
|-----------|-----------|----------------------|-------|-------|-----------|---------------------|
| x | -1.296932 | .6388579 .5842253 | -2.03 | 0.046 | -2.568059 | 0258055 31.70821 |

Absorbed degrees of freedom:

| Absorbed FE | 1 | Categories | - Redundant | = | Num. Coefs | |
|-------------------------|---|------------|-------------|---|------------|----------------|
| journal_id author_id | | 12 6 | 0 0 | | 12 6 | - ? |

^{? =} number of redundant parameters may be higher

And now we replicate these results with the wide dataset:

```
[17]: use citations_wide, clear
[18]: egen naut=rowtotal(aut1-aut6)
[19]: forval j=1/6 {
   qui replace aut`j'=aut`j'/naut
   }
```

[20]: %browse

| 1. | art_id 1 | journa~d 4 | | citati~s 38 | -1. | x 096598 |
|----|----------------------|------------------------|-----------|--------------------|-----------------|---------------------|
| | AutB; <i>I</i> | aut AutC;AutD;AutE | ;AutF | | _est_r~j 1 | aut1 0 |
| | aut2 .2 | aut3 .2 | aut4 | | | |
| - | | | | | | + |
| 2. | art_id 2 | journa~d 12 | | citati~s 34 | 3. | x 182043 |
| | | aut AutA;AutB;AutC; | | | _est_r~j 0 | aut1 .25 |
| | aut2 .25 | aut3 .25 | .25 | aut5 0 | 1 0 | |
| - | · | | | | | + |
| 3. | art_id 3 | journa~d 4 | | citati~s 22 | 2. | x 319085 |
| | | aut | thors _ | est_r~x | _est_r~j | aut1 |

| | | | AutA; | AutD | 1 | | 1 | .5 |
|----|----------------------|-----------|---------------|--------------------|---------------------|-----------|-------------|---------------|
| | aut2 0 | | aut3 0 | aut4 .5 | aut5 0 | | aut6 0 | naut 2 |
| 4. | art_id | I | journa~d | | citati~s | I | | x |
| | 4 | | 4 | | 37 | | .531 | .4979 |
| | | | | thors ; ;AutB | _est_r~x 1 | _est | • | aut1 .5 |
| | aut2 .5 | • | aut3 0 | aut4 0 | aut5 0 | | aut6 0 | naut 2 |
| 4 | | | | | | | | + |
| 5. | art_id 5 | | journa~d 3 | | citati~s 29 | | 126 | x 3452 |
| | | | | thors ; | _est_r~x 1 | _est | _r~j 1 | aut1 .5 |
| | aut2 | | aut3 0 | aut4 0 | aut5 0 | | aut6 0 | naut 2 |
| ٦ | | | | | | | | + |
| 6. | art_id 6 | | journa~d 3 | | citati~s 25 | | -1.06 | x 66023 |
| | | | | thors ; | _est_r~x 1 | _est | | aut1 .5 |
| | | | aut3 0 | | | | | |
| 4 | | | | | | | | + |
| 7. | art_id 7 | | journa~d 4 | I | citati~s 34 | | | x |
| | | | au | | _est_r~x 1 | | - | aut1 0 |
| | aut2 | | aut3 0 | | | | | |

| | + | | | | | | | + |
|-----|-------------------------------------|-----------|-----------------------------------|----------------------------|----------------------|-------------------------------|---------------------------------------|-----------------------|
| 8. | + | | journa~d 6 | | citati~s 35 | | .77 | x 01448 |
| | | | | thors __ ;AutB | est_r~x _ 1 | _est_ | r~j 1 | aut1 3.5 |
| | aut2 .5 + | | aut3 0 | aut4 0 | aut5 0 | | aut6 0 | naut 2 |
| 9. | + art_id 9 | | journa~d 4 | | citati~s 32 | | .07 | x 31317 |
| | | | | thors _ ;AutB | _est_r~x 1 | _est_ | r~j 1 | aut1 3.5 |
| | aut2 .5 | | aut3 0 | aut4 0 | aut5 0 | | aut6 0 | naut 2 |
| 10. | + art_id 10 | | journa~d 10 | | citati~s 31 | | .71! | x 51871 |
| | | | | | | | | aut1 |
| | | | | thors _ ;AutB | _est_r~x 1 | _est_ | r~j 1 | .5 |
| | aut2 .5 | | | | | _est_ | | |
| 11. | | | AutA; | AutB aut4 0 | 1 aut5 0 | | 1 aut6 0 | .5 naut |
| 11. | .5 + + | | AutA; aut3 0 journa~d 8 aut | aut4 0 | 1 aut5 0 | | 1 aut6 0 | .5 naut 2 + |
| 11. | .5 + | | AutA; aut3 0 journa~d 8 aut | AutB aut4 0 | 1 | | 1 aut6 0 .630 r~j aut6 0 aut6 0 | .5 naut 2 + |

| | 12 | 1 | | 3 | I | 27 | 1 | .099 | 93462 |
|-----|--------------------------|---------------------|-----------------------|--|------------------|---|------------------------------|-----------------------------------|--|
| | | | | | hors . AutB | _est_r~x 1 | _est | - | aut1 .5 |
| - | aut2 aut2 .5 | | aut3 0 | I | 0 | aut5 0 | Ī | 0 | naut 2 |
| - | + | | | | | | | | + |
| 13. | art_id 13 | | jour | na~d 2 | | citati~s 25 | | -2.58 | x 83632 |
| | ' | | | | hors . AutB | _est_r~x 1 | _est | • | aut1 .5 |
| | aut2 .5 | | aut3 | | aut4 0 | aut5 0 | | aut6 0 | naut 2 |
| - | , | | | | | | | | + |
| 14. | art_id 14 | | J | na~d 7 | | citati~s 29 | | . 690 | x 05127 |
| | | | | | | | | | |
| | | | | | hors . AutB | _est_r~x 1 | _est | | aut1 .5 |
| _ | aut2 .5 | | aut3 0 | AutA; | | 1 | | 1 | .5 |
| - | | | aut3 | AutA; | AutB aut4 | 1 aut5 | | 1 aut6 | .5 naut |
| 15. | .5 + + art_id | | aut3 0 | AutA; | AutB | 1 aut5 0 | | 1 aut6 0 | .5 naut |
| 15. | .5 + + art_id | | aut3 0 jour | AutA; | AutB aut4 0 | 1 aut5 0 | | 1 aut6 0 -2.06 | .5 naut 2 + x 63772 aut1 |
| 15. | .5 + | | aut3 0 jour | AutA; | AutB aut4 0 | 1 aut5 0 | _est | 1 aut6 02.06r~j 1 aut6 | .5 |
| 15. | .5 + | | aut3 0 jour | AutA; | AutB aut4 0 | 1 aut5 0 citati~s 25 est_r~x 1 aut5 | _est | 1 aut6 02.06r~j 1 aut6 | .5 naut 2 + |
| 15. | .5 + | | aut3 0 jour | AutA; na~d 8 aut AutA; | AutB aut4 0 | 1 aut5 0 citati~s 25 est_r~x 1 aut5 | | 1 aut6 0 -2.06 r~j 1 aut6 0 | .5 naut 2 + |

| - | aut2 .3333333 | | aut3 0 | | aut5 | | aut6 0 | naut 3 |
|-----|--------------------------|-------|-------------|-----------------------|-----------------|------|------------|---------------------|
| 17. | + art_id 17 | | journa | a~d 3 | citati~s 19 | | 659 | x 99711 |
| | | | Au | authors itA;AutB | _est_r~x 1 | _est | • | aut1 .5 |
| | aut2 .5 | | aut3 0 | aut4 0 | aut5 0 | | aut6 0 | naut |
| 18. | + art_id 18 | | journa | | citati~s 32 | | -1.4 | + x 78867 |
| | | | Au | authors itA;AutB | _est_r~x 1 | est | | aut1 .5 |
| - | aut2 .5 | • | aut3 0 | aut4 0 | aut5 0 | | aut6 0 | naut 2 |
| 19. | + art_id | I | journa | a~d | citati~s | | | + x |
| -0. | 19 | i | J = 42 22 | 7 | 32 | i | .307 | 71749 |
| | | | Au | authors itB;AutF | _est_r~x 1 | _est | - | aut1 0 |
| | aut2 .5 | | aut3 0 | | aut5 0 | | aut6 .5 | |
| - | + | | | | | | | + |
| 20. | art_id 20 | | journa | | citati~s 31 | | | x 03581 |
| | | AutE | 3;AutC;Au | authors ntD;AutE | _est_r~x 1 | _est | _ | aut1 0 |
| | | | | | aut5 .25 | | | naut 4 |

| 21. | art_id art_id 21 | | journa~d 6 | | citati~s 32 | | -1.2358 | x 868 |
|-----|----------------------------|------|---------------|-------------------|-----------------|-----------|-------------|--------------|
| | | | | thors .;AutB | _est_r~x 1 | _est_ | • | aut1 .5 |
| _ | aut2 .5 | | aut3 0 | aut4 0 | aut5 0 | | aut6 0 | naut 2 |
| - | + | | | | | | | + |
| 22. | art_id 22 | | journa~d 5 | | citati~s 34 | | 44525 | x 573 |
| | | | au | thors . AutA | _est_r~x 1 | _est_ | - | aut1 1 |
| | aut2 0 | • | aut3 0 | aut4 0 | aut5 0 | • | aut6 0 | naut 1 |
| - | + | | | | | | | + |
| 23. | art_id 23 | | journa~d 8 | | citati~s 27 | | .82857 | x 742 |
| | | | | thors ; | _est_r~x 1 | _est_ | • | aut1 .5 |
| - | aut2 0 | | aut3 .5 | aut4 0 | aut5 0 | | aut6 0 | naut 2 |
| - | + | | | | | | | + |
| 24. | art_id 24 | | journa~d 8 | | citati~s 42 | | .82017 | x 761 |
| | ' | | aut | thors . AutA | _est_r~x 1 | _est_ | - 0 | |
| _ | | | aut3 0 | aut4 0 | | | | naut 1 |
| - | + | | | | | | | + |
| 25. | art_id 25 | | journa~d 6 | | citati~s 37 | | 33263 | x 353 |

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authors | _est_r~x | _est_r~j | aut1 |
                AutA | 1 | 1 |
    aut2 | aut3 | aut4 | aut5 | aut6 | naut |
                 0 |
                       0 |
      0 I
           0 |
                             0 |
26. | art_id | journa~d | citati~s |
    26 | 6 | 30 | -.5047406 |
  |-----|
               authors | _est_r~x | _est_r~j | aut1 |
         AutA; AutB; AutC | 1 | 1 | .3333333 |
  |-----|
    aut2 | aut3 | aut4 | aut5 | aut6 | naut |
  | .3333333 | .3333333 | 0 | 0 | 0 | 3 |
27. | art_id | journa~d | citati~s |
           4 | 23 | .5701295
    27
         |-----|
              authors | _est_r~x | _est_r~j |
            AutA; AutB | 1 | 1 |
    aut2 | aut3 | aut4 | aut5 | aut6 | naut |
    .5 | 0 | 0 | 0 | 2 |
    art_id | journa~d | citati~s | x | 28 | 6 | 26 | .5886264 |
28. | art_id | journa~d | citati~s |
              authors | _est_r~x | _est_r~j |
               AutA | 1 | 1 |
    aut2 | aut3 | aut4 | aut5 | aut6 | naut |
    0 | 0 | 0 | 0 | 1 |
   art_id | journa~d | citati~s | x
  29 | 6 | 30 | -1.290243
               authors | _est_r~x | _est_r~j | aut1 |
               AutA | 1 | 1 |
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| - | aut2 0 + | | aut3 0 | aut4 0 | | | aut6 0 | naut 1 |
|-----|-----------------------|----------------|-------------|----------------------|--------------------|----------------|-------------|---------------------|
| 30. | + art_id 30 | | journa | ~d 10 | citati~s 33 | | 82 | x 19085 |
| | | | | authors tA;AutB | _est_r~x 1 | | _r~j 1 | aut1 .5 |
| - | aut2 .5 | | aut3 0 | aut4 0 | | | aut6 0 | naut 2 |
| 31. | + art_id 31 | | journa | ~d 7 | citati~s 32 | | 1.14 | x 48723 |
| | ' | | | authors tA;AutB | _est_r~x 1 | | _r~j 1 | aut1 .5 |
| - | aut2 .5 | | aut3 0 | aut4 0 | • | | aut6 0 | naut 2 |
| - | + | | | | | | | + |
| 32. | art_id 32 | | journa | ~d 6 | citati~s 25 | | .93: | x 19192 |
| | ' | | | authors tB;AutC | _est_r~x 1 | | • | aut1 3333333 |
| _ | | | | | aut5 0 | | | |
| - | + | | | | | | | + |
| 33. | _ | | Ū | | citati~s 36 | | | • |
| | | | | | _est_r~x 1 | | • | aut1 1 |
| - | | | | | aut5 0 | | | naut 1 |

| 34. | art_id 34 | | journ | a~d 3 | | citat: | i~s 35 | | 44 | x 46257 | + |
|----------|---------------------------|------|------------------|--------------|-----------------|--------|---------------|-----------|-------------|-----------------|-----------------------|
| | ' | | | aut | thors AutA | _est_r | | _est_ | | au [.] | t1 1 |
| - | aut2 0 | : | aut3 0 | | aut4 0 | | | | aut6 0 | | t 1 + |
| 35. | + art_id 35 | | journ | a~d 9 | | citat: | i~s 27 | | 1.4 | x 54637 | + |
| | | | | aut | | _est_r | | _est_ | _ | au [.] | t1 1 |
| <u>-</u> | | | aut3 0 | | aut4 0 | | | | aut6 0 | | t 1 + |
| <u>-</u> | + | | | | | | | | | | + |
| 36. | art_id 36 | | journ | a~d 5 | | citat: | i~s 37 | | .120 | x 02357 | |
| | ' | | AutA;A | | | _est_r | | | _r~j 1 | | |
| _ | aut2 3333333 | | aut3 333333 | | aut4 0 | ai | ut5 0 | | aut6 0 | nau | t 3 |
| - | + | | | | | | | | | | + |
| 37. | art_id 37 | | • | | | | | | .61 | x 68431 | |
| | , | | | | | _est_r | | | - | | |
| - | | | aut3 0 | | | | | | | | |
| 38. | + art_id 38 | | | | | | | | -1.1 | x 54497 | + |

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authors | _est_r~x | _est_r~j | aut1 |
                AutA; AutB | 1 | 1 |
      aut2 | aut3 | aut4 | aut5 | aut6 | naut | .5 | 0 | 0 | 0 | 2 |
     .5 |
    art_id | journa~d | citati~s |
39.
     39 | 4 | 39 | -.0999358 |
                 authors | _est_r~x | _est_r~j | aut1 |
                 AutA | 1 | 1 |

    aut2 |
    aut3 |
    aut4 |
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   art_id | journa~d | citati~s | x
40. I
  | 40 | 9 | 28 | 1.416823 |
                 authors | _est_r~x | _est_r~j | aut1 |
               AutA | 1 | 1 | 1 |
     aut2 | aut3 | aut4 | aut5 | aut6 | naut |
     0 |
            0 |
                    0 | 0 |
                                   0 | 1 |
41. | art_id | journa~d | citati~s |
  41 | 41 | 24 | 1.066625 |
                 authors | _est_r~x | _est_r~j | aut1 |
   AutA; AutB; AutC; AutD; AutE | 1 | 1 |
     aut2 | aut3 | aut4 | aut5 | aut6 | naut |
                    .2 |
Х
                 authors | _est_r~x | _est_r~j | aut1 |
     AutA;AutB;AutC | 1 | 1 | .3333333 |
     aut2 | aut3 | aut4 | aut5 | aut6 | naut |
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| +- | .3333333 | | .3333 | 333 | l | 0 | 0 | | 0 | | 3 |
|-------------------|--------------|-----------|----------------|----------|---------------|-------------------------|---------------------|----------------|------------------|----------------|------------|
| + 43. | art_id | | | jour | na~d | I | citati~s | | | | x |
| | 43 | | | | 6 | | 16 | | -1.4 | 366 | 306 |
| | | | | | au | thors . AutA | _est_r~x 1 | _est | _ | | aut1 1 |
| + | aut2 0 | | a: | | | | aut5 0 | | aut6 0 | | naut 1 |
| +· 44. - | art_id 44 | | | | na~d 4 | | citati~s 25 | | .83 | 362 | x 254 |
| | | | | | au | thors . AutA | _est_r~x 1 | | | | aut1 1 |
| + | | | | | | aut4 0 | aut5 0 | | aut6 0 | | naut 1 |
| + 45. | art_id 45 | | | - | na~d 4 | | citati~s 34 | | .92 | 351 | x 47 |
| - - | | | | | | thors ; | _est_r~x 1 | | r~j 1 | | aut1 .5 |
| + | aut2 .5 | | | ut3 0 | | aut4 0 | | | aut6 0 | | naut 2 |
| +· 46. | _ | | | jour | na~d | I | citati~s 25 | 1 | | | |
| - - | | | A- | utB; | | thors ; | _est_r~x 1 | | ;_r~j 1 | | |
| | | | .3333 | 333 | 1 .3 | 333333 | aut5 0 | | | | naut 3 |
| + | | | | | | | | | | | ى |

| 47. | art_id 47 | | journa~d 13 | | citati~s 33 | | .44 | x 2765 |
|-----|-----------------------|-----------|------------------|---------------------------|---------------------------|----------------|-----------|-----------------------------|
| | | AutA | aut;AutB;AutC; | | _est_r~x 1 | | _ | aut1 .25 |
| | aut2 25 | | aut3 .25 | | | | aut6 0 | naut 4 |
| 48. | + art_id 48 | | journa~d 9 | | citati~s | | .197 | x (2646 |
| | | | | thors AutA | _est_r~x 1 | _est | _ | aut1 1 |
| - | aut2 0 | | aut3 0 | aut4 0 | aut5 0 | | aut6 0 | naut 1 |
| 49. | _ | | journa~d | | citati~s | | | x |
| | 49 | | 7 aut | hors AutA | 22 _est_r~x 1 | est | _r~j | 28233 aut1 1 |
| | aut2 0 | | aut3 0 | aut4 0 | aut5 0 | | aut6 0 | naut 1 |
| 50. | + art_id 50 | | journa~d | | citati~s 33 | | .372 | x |
| | | | aut; AutB; AutC; | | _est_r~x | _est | _r~j | |
| - | | | aut3 .25 | | | | aut6 0 | naut 4 |
| 51. | | | journa~d 4 | | citati~s 33 | | 817 | x 3643 |
| | | | aut | hors | _est_r~x | _est | _r~j | aut1 |

| | | AutA | ;AutB; | AutC; | AutD | 1 | | 1 | .25 |
|-----|------------------------|-------|-------------|------------|------------------|-----------------|-----------|--------------|---------------------|
| | aut2 .25 | | aut3 .25 | | aut4 .25 | aut5 0 | | aut6 0 | naut 4 |
| 52. | + | | | | | | | | + |
| 52. | art_id 52 | | jour | 5 5 | İ | citati~s 20 | | 1.5 | x 74457 |
| | | | AutA; | | hors AutC | _est_r~x 1 | _ | _ 0 | aut1 .3333333 |
| - | aut2 .3333333 | | | | aut4 0 | aut5 0 | | aut6 0 | naut 3 |
| 53. | + art_id | I | jour | rna~d | I | citati~s | | | + x |
| | 53 | | | 5 | | 39 | | 1.7 | 16935 |
| | | | | | hors . AutB | _est_r~x 1 | _est | _ | aut1 .5 |
| - | aut2 .5 | | aut3 0 | | aut4 0 | aut5 0 | | aut6 0 | naut 2 |
| + | + | | | | | | | | + |
| 54. | art_id 54 | | jour | rna~d 6 | | citati~s 34 | | . 33 | x 38451 |
| | | AutA | ; AutB; | | thors AutD | | _est | _r~j _1 | aut1 .25 |
| | | 1 | . 25 | 1 | .25 | aut5 0 | | | naut 4 |
| + | + | | | | | | | | + |
| 55. | - | | • | | | citati~s 37 | | .094 | x 42601 |
| | ' | | AutA; | | hors AutC | _est_r~x 1 | | - | aut1 .3333333 |
| | aut2 | | | | | aut5 | | | naut 3 |

| + | | | | | | | | |
|------------------|-----------------|---------------------|---|-------------------------------------|-------------------------|--------------------------|----------------------|------------------------------|
| 56. | art_id 56 | | journa~d 5 | | citati~s 26 | | 9: | x 14588 |
| | | | | thors _ ;AutB | est_r~x 1 | | - | aut1 .5 |
| + | aut2 .5 | | aut3 0 | | aut5 0 | | aut6 0 | naut 2 |
| 57. | art_id 57 | | journa~d 11 | | citati~s 23 | | 1.2 | x 59047 |
| | | | au [.] | thors _ AutA | est_r~x 1 | | _ | aut1 1 |
| | | | aut3 0 | | | | | naut 1 |
| 58. | art_id 58 | | journa~d 6 | _ | citati~s 36 | | -1.00 | x 00023 |
| | | | au [.] | thors _ AutA | est_r~x 1 | _est_ | - | aut1 1 |
| | | | | | | | | |
| + | aut2 0 | | aut3 0 | aut4 0 | aut5 0 | | aut6 0 | naut 1 |
| + 59. | 0 | | | 0 | 0 citati~s 31 | | 0 | |
| + 59. - | 0 art_id | | 0 journa~d 2 | 0 thors _ | 0 citati~s 31 | | 0 163 | x 31394 aut1 |
| 59. | 0 | | 0 journa~d 2 au AutA aut3 0 | 0 | 0 | _est_ | 163 r~j 1 aut6 0 | x 31394 aut1 .5 |

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60 | 4 | 32 | .5729514 |
                authors | _est_r~x | _est_r~j | aut1 |
         AutA; AutB; AutC | 1 | 1 | .3333333 |
     aut2 | aut3 | aut4 | aut5 | aut6 | naut |
   .3333333 | .3333333 | 0 | 0 |
61. | art_id | journa~d | citati~s | x | 61 | 5 | 32 | .5039716 |
  |-----|
               authors | _est_r~x | _est_r~j | aut1 |
               AutA | 1 | 1 |
    aut2 | aut3 | aut4 | aut5 | aut6 | naut |
          0 | 0 | 0 | 0 | 1 |
62. | art_id | journa~d | citati~s | x |
  | 62 | 4 | 33 | -.3318768 |
|------
               authors | _est_r~x | _est_r~j | aut1 |
        AutA; AutB; AutC; AutD | 1 | 1 |
    aut2 | aut3 | aut4 | aut5 | aut6 | naut |
                        0 |
           .25 |
                 .25 l
                               0 | 4 |
63. | art_id | journa~d | citati~s | x
  | 63 | 5 | 42 | -1.345239 |
               authors | _est_r~x | _est_r~j | aut1 |
        AutA; AutB; AutC; AutD | 1 | 1 |
  |-----|
    aut2 |
          aut3 | aut4 | aut5 |
                              aut6 | naut |
           .25 |
                 .25 |
                       0 |
64. | art_id | journa~d | citati~s | x |
  9 | 37 | -.5360869 |
               authors | _est_r~x | _est_r~j | aut1 |
              AutA; AutB | 1 | 1 | .5 |
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| - | aut2 .5 | | aut3 0 | | aut4 0 | aut5 0 | | aut6 0 | naut | t |
|-----|-----------------------|-----------|-----------|---------------|----------------|---------------------------|----------------|------------|------------|-----------------------|
| 65. | + art_id 65 | | Ū | na~d 9 | | citati~s 25 | | .43 | x 35161 | + |
| | AutE | 3;AutC | ;AutD; | | hors AutF | _est_r~x 1 | _est_ | _ | au1 | t1 |
| - | | | | | | aut5 .2 | | aut6 .2 | | t 5 + |
| 66. | + art_id 66 | | jour | | | citati~s 34 | | 56 | x 01428 | + |
| | | | | aut | thors AutA | _est_r~x 1 | _est_ | - | au1 | t1 |
| - | aut2 0 | | aut3 0 | | aut4 0 | aut5 0 | | aut6 0 | | t |
| 67. | + art_id 67 | | jour | na~d 3 | | citati~s 26 | | 75 | x 33434 | + |
| | AutA;AutE | 3;AutC | ; | | | _est_r~x 1 | | - | | |
| _ | | .16 | 66667 | .16 | 66667 | aut5 .1666667 | .16 | 66667 | (| |
| 68. | | | - | | | citati~s | | | X | |
| | 68 | | | aut | | 28 _est_r~x 1 | _est_ | | au1 | t1 |
| | | | | | aut4 | aut5 0 | | | | |

| 69. | art_id 69 | | jour | na~d 5 | | citati~s 39 | | | x 79273 |
|-----|-----------------------|----------------|----------------|----------------|------------------|------------------|-----------|-------------------|-----------------------|
| | ' | | | aut | thors AutA | _est_r~x 1 | | _r~j 1 | aut1 1 |
| | aut2 0 | | aut3 0 | | aut4 0 | aut5 0 | | aut6 0 | naut 1 |
| 70. | + art_id 70 | | jour | na~d 7 | | citati~s 27 | | 83 | x 20007 |
| | | | | | thors ;AutB | _est_r~x 1 | | _r~j 1 | aut1 .5 |
| | aut2 .5 | | aut3 0 | | aut4 0 | aut5 0 | | aut6 0 | naut 2 |
| 71. | + art_id 71 | | jour | na~d 5 | | citati~s | | | + x 93763 |
| | | 3;Aut | C;AutD; | au1 | thors | _est_r~x | _est | _r~j | |
| | | • | aut3 666667 | • | | aut5 .1666667 | | | naut |
| 72. | + art_id 72 | | Ū | rna~d 3 | | citati~s | | 96 [,] | + x 49825 |
| | | | | aut | thors AutA | _est_r~x 1 | _est | - | aut1 1 |
| | | | aut3 0 | | aut4 0 | aut5 0 | | aut6 0 | naut 1 + |
| 73. | + art_id 73 | | jour | | | citati~s 26 | | .18 | x 83628 |

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authors | _est_r~x | _est_r~j | aut1 |
          AutA; AutB; AutC | 1 | 1 | .3333333 |
          aut2 | aut3 | aut4 | aut5 | aut6 | naut
   .3333333 | .3333333 | 0 |
                     0 |
                            0 |
74. | art_id | journa~d | citati~s |
    74 | 7 | 31 | .7626509 |
  |-----|
              authors | _est_r~x | _est_r~j | aut1 |
         AutA; AutB; AutC | 1 | 1 | .3333333 |
  |-----|
    aut2 | aut3 | aut4 | aut5 | aut6 | naut |
  75. | art_id | journa~d | citati~s | x
    75 | 7 | 36 | -1.345739
  I -------
              authors | _est_r~x | _est_r~j | aut1 |
         AutA; AutB; AutC | 1 | 1 | .3333333 |
  |-----|
     aut2 | aut3 | aut4 | aut5 | aut6 | naut |
  | .3333333 | .3333333 | 0 | 0 | 0 | 3 |
76. | art_id | journa~d | citati~s | x | | | 76 | 2 | 33 | -1.415193 |
              authors | _est_r~x | _est_r~j |
               AutA | 1 | 1 |
    aut2 | aut3 | aut4 | aut5 | aut6 | naut |
    0 | 0 | 0 | 0 | 1 |
   art_id | journa~d | citati~s | x
  77 | 5 | 22 | -.5878691
              authors | _est_r~x | _est_r~j | aut1 |
               AutA | 1 | 1 |
```

```
78. | art_id | journa~d | citati~s | x
  authors | _est_r~x | _est_r~j | aut1 |
        AutA;AutB;AutC | 1 | 1 | .3333333 |
     aut2 | aut3 | aut4 | aut5 | aut6 | naut |
  | .3333333 | .3333333 | 0 | 0 |
                             0 | 3 |
authors | _est_r~x | _est_r~j | aut1 |
        AutA; AutB; AutC | 1 | 1 | .3333333 |
  aut2 | aut3 | aut4 | aut5 | aut6 | naut | | .33333333 | .33333333 | 0 | 0 | 0 | 3 |
authors | _est_r~x | _est_r~j | aut1 |
          AutA;AutB | 1 | 1 |
    aut2 | aut3 | aut4 | aut5 | aut6 | naut |
    .5 | 0 | 0 | 0 | 0 | 2 |
81. | art_id | journa~d | citati~s | x
| 81 | 3 | 35 | -1.138787
              authors | _est_r~x | _est_r~j | aut1 |
              AutA | 1 | 1 | 1 |
    aut2 | aut3 | aut4 | aut5 | aut6 | naut |
    0 | 0 | 0 | 0 | 0 | 1 |
```

| 82. | + art_id 82 | | journa~d 10 | | citati~s 24 | | 1.2379 | x 919 |
|-----|------------------------|--------------|--------------------|----------------------|---------------------|-----------|--------------|------------------------|
| | ' | Aut <i>A</i> | aut ;AutB;AutC; | | _est_r~x 1 | | • | aut1 .25 |
| - | aut2 .25 + | | aut3 .25 | | | | aut6 0 | naut 4 + |
| 83. | + art_id 83 | | journa~d 6 | | citati~s | | 1.4620 | + x 004 |
| | | | | thors ;AutB | _est_r~x 1 | _est | • | aut1 .5 |
| - | aut2 aut2 .5 | | aut3 0 | aut4 0 | | | aut6 0 | naut 2 |
| 84. | + art_id 84 | | journa~d 7 | | citati~s | | 2.3486 | + x 689 |
| | | | aut | thors AutA | _est_r~x 1 | _est | _ • | aut1 1 |
| - | aut2 0 | | aut3 0 | aut4 0 | aut5 0 | | aut6 0 | naut 1 |
| 85. | + art_id 85 | | journa~d 4 | | citati~s 31 | | | |
| | | | aut | thors AutA | _est_r~x 1 | | ;_r~j 1 | |
| - | | | aut3 0 | | | | | |
| 86. | + art_id 86 | | journa~d 5 | | citati~s 30 | | .9811 | x 502 |

```
authors | _est_r~x | _est_r~j | aut1 |
          AutA; AutB; AutC; AutD | 1 | 1 |

    aut2 |
    aut3 |
    aut4 |
    aut5 |
    aut6 | naut |

    .25 |
    .25 |
    .25 |
    0 |
    0 |
    4 |

      .25 |
    art_id | journa~d | citati~s |
87. |
     87 | 4 | 39 | .226038 |
                   authors | _est_r~x | _est_r~j | aut1 |
       AutA; AutB; AutC; AutD | 1 | 1 |

    aut2 |
    aut3 |
    aut4 |
    aut5 |
    aut6 | naut |

    .25 |
    .25 |
    .25 |
    0 |
    0 |
    4 |

      .25 l
   88. I
                  authors | _est_r~x | _est_r~j | aut1 |
           AutA; AutB | 1 | 1 | .5 |
      aut2 | aut3 | aut4 | aut5 | aut6 | naut |
      .5 |
             0 |
                     0 | 0 |
                                      0 |
89. | art_id | journa~d | citati~s | x
   | 89 | 5 | 24 | -.2218018 |
                   authors | _est_r~x | _est_r~j | aut1 |
               AutA;AutB | 1 | 1 |
     aut2 | aut3 | aut4 | aut5 | aut6 | naut |
              0 |
                      0 |
                              0 |
authors | _est_r~x | _est_r~j | aut1 |
          AutA | 1 | 1 | 1 | 1 |
     aut2 | aut3 | aut4 | aut5 | aut6 | naut |
```

| | l 0 | | | 0 | | 0 | 0 | | 0 | | 1 |
|------|-----------------------|---|-----------|---------------|-----------------|-------------------|--------------------|----------------|--------------|--------------------|------------|
| + | + | | | | | | | | | | + |
| 91. | art_id 91 | | | joui | rna~d 6 | | citati~s 30 | | | x 30005 | |
| | | | | | au [.] | thors . AutA | _est_r~x 1 | | _r~j 1 | au | t1 1 |
| - | aut2 0 | Ċ | | aut3 0 | | aut4 0 | aut5 0 | | aut6 0 | nau | 1 |
| 92. | + art_id 92 | | | joui | rna~d 7 | | citati~s 37 | | -1.4 | x 43321 | |
| | | | | AutA | | thors ; | _est_r~x 1 | | _r~j _1 | | |
| | aut2 .3333333 | | | aut3 33333 | | aut4 0 | aut5 0 | | aut6 0 | nau | t 3 |
| - | + | | | | | | | | | | |
| 93. | art_id 93 | | | joui | rna~d 4 | | citati~s 37 | | 99 | x 73699 | |
| | | | | | | thors ; | _est_r~x 1 | _est | • | au | t1 .5 |
| | aut2 .5 | | | aut3 0 | | aut4 0 | aut5 0 | | aut6 0 | nau | t 2 |
| - | + | | | | | | | | | | + |
| 94. | | | | - | | | citati~s 30 | | | | |
| | | | | AutA | | thors .;AutC | _est_r~x 1 | _ | _r~j 1 | | |
| | | | .33 | 33333 | l | 0 | aut5 0 | | | | t 3 |
| + | + | | | | | | | | | | + |

```
95. | art_id | journa~d | citati~s | x | | | | | 95 | 3 | 37 | -1.053058 | | | ------|
                   authors | _est_r~x | _est_r~j | aut1 |
                   AutA | 1 | 1 | 1 |
               aut3 | aut4 | aut5 |
      0 | 0 | 0 | 0 | 0 | 1 |
    art_id | journa~d | citati~s |
   96 | 2 | 23 | .3320688 |
                   authors | _est_r~x | _est_r~j | aut1 |
            AutA; AutB; AutC | 1 | 1 | .3333333 |
   | aut2 | aut3 | aut4 | aut5 | aut6 | naut | | .33333333 | .33333333 | 0 | 0 | 0 | 3 |
97. | art_id | journa~d | citati~s | x
    97 | 9 | 32 | -.476414 |
------
                   authors | _est_r~x | _est_r~j | aut1 |
                AutA; AutB | 1 | 1 | .5 |
      ------

    aut2 |
    aut3 |
    aut4 |
    aut5 |
    aut6 | naut |

    .5 |
    0 |
    0 |
    0 |
    0 |
    2 |

98. | art_id | journa~d | citati~s | x
   98 | 8 | 26 | 1.598897
                   authors | _est_r~x | _est_r~j | aut1 |
                    AutA | 1 | 1 |
      aut2 | aut3 | aut4 | aut5 | aut6 | naut |
              0 |
                     0 |
                             0 |
                                      0 | 1 |
99. | art_id | journa~d | citati~s |
   | 99 | 5 | 25 | .8515619 |
|------
                   authors | _est_r~x | _est_r~j | aut1 |
```

| | | | AutA; | AutB | 1 | 1 | 1 .3333333 | | | |
|------------|------------------|-----------|----------------|------------|------------------|---------------------|--------------|---------------|-----------|------------|
| | aut2 .3333333 | • | aut3 333333 | • | aut4 0 | aut5 0 | | aut6 0 | | naut 3 |
| 100. | art_id 100 | | jour | na~d 10 | I | citati~s 28 | | 54 | 63 | x 751 |
| | | | | | thors ;AutB | _est_r~x 1 | _e: | st_r~j 1 | | aut1 .5 |
| ا | aut2 .5 | | aut3 0 | | aut4 0 | | | aut6 0 | | naut 2 |

[21]: reghdfe citations x aut1-aut6, nocons a(journal_id) keepsingletons estimates store reg_wide_yxja2

WARNING: Singleton observations not dropped; statistical significance is biased > (link)

(MWFE estimator converged in 1 iterations) note: aut6 omitted because of collinearity

HDFE Linear regression Number of obs = 100 Absorbing 1 HDFE group F(6, 82) = 0.95 Prob > F 0.4664 R-squared 0.1550 Adj R-squared = -0.0201Within R-sq. 0.0648 Root MSE 5.7913

t P>|t| Coef. Std. Err. [95% Conf. Interval] citations | x | -1.296932 .6349505 -2.04 0.044 -2.560051 -.0338135 aut1 | -6.598418 10.50028 -0.63 0.531 -27.48682 14.28998 aut2 | -7.278314 11.02983 -0.66 0.511 -29.22016 14.66353 aut3 | -8.702311 11.22261 -0.78 0.440 -31.02766 13.62304 aut4 | -8.135489 13.11509 -0.62 0.537 -34.22559 17.95461 -1.09 0.280 -55.98683 aut5 | -19.79464 18.19326 16.39756 aut6 | 0 (omitted)

77

Absorbed degrees of freedom:

```
Absorbed FE | Categories - Redundant = Num. Coefs |
------|
journal_id | 12 0 12 |
```

| Variable | reg_w~2 | reg_1~2 | reg_1~3 |
|----------|---------|----------------|-------------------|
| x | 0.6350 | | -1.2969 0.6389 |
| N | 100 | 100 -0.0201 | 100 |

legend: b/se

The results are the same ... with the exception of the last regression. This is because counting dof is no easy task with more then one absorbed variable in a long format. With large datasets this should be irrelevant.