Data Analysis of Campaign Contributions and Voting Behavior

LPM of all Representatives

The reason for using a LPM for this analysis despite popular opinion in academa that the model is not always accurate (see Ch.5 in my paper), is that the LPM is ideal for binary outcomes, i.e. pro environmental or anti environmental vote.

with control variables

This is the most basic model, which includes all representatives (who can be associated with the R or D party, not I or Libertarian) in panel and who participated in at least 2 votes (to be able to track changes in voting behaviour). This means the dataset encompasses 574 (?) Representatives.

```
# remove ID type columns
df_long <- df_long %>% select(-c(GovtrackID, opensecrets_id, first_name, last_name, name, Vot
view(df_long)
## with control variables & no contrib, only dummy
full_ols_dummy <- lm(Vote ~ . - state - BioID - Vote_change - Contribution_plus - Contributio
summary(full_ols_dummy)
```

```
Call:
lm(formula = Vote ~ . - state - BioID - Vote_change - Contribution_plus -
    Contribution_minus, data = df_long)

Residuals:
     Min       1Q   Median       3Q      Max
-0.96673 -0.03970 -0.01298  0.02099  1.02524
```

```
Coefficients:
                 Estimate Std. Error  t value Pr(>|t|)
(Intercept)     -0.3508567  0.7867810   -0.446 0.655692
district         0.0006901  0.0003737    1.847 0.064958 .
partyR          -0.9109966  0.0084117 -108.301  < 2e-16 ***
birthday         0.0007040  0.0004006    1.757 0.078998 .
genderM         -0.0246431  0.0093088   -2.647 0.008181 **
nominate_dim1   -0.1223788  0.0282838   -4.327 1.59e-05 ***
nominate_dim2   -0.0745309  0.0215235   -3.463 0.000547 ***
GeographicalNE   0.0735222  0.0113152    6.498 1.04e-10 ***
GeographicalSO   0.0039634  0.0094534    0.419 0.675079
GeographicalWE   0.0160510  0.0113185    1.418 0.156321
Instance         0.0005685  0.0001799    3.161 0.001600 **
seniority        0.0012243  0.0010412    1.176 0.239791
Dmajority        0.0246163  0.0088222    2.790 0.005320 **
anti_env_dummy  -0.0281210  0.0131632   -2.136 0.032780 *
pro_env_dummy    0.0068101  0.0081973    0.831 0.406205
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.153 on 1886 degrees of freedom
  (1417 observations deleted due to missingness)
Multiple R-squared:  0.907, Adjusted R-squared:  0.9063
F-statistic:  1313 on 14 and 1886 DF,  p-value: < 2.2e-16
```

```
## with control variables and contribs
full_ols <- lm(Vote ~ . - state - BioID - Vote_change, data = df_long)
summary(full_ols)
```

```
Call:
lm(formula = Vote ~ . - state - BioID - Vote_change, data = df_long)

Residuals:
     Min       1Q   Median       3Q      Max
-0.99060 -0.04051 -0.01116  0.02351  1.00095

Coefficients:
                 Estimate Std. Error  t value Pr(>|t|)
(Intercept)     -4.159e-01  7.822e-01   -0.532  0.59495
district         7.882e-04  3.717e-04    2.120  0.03411 *
```

```
partyR               -9.010e-01  8.855e-03 -101.745  < 2e-16 ***
birthday              7.378e-04  3.982e-04    1.853  0.06409 .
genderM              -2.519e-02  9.241e-03   -2.726  0.00648 **
nominate_dim1        -1.407e-01  2.851e-02   -4.935 8.74e-07 ***
nominate_dim2        -6.994e-02  2.134e-02   -3.276  0.00107 **
GeographicalNE        7.307e-02  1.123e-02    6.507 9.82e-11 ***
GeographicalSO        8.803e-03  9.403e-03    0.936  0.34929
GeographicalWE        1.938e-02  1.124e-02    1.725  0.08475 .
Instance              4.826e-04  1.788e-04    2.698  0.00703 **
seniority             1.618e-03  1.038e-03    1.559  0.11921
Contribution_minus   -6.038e-07  1.476e-07   -4.090 4.49e-05 ***
Contribution_plus     7.214e-06  1.400e-06    5.152 2.85e-07 ***
Dmajority             2.406e-02  8.748e-03    2.750  0.00601 **
anti_env_dummy       -2.099e-02  1.317e-02   -1.593  0.11134
pro_env_dummy        -6.638e-03  9.169e-03   -0.724  0.46919
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.1516 on 1884 degrees of freedom
  (1417 observations deleted due to missingness)
Multiple R-squared:  0.9087,    Adjusted R-squared:  0.908
F-statistic:  1172 on 16 and 1884 DF,  p-value: < 2.2e-16
```

```r
# same thing again with log transformed contributions
df_long_log <- df_long_log %>% select(-c(GovtrackID, opensecrets_id, first_name, last_name, r
full_ols_log <- lm(Vote ~ . - state - BioID - Vote_change, data = df_long_log)
summary(full_ols_log)
```

```
Call:
lm(formula = Vote ~ . - state - BioID - Vote_change, data = df_long_log)

Residuals:
     Min       1Q   Median       3Q      Max
-1.09309 -0.03431 -0.00684  0.02394  0.97306

Coefficients:
                    Estimate Std. Error  t value Pr(>|t|)
(Intercept)        0.1951467  0.7671589    0.254 0.799233
district           0.0001180  0.0003708    0.318 0.750326
partyR            -0.9109252  0.0090809 -100.312  < 2e-16 ***
Vote_change_dummy  0.1760734  0.0173161   10.168  < 2e-16 ***
```

```
birthday                0.0004227  0.0003906    1.082 0.279375
genderM                -0.0266096  0.0090810   -2.930 0.003428 **
nominate_dim1          -0.0751775  0.0287092   -2.619 0.008900 **
nominate_dim2          -0.1057884  0.0211617   -4.999 6.30e-07 ***
GeographicalNE          0.0605128  0.0110885    5.457 5.47e-08 ***
GeographicalSO         -0.0008319  0.0092087   -0.090 0.928025
GeographicalWE          0.0190261  0.0110184    1.727 0.084375 .
Instance                0.0005591  0.0001747    3.201 0.001394 **
seniority               0.0002570  0.0010177    0.252 0.800688
Dmajority               0.0284876  0.0085833    3.319 0.000921 ***
anti_env_dummy          0.0788661  0.0317912    2.481 0.013197 *
pro_env_dummy          -0.0696149  0.0340943   -2.042 0.041307 *
Contribution_plus_log   0.0113726  0.0046009    2.472 0.013530 *
Contribution_minus_log -0.0120736  0.0033220   -3.634 0.000286 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.1484 on 1883 degrees of freedom
  (1417 observations deleted due to missingness)
Multiple R-squared:  0.9126,    Adjusted R-squared:  0.9118
F-statistic:  1157 on 17 and 1883 DF,  p-value: < 2.2e-16
```
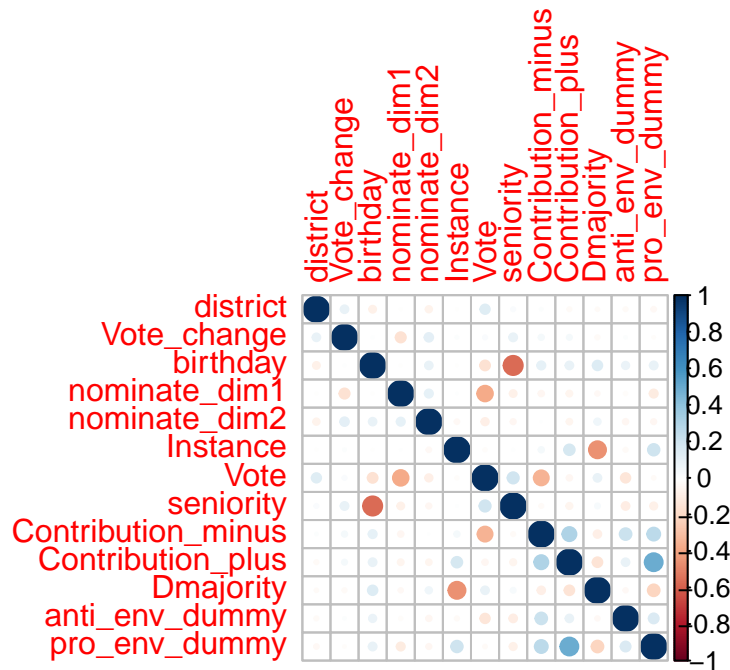
Why such high adjusted R-squared, use corrtest to see if multicollinearity is present.

```
# select only numeric variables
df_long_num <- df_long %>%
    select_if(is.numeric) %>%
    filter(complete.cases(.))
corrplot(cor(df_long_num))
```

4

The ols regresses the pro and anti environmental contributions with the control variables used:

- party
- district
- birthday
- state (alt. to Geographical)
- Seniority (number of terms served prior to vote)
- DW-Nominate Scores from the 1st and second dimensions
- Geographical region (i.e. States categorised into regions (South, West, North-East and Midwest))
- majority party in the house at the time of the vote.

transforming the contribution variables logarithmically does not change the adjusted R-squared of the model by much. It also decreases the significance of the contribution coefficients, which is strange, given that the contribution variables are highly skewed and thus should be transformed logarithmically.

check for multicolinarity in model

```
vif(full_ols)
```

```
                  GVIF Df GVIF^(1/(2*Df))
district           1.106005  1        1.051668
party              1.614196  1        1.270510
birthday           1.633170  1        1.277956
gender             1.173584  1        1.083321
nominate_dim1      1.286703  1        1.134329
nominate_dim2      1.044345  1        1.021932
Geographical       1.349322  3        1.051201
Instance           1.301281  1        1.140737
seniority          1.588564  1        1.260382
Contribution_minus 1.385466  1        1.177058
Contribution_plus  1.420459  1        1.191830
Dmajority          1.373583  1        1.171999
anti_env_dummy     1.081422  1        1.039914
pro_env_dummy      1.465752  1        1.210683
```

shows that multicolinearity is not of a real concern here, all VIF values are below 5, most of which between 1 and 1.25.

```
df_long <- df_long %>% filter(complete.cases(Contribution_plus))
skewness(df_long$Contribution_plus)
```

```
[1] 7.249464
```

```
df_long_log <- df_long_log %>% filter(complete.cases(Contribution_plus_log))
skewness(df_long_log$Contribution_plus_log)
```

```
[1] 0.9765213
```

The reason for transforming the contribution variables is to account for differences in contributions which representatives might receive, i.e. AOC vs. Kevin McCarthy.

checking differences in party

```
df_long_D <- df_long %>%
    filter(party == "D") %>%
    select(-c(state, party, BioID, Vote_change))

full_ols_D <- lm(Vote ~ ., data = df_long_D)
summary(full_ols_D)
```

```
Call:
lm(formula = Vote ~ ., data = df_long_D)

Residuals:
     Min       1Q   Median       3Q      Max
-0.89386 -0.02095  0.00584  0.03769  0.22466

Coefficients:
                     Estimate Std. Error t value Pr(>|t|)
(Intercept)         2.405e-01  8.120e-01   0.296  0.76716
district           -1.681e-03  3.550e-04  -4.736 2.55e-06 ***
birthday            3.645e-04  4.135e-04   0.882  0.37824
genderM            -6.949e-03  7.936e-03  -0.876  0.38144
nominate_dim1       2.450e-01  3.561e-02   6.881 1.14e-11 ***
nominate_dim2      -1.905e-01  2.166e-02  -8.796  < 2e-16 ***
GeographicalNE      5.931e-03  1.060e-02   0.559  0.57603
GeographicalSO     -9.807e-03  1.092e-02  -0.898  0.36939
GeographicalWE      2.952e-02  1.158e-02   2.548  0.01100 *
Instance            2.535e-04  1.876e-04   1.352  0.17687
seniority          -2.062e-03  1.034e-03  -1.994  0.04650 *
Contribution_minus -7.981e-07  2.657e-07  -3.004  0.00274 **
Contribution_plus   4.249e-06  1.947e-06   2.182  0.02936 *
Dmajority           3.633e-02  8.869e-03   4.096 4.59e-05 ***
anti_env_dummy     -6.912e-03  1.145e-02  -0.604  0.54615
pro_env_dummy      -5.442e-03  9.344e-03  -0.582  0.56048
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.106 on 870 degrees of freedom
  (250 observations deleted due to missingness)
Multiple R-squared:  0.1741,    Adjusted R-squared:  0.1599
F-statistic: 12.23 on 15 and 870 DF,  p-value: < 2.2e-16
```

```r
df_long_R <- df_long %>%
    filter(party == "R") %>%
    select(-c(state, party, BioID, Vote_change))

full_ols_R <- lm(Vote ~ ., data = df_long_R)
summary(full_ols_R)
```

```
Call:
lm(formula = Vote ~ ., data = df_long_R)

Residuals:
     Min       1Q   Median       3Q      Max
-0.38817 -0.05319 -0.01624  0.01787  0.97551

Coefficients:
                    Estimate Std. Error t value Pr(>|t|)
(Intercept)       -3.073e+00  1.228e+00  -2.502 0.012493 *
district           2.411e-03  6.669e-04   3.615 0.000315 ***
birthday           1.625e-03  6.244e-04   2.603 0.009377 **
genderM           -2.610e-02  1.989e-02  -1.312 0.189714
nominate_dim1     -2.366e-01  4.606e-02  -5.137 3.35e-07 ***
nominate_dim2      3.748e-02  3.445e-02   1.088 0.276918
GeographicalNE     1.663e-01  2.198e-02   7.568 8.60e-14 ***
GeographicalSO     3.280e-02  1.387e-02   2.365 0.018238 *
GeographicalWE     1.681e-02  1.813e-02   0.927 0.354258
Instance           6.549e-04  2.738e-04   2.392 0.016935 *
seniority          2.712e-03  1.773e-03   1.529 0.126486
Contribution_minus -5.609e-07  1.881e-07  -2.982 0.002931 **
Contribution_plus  9.480e-06  1.870e-06   5.069 4.76e-07 ***
Dmajority          2.589e-02  1.390e-02   1.863 0.062697 .
anti_env_dummy    -2.739e-02  2.623e-02  -1.044 0.296549
pro_env_dummy     -9.943e-03  1.463e-02  -0.680 0.496788
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.1713 on 999 degrees of freedom
  (163 observations deleted due to missingness)
Multiple R-squared:  0.178,	Adjusted R-squared:  0.1657
F-statistic: 14.43 on 15 and 999 DF,  p-value: < 2.2e-16
```

Not much difference in the coefficients between the two parties. Why NA in anti_env_dummy ? because all received contributions? lets see...

```
table(df_long_R$anti_env_dummy)
```

```
   0    1
  68 1110
```

Since only 96 instances of non-anti environmental contributions exist, this means that only $96/6 = 16$ representatives never received contributions from anti environmental groups. hence why there are probably NAs for this variable.

with party & year fixed effects

```
ols_party <- lm(Vote ~ district + birthday + nominate_dim1 + nominate_dim2 + Geographical + a
summary(ols_party)
```

```
Call:
lm(formula = Vote ~ district + birthday + nominate_dim1 + nominate_dim2 +
    Geographical + as.factor(party) + as.factor(Instance) + seniority +
    Contribution_minus + Contribution_plus + gender + pro_env_dummy +
    anti_env_dummy, data = df_long)

Residuals:
     Min       1Q   Median       3Q      Max
-0.98664 -0.04059 -0.01140  0.02301  1.00436

Coefficients:
                      Estimate Std. Error  t value Pr(>|t|)
(Intercept)         -4.263e-01  7.842e-01   -0.544  0.58680
district             7.851e-04  3.719e-04    2.111  0.03489 *
birthday             7.414e-04  3.994e-04    1.856  0.06355 .
nominate_dim1       -1.412e-01  2.852e-02   -4.950 8.10e-07 ***
nominate_dim2       -6.979e-02  2.135e-02   -3.269  0.00110 **
GeographicalNE       7.292e-02  1.123e-02    6.490 1.09e-10 ***
GeographicalSO       8.676e-03  9.407e-03    0.922  0.35645
GeographicalWE       1.943e-02  1.124e-02    1.729  0.08400 .
as.factor(party)R   -9.011e-01  8.864e-03 -101.662  < 2e-16 ***
as.factor(Instance)4 1.007e-02  1.206e-02    0.835  0.40400
as.factor(Instance)6 3.505e-02  1.237e-02    2.833  0.00465 **
as.factor(Instance)7 2.546e-02  1.309e-02    1.945  0.05196 .
as.factor(Instance)51 2.387e-02 1.223e-02    1.952  0.05107 .
as.factor(Instance)52 3.305e-02 1.232e-02    2.683  0.00737 **
seniority            1.643e-03  1.042e-03    1.578  0.11484
Contribution_minus  -6.107e-07  1.479e-07   -4.130 3.79e-05 ***
Contribution_plus    7.200e-06  1.402e-06    5.137 3.08e-07 ***
genderM             -2.513e-02  9.246e-03   -2.718  0.00663 **
```

```
pro_env_dummy            -6.747e-03  9.173e-03   -0.736  0.46206
anti_env_dummy           -2.101e-02  1.318e-02   -1.594  0.11119
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.1516 on 1881 degrees of freedom
  (413 observations deleted due to missingness)
Multiple R-squared:  0.9088,     Adjusted R-squared:  0.9079
F-statistic: 986.8 on 19 and 1881 DF,  p-value: < 2.2e-16
```

```
# same with just anti and pro contribution dummies
ols_party_dummy <- lm(Vote ~ district + birthday + nominate_dim1 + nominate_dim2 + Geographic
summary(ols_party_dummy)
```

```
Call:
lm(formula = Vote ~ district + birthday + nominate_dim1 + nominate_dim2 +
    Geographical + as.factor(party) + as.factor(Instance) + seniority +
    gender + pro_env_dummy + anti_env_dummy, data = df_long)

Residuals:
     Min       1Q   Median       3Q      Max
-0.97144 -0.04081 -0.01261  0.02077  1.03026

Coefficients:
                        Estimate Std. Error  t value Pr(>|t|)
(Intercept)           -0.3501056  0.7886732   -0.444 0.657153
district               0.0006861  0.0003739    1.835 0.066644 .
birthday               0.0007020  0.0004016    1.748 0.080642 .
nominate_dim1         -0.1226100  0.0282948   -4.333 1.55e-05 ***
nominate_dim2         -0.0743652  0.0215323   -3.454 0.000565 ***
GeographicalNE         0.0734140  0.0113202    6.485 1.13e-10 ***
GeographicalSO         0.0038199  0.0094577    0.404 0.686337
GeographicalWE         0.0161143  0.0113227    1.423 0.154849
as.factor(party)R     -0.9112320  0.0084189 -108.237  < 2e-16 ***
as.factor(Instance)4   0.0102176  0.0121690    0.840 0.401215
as.factor(Instance)6   0.0348138  0.0124807    2.789 0.005333 **
as.factor(Instance)7   0.0277378  0.0131899    2.103 0.035602 *
as.factor(Instance)51  0.0276148  0.0123203    2.241 0.025116 *
as.factor(Instance)52  0.0376790  0.0124016    3.038 0.002412 **
seniority              0.0012311  0.0010448    1.178 0.238787
genderM               -0.0245815  0.0093145   -2.639 0.008382 **
```

```
pro_env_dummy              0.0065573  0.0082036    0.799 0.424201
anti_env_dummy            -0.0281664  0.0131776   -2.137 0.032691 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.153 on 1883 degrees of freedom
  (413 observations deleted due to missingness)
Multiple R-squared:  0.9071,    Adjusted R-squared:  0.9062
F-statistic:  1081 on 17 and 1883 DF,  p-value: < 2.2e-16
```

```
# same thing with plm
ols_party_plm <- plm(Vote ~ district + birthday + nominate_dim1 + nominate_dim2 + Geographica
```

```
Warning in pdata.frame(data, index): duplicate couples (id-time) in resulting pdata.frame
 to find out which, use, e.g., table(index(your_pdataframe), useNA = "ifany")
```

with state & year fixed effects

once with geographical

```
ols_geo <- lm(Vote ~ district + party + birthday + nominate_dim1 + nominate_dim2 + as.factor
summary(ols_geo)
```

```
Call:
lm(formula = Vote ~ district + party + birthday + nominate_dim1 +
    nominate_dim2 + as.factor(Geographical) + as.factor(Instance) +
    seniority + Contribution_minus + Contribution_plus + gender +
    pro_env_dummy + anti_env_dummy, data = df_long)

Residuals:
     Min       1Q    Median       3Q      Max
-0.98664 -0.04059 -0.01140  0.02301  1.00436

Coefficients:
                        Estimate Std. Error  t value Pr(>|t|)
(Intercept)           -4.263e-01  7.842e-01   -0.544  0.58680
district               7.851e-04  3.719e-04    2.111  0.03489 *
partyR                -9.011e-01  8.864e-03 -101.662  < 2e-16 ***
```

```
birthday                      7.414e-04  3.994e-04    1.856  0.06355 .
nominate_dim1                 -1.412e-01  2.852e-02   -4.950 8.10e-07 ***
nominate_dim2                 -6.979e-02  2.135e-02   -3.269  0.00110 **
as.factor(Geographical)NE      7.292e-02  1.123e-02    6.490 1.09e-10 ***
as.factor(Geographical)SO      8.676e-03  9.407e-03    0.922  0.35645
as.factor(Geographical)WE      1.943e-02  1.124e-02    1.729  0.08400 .
as.factor(Instance)4           1.007e-02  1.206e-02    0.835  0.40400
as.factor(Instance)6           3.505e-02  1.237e-02    2.833  0.00465 **
as.factor(Instance)7           2.546e-02  1.309e-02    1.945  0.05196 .
as.factor(Instance)51          2.387e-02  1.223e-02    1.952  0.05107 .
as.factor(Instance)52          3.305e-02  1.232e-02    2.683  0.00737 **
seniority                      1.643e-03  1.042e-03    1.578  0.11484
Contribution_minus           -6.107e-07  1.479e-07   -4.130 3.79e-05 ***
Contribution_plus             7.200e-06  1.402e-06    5.137 3.08e-07 ***
genderM                      -2.513e-02  9.246e-03   -2.718  0.00663 **
pro_env_dummy                -6.747e-03  9.173e-03   -0.736  0.46206
anti_env_dummy               -2.101e-02  1.318e-02   -1.594  0.11119
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.1516 on 1881 degrees of freedom
  (413 observations deleted due to missingness)
Multiple R-squared:  0.9088,     Adjusted R-squared:  0.9079
F-statistic: 986.8 on 19 and 1881 DF,  p-value: < 2.2e-16
```

```r
# same thing with plm
ols_geo_plm <- plm(Vote ~ district + party + birthday + nominate_dim1 + nominate_dim2 + seni
```

```
Warning in pdata.frame(data, index): duplicate couples (id-time) in resulting pdata.frame
 to find out which, use, e.g., table(index(your_pdataframe), useNA = "ifany")
```

```r
summary(ols_geo_plm)
```

```
Oneway (individual) effect Within Model

Call:
plm(formula = Vote ~ district + party + birthday + nominate_dim1 +
    nominate_dim2 + seniority + Contribution_minus + Contribution_plus +
    gender + pro_env_dummy + anti_env_dummy, data = df_long,
    model = "within", index = c("Geographical", "Instance"))
```

```
Balanced Panel: n = 4, T = 6, N = 1901

Residuals:
     Min.    1st Qu.    Median   3rd Qu.       Max.
-0.985606 -0.037830 -0.012172  0.022552  1.007199

Coefficients:
                    Estimate  Std. Error   t-value  Pr(>|t|)
district           7.6838e-04  3.7249e-04    2.0628  0.039267 *
partyR            -9.0180e-01  8.8572e-03 -101.8152 < 2.2e-16 ***
birthday           9.9014e-04  3.8770e-04    2.5539  0.010730 *
nominate_dim1     -1.4168e-01  2.8569e-02   -4.9591 7.716e-07 ***
nominate_dim2     -6.9078e-02  2.1372e-02   -3.2322  0.001250 **
seniority          2.0890e-03  1.0273e-03    2.0334  0.042148 *
Contribution_minus -6.2442e-07 1.4780e-07   -4.2247 2.506e-05 ***
Contribution_plus  7.3910e-06  1.3977e-06    5.2878 1.382e-07 ***
genderM           -2.5998e-02  9.2556e-03   -2.8089  0.005023 **
pro_env_dummy     -7.3160e-03  9.0136e-03   -0.8117  0.417088
anti_env_dummy    -2.2781e-02  1.3178e-02   -1.7287  0.084021 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Total Sum of Squares:    415.61
Residual Sum of Squares: 43.537
R-Squared:       0.89525
Adj. R-Squared: 0.89447
F-statistic: 1465.29 on 11 and 1886 DF, p-value: < 2.22e-16
```

```r
# same thing with log
ols_geo_log <- lm(Vote ~ district + party + birthday + nominate_dim1 + nominate_dim2 + as.fac
summary(ols_geo_log)
```

```
Call:
lm(formula = Vote ~ district + party + birthday + nominate_dim1 +
    nominate_dim2 + as.factor(Geographical) + as.factor(Instance) +
    seniority + Contribution_minus_log + Contribution_plus_log +
    gender + pro_env_dummy + anti_env_dummy, data = df_long_log)

Residuals:
     Min        1Q    Median        3Q       Max
-0.96550 -0.04226 -0.01131  0.02241  1.00041
```

```
Coefficients:
                            Estimate Std. Error t value Pr(>|t|)
(Intercept)               -0.4591089  0.7869615  -0.583 0.559698
district                   0.0008103  0.0003743   2.165 0.030541 *
partyR                    -0.8996493  0.0092617 -97.137  < 2e-16 ***
birthday                   0.0007581  0.0004008   1.892 0.058707 .
nominate_dim1             -0.1389326  0.0287939  -4.825 1.51e-06 ***
nominate_dim2             -0.0726271  0.0214780  -3.381 0.000736 ***
as.factor(Geographical)NE  0.0704985  0.0113434   6.215 6.31e-10 ***
as.factor(Geographical)SO  0.0056663  0.0094350   0.601 0.548207
as.factor(Geographical)WE  0.0177440  0.0113159   1.568 0.117036
as.factor(Instance)4       0.0111050  0.0121206   0.916 0.359673
as.factor(Instance)6       0.0350433  0.0124298   2.819 0.004863 **
as.factor(Instance)7       0.0253127  0.0131640   1.923 0.054646 .
as.factor(Instance)51      0.0263085  0.0122730   2.144 0.032192 *
as.factor(Instance)52      0.0364922  0.0123535   2.954 0.003176 **
seniority                  0.0014049  0.0010425   1.348 0.177926
Contribution_minus_log    -0.0119403  0.0034188  -3.492 0.000490 ***
Contribution_plus_log      0.0132229  0.0047233   2.799 0.005171 **
genderM                   -0.0226172  0.0093202  -2.427 0.015331 *
pro_env_dummy             -0.0826574  0.0350031  -2.361 0.018306 *
anti_env_dummy             0.0760222  0.0326888   2.326 0.020144 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.1524 on 1881 degrees of freedom
  (413 observations deleted due to missingness)
Multiple R-squared:  0.9079,    Adjusted R-squared:  0.907
F-statistic: 976.3 on 19 and 1881 DF,  p-value: < 2.2e-16
```

Explain the following in the paper:

- why bill fixed effects (environmental occurances/perception may influence voting)
- why state fixed effects (D-CA != D-TX or so. avg. rep from states different)

for ols_geo_1 since I are being stricter than in the model before, since I am using fixed effects for the geographical region and the (year). This means that the model is more robust, but also more specific.

once with state

```
ols_state_fe <- lm(Vote ~ party + birthday + nominate_dim1 + nominate_dim2 + as.factor(state)
summary(ols_state_fe)
```

```
Call:
lm(formula = Vote ~ party + birthday + nominate_dim1 + nominate_dim2 +
    as.factor(state) + as.factor(Instance) + seniority + Contribution_minus +
    Contribution_plus + gender + pro_env_dummy + anti_env_dummy,
    data = df_long)

Residuals:
     Min       1Q   Median       3Q      Max
-0.98076 -0.04303 -0.00641  0.02722  0.93072

Coefficients:
                     Estimate Std. Error t value Pr(>|t|)
(Intercept)        -1.288e+00  7.668e-01  -1.680 0.093152 .
partyR             -8.947e-01  9.179e-03 -97.476  < 2e-16 ***
birthday            1.157e-03  3.915e-04   2.955 0.003165 **
nominate_dim1      -1.437e-01  2.930e-02  -4.904 1.01e-06 ***
nominate_dim2      -5.672e-02  2.137e-02  -2.654 0.008013 **
as.factor(state)AL  4.188e-02  6.914e-02   0.606 0.544709
as.factor(state)AR  3.049e-02  7.231e-02   0.422 0.673306
as.factor(state)AZ  7.449e-02  7.018e-02   1.061 0.288595
as.factor(state)CA  8.262e-02  6.501e-02   1.271 0.203947
as.factor(state)CO  8.175e-02  6.890e-02   1.186 0.235584
as.factor(state)CT  8.710e-02  7.054e-02   1.235 0.217075
as.factor(state)DE  8.102e-02  9.042e-02   0.896 0.370333
as.factor(state)FL  1.311e-01  6.564e-02   1.997 0.046000 *
as.factor(state)GA  4.124e-02  6.694e-02   0.616 0.537915
as.factor(state)HI  5.695e-02  8.285e-02   0.687 0.491915
as.factor(state)IA  3.441e-03  7.435e-02   0.046 0.963089
as.factor(state)ID  4.323e-02  8.066e-02   0.536 0.592054
as.factor(state)IL  7.013e-02  6.610e-02   1.061 0.288795
as.factor(state)IN  2.196e-02  6.801e-02   0.323 0.746752
as.factor(state)KS  1.766e-02  7.450e-02   0.237 0.812685
as.factor(state)KY  4.369e-02  6.937e-02   0.630 0.528832
as.factor(state)LA  5.868e-02  7.109e-02   0.825 0.409242
as.factor(state)MA  9.440e-02  6.819e-02   1.384 0.166413
```

```
as.factor(state)MD      1.031e-01  6.873e-02   1.501 0.133599
as.factor(state)ME      6.580e-02  7.951e-02   0.828 0.408007
as.factor(state)MI      1.000e-01  6.666e-02   1.500 0.133723
as.factor(state)MN     -2.670e-03  6.878e-02  -0.039 0.969037
as.factor(state)MO      2.866e-02  6.854e-02   0.418 0.675819
as.factor(state)MS      7.021e-02  7.288e-02   0.963 0.335446
as.factor(state)MT      7.421e-03  1.099e-01   0.068 0.946167
as.factor(state)NC      5.635e-02  6.764e-02   0.833 0.404894
as.factor(state)ND      7.392e-03  1.267e-01   0.058 0.953499
as.factor(state)NE     -1.931e-02  7.458e-02  -0.259 0.795769
as.factor(state)NH      5.945e-02  8.110e-02   0.733 0.463577
as.factor(state)NJ      1.470e-01  6.685e-02   2.199 0.027964 *
as.factor(state)NM      5.074e-02  8.682e-02   0.584 0.558965
as.factor(state)NV      5.768e-02  7.267e-02   0.794 0.427438
as.factor(state)NY      1.559e-01  6.543e-02   2.383 0.017253 *
as.factor(state)OH      4.687e-02  6.607e-02   0.709 0.478158
as.factor(state)OK      2.753e-02  7.404e-02   0.372 0.710113
as.factor(state)OR      9.039e-02  7.011e-02   1.289 0.197462
as.factor(state)PA      1.152e-01  6.606e-02   1.744 0.081288 .
as.factor(state)RI      1.000e-01  7.848e-02   1.274 0.202729
as.factor(state)SC      1.169e-01  6.915e-02   1.690 0.091091 .
as.factor(state)SD     -1.753e-02  9.455e-02  -0.185 0.852946
as.factor(state)TN      4.596e-02  6.804e-02   0.676 0.499384
as.factor(state)TX      2.807e-02  6.532e-02   0.430 0.667423
as.factor(state)UT      2.848e-02  7.381e-02   0.386 0.699616
as.factor(state)VA      5.810e-02  6.762e-02   0.859 0.390314
as.factor(state)WA      7.401e-02  6.759e-02   1.095 0.273649
as.factor(state)WI      6.681e-02  6.958e-02   0.960 0.337058
as.factor(state)WV      2.044e-02  7.475e-02   0.273 0.784540
as.factor(state)WY      3.338e-02  1.021e-01   0.327 0.743763
as.factor(Instance)4    1.212e-02  1.149e-02   1.055 0.291509
as.factor(Instance)6    3.526e-02  1.175e-02   3.001 0.002718 **
as.factor(Instance)7    2.842e-02  1.233e-02   2.306 0.021222 *
as.factor(Instance)51   2.468e-02  1.160e-02   2.127 0.033515 *
as.factor(Instance)52   3.328e-02  1.169e-02   2.847 0.004453 **
seniority               1.822e-03  1.033e-03   1.763 0.078062 .
Contribution_minus     -4.776e-07  1.351e-07  -3.536 0.000415 ***
Contribution_plus       6.984e-06  1.417e-06   4.930 8.87e-07 ***
genderM                -2.857e-02  9.030e-03  -3.164 0.001578 **
pro_env_dummy          -4.585e-04  8.815e-03  -0.052 0.958518
anti_env_dummy         -2.567e-02  1.292e-02  -1.987 0.047065 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Residual standard error: 0.1538 on 2153 degrees of freedom
  (97 observations deleted due to missingness)
Multiple R-squared:  0.9081,     Adjusted R-squared:  0.9054
F-statistic: 337.6 on 63 and 2153 DF,  p-value: < 2.2e-16
```

```
# same thing again with plm
ols_state_fe_plm <- plm(Vote ~ party + birthday + nominate_dim1 + nominate_dim2 + seniority
```

```
Warning in pdata.frame(data, index): duplicate couples (id-time) in resulting pdata.frame
 to find out which, use, e.g., table(index(your_pdataframe), useNA = "ifany")
```

```
summary(ols_state_fe_plm)
```

```
Oneway (individual) effect Within Model

Call:
plm(formula = Vote ~ party + birthday + nominate_dim1 + nominate_dim2 +
    seniority + Contribution_minus + Contribution_plus + gender +
    pro_env_dummy + anti_env_dummy, data = df_long, model = "within",
    index = c("state", "Instance"))

Unbalanced Panel: n = 49, T = 2-283, N = 2217

Residuals:
      Min.    1st Qu.     Median    3rd Qu.       Max.
-0.9675578 -0.0435903 -0.0052962  0.0257190  0.9332252

Coefficients:
                     Estimate  Std. Error  t-value  Pr(>|t|)
partyR             -8.9567e-01  9.1785e-03 -97.5835 < 2.2e-16 ***
birthday            1.4407e-03  3.7839e-04   3.8074 0.0001444 ***
nominate_dim1      -1.4360e-01  2.9345e-02  -4.8935 1.064e-06 ***
nominate_dim2      -5.5328e-02  2.1378e-02  -2.5881 0.0097156 **
seniority           2.3691e-03  1.0148e-03   2.3345 0.0196632 *
Contribution_minus -4.8760e-07  1.3502e-07  -3.6114 0.0003115 ***
Contribution_plus   7.1870e-06  1.4107e-06   5.0945 3.800e-07 ***
genderM            -2.9704e-02  9.0355e-03  -3.2875 0.0010271 **
pro_env_dummy      -1.6461e-03  8.6430e-03  -0.1905 0.8489679
anti_env_dummy     -2.6618e-02  1.2928e-02  -2.0590 0.0396185 *
---
```

```
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1


Total Sum of Squares:    394.57
Residual Sum of Squares: 51.254
R-Squared:       0.8701
Adj. R-Squared: 0.86661
F-statistic: 1445.5 on 10 and 2158 DF, p-value: < 2.22e-16
```

```r
# same thing again with log
ols_state_fe_log <- lm(Vote ~ party + birthday + nominate_dim1 + nominate_dim2 + as.factor(st
summary(ols_state_fe_log)
```

```
Call:
lm(formula = Vote ~ party + birthday + nominate_dim1 + nominate_dim2 +
    as.factor(state) + as.factor(Instance) + seniority + Contribution_minus_log +
    Contribution_plus_log + gender + pro_env_dummy + anti_env_dummy,
    data = df_long_log)


Residuals:
     Min       1Q   Median       3Q      Max
-0.96950 -0.04431 -0.00684  0.02780  0.92596


Coefficients:
                       Estimate Std. Error t value Pr(>|t|)
(Intercept)          -1.4131558  0.7687040  -1.838  0.06615 .
partyR               -0.8934106  0.0094783 -94.258  < 2e-16 ***
birthday              0.0012239  0.0003926   3.118  0.00185 **
nominate_dim1        -0.1458261  0.0297420  -4.903 1.01e-06 ***
nominate_dim2        -0.0608293  0.0214780  -2.832  0.00467 **
as.factor(state)AL    0.0419216  0.0694180   0.604  0.54597
as.factor(state)AR    0.0282338  0.0726003   0.389  0.69739
as.factor(state)AZ    0.0728869  0.0704719   1.034  0.30113
as.factor(state)CA    0.0764943  0.0652153   1.173  0.24095
as.factor(state)CO    0.0835448  0.0691082   1.209  0.22683
as.factor(state)CT    0.0784138  0.0708326   1.107  0.26840
as.factor(state)DE    0.0773796  0.0907723   0.852  0.39405
as.factor(state)FL    0.1250684  0.0659216   1.897  0.05793 .
as.factor(state)GA    0.0365091  0.0671892   0.543  0.58693
as.factor(state)HI    0.0433561  0.0832550   0.521  0.60259
as.factor(state)IA    0.0256047  0.0744066   0.344  0.73079
as.factor(state)ID    0.0366105  0.0809088   0.452  0.65096
```

```
as.factor(state)IL           0.0659180   0.0663566    0.993  0.32063
as.factor(state)IN           0.0210719   0.0682979    0.309  0.75771
as.factor(state)KS           0.0182655   0.0747227    0.244  0.80691
as.factor(state)KY           0.0368347   0.0696307    0.529  0.59686
as.factor(state)LA           0.0477975   0.0711664    0.672  0.50189
as.factor(state)MA           0.0870165   0.0684438    1.271  0.20374
as.factor(state)MD           0.0933834   0.0689310    1.355  0.17564
as.factor(state)ME           0.0640444   0.0799157    0.801  0.42299
as.factor(state)MI           0.0971507   0.0668916    1.452  0.14655
as.factor(state)MN          -0.0054061   0.0690344   -0.078  0.93759
as.factor(state)MO           0.0243813   0.0688178    0.354  0.72316
as.factor(state)MS           0.0698431   0.0731654    0.955  0.33989
as.factor(state)MT          -0.0013241   0.1102809   -0.012  0.99042
as.factor(state)NC           0.0528712   0.0678787    0.779  0.43612
as.factor(state)ND           0.0054669   0.1272275    0.043  0.96573
as.factor(state)NE          -0.0202777   0.0749573   -0.271  0.78678
as.factor(state)NH           0.0494536   0.0814894    0.607  0.54400
as.factor(state)NJ           0.1478090   0.0670874    2.203  0.02768 *
as.factor(state)NM           0.0412632   0.0871305    0.474  0.63585
as.factor(state)NV           0.0516852   0.0728998    0.709  0.47841
as.factor(state)NY           0.1507442   0.0656891    2.295  0.02184 *
as.factor(state)OH           0.0429944   0.0662783    0.649  0.51661
as.factor(state)OK           0.0243711   0.0743343    0.328  0.74305
as.factor(state)OR           0.0821647   0.0703099    1.169  0.24269
as.factor(state)PA           0.1090435   0.0663100    1.644  0.10023
as.factor(state)RI           0.0799745   0.0790184    1.012  0.31160
as.factor(state)SC           0.1136158   0.0694321    1.636  0.10191
as.factor(state)SD          -0.0225157   0.0949221   -0.237  0.81252
as.factor(state)TN           0.0389729   0.0683393    0.570  0.56854
as.factor(state)TX           0.0242671   0.0654871    0.371  0.71100
as.factor(state)UT           0.0270868   0.0740842    0.366  0.71468
as.factor(state)VA           0.0530005   0.0678840    0.781  0.43503
as.factor(state)WA           0.0672618   0.0678498    0.991  0.32163
as.factor(state)WI           0.0630914   0.0698421    0.903  0.36644
as.factor(state)WV           0.0136554   0.0750156    0.182  0.85557
as.factor(state)WY           0.0275054   0.1024208    0.269  0.78830
as.factor(Instance)4         0.0128152   0.0115329    1.111  0.26661
as.factor(Instance)6         0.0346753   0.0117927    2.940  0.00331 **
as.factor(Instance)7         0.0271531   0.0124003    2.190  0.02865 *
as.factor(Instance)51        0.0266620   0.0116362    2.291  0.02204 *
as.factor(Instance)52        0.0364435   0.0117058    3.113  0.00187 **
seniority                    0.0016735   0.0010332    1.620  0.10545
Contribution_minus_log      -0.0105324   0.0034430   -3.059  0.00225 **
```

```
Contribution_plus_log    0.0124879   0.0046028    2.713   0.00672 **
genderM                 -0.0271517   0.0090819   -2.990   0.00282 **
pro_env_dummy           -0.0718579   0.0340709   -2.109   0.03505 *
anti_env_dummy           0.0602036   0.0326595    1.843   0.06541 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.1544 on 2153 degrees of freedom
  (97 observations deleted due to missingness)
Multiple R-squared:  0.9074,    Adjusted R-squared:  0.9047
F-statistic: 334.8 on 63 and 2153 DF,  p-value: < 2.2e-16
```

```r
# same thing with only dummies
ols_state_fe_dummy <- lm(Vote ~ party + birthday + nominate_dim1 + nominate_dim2 + as.factor
summary(ols_state_fe_dummy)
```

```
Call:
lm(formula = Vote ~ party + birthday + nominate_dim1 + nominate_dim2 +
    as.factor(state) + as.factor(Instance) + seniority + gender +
    pro_env_dummy + anti_env_dummy, data = df_long)

Residuals:
     Min       1Q   Median       3Q      Max
-0.98066 -0.04457 -0.00705  0.02487  0.95248

Coefficients:
                      Estimate Std. Error  t value Pr(>|t|)
(Intercept)         -1.2861478  0.7685857   -1.673  0.09439 .
partyR              -0.9026301  0.0086974 -103.782  < 2e-16 ***
birthday             0.0011537  0.0003925    2.939  0.00333 **
nominate_dim1       -0.1282592  0.0289995   -4.423 1.02e-05 ***
nominate_dim2       -0.0591529  0.0215086   -2.750  0.00601 **
as.factor(state)AL   0.0436262  0.0695799    0.627  0.53073
as.factor(state)AR   0.0316345  0.0727902    0.435  0.66390
as.factor(state)AZ   0.0763508  0.0706034    1.081  0.27964
as.factor(state)CA   0.0793462  0.0653720    1.214  0.22497
as.factor(state)CO   0.0901303  0.0692411    1.302  0.19316
as.factor(state)CT   0.0883145  0.0709799    1.244  0.21355
as.factor(state)DE   0.0805899  0.0909679    0.886  0.37576
as.factor(state)FL   0.1356480  0.0660485    2.054  0.04012 *
as.factor(state)GA   0.0413075  0.0673580    0.613  0.53977
```

```
as.factor(state)HI        0.0593795   0.0833951     0.712   0.47653
as.factor(state)IA        0.0500780   0.0741585     0.675   0.49957
as.factor(state)ID        0.0344805   0.0810965     0.425   0.67075
as.factor(state)IL        0.0728396   0.0664240     1.097   0.27295
as.factor(state)IN        0.0277434   0.0684399     0.405   0.68525
as.factor(state)KS        0.0246275   0.0747233     0.330   0.74175
as.factor(state)KY        0.0435843   0.0697656     0.625   0.53222
as.factor(state)LA        0.0400921   0.0712146     0.563   0.57351
as.factor(state)MA        0.0945927   0.0685974     1.379   0.16805
as.factor(state)MD        0.0989136   0.0690782     1.432   0.15232
as.factor(state)ME        0.0636865   0.0800433     0.796   0.42632
as.factor(state)MI        0.0962977   0.0670283     1.437   0.15096
as.factor(state)MN        0.0018647   0.0691997     0.027   0.97850
as.factor(state)MO        0.0293366   0.0689796     0.425   0.67066
as.factor(state)MS        0.0684506   0.0733073     0.934   0.35054
as.factor(state)MT        0.0018636   0.1103743     0.017   0.98653
as.factor(state)NC        0.0543680   0.0680562     0.799   0.42445
as.factor(state)ND       -0.0024483   0.1275227    -0.019   0.98468
as.factor(state)NE       -0.0024007   0.0750209    -0.032   0.97447
as.factor(state)NH        0.0654929   0.0816047     0.803   0.42232
as.factor(state)NJ        0.1520291   0.0672415     2.261   0.02386 *
as.factor(state)NM        0.0478932   0.0873393     0.548   0.58350
as.factor(state)NV        0.0527532   0.0730903     0.722   0.47052
as.factor(state)NY        0.1592474   0.0658128     2.420   0.01562 *
as.factor(state)OH        0.0403870   0.0664263     0.608   0.54325
as.factor(state)OK        0.0247102   0.0744879     0.332   0.74012
as.factor(state)OR        0.0884627   0.0704302     1.256   0.20924
as.factor(state)PA        0.1149961   0.0664409     1.731   0.08363 .
as.factor(state)RI        0.1042478   0.0789901     1.320   0.18706
as.factor(state)SC        0.1148956   0.0695623     1.652   0.09874 .
as.factor(state)SD       -0.0175488   0.0951862    -0.184   0.85375
as.factor(state)TN        0.0504883   0.0684704     0.737   0.46098
as.factor(state)TX        0.0205304   0.0655618     0.313   0.75420
as.factor(state)UT        0.0240775   0.0742789     0.324   0.74586
as.factor(state)VA        0.0570348   0.0680264     0.838   0.40189
as.factor(state)WA        0.0731931   0.0680083     1.076   0.28194
as.factor(state)WI        0.0644798   0.0700222     0.921   0.35723
as.factor(state)WV        0.0149144   0.0751864     0.198   0.84278
as.factor(state)WY        0.0167429   0.1025550     0.163   0.87033
as.factor(Instance)4      0.0120398   0.0115644     1.041   0.29794
as.factor(Instance)6      0.0343519   0.0118263     2.905   0.00371 **
as.factor(Instance)7      0.0298520   0.0123968     2.408   0.01612 *
as.factor(Instance)51     0.0279697   0.0116652     2.398   0.01658 *
```

```
as.factor(Instance)52   0.0378186   0.0117327    3.223   0.00129 **
seniority                0.0015919   0.0010349    1.538   0.12412
genderM                 -0.0284395   0.0090886   -3.129   0.00178 **
pro_env_dummy            0.0130891   0.0078570    1.666   0.09588 .
anti_env_dummy          -0.0310207   0.0128910   -2.406   0.01619 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.1549 on 2155 degrees of freedom
  (97 observations deleted due to missingness)
Multiple R-squared:  0.9068,    Adjusted R-squared:  0.9041
F-statistic: 343.5 on 61 and 2155 DF,  p-value: < 2.2e-16
```

using state instead of geographical region means that we can more accurately determine the differences in voting behavior between representatives from different states, not just regions. this makes sense, when we look at the states which are significant in the model, i.e. NY, SC, NJ, NH, FL, CT, AZ, they are not all from the same region, manye from the north east and the south and west, but no real patterns…

```
kable(head(state_makeup), format = "html")
```

State	Number
Alabama	7
Alaska	1
Arizona	9
Arkansas	4
California	52
Colorado	8

```
# mean(state_makeup$Number)
# boxplot(state_makeup$Number)
```

Discuss… maybe makeup of states also important for the coefficient. If you have only

The average amount of representatives for each state is 8.7 , with the highest number of representatives from California (52) and the lowest from Wyoming, Vermont, Alaska, etc. (1).

here, the model is getting stricter than before, since I am not only fixing for state and year (instance) but also for party, also i cannot include the dummy variables for anti and pro environmental contributions

with individual & year fixed effects

```
ols_ind_fe <- lm(Vote ~ nominate_dim1 + nominate_dim2 + as.factor(Instance) + as.factor(BioI[
summary(ols_ind_fe)
```

```
Call:
lm(formula = Vote ~ nominate_dim1 + nominate_dim2 + as.factor(Instance) +
    as.factor(BioID) + seniority + Contribution_minus + Contribution_plus,
    data = df_long)

Residuals:
     Min       1Q   Median       3Q      Max
-0.82265 -0.01015 -0.00226  0.01038  0.82707

Coefficients: (2 not defined because of singularities)
                           Estimate Std. Error t value Pr(>|t|)
(Intercept)                8.719e-01  1.311e+00   0.665 0.506071
nominate_dim1             -2.131e+00  2.957e+00  -0.721 0.471276
nominate_dim2             -3.873e-01  1.117e+00  -0.347 0.728785
as.factor(Instance)4      -5.540e-03  4.479e-02  -0.124 0.901582
as.factor(Instance)6      -1.454e-02  1.328e-01  -0.109 0.912847
as.factor(Instance)7      -3.294e-02  1.769e-01  -0.186 0.852292
as.factor(Instance)51     -8.354e-03  8.869e-02  -0.094 0.924968
as.factor(Instance)52     -8.445e-04  8.873e-02  -0.010 0.992407
as.factor(BioID)A000367    7.613e-01  1.287e+00   0.592 0.554205
as.factor(BioID)A000369   -2.420e-02  8.095e-02  -0.299 0.765037
as.factor(BioID)A000370    1.088e+00  1.197e-01   9.090  < 2e-16 ***
as.factor(BioID)A000371    8.186e-01  2.781e-01   2.943 0.003292 **
as.factor(BioID)A000372    6.875e-01  1.003e+00   0.685 0.493277
as.factor(BioID)A000374    3.555e-01  5.318e-01   0.668 0.503955
as.factor(BioID)A000375    4.779e-01  6.300e-01   0.759 0.448211
as.factor(BioID)A000376    1.322e+00  8.113e-01   1.630 0.103298
as.factor(BioID)A000377    1.322e-01  2.046e-01   0.646 0.518307
as.factor(BioID)A000378    8.595e-01  3.663e-01   2.346 0.019085 *
as.factor(BioID)B000213    4.482e-02  4.824e-01   0.093 0.925991
as.factor(BioID)B000287    1.135e+00  2.288e-01   4.960 7.77e-07 ***
as.factor(BioID)B000490    3.702e-01  4.451e-01   0.832 0.405708
as.factor(BioID)B000574    1.073e+00  2.134e-01   5.027 5.52e-07 ***
as.factor(BioID)B000755    1.638e-01  2.237e-01   0.732 0.464255
as.factor(BioID)B000911    9.293e-01  3.672e-01   2.531 0.011460 *
```

```
as.factor(BioID)B001227   1.077e+00   1.870e-01    5.758 1.01e-08 ***
as.factor(BioID)B001248   2.857e-01   3.538e-01    0.807 0.419552
as.factor(BioID)B001250   1.999e-01   2.492e-01    0.802 0.422573
as.factor(BioID)B001251   9.349e-01   1.984e-01    4.712 2.66e-06 ***
as.factor(BioID)B001255   1.725e-02   9.591e-02    0.180 0.857312
as.factor(BioID)B001257  -6.867e-02   2.605e-01   -0.264 0.792113
as.factor(BioID)B001260  -1.540e-01   3.161e-01   -0.487 0.626244
as.factor(BioID)B001269  -1.678e-01   2.613e-01   -0.642 0.520758
as.factor(BioID)B001270   1.355e+00   4.452e-01    3.044 0.002370 **
as.factor(BioID)B001271   2.002e-01   2.257e-01    0.887 0.375217
as.factor(BioID)B001273   4.149e-01   5.392e-01    0.770 0.441698
as.factor(BioID)B001274   6.221e-01   9.341e-01    0.666 0.505460
as.factor(BioID)B001275   3.440e-02   1.650e-01    0.209 0.834857
as.factor(BioID)B001278   1.074e+00   2.270e-01    4.729 2.45e-06 ***
as.factor(BioID)B001281   1.043e+00   8.982e-02   11.616  < 2e-16 ***
as.factor(BioID)B001282   2.439e-01   3.677e-01    0.663 0.507275
as.factor(BioID)B001283   6.375e-01   8.376e-01    0.761 0.446657
as.factor(BioID)B001284  -8.780e-02   1.369e-01   -0.641 0.521345
as.factor(BioID)B001285   7.332e-01   4.363e-01    1.680 0.093066 .
as.factor(BioID)B001286   6.132e-01   5.941e-01    1.032 0.302164
as.factor(BioID)B001287   5.997e-01   6.272e-01    0.956 0.339183
as.factor(BioID)B001289   4.760e-01   6.878e-01    0.692 0.488964
as.factor(BioID)B001290   9.766e-01   1.402e+00    0.697 0.486088
as.factor(BioID)B001291   6.467e-01   8.609e-01    0.751 0.452592
as.factor(BioID)B001292   9.506e-01   1.074e-01    8.854  < 2e-16 ***
as.factor(BioID)B001293   9.762e-02   1.306e-01    0.747 0.454885
as.factor(BioID)B001294   3.979e-01   7.320e-01    0.544 0.586838
as.factor(BioID)B001295  -7.761e-02   1.662e-01   -0.467 0.640633
as.factor(BioID)B001296   9.878e-01   7.442e-02   13.273  < 2e-16 ***
as.factor(BioID)B001297   6.566e-01   1.036e+00    0.634 0.526328
as.factor(BioID)B001298  -2.137e-01   2.870e-01   -0.745 0.456654
as.factor(BioID)B001299   5.247e-01   7.037e-01    0.746 0.455966
as.factor(BioID)B001300   1.232e+00   3.219e-01    3.827 0.000135 ***
as.factor(BioID)B001301   7.741e-02   1.093e-01    0.708 0.478809
as.factor(BioID)B001302   1.096e+00   1.700e+00    0.645 0.519207
as.factor(BioID)B001303   9.115e-01   1.495e-01    6.096 1.35e-09 ***
as.factor(BioID)B001304   8.628e-01   2.151e-01    4.011 6.31e-05 ***
as.factor(BioID)B001306   1.690e-01   2.924e-01    0.578 0.563454
as.factor(BioID)B001307   3.194e-01   7.486e-01    0.427 0.669619
as.factor(BioID)B001309   6.926e-01   1.090e+00    0.635 0.525381
as.factor(BioID)C000059  -2.489e-01   4.859e-01   -0.512 0.608526
as.factor(BioID)C000266   1.609e-01   2.671e-01    0.602 0.546992
as.factor(BioID)C000537   1.018e+00   2.385e-01    4.268 2.08e-05 ***
```

```
as.factor(BioID)C000714   1.478e+00  6.385e-01    2.315 0.020723 *
as.factor(BioID)C000754   2.983e-01  1.178e+00    0.253 0.800092
as.factor(BioID)C000984   9.303e-01  3.409e-01    2.729 0.006414 **
as.factor(BioID)C001036   8.866e-01  3.224e-01    2.750 0.006017 **
as.factor(BioID)C001037   1.234e+00  3.282e-01    3.761 0.000175 ***
as.factor(BioID)C001038   8.764e-01  3.928e-01    2.231 0.025813 *
as.factor(BioID)C001045  -1.558e-01  2.771e-01   -0.562 0.573994
as.factor(BioID)C001048   2.141e-01  2.752e-01    0.778 0.436807
as.factor(BioID)C001051   2.591e-01  4.503e-01    0.575 0.565127
as.factor(BioID)C001053  -1.466e-01  2.099e-01   -0.698 0.484973
as.factor(BioID)C001055   5.298e-01  6.905e-01    0.767 0.442984
as.factor(BioID)C001059   2.236e-01  5.076e-01    0.440 0.659640
as.factor(BioID)C001061   9.836e-01  2.488e-01    3.954 8.01e-05 ***
as.factor(BioID)C001063   9.104e-02  3.411e-01    0.267 0.789600
as.factor(BioID)C001066   9.899e-01  1.818e-01    5.444 5.97e-08 ***
as.factor(BioID)C001067   1.431e+00  5.774e-01    2.479 0.013282 *
as.factor(BioID)C001068   9.979e-01  6.732e-02   14.824  < 2e-16 ***
as.factor(BioID)C001069   7.738e-01  4.448e-01    1.739 0.082147 .
as.factor(BioID)C001072   9.694e-01  2.146e-01    4.517 6.72e-06 ***
as.factor(BioID)C001076   5.610e-01  7.541e-01    0.744 0.457020
as.factor(BioID)C001077   4.009e-01  2.396e-01    1.673 0.094546 .
as.factor(BioID)C001078   7.230e-01  4.880e-01    1.481 0.138691
as.factor(BioID)C001080   1.242e+00  3.885e-01    3.197 0.001415 **
as.factor(BioID)C001083   6.894e-01  5.014e-01    1.375 0.169352
as.factor(BioID)C001084   9.962e-01  7.725e-02   12.896  < 2e-16 ***
as.factor(BioID)C001087   1.692e-01  2.789e-01    0.607 0.544104
as.factor(BioID)C001090   8.328e-01  3.251e-01    2.562 0.010506 *
as.factor(BioID)C001091   9.797e-01  1.153e-01    8.498  < 2e-16 ***
as.factor(BioID)C001092  -5.578e-02  1.187e-01   -0.470 0.638551
as.factor(BioID)C001093   4.446e-01  5.825e-01    0.763 0.445383
as.factor(BioID)C001094  -4.001e-02  9.621e-02   -0.416 0.677522
as.factor(BioID)C001097   9.352e-01  2.056e-01    4.549 5.77e-06 ***
as.factor(BioID)C001101   1.233e+00  3.845e-01    3.206 0.001370 **
as.factor(BioID)C001103   4.257e-01  6.520e-01    0.653 0.513888
as.factor(BioID)C001105  -1.460e-01  2.606e-01   -0.560 0.575356
as.factor(BioID)C001106   2.487e-01  6.243e-01    0.398 0.690415
as.factor(BioID)C001107   6.283e-01  5.329e-01    1.179 0.238592
as.factor(BioID)C001108   3.717e-01  4.907e-01    0.757 0.448877
as.factor(BioID)C001109   3.068e-01  8.322e-01    0.369 0.712428
as.factor(BioID)C001110   8.249e-01  2.542e-01    3.245 0.001199 **
as.factor(BioID)C001111   6.277e-01  5.398e-01    1.163 0.245025
as.factor(BioID)C001112   8.138e-01  2.807e-01    2.900 0.003784 **
as.factor(BioID)C001114   1.272e-01  2.118e-01    0.600 0.548347
```

```
as.factor(BioID)C001117  1.700e+00  1.173e+00   1.450 0.147377
as.factor(BioID)C001118  7.408e-01  1.075e+00   0.689 0.490889
as.factor(BioID)C001119  9.525e-01  4.589e-01   2.076 0.038083 *
as.factor(BioID)C001120  1.705e-01  3.315e-01   0.514 0.607062
as.factor(BioID)C001121  8.885e-01  1.978e-01   4.493 7.51e-06 ***
as.factor(BioID)D000096  1.085e+00  1.703e-01   6.373 2.39e-10 ***
as.factor(BioID)D000191  7.777e-01  6.986e-01   1.113 0.265797
as.factor(BioID)D000197  9.870e-01  1.502e-01   6.570 6.67e-11 ***
as.factor(BioID)D000216  8.229e-01  5.138e-01   1.602 0.109430
as.factor(BioID)D000399  9.146e-01  2.266e-01   4.036 5.69e-05 ***
as.factor(BioID)D000482  6.789e-01  6.473e-01   1.049 0.294414
as.factor(BioID)D000533  3.423e-01  4.608e-01   0.743 0.457670
as.factor(BioID)D000598  7.580e-01  4.841e-01   1.566 0.117539
as.factor(BioID)D000600 -3.345e-01  5.667e-01  -0.590 0.555155
as.factor(BioID)D000604 -4.104e-01  6.996e-01  -0.587 0.557587
as.factor(BioID)D000610  9.271e-01  1.925e-01   4.815 1.61e-06 ***
as.factor(BioID)D000612 -1.840e-01  2.926e-01  -0.629 0.529413
as.factor(BioID)D000614  2.085e-01  2.442e-01   0.854 0.393187
as.factor(BioID)D000615  6.060e-01  7.892e-01   0.768 0.442632
as.factor(BioID)D000616  3.292e-01  3.990e-01   0.825 0.409381
as.factor(BioID)D000617  7.671e-01  3.495e-01   2.195 0.028324 *
as.factor(BioID)D000619 -2.580e-01  3.733e-01  -0.691 0.489573
as.factor(BioID)D000620  6.975e-01  4.991e-01   1.398 0.162427
as.factor(BioID)D000621  5.564e-01  7.148e-01   0.778 0.436453
as.factor(BioID)D000623  1.357e+00  5.975e-01   2.270 0.023311 *
as.factor(BioID)D000624  1.024e+00  7.714e-02  13.277  < 2e-16 ***
as.factor(BioID)D000625 -3.736e-01  5.592e-01  -0.668 0.504170
as.factor(BioID)D000626  6.418e-01  9.693e-01   0.662 0.507972
as.factor(BioID)D000627  8.015e-01  3.279e-01   2.445 0.014604 *
as.factor(BioID)D000628  3.289e-01  5.829e-01   0.564 0.572629
as.factor(BioID)D000629  8.016e-01  2.885e-01   2.779 0.005514 **
as.factor(BioID)D000630  7.251e-01  3.700e-01   1.960 0.050210 .
as.factor(BioID)D000631  1.104e+00  1.543e-01   7.154 1.25e-12 ***
as.factor(BioID)E000179  7.901e-01  5.958e-01   1.326 0.185036
as.factor(BioID)E000215  8.663e-01  2.437e-01   3.554 0.000389 ***
as.factor(BioID)E000288  1.411e+00  6.926e-01   2.037 0.041811 *
as.factor(BioID)E000290  1.364e+00  4.854e-01   2.809 0.005026 **
as.factor(BioID)E000291  8.557e-02  1.824e-01   0.469 0.638955
as.factor(BioID)E000293  7.936e-01  3.510e-01   2.261 0.023898 *
as.factor(BioID)E000294  1.168e-01  1.672e-01   0.698 0.484990
as.factor(BioID)E000296  1.150e+00  2.116e-01   5.434 6.33e-08 ***
as.factor(BioID)E000297  1.436e+00  6.448e-01   2.228 0.026037 *
as.factor(BioID)E000298  4.970e-01  6.795e-01   0.731 0.464587
```

```
as.factor(BioID)E000299   1.242e+00   4.701e-01    2.642 0.008318 **
as.factor(BioID)F000030   9.886e-01   2.867e-01    3.448 0.000578 ***
as.factor(BioID)F000372  -3.319e-01   5.801e-01   -0.572 0.567219
as.factor(BioID)F000448   6.514e-01   8.078e-01    0.806 0.420171
as.factor(BioID)F000449  -3.093e-01   5.526e-01   -0.560 0.575795
as.factor(BioID)F000450   4.186e-01   5.350e-01    0.782 0.434066
as.factor(BioID)F000451  -4.286e-01   6.539e-01   -0.655 0.512265
as.factor(BioID)F000454   6.277e-01   5.340e-01    1.175 0.239968
as.factor(BioID)F000455   1.333e+00   4.124e-01    3.232 0.001252 **
as.factor(BioID)F000456   3.481e-01   3.911e-01    0.890 0.373537
as.factor(BioID)F000458   2.807e-01   3.492e-01    0.804 0.421580
as.factor(BioID)F000459   1.518e-01   3.104e-01    0.489 0.624869
as.factor(BioID)F000460   2.601e-01   2.926e-01    0.889 0.374166
as.factor(BioID)F000461   4.140e-01   5.811e-01    0.712 0.476303
as.factor(BioID)F000462   9.547e-01   1.467e-01    6.506 1.02e-10 ***
as.factor(BioID)F000464   5.837e-01   5.859e-01    0.996 0.319259
as.factor(BioID)F000465   4.739e-01   6.952e-01    0.682 0.495532
as.factor(BioID)F000466   4.614e-01   7.534e-01    0.612 0.540311
as.factor(BioID)F000468   1.456e+00   1.072e+00    1.358 0.174580
as.factor(BioID)G000289  -1.572e-02   4.422e-01   -0.036 0.971640
as.factor(BioID)G000377  -9.012e-02   2.725e-01   -0.331 0.740941
as.factor(BioID)G000410   5.453e-01   3.361e-01    1.622 0.104903
as.factor(BioID)G000535   1.062e+00   2.194e-01    4.839 1.42e-06 ***
as.factor(BioID)G000546   4.766e-04   1.815e-01    0.003 0.997905
as.factor(BioID)G000548   5.651e-01   7.468e-01    0.757 0.449280
as.factor(BioID)G000551   1.391e+00   5.079e-01    2.739 0.006224 **
as.factor(BioID)G000552   5.511e-01   7.901e-01    0.698 0.485555
as.factor(BioID)G000553   1.076e+00   1.050e-01   10.248  < 2e-16 ***
as.factor(BioID)G000556   1.038e+00   2.292e-01    4.531 6.30e-06 ***
as.factor(BioID)G000558   7.308e-02   1.122e-01    0.651 0.515021
as.factor(BioID)G000559   7.477e-01   4.238e-01    1.764 0.077846 .
as.factor(BioID)G000560   5.860e-01   7.291e-01    0.804 0.421731
as.factor(BioID)G000563   2.146e-01   3.175e-01    0.676 0.499276
as.factor(BioID)G000565   7.561e-01   1.152e+00    0.657 0.511552
as.factor(BioID)G000566   4.747e-01   5.806e-01    0.818 0.413715
as.factor(BioID)G000568   3.276e-01   5.016e-01    0.653 0.513779
as.factor(BioID)G000571   7.766e-01   3.066e-01    2.533 0.011401 *
as.factor(BioID)G000574   1.009e+00   6.694e-02   15.077  < 2e-16 ***
as.factor(BioID)G000576   4.656e-01   6.682e-01    0.697 0.486050
as.factor(BioID)G000577   3.445e-02   8.413e-02    0.409 0.682240
as.factor(BioID)G000578   9.713e-01   1.137e+00    0.854 0.393001
as.factor(BioID)G000579   5.276e-02   8.286e-02    0.637 0.524381
as.factor(BioID)G000581   9.890e-01   7.218e-01    1.370 0.170834
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as.factor(BioID)G000583   5.296e-01   6.274e-01    0.844 0.398776
as.factor(BioID)G000584   6.651e-02   1.076e-01    0.618 0.536398
as.factor(BioID)G000585   1.386e+00   6.192e-01    2.238 0.025341 *
as.factor(BioID)G000586   1.389e+00   1.017e+00    1.366 0.172201
as.factor(BioID)G000587   2.003e+00   1.545e+00    1.297 0.194968
as.factor(BioID)G000588  -2.344e-01   3.407e-01   -0.688 0.491421
as.factor(BioID)G000589   7.469e-01   1.026e+00    0.728 0.466672
as.factor(BioID)G000590   5.633e-01   7.602e-01    0.741 0.458836
as.factor(BioID)G000591   2.923e-01   4.204e-01    0.695 0.486986
as.factor(BioID)G000592   5.063e-01   6.447e-01    0.785 0.432352
as.factor(BioID)H000324   1.184e+00   3.170e-01    3.736 0.000193 ***
as.factor(BioID)H000636   7.849e-01   4.386e-01    1.789 0.073728 .
as.factor(BioID)H000874   7.461e-01   6.716e-01    1.111 0.266815
as.factor(BioID)H001034   1.317e+00   4.579e-01    2.875 0.004087 **
as.factor(BioID)H001036   5.246e-01   6.453e-01    0.813 0.416378
as.factor(BioID)H001038   7.742e-01   4.627e-01    1.673 0.094488 .
as.factor(BioID)H001045   7.804e-02   2.405e-01    0.324 0.745618
as.factor(BioID)H001047   6.531e-01   5.035e-01    1.297 0.194738
as.factor(BioID)H001048   2.388e-01   2.831e-01    0.843 0.399103
as.factor(BioID)H001050   8.691e-01   3.153e-01    2.756 0.005911 **
as.factor(BioID)H001051   1.030e-01   6.184e-01    0.167 0.867765
as.factor(BioID)H001052   6.475e-01   9.477e-01    0.683 0.494545
as.factor(BioID)H001053   1.790e-01   2.472e-01    0.724 0.468990
as.factor(BioID)H001055  -1.892e-01   4.296e-01   -0.440 0.659706
as.factor(BioID)H001056  -1.637e-01   2.786e-01   -0.588 0.556794
as.factor(BioID)H001057   8.569e-01   1.252e+00    0.685 0.493715
as.factor(BioID)H001058   2.273e-01   2.625e-01    0.866 0.386672
as.factor(BioID)H001059   1.388e-01   1.594e-01    0.871 0.384025
as.factor(BioID)H001063   1.065e+00   1.906e-01    5.590 2.65e-08 ***
as.factor(BioID)H001064   8.047e-01   3.131e-01    2.570 0.010256 *
as.factor(BioID)H001066   8.925e-01   1.870e-01    4.774 1.96e-06 ***
as.factor(BioID)H001067   2.873e-01   3.747e-01    0.767 0.443353
as.factor(BioID)H001068   1.203e+00   4.719e-01    2.549 0.010885 *
as.factor(BioID)H001071   8.905e-01   1.265e+00    0.704 0.481657
as.factor(BioID)H001072   1.400e-01   2.570e-01    0.545 0.586149
as.factor(BioID)H001073  -1.773e-01   2.835e-01   -0.625 0.531817
as.factor(BioID)H001074   8.323e-02   2.237e-01    0.372 0.709925
as.factor(BioID)H001077   5.720e-01   8.706e-01    0.657 0.511281
as.factor(BioID)H001078   2.935e-01   4.891e-01    0.600 0.548553
as.factor(BioID)H001081   8.507e-01   2.269e-01    3.750 0.000183 ***
as.factor(BioID)H001085   8.381e-01   2.718e-01    3.083 0.002082 **
as.factor(BioID)H001088   2.790e-01   5.299e-01    0.527 0.598593
as.factor(BioID)H001090   1.093e+00   4.949e-01    2.208 0.027346 *
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as.factor(BioID)I000056    2.941e-02  2.995e-01    0.098 0.921790
as.factor(BioID)I000057    7.197e-01  5.673e-01    1.269 0.204693
as.factor(BioID)J000032    9.635e-01  3.268e-01    2.949 0.003235 **
as.factor(BioID)J000126    1.030e+00  2.673e-01    3.854 0.000121 ***
as.factor(BioID)J000174    3.139e-01  4.132e-01    0.760 0.447585
as.factor(BioID)J000288    1.054e+00  1.767e-01    5.968 2.93e-09 ***
as.factor(BioID)J000289    6.433e-01  8.549e-01    0.752 0.451908
as.factor(BioID)J000290    1.827e-01  2.173e-01    0.841 0.400674
as.factor(BioID)J000292    1.026e-01  1.373e-01    0.748 0.454823
as.factor(BioID)J000294    1.151e+00  1.748e-01    6.584 6.11e-11 ***
as.factor(BioID)J000295   -2.433e-01  3.438e-01   -0.708 0.479212
as.factor(BioID)J000297   -1.003e-01  1.936e-01   -0.518 0.604664
as.factor(BioID)J000298    1.668e+00  1.083e+00    1.540 0.123691
as.factor(BioID)J000299    3.319e-01  4.155e-01    0.799 0.424557
as.factor(BioID)J000301    1.705e-01  2.779e-01    0.614 0.539571
as.factor(BioID)J000302    3.401e-01  4.495e-01    0.757 0.449329
as.factor(BioID)K000009    6.540e-01  7.568e-01    0.864 0.387636
as.factor(BioID)K000188    5.346e-01  8.185e-01    0.653 0.513730
as.factor(BioID)K000210   -5.163e-01  9.576e-01   -0.539 0.589860
as.factor(BioID)K000362    3.434e-01  4.724e-01    0.727 0.467448
as.factor(BioID)K000363    1.252e-01  1.760e-01    0.712 0.476811
as.factor(BioID)K000368    4.463e-01  8.659e-01    0.515 0.606331
as.factor(BioID)K000375    8.183e-01  3.102e-01    2.638 0.008421 **
as.factor(BioID)K000376    2.703e-02  1.874e-01    0.144 0.885335
as.factor(BioID)K000378   -2.805e-01  3.788e-01   -0.741 0.459072
as.factor(BioID)K000379    1.061e+00  1.119e-01    9.480  < 2e-16 ***
as.factor(BioID)K000380    9.394e-01  1.206e-01    7.790 1.17e-14 ***
as.factor(BioID)K000381    7.569e-01  4.256e-01    1.778 0.075514 .
as.factor(BioID)K000382    6.727e-01  4.918e-01    1.368 0.171504
as.factor(BioID)K000385    1.092e+00  1.161e-01    9.409  < 2e-16 ***
as.factor(BioID)K000386    5.039e-01  7.555e-01    0.667 0.504817
as.factor(BioID)K000387    3.545e-01  1.003e-01    3.533 0.000422 ***
as.factor(BioID)K000388    5.664e-01  8.257e-01    0.686 0.492842
as.factor(BioID)K000389    1.285e+00  4.640e-01    2.768 0.005696 **
as.factor(BioID)K000390    1.049e+00  1.745e-01    6.012 2.25e-09 ***
as.factor(BioID)K000391    8.099e-01  2.892e-01    2.800 0.005162 **
as.factor(BioID)K000392    3.987e-01  6.722e-01    0.593 0.553193
as.factor(BioID)K000394    9.987e-01  2.177e-01    4.587 4.83e-06 ***
as.factor(BioID)K000395    2.566e-01  4.049e-01    0.634 0.526284
as.factor(BioID)L000263    7.145e-01  7.100e-01    1.006 0.314364
as.factor(BioID)L000287    1.210e+00  3.670e-01    3.296 0.001002 **
as.factor(BioID)L000397    9.338e-01  1.332e-01    7.009 3.47e-12 ***
as.factor(BioID)L000480    7.741e-01  5.744e-01    1.348 0.177945
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as.factor(BioID)L000491 -1.364e-01  2.395e-01  -0.570 0.568956
as.factor(BioID)L000551  1.614e+00  8.974e-01   1.799 0.072187 .
as.factor(BioID)L000554 -5.104e-01  8.502e-01  -0.600 0.548364
as.factor(BioID)L000557  8.291e-01  4.541e-01   1.826 0.068055 .
as.factor(BioID)L000559  8.290e-01  3.883e-01   2.135 0.032894 *
as.factor(BioID)L000560  8.346e-01  3.446e-01   2.422 0.015544 *
as.factor(BioID)L000562  7.399e-01  5.420e-01   1.365 0.172440
as.factor(BioID)L000563  5.759e-01  6.583e-01   0.875 0.381799
as.factor(BioID)L000564  5.508e-01  7.363e-01   0.748 0.454480
as.factor(BioID)L000565  6.245e-01  6.273e-01   0.996 0.319563
as.factor(BioID)L000566  2.357e-01  3.163e-01   0.745 0.456359
as.factor(BioID)L000567  1.073e-01  2.361e-01   0.454 0.649722
as.factor(BioID)L000569  1.050e-01  1.404e-01   0.748 0.454654
as.factor(BioID)L000573  8.644e-01  1.328e+00   0.651 0.515155
as.factor(BioID)L000576  3.327e-01  4.531e-01   0.734 0.462905
as.factor(BioID)L000578  2.466e-01  2.888e-01   0.854 0.393314
as.factor(BioID)L000579  1.195e+00  3.676e-01   3.252 0.001168 **
as.factor(BioID)L000580  7.770e-01  3.864e-01   2.011 0.044523 *
as.factor(BioID)L000581  1.072e+00  9.077e-02  11.805  < 2e-16 ***
as.factor(BioID)L000582  9.867e-01  1.083e-01   9.112  < 2e-16 ***
as.factor(BioID)L000583  5.552e-01  7.167e-01   0.775 0.438642
as.factor(BioID)L000584  2.868e-01  3.523e-01   0.814 0.415723
as.factor(BioID)L000585  1.487e-01  2.565e-01   0.580 0.562201
as.factor(BioID)L000586  6.942e-01  4.469e-01   1.553 0.120522
as.factor(BioID)L000587  2.630e-01  4.141e-01   0.635 0.525455
as.factor(BioID)L000588  4.858e-01  6.800e-01   0.714 0.475039
as.factor(BioID)L000590  7.496e-01  3.534e-01   2.121 0.034079 *
as.factor(BioID)L000591  7.213e-01  3.944e-01   1.829 0.067622 .
as.factor(BioID)L000592  1.356e+00  7.593e-01   1.786 0.074342 .
as.factor(BioID)L000593  8.874e-01  1.705e-01   5.205 2.17e-07 ***
as.factor(BioID)M000087  8.536e-01  3.450e-01   2.474 0.013442 *
as.factor(BioID)M000312  1.216e+00  2.922e-01   4.164 3.29e-05 ***
as.factor(BioID)M000404  1.397e+00  5.144e-01   2.715 0.006700 **
as.factor(BioID)M000689 -4.311e-02  3.732e-01  -0.116 0.908041
as.factor(BioID)M001137  8.611e-01  4.269e-01   2.017 0.043843 *
as.factor(BioID)M001143  9.512e-01  2.045e-01   4.651 3.56e-06 ***
as.factor(BioID)M001144  4.198e-01  5.071e-01   0.828 0.407866
as.factor(BioID)M001150 -2.466e-01  5.551e-01  -0.444 0.656872
as.factor(BioID)M001151 -3.511e-01  5.854e-01  -0.600 0.548703
as.factor(BioID)M001156  1.953e-01  2.433e-01   0.803 0.422255
as.factor(BioID)M001157 -2.837e-02  1.728e-01  -0.164 0.869629
as.factor(BioID)M001158  3.677e-01  4.508e-01   0.816 0.414871
as.factor(BioID)M001159 -8.448e-03  1.785e-01  -0.047 0.962258
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as.factor(BioID)M001160   1.241e+00  3.132e-01   3.962 7.76e-05 ***
as.factor(BioID)M001163   9.961e-01  1.380e-01   7.218 7.98e-13 ***
as.factor(BioID)M001165   1.390e-01  1.248e-01   1.113 0.265704
as.factor(BioID)M001166   6.524e-01  5.329e-01   1.224 0.221051
as.factor(BioID)M001177   6.634e-01  9.690e-01   0.685 0.493647
as.factor(BioID)M001180  -2.142e-01  3.366e-01  -0.636 0.524730
as.factor(BioID)M001181  -9.695e-02  6.663e-01  -0.145 0.884340
as.factor(BioID)M001182   9.187e-01  1.393e+00   0.659 0.509771
as.factor(BioID)M001184   8.005e-01  1.331e+00   0.601 0.547683
as.factor(BioID)M001187   4.582e-01  6.275e-01   0.730 0.465368
as.factor(BioID)M001188   9.715e-01  8.646e-02  11.237  < 2e-16 ***
as.factor(BioID)M001189   3.293e-01  4.054e-01   0.812 0.416688
as.factor(BioID)M001191   4.900e-01  7.786e-01   0.629 0.529245
as.factor(BioID)M001193  -3.456e-01  4.801e-01  -0.720 0.471761
as.factor(BioID)M001194   1.276e-01  1.872e-01   0.681 0.495689
as.factor(BioID)M001195   3.893e-01  5.633e-01   0.691 0.489653
as.factor(BioID)M001196   7.175e-01  4.426e-01   1.621 0.105195
as.factor(BioID)M001199   1.233e+00  4.605e-01   2.677 0.007499 **
as.factor(BioID)M001200   9.306e-01  1.572e-01   5.919 3.92e-09 ***
as.factor(BioID)M001201   1.245e-01  3.101e-01   0.401 0.688144
as.factor(BioID)M001202   5.035e-01  6.966e-01   0.723 0.469891
as.factor(BioID)M001203   7.544e-01  3.516e-01   2.146 0.032049 *
as.factor(BioID)M001204   2.771e-01  4.727e-01   0.586 0.557871
as.factor(BioID)M001205   2.741e-01  3.967e-01   0.691 0.489635
as.factor(BioID)M001206   8.726e-01  1.991e-01   4.382 1.25e-05 ***
as.factor(BioID)M001208   9.129e-01  1.996e-01   4.573 5.17e-06 ***
as.factor(BioID)N000002   1.170e+00  2.444e-01   4.788 1.83e-06 ***
as.factor(BioID)N000015   8.150e-01  5.623e-01   1.449 0.147410
as.factor(BioID)N000127   1.032e+00  1.911e-01   5.398 7.71e-08 ***
as.factor(BioID)N000179   1.020e+00  1.464e-01   6.970 4.54e-12 ***
as.factor(BioID)N000181   5.610e-02  1.049e-01   0.535 0.592782
as.factor(BioID)N000182   4.855e-01  6.370e-01   0.762 0.446055
as.factor(BioID)N000184   4.694e-02  1.494e-01   0.314 0.753399
as.factor(BioID)N000185   1.489e-01  1.641e-01   0.907 0.364447
as.factor(BioID)N000188   1.113e+00  2.387e-01   4.663 3.37e-06 ***
as.factor(BioID)N000189  -9.107e-02  1.943e-01  -0.469 0.639347
as.factor(BioID)N000190   1.063e+00  1.570e+00   0.677 0.498514
as.factor(BioID)N000191   1.053e+00  2.013e-01   5.234 1.87e-07 ***
as.factor(BioID)O000168   3.666e-01  4.894e-01   0.749 0.453945
as.factor(BioID)O000170   8.373e-01  2.147e-01   3.900 0.000100 ***
as.factor(BioID)O000171   6.068e-01  5.431e-01   1.117 0.264046
as.factor(BioID)O000172   1.133e+00  8.095e-01   1.400 0.161723
as.factor(BioID)O000173   1.132e+00  8.088e-01   1.399 0.162007
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as.factor(BioID)P000034   7.725e-01  5.657e-01   1.366 0.172240
as.factor(BioID)P000096   7.353e-01  6.113e-01   1.203 0.229167
as.factor(BioID)P000197   9.905e-01  3.788e-01   2.615 0.009004 **
as.factor(BioID)P000258  -2.565e-01  6.557e-01  -0.391 0.695664
as.factor(BioID)P000373   1.242e-01  3.313e-01   0.375 0.707856
as.factor(BioID)P000523   6.263e-01  8.217e-01   0.762 0.446098
as.factor(BioID)P000588   6.153e-02  1.841e-01   0.334 0.738239
as.factor(BioID)P000591   4.422e-01  5.259e-01   0.841 0.400602
as.factor(BioID)P000592   3.085e-01  3.718e-01   0.830 0.406880
as.factor(BioID)P000593   6.648e-01  5.638e-01   1.179 0.238540
as.factor(BioID)P000594  -7.451e-03  9.019e-02  -0.083 0.934169
as.factor(BioID)P000597   1.089e+00  1.862e-01   5.850 5.90e-09 ***
as.factor(BioID)P000598   9.198e-01  3.289e-01   2.796 0.005229 **
as.factor(BioID)P000599   3.227e-01  4.809e-01   0.671 0.502302
as.factor(BioID)P000601   3.902e-01  6.314e-01   0.618 0.536690
as.factor(BioID)P000602   5.661e-01  7.249e-01   0.781 0.434918
as.factor(BioID)P000604   1.218e+00  2.604e-01   4.679 3.11e-06 ***
as.factor(BioID)P000605   7.104e-01  1.088e+00   0.653 0.514000
as.factor(BioID)P000606   4.213e-01  6.266e-01   0.672 0.501471
as.factor(BioID)P000607   1.437e+00  7.783e-01   1.847 0.064912 .
as.factor(BioID)P000608   5.064e-01  7.643e-01   0.663 0.507682
as.factor(BioID)P000609   5.876e-01  7.908e-01   0.743 0.457565
as.factor(BioID)P000611  -5.958e-02  1.259e-01  -0.473 0.636071
as.factor(BioID)P000613   7.746e-01  3.245e-01   2.387 0.017095 *
as.factor(BioID)P000614   7.642e-01  3.415e-01   2.238 0.025352 *
as.factor(BioID)P000615   2.663e-01  4.073e-01   0.654 0.513307
as.factor(BioID)P000616   7.926e-01  2.939e-01   2.697 0.007075 **
as.factor(BioID)P000617   1.233e+00  8.861e-01   1.391 0.164307
as.factor(BioID)P000618   7.112e-01  3.919e-01   1.815 0.069721 .
as.factor(BioID)Q000023   8.438e-01  2.309e-01   3.655 0.000265 ***
as.factor(BioID)R000053   1.112e+00  2.616e-01   4.250 2.25e-05 ***
as.factor(BioID)R000395  -3.627e-01  7.648e-01  -0.474 0.635360
as.factor(BioID)R000409   3.855e-01  5.072e-01   0.760 0.447393
as.factor(BioID)R000435   1.658e-01  8.756e-01   0.189 0.849822
as.factor(BioID)R000486   9.836e-01  3.086e-01   3.187 0.001462 **
as.factor(BioID)R000487   4.672e-01  6.005e-01   0.778 0.436663
as.factor(BioID)R000515   1.016e+00  2.678e-01   3.794 0.000153 ***
as.factor(BioID)R000575  -4.176e-02  8.241e-02  -0.507 0.612454
as.factor(BioID)R000576   6.842e-01  5.440e-01   1.258 0.208612
as.factor(BioID)R000577   9.442e-01  1.784e-01   5.293 1.36e-07 ***
as.factor(BioID)R000578  -1.100e-01  6.974e-01  -0.158 0.874714
as.factor(BioID)R000580   2.158e-01  2.409e-01   0.896 0.370568
as.factor(BioID)R000582   1.011e-01  1.583e-01   0.638 0.523269
```

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as.factor(BioID)R000583   5.437e-02  1.735e-01   0.313 0.754083
as.factor(BioID)R000585  -1.624e-01  5.162e-01  -0.315 0.753124
as.factor(BioID)R000586  -2.336e-02  1.268e-01  -0.184 0.853806
as.factor(BioID)R000587   5.127e-01  7.169e-01   0.715 0.474619
as.factor(BioID)R000588   1.248e+00  3.732e-01   3.343 0.000846 ***
as.factor(BioID)R000591   1.039e-01  4.301e-01   0.242 0.809066
as.factor(BioID)R000592   4.174e-01  5.488e-01   0.761 0.447051
as.factor(BioID)R000593   2.504e-01  2.964e-01   0.845 0.398242
as.factor(BioID)R000597   3.643e-01  5.042e-01   0.723 0.470083
as.factor(BioID)R000598   1.871e-01  1.938e-01   0.966 0.334428
as.factor(BioID)R000599   6.407e-01  5.607e-01   1.143 0.253266
as.factor(BioID)R000601   6.249e-01  8.422e-01   0.742 0.458181
as.factor(BioID)R000602   7.122e-01  4.538e-01   1.569 0.116750
as.factor(BioID)R000603   3.983e-01  5.876e-01   0.678 0.498025
as.factor(BioID)R000604   1.932e-01  2.674e-01   0.722 0.470225
as.factor(BioID)R000606   1.318e+00  5.016e-01   2.627 0.008699 **
as.factor(BioID)R000607   1.367e+00  7.159e-01   1.910 0.056292 .
as.factor(BioID)R000609   4.731e-02  8.260e-02   0.573 0.566909
as.factor(BioID)R000610   8.893e-02  1.425e-01   0.624 0.532643
as.factor(BioID)R000612   5.890e-01  8.319e-01   0.708 0.479033
as.factor(BioID)R000614   1.079e+00  1.700e+00   0.635 0.525632
as.factor(BioID)S000018   6.015e-01  7.951e-01   0.757 0.449437
as.factor(BioID)S000030   7.628e-01  5.958e-01   1.280 0.200617
as.factor(BioID)S000051   1.280e+00  1.268e+00   1.010 0.312721
as.factor(BioID)S000185   8.816e-01  5.081e-01   1.735 0.082937 .
as.factor(BioID)S000248   1.078e+00  2.038e-01   5.289 1.39e-07 ***
as.factor(BioID)S000250   2.650e-01  3.511e-01   0.755 0.450517
as.factor(BioID)S000344   7.372e-01  5.274e-01   1.398 0.162371
as.factor(BioID)S000364  -1.831e-01  4.312e-01  -0.425 0.671116
as.factor(BioID)S000480   9.062e-01  5.131e-01   1.766 0.077561 .
as.factor(BioID)S000510   6.266e-01  6.512e-01   0.962 0.336070
as.factor(BioID)S000522  -8.859e-02  1.155e+00  -0.077 0.938857
as.factor(BioID)S000583  -1.892e-01  6.391e-01  -0.296 0.767249
as.factor(BioID)S001145   1.354e+00  4.665e-01   2.903 0.003744 **
as.factor(BioID)S001148  -2.664e-01  4.401e-01  -0.605 0.545070
as.factor(BioID)S001150   7.808e-01  4.328e-01   1.804 0.071385 .
as.factor(BioID)S001154  -7.223e-02  1.807e-01  -0.400 0.689407
as.factor(BioID)S001156   1.141e+00  1.950e-01   5.852 5.84e-09 ***
as.factor(BioID)S001157   7.160e-01  4.820e-01   1.485 0.137636
as.factor(BioID)S001165   9.160e-01  2.496e-01   3.670 0.000250 ***
as.factor(BioID)S001168   1.055e+00  1.455e-01   7.248 6.42e-13 ***
as.factor(BioID)S001170   7.947e-01  3.589e-01   2.214 0.026941 *
as.factor(BioID)S001172   2.096e-01  2.848e-01   0.736 0.461859
```

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as.factor(BioID)S001175   1.009e+00   1.225e-01    8.238 3.47e-16 ***
as.factor(BioID)S001176   3.089e-01   3.570e-01    0.865 0.387140
as.factor(BioID)S001180   4.694e-01   8.332e-01    0.563 0.573261
as.factor(BioID)S001183   3.579e-01   5.090e-01    0.703 0.482107
as.factor(BioID)S001185   1.077e+00   2.204e-01    4.888 1.12e-06 ***
as.factor(BioID)S001187  -1.683e-01   2.653e-01   -0.634 0.525932
as.factor(BioID)S001188   6.720e-01   8.953e-01    0.751 0.452983
as.factor(BioID)S001189   3.510e-01   5.337e-01    0.658 0.510835
as.factor(BioID)S001190   5.525e-01   6.430e-01    0.859 0.390263
as.factor(BioID)S001192   2.195e-01   2.862e-01    0.767 0.443256
as.factor(BioID)S001193   8.900e-01   2.175e-01    4.092 4.48e-05 ***
as.factor(BioID)S001195   4.243e-01   6.062e-01    0.700 0.484130
as.factor(BioID)S001196   5.684e-01   3.168e-01    1.794 0.073009 .
as.factor(BioID)S001199   1.118e-01   1.720e-01    0.650 0.515827
as.factor(BioID)S001200   9.480e-01   1.191e-01    7.962 3.10e-15 ***
as.factor(BioID)S001201   6.134e-01   5.564e-01    1.102 0.270430
as.factor(BioID)S001205   1.153e+00   2.199e-01    5.244 1.77e-07 ***
as.factor(BioID)S001207   7.107e-01   3.961e-01    1.794 0.072931 .
as.factor(BioID)S001208   1.097e+00   6.173e-01    1.777 0.075715 .
as.factor(BioID)S001209   6.544e-01   4.577e-01    1.430 0.152952
as.factor(BioID)S001211   8.294e-01   2.605e-01    3.183 0.001482 **
as.factor(BioID)S001212  -6.100e-03   1.125e-01   -0.054 0.956763
as.factor(BioID)S001213   3.872e-02   1.059e-01    0.366 0.714596
as.factor(BioID)S001214   7.047e-01   1.064e+00    0.662 0.507827
as.factor(BioID)S001215   1.045e+00   2.399e-01    4.357 1.40e-05 ***
as.factor(BioID)S001216   9.073e-01   3.117e-01    2.911 0.003649 **
as.factor(BioID)T000193   1.175e+00   2.403e-01    4.891 1.10e-06 ***
as.factor(BioID)T000238   1.774e-01   2.422e-01    0.733 0.463889
as.factor(BioID)T000460   8.339e-01   4.379e-01    1.904 0.057056 .
as.factor(BioID)T000462  -1.526e-01   4.616e-01   -0.330 0.741070
as.factor(BioID)T000463  -3.271e-01   5.063e-01   -0.646 0.518318
as.factor(BioID)T000465   9.633e-01   1.237e-01    7.789 1.17e-14 ***
as.factor(BioID)T000467  -9.625e-02   1.572e-01   -0.612 0.540522
as.factor(BioID)T000468   7.791e-01   3.267e-01    2.385 0.017203 *
as.factor(BioID)T000469   1.038e+00   8.135e-02   12.757  < 2e-16 ***
as.factor(BioID)T000470   4.819e-02   1.270e-01    0.379 0.704496
as.factor(BioID)T000472   1.192e+00   3.133e-01    3.805 0.000147 ***
as.factor(BioID)T000474   8.917e-01   2.084e-01    4.279 1.98e-05 ***
as.factor(BioID)T000475  -8.933e-03   1.311e-01   -0.068 0.945680
as.factor(BioID)T000477   9.166e-02   1.293e-01    0.709 0.478391
as.factor(BioID)T000478   9.932e-02   1.359e-01    0.731 0.465047
as.factor(BioID)T000479   4.537e-01   6.918e-01    0.656 0.512022
as.factor(BioID)T000480   4.692e-01   6.768e-01    0.693 0.488280
```

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as.factor(BioID)T000481    1.118e+00  7.989e-01    1.400 0.161819
as.factor(BioID)T000482    1.090e+00  2.096e-01    5.202 2.21e-07 ***
as.factor(BioID)U000031    2.040e-01  5.703e-01    0.358 0.720521
as.factor(BioID)U000040    1.535e+00  9.207e-01    1.667 0.095608 .
as.factor(BioID)V000081    1.219e+00  2.968e-01    4.107 4.20e-05 ***
as.factor(BioID)V000108    8.202e-01  4.870e-01    1.684 0.092328 .
as.factor(BioID)V000130    9.673e-01  1.362e-01    7.102 1.81e-12 ***
as.factor(BioID)V000131    9.198e-01  2.113e-01    4.354 1.42e-05 ***
as.factor(BioID)V000132    7.432e-01  2.022e-01    3.675 0.000245 ***
as.factor(BioID)V000133    6.904e-01  5.099e-01    1.354 0.175945
as.factor(BioID)W000187    1.329e+00  4.744e-01    2.802 0.005139 **
as.factor(BioID)W000413   -3.119e-01  6.407e-01   -0.487 0.626414
as.factor(BioID)W000791   -2.921e-01  6.525e-01   -0.448 0.654441
as.factor(BioID)W000795    1.735e-01  2.374e-01    0.731 0.465099
as.factor(BioID)W000796    5.428e-01  6.878e-01    0.789 0.430156
as.factor(BioID)W000797    9.343e-01  2.338e-01    3.997 6.71e-05 ***
as.factor(BioID)W000798    1.882e-01  2.127e-01    0.885 0.376511
as.factor(BioID)W000799    6.816e-01  5.268e-01    1.294 0.195950
as.factor(BioID)W000804    7.051e-04  2.193e-01    0.003 0.997435
as.factor(BioID)W000806    2.262e-01  2.724e-01    0.831 0.406374
as.factor(BioID)W000808    1.092e+00  1.385e-01    7.884 5.66e-15 ***
as.factor(BioID)W000809    5.523e-02  3.655e-01    0.151 0.879913
as.factor(BioID)W000810    4.058e-01  5.332e-01    0.761 0.446783
as.factor(BioID)W000812    4.084e-02  1.326e-01    0.308 0.758174
as.factor(BioID)W000813    1.375e-01  2.596e-01    0.530 0.596341
as.factor(BioID)W000814    6.554e-01  8.378e-01    0.782 0.434143
as.factor(BioID)W000815    3.186e-01  4.660e-01    0.684 0.494340
as.factor(BioID)W000816    3.880e-01  4.792e-01    0.810 0.418187
as.factor(BioID)W000820    1.024e-01  1.562e-01    0.656 0.512042
as.factor(BioID)W000821    3.950e-01  6.051e-01    0.653 0.514003
as.factor(BioID)W000822    1.469e+00  6.647e-01    2.210 0.027265 *
as.factor(BioID)W000823    6.152e-01  2.022e-01    3.042 0.002387 **
as.factor(BioID)W000825    1.034e+00  2.549e-01    4.058 5.18e-05 ***
as.factor(BioID)W000826    7.930e-01  2.969e-01    2.671 0.007644 **
as.factor(BioID)Y000033   -5.183e-01  1.029e+00   -0.504 0.614502
as.factor(BioID)Y000062    9.470e-01  9.880e-02    9.585  < 2e-16 ***
as.factor(BioID)Y000063    2.520e-01  3.235e-01    0.779 0.435998
as.factor(BioID)Y000065    7.320e-01  1.073e+00    0.682 0.495104
as.factor(BioID)Y000066          NA         NA       NA       NA
as.factor(BioID)Z000017          NA         NA       NA       NA
seniority                  1.702e-02  4.440e-02    0.383 0.701600
Contribution_minus        -2.363e-07  1.713e-07   -1.380 0.167819
Contribution_plus          3.608e-06  1.128e-06    3.199 0.001407 **
```

```
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.1089 on 1679 degrees of freedom
  (97 observations deleted due to missingness)
Multiple R-squared:  0.9641,    Adjusted R-squared:  0.9526
F-statistic: 83.85 on 537 and 1679 DF,  p-value: < 2.2e-16
```

```r
# same thing again with plm
ols_ind_fe_plm <- plm(Vote ~ nominate_dim1 + nominate_dim2 + seniority + Contribution_minus ~
summary(ols_ind_fe_plm)
```

```
Oneway (individual) effect Within Model

Call:
plm(formula = Vote ~ nominate_dim1 + nominate_dim2 + seniority +
    Contribution_minus + Contribution_plus, data = df_long, model = "within",
    index = c("BioID", "Instance"))

Unbalanced Panel: n = 530, T = 1-6, N = 2217

Residuals:
       Min.     1st Qu.      Median     3rd Qu.        Max.
-0.82532371 -0.00807496 -0.00014695  0.00855978  0.82174761

Coefficients:
                     Estimate  Std. Error t-value  Pr(>|t|)
seniority          9.6468e-03  2.1460e-03  4.4952 7.423e-06 ***
Contribution_minus -2.0592e-07 1.7050e-07 -1.2077 0.2273193
Contribution_plus   3.9808e-06 1.1011e-06  3.6154 0.0003087 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Total Sum of Squares:    20.367
Residual Sum of Squares: 19.986
R-Squared:       0.018682
Adj. R-Squared: -0.29133
F-statistic: 10.6862 on 3 and 1684 DF, p-value: 5.8606e-07
```

```r
# same thing again with log
ols_ind_fe_log <- lm(Vote ~ district + party + birthday + nominate_dim1 + nominate_dim2 + as
summary(ols_ind_fe_log)
```

```
Call:
lm(formula = Vote ~ district + party + birthday + nominate_dim1 +
    nominate_dim2 + as.factor(Instance) + as.factor(BioID) +
    seniority + Contribution_minus_log + Contribution_plus_log,
    data = df_long_log)

Residuals:
     Min       1Q   Median       3Q      Max
-0.81706 -0.01092 -0.00389  0.01325  0.82121

Coefficients: (5 not defined because of singularities)
                         Estimate Std. Error t value Pr(>|t|)
(Intercept)             14.4416138 35.5235913   0.407 0.684410
district                -0.0565309  0.1488284  -0.380 0.704121
partyR                  -0.8613168  0.3922392  -2.196 0.028260 *
birthday                -0.0068359  0.0180078  -0.380 0.704294
nominate_dim1            0.0785876  0.3534751   0.222 0.824090
nominate_dim2           -0.4218651  0.9584230  -0.440 0.659884
as.factor(Instance)4    -0.0147396  0.0569280  -0.259 0.795737
as.factor(Instance)6    -0.0343328  0.1696859  -0.202 0.839686
as.factor(Instance)7    -0.0621551  0.2263281  -0.275 0.783645
as.factor(Instance)51   -0.0155064  0.1131406  -0.137 0.891007
as.factor(Instance)52   -0.0098209  0.1132238  -0.087 0.930891
as.factor(BioID)A000367  0.3182258  0.7679453   0.414 0.678654
as.factor(BioID)A000369 -0.1092827  0.3032725  -0.360 0.718642
as.factor(BioID)A000370  0.4504502  1.2490541   0.361 0.718427
as.factor(BioID)A000372  0.4695025  1.2597357   0.373 0.709428
as.factor(BioID)A000374  0.0923041  0.2674560   0.345 0.730056
as.factor(BioID)A000375  0.9134540  2.4558526   0.372 0.709985
as.factor(BioID)A000376  2.1948037  5.6625435   0.388 0.698370
as.factor(BioID)A000377 -0.0585667  0.1714106  -0.342 0.732646
as.factor(BioID)A000378  0.3774894  0.9068673   0.416 0.677285
as.factor(BioID)B000213 -0.2893319  0.6989965  -0.414 0.678991
as.factor(BioID)B000287  1.6717329  4.4114512   0.379 0.704779
as.factor(BioID)B000490 -0.4803467  0.3745537  -1.282 0.199892
as.factor(BioID)B000574  0.0151667  0.1185292   0.128 0.898200
as.factor(BioID)B000755  0.0475954  0.2346333   0.203 0.839281
as.factor(BioID)B000911 -0.0758141  0.2485361  -0.305 0.760378
as.factor(BioID)B001227 -0.2728361  0.6735992  -0.405 0.685507
as.factor(BioID)B001248  1.0771235  2.9090449   0.370 0.711238
as.factor(BioID)B001250 -0.3544054  0.8813000  -0.402 0.687642
as.factor(BioID)B001251 -0.2032592  0.5003164  -0.406 0.684611
```

```
as.factor(BioID)B001255 -0.0689870  0.2618565  -0.263 0.792239
as.factor(BioID)B001257  0.3662366  1.0227301   0.358 0.720324
as.factor(BioID)B001260  0.5464708  1.4929604   0.366 0.714396
as.factor(BioID)B001269  0.4855297  1.2212817   0.398 0.691016
as.factor(BioID)B001270  1.9221550  5.0947384   0.377 0.706020
as.factor(BioID)B001271 -0.2113750  0.6006881  -0.352 0.724974
as.factor(BioID)B001273  0.0843363  0.2322517   0.363 0.716565
as.factor(BioID)B001274  0.1076984  0.2819797   0.382 0.702565
as.factor(BioID)B001275  0.3351353  0.8455164   0.396 0.691893
as.factor(BioID)B001278  0.0360729  0.1226477   0.294 0.768711
as.factor(BioID)B001281 -0.0135390  0.0759772  -0.178 0.858593
as.factor(BioID)B001282  0.2815925  0.7091598   0.397 0.691368
as.factor(BioID)B001283 -0.0444410  0.1882905  -0.236 0.813448
as.factor(BioID)B001284  0.1164403  0.2995694   0.389 0.697562
as.factor(BioID)B001285  1.3198170  3.4793691   0.379 0.704502
as.factor(BioID)B001286  0.8796855  2.3012741   0.382 0.702325
as.factor(BioID)B001289 -0.1572668  0.4052790  -0.388 0.698040
as.factor(BioID)B001290  0.2636999  0.7076674   0.373 0.709477
as.factor(BioID)B001291  1.7132340  4.5805552   0.374 0.708443
as.factor(BioID)B001292  0.3216807  0.8557718   0.376 0.707050
as.factor(BioID)B001293  0.2979280  0.7827714   0.381 0.703552
as.factor(BioID)B001294 -0.0196591  0.1611520  -0.122 0.902923
as.factor(BioID)B001295  0.4467094  1.2092599   0.369 0.711879
as.factor(BioID)B001297  0.1367762  0.3441118   0.397 0.691076
as.factor(BioID)B001298 -0.0168745  0.1457429  -0.116 0.907841
as.factor(BioID)B001299  0.0743241  0.2610902   0.285 0.775940
as.factor(BioID)B001300  2.5440503  6.7095477   0.379 0.704619
as.factor(BioID)B001301 -0.2320094  0.5913217  -0.392 0.694853
as.factor(BioID)B001302  0.2424928  0.6399403   0.379 0.704796
as.factor(BioID)B001303 -0.0070642  0.1071653  -0.066 0.947452
as.factor(BioID)B001304  0.1779650  0.4830318   0.368 0.712605
as.factor(BioID)B001306  0.5472189  1.4553405   0.376 0.706967
as.factor(BioID)B001307  0.1736901  0.4267619   0.407 0.684072
as.factor(BioID)B001309  0.0750906  0.2216177   0.339 0.734788
as.factor(BioID)C000266 -0.4047039  0.9837040  -0.411 0.680835
as.factor(BioID)C000537 -0.0669642  0.1568981  -0.427 0.669589
as.factor(BioID)C000714  0.2877756  0.8317747   0.346 0.729410
as.factor(BioID)C000754 -0.0730629  0.1787379  -0.409 0.682769
as.factor(BioID)C000984  0.0480583  0.2450262   0.196 0.844532
as.factor(BioID)C001036  1.0031589  2.6538441   0.378 0.705485
as.factor(BioID)C001037  0.0730022  0.3028628   0.241 0.809558
as.factor(BioID)C001038  0.5454544  1.4870116   0.367 0.713813
as.factor(BioID)C001045 -0.1276885  0.4128479  -0.309 0.757148
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as.factor(BioID)C001048   0.1124511  0.3075252   0.366 0.714670
as.factor(BioID)C001051   1.4658016  3.8518813   0.381 0.703600
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as.factor(BioID)N000182  0.7507325  1.9701989   0.381 0.703227
as.factor(BioID)N000184 -0.0770839  0.2547637  -0.303 0.762261
as.factor(BioID)N000185  0.3173052  0.8382733   0.379 0.705099
as.factor(BioID)N000188  0.0483379  0.1576092   0.307 0.759120
as.factor(BioID)N000189  0.1007199  0.2627300   0.383 0.701511
as.factor(BioID)N000190  0.1261599  0.3724473   0.339 0.734861
as.factor(BioID)N000191  0.3036041  0.7950733   0.382 0.702624
as.factor(BioID)O000168  1.0600119  2.7957369   0.379 0.704631
as.factor(BioID)O000170  1.0148839  2.5903615   0.392 0.695270
as.factor(BioID)O000171 -0.0360592  0.1637357  -0.220 0.825725
as.factor(BioID)O000172  1.3337426  3.3392713   0.399 0.689650
as.factor(BioID)O000173  0.7722700  1.8792109   0.411 0.681168
as.factor(BioID)P000034 -0.0905193  0.2104545  -0.430 0.667178
as.factor(BioID)P000096  0.0359246  0.2686754   0.134 0.893651
```

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as.factor(BioID)P000258 -0.5321022  0.5295722  -1.005 0.315174
as.factor(BioID)P000373  0.3162134  0.9467817   0.334 0.738438
as.factor(BioID)P000523 -0.3114197  0.7167238  -0.435 0.663988
as.factor(BioID)P000588 -0.3173850  0.7867496  -0.403 0.686705
as.factor(BioID)P000591 -0.0343788  0.1572282  -0.219 0.826950
as.factor(BioID)P000592 -0.3285720  0.8099999  -0.406 0.685065
as.factor(BioID)P000593  0.1879678  0.5278549   0.356 0.721820
as.factor(BioID)P000594 -0.0167995  0.1166085  -0.144 0.885468
as.factor(BioID)P000597 -0.0021381  0.1074367  -0.020 0.984125
as.factor(BioID)P000598  0.3486321  0.8159395   0.427 0.669242
as.factor(BioID)P000599  0.1865766  0.5092439   0.366 0.714136
as.factor(BioID)P000601  0.1812026  0.4483347   0.404 0.686150
as.factor(BioID)P000602  0.0273035  0.1052010   0.260 0.795259
as.factor(BioID)P000604  0.4296998  1.1699426   0.367 0.713462
as.factor(BioID)P000606  0.2933997  0.7622790   0.385 0.700370
as.factor(BioID)P000607  0.2388593  0.5963032   0.401 0.688799
as.factor(BioID)P000609  0.0717459  0.2630413   0.273 0.785081
as.factor(BioID)P000611 -0.0935752  0.3094394  -0.302 0.762389
as.factor(BioID)P000614  0.2862957  0.7094190   0.404 0.686594
as.factor(BioID)P000615  0.1611376  0.4668385   0.345 0.730019
as.factor(BioID)P000616  0.2551374  0.6480056   0.394 0.693841
as.factor(BioID)P000617  0.8262365  2.0271027   0.408 0.683632
as.factor(BioID)Q000023  0.2090157  0.5374131   0.389 0.697386
as.factor(BioID)R000053  0.2437950  0.7131753   0.342 0.732518
as.factor(BioID)R000395 -0.3926181  0.9484111  -0.414 0.678955
as.factor(BioID)R000409  2.2337696  5.9484701   0.376 0.707329
as.factor(BioID)R000435  1.6995818  2.7746211   0.613 0.540274
as.factor(BioID)R000486  1.8269486  4.9155027   0.372 0.710193
as.factor(BioID)R000487  1.7752223  4.7272795   0.376 0.707324
as.factor(BioID)R000515 -0.3356647  0.7888965  -0.425 0.670546
as.factor(BioID)R000575 -0.0696211  0.2030241  -0.343 0.731709
as.factor(BioID)R000576 -0.1699685  0.4157917  -0.409 0.682760
as.factor(BioID)R000577  0.6645616  1.7647378   0.377 0.706543
as.factor(BioID)R000578  0.4455338  0.3510278   1.269 0.204567
as.factor(BioID)R000580  0.2691457  0.1604224   1.678 0.093618 .
as.factor(BioID)R000582 -0.3563307  0.8947729  -0.398 0.690516
as.factor(BioID)R000583  0.7350190  1.9303579   0.381 0.703432
as.factor(BioID)R000585  1.2895152  2.9530099   0.437 0.662411
as.factor(BioID)R000586  0.6707320  1.7584536   0.381 0.702939
as.factor(BioID)R000587  0.2827110  0.6937220   0.408 0.683681
as.factor(BioID)R000588  0.1867628  0.4925463   0.379 0.704612
as.factor(BioID)R000591  0.2136179  0.4775363   0.447 0.654702
as.factor(BioID)R000592  0.0642672  0.1826107   0.352 0.724939
```

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as.factor(BioID)R000593  0.5904697  1.5728781   0.375 0.707413
as.factor(BioID)R000597  0.1872538  0.5105961   0.367 0.713871
as.factor(BioID)R000598  0.4426261  1.1865242   0.373 0.709171
as.factor(BioID)R000601  0.0370951  0.1622184   0.229 0.819155
as.factor(BioID)R000602  0.1814260  0.4800838   0.378 0.705557
as.factor(BioID)R000603  0.3227833  0.8455929   0.382 0.702723
as.factor(BioID)R000604  0.1290106  0.3527087   0.366 0.714590
as.factor(BioID)R000606  0.4713825  1.2453723   0.379 0.705110
as.factor(BioID)R000607  1.9991189  2.5950329   0.770 0.441212
as.factor(BioID)R000610  0.7663606  2.0289892   0.378 0.705705
as.factor(BioID)R000612  0.1943535  0.5540939   0.351 0.725821
as.factor(BioID)R000614  1.2839329  3.3434781   0.384 0.701027
as.factor(BioID)S000018  0.0528758  0.1587130   0.333 0.739067
as.factor(BioID)S000030  2.3134422  6.1194265   0.378 0.705450
as.factor(BioID)S000051  0.5099643  0.1489931   3.423 0.000637 ***
as.factor(BioID)S000185 -0.2891891  0.6555925  -0.441 0.659199
as.factor(BioID)S000248  0.4690702  1.3077133   0.359 0.719876
as.factor(BioID)S000364  0.4463546  1.2368687   0.361 0.718246
as.factor(BioID)S000480  0.8101749  2.2610560   0.358 0.720159
as.factor(BioID)S000510  0.2997453  0.8378307   0.358 0.720573
as.factor(BioID)S000522  0.2834465  0.7721490   0.367 0.713608
as.factor(BioID)S000583  0.5496402  1.5884520   0.346 0.729377
as.factor(BioID)S001145  0.2080694  0.6118176   0.340 0.733843
as.factor(BioID)S001148 -0.2551203  0.6618887  -0.385 0.699967
as.factor(BioID)S001154  0.2447240  0.6597408   0.371 0.710738
as.factor(BioID)S001156  2.0109114  5.3363565   0.377 0.706354
as.factor(BioID)S001157  0.4615985  1.2561258   0.367 0.713317
as.factor(BioID)S001165  0.2032871  0.5999332   0.339 0.734773
as.factor(BioID)S001168  0.0096331  0.1277232   0.075 0.939890
as.factor(BioID)S001170 -0.0895680  0.2716887  -0.330 0.741697
as.factor(BioID)S001172 -0.0083798  0.0577225  -0.145 0.884594
as.factor(BioID)S001175  0.7014044  1.8128710   0.387 0.698886
as.factor(BioID)S001176 -0.1948263  0.4851080  -0.402 0.688028
as.factor(BioID)S001180  0.0839071  0.2598231   0.323 0.746788
as.factor(BioID)S001185  0.4451559  1.1358750   0.392 0.695186
as.factor(BioID)S001187  0.7123076  1.8496980   0.385 0.700225
as.factor(BioID)S001188  0.0140561  0.1390465   0.101 0.919494
as.factor(BioID)S001189  0.3625597  0.9320705   0.389 0.697347
as.factor(BioID)S001190  0.5352646  1.3886778   0.385 0.699962
as.factor(BioID)S001192 -0.0922254  0.2427344  -0.380 0.704044
as.factor(BioID)S001195  0.4170557  1.0822082   0.385 0.700017
as.factor(BioID)S001196  1.9703842  3.0442801   0.647 0.517580
as.factor(BioID)S001200  0.6144273  1.6117628   0.381 0.703101
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as.factor(BioID)S001201  0.1437608  0.3882418   0.370 0.711224
as.factor(BioID)S001205  0.2156629  0.6058033   0.356 0.721897
as.factor(BioID)S001207  0.7612429  1.9597379   0.388 0.697747
as.factor(BioID)S001209  0.6211598  1.5628287   0.397 0.691089
as.factor(BioID)S001212  0.3352708  0.9012753   0.372 0.709951
as.factor(BioID)S001213  0.0214589  0.1174015   0.183 0.854995
as.factor(BioID)S001214  0.9776517  2.5704293   0.380 0.703745
as.factor(BioID)S001215  0.8378754  2.1588427   0.388 0.697990
as.factor(BioID)S001216  0.6452515  1.6142486   0.400 0.689421
as.factor(BioID)T000193 -0.1833608  0.4406911  -0.416 0.677417
as.factor(BioID)T000238  0.3634183  1.0114427   0.359 0.719419
as.factor(BioID)T000462  0.3109654  0.8587884   0.362 0.717332
as.factor(BioID)T000463  0.2899196  0.7870467   0.368 0.712656
as.factor(BioID)T000465 -0.0347343  0.1170513  -0.297 0.766705
as.factor(BioID)T000468 -0.0724956  0.2154880  -0.336 0.736600
as.factor(BioID)T000469  0.9962714  2.6107254   0.382 0.702810
as.factor(BioID)T000470 -0.1401698  0.3596609  -0.390 0.696796
as.factor(BioID)T000474  1.9256603  5.0848440   0.379 0.704963
as.factor(BioID)T000475  0.4907626  1.2657195   0.388 0.698271
as.factor(BioID)T000477  0.0245891  0.1180975   0.208 0.835095
as.factor(BioID)T000479  0.1318588  0.3502679   0.376 0.706637
as.factor(BioID)T000480  0.2268988  0.6239791   0.364 0.716187
as.factor(BioID)T000482  0.2663434  0.7034035   0.379 0.705004
as.factor(BioID)U000031  0.3643643  0.3289475   1.108 0.268192
as.factor(BioID)U000040  1.0826289  2.7948893   0.387 0.698547
as.factor(BioID)V000081  0.1147830  0.3912750   0.293 0.769292
as.factor(BioID)V000108 -0.3549190  0.8608482  -0.412 0.680189
as.factor(BioID)V000131  1.7875819  5.1000189   0.351 0.726011
as.factor(BioID)V000132  1.8273031  5.1807402   0.353 0.724357
as.factor(BioID)V000133  1.1490421  0.3791110   3.031 0.002482 **
as.factor(BioID)W000187  1.8995695  5.1565713   0.368 0.712646
as.factor(BioID)W000413 -0.4293044  1.1625098  -0.369 0.711966
as.factor(BioID)W000791 -0.3317672  0.8170437  -0.406 0.684761
as.factor(BioID)W000795 -0.3351678  0.8208191  -0.408 0.683090
as.factor(BioID)W000796 -0.1818638  0.4860233  -0.374 0.708320
as.factor(BioID)W000799 -0.0355199  0.1613577  -0.220 0.825800
as.factor(BioID)W000804 -0.2935574  0.7211576  -0.407 0.684022
as.factor(BioID)W000808  1.0806557  2.9048136   0.372 0.709931
as.factor(BioID)W000809  0.1229967  0.2741722   0.449 0.653780
as.factor(BioID)W000810  0.2316614  0.6308765   0.367 0.713520
as.factor(BioID)W000812 -0.0194654  0.1189486  -0.164 0.870034
as.factor(BioID)W000813 -0.0001427  0.0853835  -0.002 0.998667
as.factor(BioID)W000814  0.4585303  1.2865273   0.356 0.721587
```

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as.factor(BioID)W000815 -0.0632676  0.1882847  -0.336 0.736905
as.factor(BioID)W000816  1.0809367  2.9073264   0.372 0.710099
as.factor(BioID)W000820  2.3863115  6.2765059   0.380 0.703855
as.factor(BioID)W000821  0.1440592  0.3716232   0.388 0.698334
as.factor(BioID)W000822  0.5335239  1.4346103   0.372 0.710026
as.factor(BioID)W000823  0.7750664  0.7374075   1.051 0.293404
as.factor(BioID)W000825  0.6877688  1.7766880   0.387 0.698734
as.factor(BioID)W000826  0.4356259  1.1061989   0.394 0.693784
as.factor(BioID)Y000033 -0.7466633  1.8530727  -0.403 0.687058
as.factor(BioID)Y000062         NA         NA      NA       NA
as.factor(BioID)Y000063         NA         NA      NA       NA
as.factor(BioID)Y000065         NA         NA      NA       NA
as.factor(BioID)Y000066         NA         NA      NA       NA
as.factor(BioID)Z000017         NA         NA      NA       NA
seniority                0.0242505  0.0567309   0.427 0.669105
Contribution_minus_log   0.0004834  0.0014424   0.335 0.737574
Contribution_plus_log   -0.0008799  0.0011041  -0.797 0.425597
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.1125 on 1429 degrees of freedom
  (413 observations deleted due to missingness)
Multiple R-squared:  0.9619,    Adjusted R-squared:  0.9494
F-statistic: 76.61 on 471 and 1429 DF,  p-value: < 2.2e-16
```

```r
# same thing with only dummies
ols_ind_fe_dummy <- lm(Vote ~ nominate_dim1 + nominate_dim2 + as.factor(Instance) + as.factor
summary(ols_ind_fe_dummy)
```

```
Call:
lm(formula = Vote ~ nominate_dim1 + nominate_dim2 + as.factor(Instance) +
    as.factor(BioID) + seniority + anti_env_dummy + pro_env_dummy,
    data = df_long)

Residuals:
     Min       1Q   Median       3Q      Max
-0.82068 -0.00991 -0.00322  0.01077  0.82152

Coefficients: (2 not defined because of singularities)
                    Estimate Std. Error t value Pr(>|t|)
(Intercept)        3.828e-01  1.307e+00   0.293 0.769597
```

```
nominate_dim1           -8.688e-01  2.940e+00   -0.296 0.767637
nominate_dim2           -5.075e-01  1.121e+00   -0.453 0.650771
as.factor(Instance)4    -9.524e-03  4.497e-02   -0.212 0.832297
as.factor(Instance)6    -2.845e-02  1.334e-01   -0.213 0.831145
as.factor(Instance)7    -4.968e-02  1.776e-01   -0.280 0.779748
as.factor(Instance)51   -1.330e-02  8.904e-02   -0.149 0.881307
as.factor(Instance)52   -4.743e-03  8.909e-02   -0.053 0.957543
as.factor(BioID)A000367  5.078e-01  1.289e+00    0.394 0.693660
as.factor(BioID)A000369 -1.235e-02  8.112e-02   -0.152 0.879029
as.factor(BioID)A000370  9.831e-01  1.157e-01    8.499  < 2e-16 ***
as.factor(BioID)A000371  9.340e-01  2.768e-01    3.374 0.000758 ***
as.factor(BioID)A000372  3.385e-01  1.001e+00    0.338 0.735145
as.factor(BioID)A000374  1.903e-01  5.310e-01    0.358 0.720146
as.factor(BioID)A000375  1.679e-01  6.245e-01    0.269 0.788038
as.factor(BioID)A000376  1.358e+00  8.146e-01    1.667 0.095634 .
as.factor(BioID)A000377  6.660e-02  2.043e-01    0.326 0.744447
as.factor(BioID)A000378  1.115e+00  3.605e-01    3.093 0.002012 **
as.factor(BioID)B000213 -1.961e-01  4.798e-01   -0.409 0.682803
as.factor(BioID)B000287  9.744e-01  2.238e-01    4.353 1.42e-05 ***
as.factor(BioID)B000490  5.100e-01  4.445e-01    1.147 0.251408
as.factor(BioID)B000574  1.086e+00  2.144e-01    5.066 4.51e-07 ***
as.factor(BioID)B000755 -1.981e-02  2.178e-01   -0.091 0.927546
as.factor(BioID)B000911  8.592e-01  3.686e-01    2.331 0.019855 *
as.factor(BioID)B001227  9.463e-01  1.836e-01    5.154 2.85e-07 ***
as.factor(BioID)B001248  5.550e-02  3.477e-01    0.160 0.873215
as.factor(BioID)B001250 -5.141e-03  2.421e-01   -0.021 0.983056
as.factor(BioID)B001251  9.150e-01  1.990e-01    4.597 4.60e-06 ***
as.factor(BioID)B001255  7.267e-03  9.482e-02    0.077 0.938920
as.factor(BioID)B001257 -1.153e-01  2.613e-01   -0.441 0.659093
as.factor(BioID)B001260 -1.260e-01  3.172e-01   -0.397 0.691215
as.factor(BioID)B001269  1.534e-04  2.567e-01    0.001 0.999523
as.factor(BioID)B001270  1.113e+00  4.400e-01    2.528 0.011547 *
as.factor(BioID)B001271  7.288e-02  2.231e-01    0.327 0.743900
as.factor(BioID)B001273  1.853e-01  5.362e-01    0.346 0.729747
as.factor(BioID)B001274  3.316e-01  9.327e-01    0.356 0.722200
as.factor(BioID)B001275  7.640e-02  1.654e-01    0.462 0.644181
as.factor(BioID)B001278  1.104e+00  2.278e-01    4.846 1.37e-06 ***
as.factor(BioID)B001281  9.754e-01  8.796e-02   11.089  < 2e-16 ***
as.factor(BioID)B001282  1.462e-01  3.677e-01    0.398 0.690958
as.factor(BioID)B001283  2.692e-01  8.324e-01    0.323 0.746386
as.factor(BioID)B001284 -6.605e-03  1.352e-01   -0.049 0.961045
as.factor(BioID)B001285  8.572e-01  4.362e-01    1.965 0.049579 *
as.factor(BioID)B001286  8.117e-01  5.929e-01    1.369 0.171141
```

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as.factor(BioID)B001287   7.919e-01   6.265e-01    1.264 0.206459
as.factor(BioID)B001289   2.283e-01   6.857e-01    0.333 0.739178
as.factor(BioID)B001290   4.611e-01   1.397e+00    0.330 0.741351
as.factor(BioID)B001291   2.459e-01   8.545e-01    0.288 0.773593
as.factor(BioID)B001292   9.761e-01   1.076e-01    9.074  < 2e-16 ***
as.factor(BioID)B001293   3.675e-02   1.296e-01    0.283 0.776868
as.factor(BioID)B001294   3.022e-01   7.341e-01    0.412 0.680628
as.factor(BioID)B001295  -6.007e-02   1.667e-01   -0.360 0.718597
as.factor(BioID)B001296   9.989e-01   7.456e-02   13.398  < 2e-16 ***
as.factor(BioID)B001297   3.802e-01   1.036e+00    0.367 0.713656
as.factor(BioID)B001298  -5.677e-02   2.839e-01   -0.200 0.841536
as.factor(BioID)B001299   2.001e-01   6.987e-01    0.286 0.774632
as.factor(BioID)B001300   1.100e+00   3.202e-01    3.436 0.000604 ***
as.factor(BioID)B001301   2.394e-02   1.085e-01    0.221 0.825352
as.factor(BioID)B001302   6.088e-01   1.699e+00    0.358 0.720165
as.factor(BioID)B001303   9.854e-01   1.483e-01    6.643 4.13e-11 ***
as.factor(BioID)B001304   9.395e-01   2.146e-01    4.378 1.27e-05 ***
as.factor(BioID)B001306   1.084e-01   2.929e-01    0.370 0.711270
as.factor(BioID)B001307   3.249e-01   7.514e-01    0.432 0.665536
as.factor(BioID)B001309   3.965e-01   1.090e+00    0.364 0.716115
as.factor(BioID)C000059  -2.042e-01   4.875e-01   -0.419 0.675417
as.factor(BioID)C000266  -5.121e-02   2.598e-01   -0.197 0.843750
as.factor(BioID)C000537   8.980e-01   2.371e-01    3.787 0.000158 ***
as.factor(BioID)C000714   1.145e+00   6.319e-01    1.813 0.070080 .
as.factor(BioID)C000754   5.453e-01   1.179e+00    0.462 0.643906
as.factor(BioID)C000984   8.436e-01   3.414e-01    2.471 0.013575 *
as.factor(BioID)C001036   8.782e-01   3.238e-01    2.712 0.006762 **
as.factor(BioID)C001037   9.802e-01   3.196e-01    3.067 0.002194 **
as.factor(BioID)C001038   8.306e-01   3.941e-01    2.108 0.035209 *
as.factor(BioID)C001045  -7.315e-02   2.769e-01   -0.264 0.791691
as.factor(BioID)C001048   8.063e-02   2.730e-01    0.295 0.767807
as.factor(BioID)C001051   1.779e-01   4.511e-01    0.394 0.693380
as.factor(BioID)C001053  -4.412e-02   2.080e-01   -0.212 0.832051
as.factor(BioID)C001055   7.772e-01   6.885e-01    1.129 0.259114
as.factor(BioID)C001059   4.943e-01   5.020e-01    0.985 0.324983
as.factor(BioID)C001061   8.902e-01   2.480e-01    3.589 0.000341 ***
as.factor(BioID)C001063   3.375e-01   3.333e-01    1.013 0.311371
as.factor(BioID)C001066   9.224e-01   1.813e-01    5.088 4.03e-07 ***
as.factor(BioID)C001067   1.164e+00   5.731e-01    2.032 0.042337 *
as.factor(BioID)C001068   1.016e+00   6.750e-02   15.059  < 2e-16 ***
as.factor(BioID)C001069   8.211e-01   4.462e-01    1.840 0.065943 .
as.factor(BioID)C001072   9.091e-01   2.147e-01    4.235 2.41e-05 ***
as.factor(BioID)C001076   2.527e-01   7.504e-01    0.337 0.736359
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as.factor(BioID)C001077  3.264e-01  2.393e-01   1.364 0.172821
as.factor(BioID)C001078  8.180e-01  4.889e-01   1.673 0.094451 .
as.factor(BioID)C001080  1.149e+00  3.886e-01   2.957 0.003151 **
as.factor(BioID)C001083  8.647e-01  5.003e-01   1.728 0.084124 .
as.factor(BioID)C001084  1.025e+00  7.727e-02  13.268  < 2e-16 ***
as.factor(BioID)C001087  1.122e-01  2.793e-01   0.402 0.687896
as.factor(BioID)C001090  8.800e-01  3.260e-01   2.700 0.007010 **
as.factor(BioID)C001091  9.626e-01  1.156e-01   8.325  < 2e-16 ***
as.factor(BioID)C001092  7.368e-03  1.178e-01   0.063 0.950139
as.factor(BioID)C001093  1.726e-01  5.781e-01   0.298 0.765383
as.factor(BioID)C001094  7.160e-03  9.576e-02   0.075 0.940406
as.factor(BioID)C001097  9.200e-01  2.064e-01   4.457 8.84e-06 ***
as.factor(BioID)C001101  1.147e+00  3.848e-01   2.981 0.002916 **
as.factor(BioID)C001103  2.402e-01  6.517e-01   0.369 0.712515
as.factor(BioID)C001105  3.072e-02  2.556e-01   0.120 0.904324
as.factor(BioID)C001106  4.798e-01  6.223e-01   0.771 0.440828
as.factor(BioID)C001107  8.753e-01  5.292e-01   1.654 0.098299 .
as.factor(BioID)C001108  1.246e-01  4.860e-01   0.256 0.797644
as.factor(BioID)C001109  3.731e-01  8.352e-01   0.447 0.655166
as.factor(BioID)C001110  9.758e-01  2.507e-01   3.892 0.000103 ***
as.factor(BioID)C001111  8.435e-01  5.374e-01   1.570 0.116652
as.factor(BioID)C001112  9.280e-01  2.794e-01   3.321 0.000916 ***
as.factor(BioID)C001114  7.503e-02  2.119e-01   0.354 0.723340
as.factor(BioID)C001117  1.449e+00  1.174e+00   1.234 0.217378
as.factor(BioID)C001118  3.533e-01  1.072e+00   0.330 0.741714
as.factor(BioID)C001119  1.190e+00  4.559e-01   2.609 0.009159 **
as.factor(BioID)C001120  1.405e-01  3.323e-01   0.423 0.672508
as.factor(BioID)C001121  1.008e+00  1.951e-01   5.170 2.62e-07 ***
as.factor(BioID)D000096  9.626e-01  1.664e-01   5.784 8.67e-09 ***
as.factor(BioID)D000191  6.759e-01  7.009e-01   0.964 0.335009
as.factor(BioID)D000197  9.358e-01  1.499e-01   6.242 5.46e-10 ***
as.factor(BioID)D000216  7.582e-01  5.156e-01   1.471 0.141573
as.factor(BioID)D000399  8.995e-01  2.275e-01   3.953 8.03e-05 ***
as.factor(BioID)D000482  7.254e-01  6.496e-01   1.117 0.264222
as.factor(BioID)D000533  7.540e-02  4.545e-01   0.166 0.868241
as.factor(BioID)D000598  8.014e-01  4.857e-01   1.650 0.099173 .
as.factor(BioID)D000600 -2.119e-01  5.675e-01  -0.373 0.708941
as.factor(BioID)D000604 -2.444e-01  7.002e-01  -0.349 0.727069
as.factor(BioID)D000610  9.224e-01  1.932e-01   4.774 1.96e-06 ***
as.factor(BioID)D000612 -6.618e-02  2.906e-01  -0.228 0.819892
as.factor(BioID)D000614  5.312e-02  2.402e-01   0.221 0.825054
as.factor(BioID)D000615  2.133e-01  7.821e-01   0.273 0.785073
as.factor(BioID)D000616  8.193e-02  3.926e-01   0.209 0.834732
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as.factor(BioID)D000617  9.029e-01  3.482e-01   2.593 0.009593 **
as.factor(BioID)D000619 -9.545e-02  3.710e-01  -0.257 0.796985
as.factor(BioID)D000620  8.393e-01  4.989e-01   1.682 0.092697 .
as.factor(BioID)D000621  2.127e-01  7.091e-01   0.300 0.764197
as.factor(BioID)D000623  1.234e+00  5.983e-01   2.062 0.039360 *
as.factor(BioID)D000624  1.022e+00  7.748e-02  13.193  < 2e-16 ***
as.factor(BioID)D000625 -1.595e-01  5.570e-01  -0.286 0.774703
as.factor(BioID)D000626  3.414e-01  9.679e-01   0.353 0.724360
as.factor(BioID)D000627  8.890e-01  3.279e-01   2.712 0.006764 **
as.factor(BioID)D000628  2.303e-01  5.842e-01   0.394 0.693407
as.factor(BioID)D000629  9.969e-01  2.836e-01   3.516 0.000451 ***
as.factor(BioID)D000630  9.707e-01  3.638e-01   2.668 0.007704 **
as.factor(BioID)D000631  1.035e+00  1.532e-01   6.755 1.96e-11 ***
as.factor(BioID)E000179  7.302e-01  5.979e-01   1.221 0.222136
as.factor(BioID)E000215  8.985e-01  2.444e-01   3.677 0.000244 ***
as.factor(BioID)E000288  1.280e+00  6.938e-01   1.845 0.065268 .
as.factor(BioID)E000290  1.169e+00  4.829e-01   2.420 0.015635 *
as.factor(BioID)E000291  9.687e-02  1.831e-01   0.529 0.596849
as.factor(BioID)E000293  8.920e-01  3.509e-01   2.542 0.011112 *
as.factor(BioID)E000294  4.461e-02  1.661e-01   0.269 0.788225
as.factor(BioID)E000296  1.061e+00  2.104e-01   5.043 5.07e-07 ***
as.factor(BioID)E000297  1.218e+00  6.431e-01   1.894 0.058388 .
as.factor(BioID)E000298  1.955e-01  6.752e-01   0.290 0.772194
as.factor(BioID)E000299  1.190e+00  4.715e-01   2.525 0.011669 *
as.factor(BioID)F000030  8.924e-01  2.864e-01   3.116 0.001864 **
as.factor(BioID)F000372 -2.201e-01  5.811e-01  -0.379 0.704905
as.factor(BioID)F000448  1.821e-01  7.971e-01   0.229 0.819276
as.factor(BioID)F000449 -2.136e-01  5.537e-01  -0.386 0.699741
as.factor(BioID)F000450  1.255e-01  5.287e-01   0.237 0.812318
as.factor(BioID)F000451 -1.783e-01  6.516e-01  -0.274 0.784430
as.factor(BioID)F000454  8.467e-01  5.316e-01   1.593 0.111369
as.factor(BioID)F000455  1.088e+00  4.067e-01   2.676 0.007524 **
as.factor(BioID)F000456  7.562e-02  3.833e-01   0.197 0.843627
as.factor(BioID)F000458  1.190e-01  3.465e-01   0.344 0.731229
as.factor(BioID)F000459  1.359e-01  3.116e-01   0.436 0.662847
as.factor(BioID)F000460  4.689e-02  2.861e-01   0.164 0.869855
as.factor(BioID)F000461  2.014e-01  5.793e-01   0.348 0.728140
as.factor(BioID)F000462  9.450e-01  1.473e-01   6.414 1.84e-10 ***
as.factor(BioID)F000464  8.177e-01  5.831e-01   1.402 0.160993
as.factor(BioID)F000465  2.354e-01  6.935e-01   0.339 0.734356
as.factor(BioID)F000466  7.927e-01  7.487e-01   1.059 0.289834
as.factor(BioID)F000468  1.474e+00  1.077e+00   1.369 0.171043
as.factor(BioID)G000289 -1.980e-01  4.411e-01  -0.449 0.653639
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as.factor(BioID)G000377 -1.222e-01  2.735e-01  -0.447 0.655212
as.factor(BioID)G000410  6.327e-01  3.363e-01   1.881 0.060120 .
as.factor(BioID)G000535  9.251e-01  2.166e-01   4.272 2.05e-05 ***
as.factor(BioID)G000546 -7.395e-02  1.806e-01  -0.410 0.682194
as.factor(BioID)G000548  2.107e-01  7.408e-01   0.284 0.776116
as.factor(BioID)G000551  1.135e+00  5.031e-01   2.256 0.024178 *
as.factor(BioID)G000552  2.553e-01  7.871e-01   0.324 0.745735
as.factor(BioID)G000553  1.022e+00  1.039e-01   9.835  < 2e-16 ***
as.factor(BioID)G000556  1.122e+00  2.294e-01   4.892 1.09e-06 ***
as.factor(BioID)G000558  4.089e-02  1.122e-01   0.365 0.715528
as.factor(BioID)G000559  8.508e-01  4.240e-01   2.006 0.044971 *
as.factor(BioID)G000560  1.562e-01  7.192e-01   0.217 0.828118
as.factor(BioID)G000563  1.198e-01  3.171e-01   0.378 0.705718
as.factor(BioID)G000565  4.163e-01  1.151e+00   0.362 0.717538
as.factor(BioID)G000566  1.269e-01  5.723e-01   0.222 0.824585
as.factor(BioID)G000568  1.898e-01  5.015e-01   0.378 0.705159
as.factor(BioID)G000571  9.605e-01  3.028e-01   3.172 0.001540 **
as.factor(BioID)G000574  9.888e-01  6.676e-02  14.810  < 2e-16 ***
as.factor(BioID)G000576  2.261e-01  6.661e-01   0.339 0.734291
as.factor(BioID)G000577 -1.829e-02  8.283e-02  -0.221 0.825290
as.factor(BioID)G000578  7.870e-01  1.139e+00   0.691 0.489815
as.factor(BioID)G000579 -9.998e-03  8.084e-02  -0.124 0.901592
as.factor(BioID)G000581  1.075e+00  7.244e-01   1.485 0.137863
as.factor(BioID)G000583  8.579e-01  6.211e-01   1.381 0.167410
as.factor(BioID)G000584  2.592e-02  1.071e-01   0.242 0.808733
as.factor(BioID)G000585  1.229e+00  6.194e-01   1.985 0.047352 *
as.factor(BioID)G000586  1.452e+00  1.021e+00   1.422 0.155086
as.factor(BioID)G000587  1.548e+00  1.544e+00   1.003 0.316015
as.factor(BioID)G000588 -6.373e-03  3.344e-01  -0.019 0.984795
as.factor(BioID)G000589  3.069e-01  1.020e+00   0.301 0.763567
as.factor(BioID)G000590  2.158e-01  7.548e-01   0.286 0.774966
as.factor(BioID)G000591  1.347e-01  4.187e-01   0.322 0.747745
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as.factor(BioID)H000324  9.372e-01  3.089e-01   3.034 0.002453 **
as.factor(BioID)H000636  8.397e-01  4.401e-01   1.908 0.056589 .
as.factor(BioID)H000874  7.000e-01  6.743e-01   1.038 0.299395
as.factor(BioID)H001034  1.176e+00  4.572e-01   2.571 0.010215 *
as.factor(BioID)H001036  1.049e-01  6.340e-01   0.165 0.868657
as.factor(BioID)H001038  8.083e-01  4.644e-01   1.741 0.081915 .
as.factor(BioID)H001045  1.192e-01  2.410e-01   0.494 0.621065
as.factor(BioID)H001047  8.544e-01  5.013e-01   1.705 0.088461 .
as.factor(BioID)H001048  4.452e-02  2.776e-01   0.160 0.872577
as.factor(BioID)H001050  8.876e-01  3.166e-01   2.803 0.005120 **
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as.factor(BioID)H001051   3.306e-01   6.166e-01    0.536 0.591957
as.factor(BioID)H001052   3.247e-01   9.454e-01    0.343 0.731275
as.factor(BioID)H001053   8.426e-02   2.461e-01    0.342 0.732150
as.factor(BioID)H001055  -1.412e-01   4.305e-01   -0.328 0.742986
as.factor(BioID)H001056  -9.415e-02   2.787e-01   -0.338 0.735507
as.factor(BioID)H001057   4.555e-01   1.250e+00    0.365 0.715518
as.factor(BioID)H001058   3.083e-02   2.564e-01    0.120 0.904303
as.factor(BioID)H001059   9.499e-04   1.543e-01    0.006 0.995089
as.factor(BioID)H001063   1.100e+00   1.910e-01    5.757 1.02e-08 ***
as.factor(BioID)H001064   9.125e-01   3.124e-01    2.921 0.003536 **
as.factor(BioID)H001066   9.707e-01   1.862e-01    5.214 2.07e-07 ***
as.factor(BioID)H001067   1.216e-01   3.725e-01    0.327 0.744076
as.factor(BioID)H001068   1.215e+00   4.740e-01    2.564 0.010444 *
as.factor(BioID)H001071   4.058e-01   1.260e+00    0.322 0.747471
as.factor(BioID)H001072   1.063e-01   2.577e-01    0.412 0.680041
as.factor(BioID)H001073  -4.034e-02   2.797e-01   -0.144 0.885355
as.factor(BioID)H001074   9.305e-02   2.247e-01    0.414 0.678819
as.factor(BioID)H001077   3.095e-01   8.696e-01    0.356 0.721957
as.factor(BioID)H001078   1.911e-01   4.898e-01    0.390 0.696468
as.factor(BioID)H001081   9.667e-01   2.253e-01    4.291 1.88e-05 ***
as.factor(BioID)H001085   1.028e+00   2.667e-01    3.853 0.000121 ***
as.factor(BioID)H001088   2.148e-01   5.315e-01    0.404 0.686221
as.factor(BioID)H001090   1.224e+00   4.959e-01    2.468 0.013698 *
as.factor(BioID)I000056  -1.168e-01   2.974e-01   -0.393 0.694523
as.factor(BioID)I000057   7.850e-01   5.690e-01    1.380 0.167889
as.factor(BioID)J000032   8.491e-01   3.263e-01    2.602 0.009349 **
as.factor(BioID)J000126   8.890e-01   2.650e-01    3.355 0.000813 ***
as.factor(BioID)J000174   2.110e-02   4.042e-01    0.052 0.958376
as.factor(BioID)J000288   9.341e-01   1.736e-01    5.382 8.42e-08 ***
as.factor(BioID)J000289   2.347e-01   8.481e-01    0.277 0.782013
as.factor(BioID)J000290  -6.379e-03   2.105e-01   -0.030 0.975831
as.factor(BioID)J000292   5.241e-02   1.365e-01    0.384 0.701009
as.factor(BioID)J000294   1.033e+00   1.713e-01    6.031 1.99e-09 ***
as.factor(BioID)J000295  -4.974e-02   3.396e-01   -0.146 0.883568
as.factor(BioID)J000297   2.509e-02   1.905e-01    0.132 0.895205
as.factor(BioID)J000298   1.406e+00   1.083e+00    1.298 0.194337
as.factor(BioID)J000299   1.020e-01   4.109e-01    0.248 0.804058
as.factor(BioID)J000301   9.870e-02   2.780e-01    0.355 0.722598
as.factor(BioID)J000302   1.196e-01   4.456e-01    0.268 0.788410
as.factor(BioID)K000009   6.680e-01   7.597e-01    0.879 0.379348
as.factor(BioID)K000188   6.765e-01   8.202e-01    0.825 0.409656
as.factor(BioID)K000210  -3.916e-01   9.603e-01   -0.408 0.683455
as.factor(BioID)K000362   9.310e-02   4.671e-01    0.199 0.842056
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as.factor(BioID)K000363 -8.878e-03  1.717e-01  -0.052 0.958760
as.factor(BioID)K000368  7.214e-01  8.646e-01   0.834 0.404226
as.factor(BioID)K000375  8.955e-01  3.104e-01   2.885 0.003965 **
as.factor(BioID)K000376  8.649e-02  1.874e-01   0.462 0.644473
as.factor(BioID)K000378 -4.689e-02  3.728e-01  -0.126 0.899910
as.factor(BioID)K000379  1.047e+00  1.122e-01   9.334  < 2e-16 ***
as.factor(BioID)K000380  9.806e-01  1.203e-01   8.151 7.00e-16 ***
as.factor(BioID)K000381  8.491e-01  4.261e-01   1.993 0.046438 *
as.factor(BioID)K000382  8.515e-01  4.903e-01   1.737 0.082652 .
as.factor(BioID)K000385  9.909e-01  1.121e-01   8.841  < 2e-16 ***
as.factor(BioID)K000386  7.579e-01  7.537e-01   1.006 0.314770
as.factor(BioID)K000387  3.688e-01  1.006e-01   3.667 0.000253 ***
as.factor(BioID)K000388  2.818e-01  8.236e-01   0.342 0.732268
as.factor(BioID)K000389  1.176e+00  4.642e-01   2.533 0.011388 *
as.factor(BioID)K000390  1.065e+00  1.752e-01   6.081 1.48e-09 ***
as.factor(BioID)K000391  9.088e-01  2.886e-01   3.149 0.001665 **
as.factor(BioID)K000392  2.587e-01  6.731e-01   0.384 0.700833
as.factor(BioID)K000394  1.086e+00  2.178e-01   4.988 6.73e-07 ***
as.factor(BioID)K000395  1.447e-01  4.048e-01   0.358 0.720759
as.factor(BioID)L000263  6.857e-01  7.129e-01   0.962 0.336257
as.factor(BioID)L000287  9.308e-01  3.579e-01   2.601 0.009382 **
as.factor(BioID)L000397  9.493e-01  1.337e-01   7.102 1.80e-12 ***
as.factor(BioID)L000480  7.408e-01  5.767e-01   1.284 0.199166
as.factor(BioID)L000491 -9.406e-02  2.399e-01  -0.392 0.695082
as.factor(BioID)L000551  1.285e+00  8.942e-01   1.437 0.150799
as.factor(BioID)L000554 -2.963e-01  8.505e-01  -0.348 0.727575
as.factor(BioID)L000557  7.986e-01  4.557e-01   1.753 0.079867 .
as.factor(BioID)L000559  8.319e-01  3.898e-01   2.134 0.032953 *
as.factor(BioID)L000560  8.557e-01  3.458e-01   2.474 0.013447 *
as.factor(BioID)L000562  7.709e-01  5.441e-01   1.417 0.156689
as.factor(BioID)L000563  7.791e-01  6.575e-01   1.185 0.236175
as.factor(BioID)L000564  2.077e-01  7.308e-01   0.284 0.776284
as.factor(BioID)L000565  7.697e-01  6.278e-01   1.226 0.220403
as.factor(BioID)L000566  9.726e-02  3.145e-01   0.309 0.757179
as.factor(BioID)L000567  1.922e-01  2.354e-01   0.816 0.414356
as.factor(BioID)L000569  4.303e-02  1.393e-01   0.309 0.757383
as.factor(BioID)L000573  4.851e-01  1.327e+00   0.366 0.714701
as.factor(BioID)L000576  1.513e-01  4.511e-01   0.335 0.737448
as.factor(BioID)L000578  5.650e-02  2.834e-01   0.199 0.841995
as.factor(BioID)L000579  1.158e+00  3.687e-01   3.140 0.001722 **
as.factor(BioID)L000580  8.745e-01  3.868e-01   2.261 0.023897 *
as.factor(BioID)L000581  9.977e-01  8.819e-02  11.312  < 2e-16 ***
as.factor(BioID)L000582  1.030e+00  1.079e-01   9.542  < 2e-16 ***
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as.factor(BioID)L000583  1.826e-01  7.094e-01   0.257 0.796936
as.factor(BioID)L000584  9.442e-02  3.483e-01   0.271 0.786350
as.factor(BioID)L000585  9.957e-02  2.569e-01   0.388 0.698373
as.factor(BioID)L000586  8.679e-01  4.451e-01   1.950 0.051357 .
as.factor(BioID)L000587  1.500e-01  4.141e-01   0.362 0.717277
as.factor(BioID)L000588  8.369e-01  6.734e-01   1.243 0.214168
as.factor(BioID)L000590  9.915e-01  3.473e-01   2.855 0.004361 **
as.factor(BioID)L000591  1.023e+00  3.853e-01   2.654 0.008022 **
as.factor(BioID)L000592  1.323e+00  7.622e-01   1.736 0.082818 .
as.factor(BioID)L000593  1.003e+00  1.680e-01   5.970 2.90e-09 ***
as.factor(BioID)M000087  8.469e-01  3.463e-01   2.446 0.014566 *
as.factor(BioID)M000312  1.041e+00  2.875e-01   3.621 0.000302 ***
as.factor(BioID)M000404  1.021e+00  5.027e-01   2.030 0.042480 *
as.factor(BioID)M000689 -1.534e-01  3.734e-01  -0.411 0.681360
as.factor(BioID)M001137  8.055e-01  4.283e-01   1.881 0.060173 .
as.factor(BioID)M001143  9.124e-01  2.048e-01   4.454 8.97e-06 ***
as.factor(BioID)M001144  1.007e-01  4.990e-01   0.202 0.840020
as.factor(BioID)M001150 -2.143e-01  5.573e-01  -0.384 0.700675
as.factor(BioID)M001151 -1.941e-01  5.854e-01  -0.332 0.740286
as.factor(BioID)M001156  1.741e-02  2.379e-01   0.073 0.941674
as.factor(BioID)M001157 -7.337e-02  1.730e-01  -0.424 0.671610
as.factor(BioID)M001158  9.106e-02  4.442e-01   0.205 0.837607
as.factor(BioID)M001159 -7.593e-02  1.782e-01  -0.426 0.670085
as.factor(BioID)M001160  1.078e+00  3.099e-01   3.477 0.000520 ***
as.factor(BioID)M001163  9.449e-01  1.375e-01   6.873 8.82e-12 ***
as.factor(BioID)M001165  2.708e-02  1.157e-01   0.234 0.814954
as.factor(BioID)M001166  8.236e-01  5.321e-01   1.548 0.121812
as.factor(BioID)M001177  3.288e-01  9.664e-01   0.340 0.733693
as.factor(BioID)M001180 -9.548e-02  3.355e-01  -0.285 0.776011
as.factor(BioID)M001181  1.289e-01  6.649e-01   0.194 0.846283
as.factor(BioID)M001182  5.223e-01  1.393e+00   0.375 0.707682
as.factor(BioID)M001184  5.140e-01  1.333e+00   0.386 0.699758
as.factor(BioID)M001187  2.032e-01  6.244e-01   0.325 0.744926
as.factor(BioID)M001188  1.013e+00  8.622e-02  11.745  < 2e-16 ***
as.factor(BioID)M001189  1.127e-01  4.009e-01   0.281 0.778653
as.factor(BioID)M001191  7.681e-01  7.764e-01   0.989 0.322648
as.factor(BioID)M001193 -9.005e-02  4.750e-01  -0.190 0.849648
as.factor(BioID)M001194  6.539e-02  1.868e-01   0.350 0.726341
as.factor(BioID)M001195  1.942e-01  5.618e-01   0.346 0.729640
as.factor(BioID)M001196  8.579e-01  4.421e-01   1.940 0.052506 .
as.factor(BioID)M001199  1.191e+00  4.621e-01   2.578 0.010033 *
as.factor(BioID)M001200  9.463e-01  1.577e-01   6.001 2.39e-09 ***
as.factor(BioID)M001201  1.312e-01  3.114e-01   0.421 0.673540
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as.factor(BioID)M001202   8.109e-01   6.924e-01    1.171 0.241667
as.factor(BioID)M001203   9.254e-01   3.489e-01    2.652 0.008065 **
as.factor(BioID)M001204   1.803e-01   4.734e-01    0.381 0.703354
as.factor(BioID)M001205   1.292e-01   3.954e-01    0.327 0.743828
as.factor(BioID)M001206   9.700e-01   1.975e-01    4.911 9.95e-07 ***
as.factor(BioID)M001208   1.036e+00   1.970e-01    5.259 1.63e-07 ***
as.factor(BioID)N000002   1.032e+00   2.411e-01    4.278 1.99e-05 ***
as.factor(BioID)N000015   7.434e-01   5.641e-01    1.318 0.187755
as.factor(BioID)N000127   1.089e+00   1.911e-01    5.701 1.40e-08 ***
as.factor(BioID)N000179   9.427e-01   1.449e-01    6.507 1.01e-10 ***
as.factor(BioID)N000181  -2.208e-02   1.024e-01   -0.216 0.829323
as.factor(BioID)N000182   1.962e-01   6.325e-01    0.310 0.756392
as.factor(BioID)N000184   6.324e-02   1.499e-01    0.422 0.673143
as.factor(BioID)N000185   2.889e-02   1.604e-01    0.180 0.857115
as.factor(BioID)N000188   1.104e+00   2.397e-01    4.605 4.44e-06 ***
as.factor(BioID)N000189   4.313e-02   1.911e-01    0.226 0.821487
as.factor(BioID)N000190   5.292e-01   1.566e+00    0.338 0.735449
as.factor(BioID)N000191   1.078e+00   2.019e-01    5.340 1.05e-07 ***
as.factor(BioID)O000168   1.655e-01   4.872e-01    0.340 0.734108
as.factor(BioID)O000170   1.012e+00   2.075e-01    4.878 1.17e-06 ***
as.factor(BioID)O000171   8.708e-01   5.387e-01    1.616 0.106203
as.factor(BioID)O000172   1.369e+00   8.103e-01    1.690 0.091247 .
as.factor(BioID)O000173   1.369e+00   8.094e-01    1.691 0.091000 .
as.factor(BioID)P000034   7.433e-01   5.679e-01    1.309 0.190718
as.factor(BioID)P000096   7.311e-01   6.136e-01    1.191 0.233640
as.factor(BioID)P000197   8.372e-01   3.772e-01    2.220 0.026584 *
as.factor(BioID)P000258   9.125e-02   6.489e-01    0.141 0.888190
as.factor(BioID)P000373  -1.015e-01   3.258e-01   -0.311 0.755460
as.factor(BioID)P000523   6.386e-01   8.249e-01    0.774 0.438907
as.factor(BioID)P000588  -6.549e-02   1.812e-01   -0.361 0.717884
as.factor(BioID)P000591   1.046e-01   5.172e-01    0.202 0.839813
as.factor(BioID)P000592   2.598e-02   3.629e-01    0.072 0.942922
as.factor(BioID)P000593   7.936e-01   5.643e-01    1.406 0.159821
as.factor(BioID)P000594  -8.672e-03   9.049e-02   -0.096 0.923662
as.factor(BioID)P000597   1.082e+00   1.869e-01    5.788 8.46e-09 ***
as.factor(BioID)P000598   1.129e+00   3.244e-01    3.479 0.000516 ***
as.factor(BioID)P000599   1.715e-01   4.801e-01    0.357 0.720897
as.factor(BioID)P000601   2.451e-01   6.319e-01    0.388 0.698120
as.factor(BioID)P000602   2.292e-01   7.200e-01    0.318 0.750235
as.factor(BioID)P000604   1.053e+00   2.561e-01    4.112 4.12e-05 ***
as.factor(BioID)P000605   3.956e-01   1.087e+00    0.364 0.716033
as.factor(BioID)P000606   2.351e-01   6.259e-01    0.376 0.707242
as.factor(BioID)P000607   1.320e+00   7.802e-01    1.691 0.090958 .
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as.factor(BioID)P000608   7.568e-01   7.628e-01    0.992 0.321288
as.factor(BioID)P000609   2.313e-01   7.855e-01    0.294 0.768425
as.factor(BioID)P000611   1.839e-03   1.252e-01    0.015 0.988282
as.factor(BioID)P000613   9.204e-01   3.224e-01    2.855 0.004358 **
as.factor(BioID)P000614   1.005e+00   3.348e-01    3.002 0.002719 **
as.factor(BioID)P000615   1.415e-01   4.068e-01    0.348 0.728005
as.factor(BioID)P000616   9.627e-01   2.906e-01    3.313 0.000944 ***
as.factor(BioID)P000617   1.404e+00   8.885e-01    1.580 0.114273
as.factor(BioID)P000618   9.633e-01   3.858e-01    2.497 0.012613 *
as.factor(BioID)Q000023   9.449e-01   2.296e-01    4.115 4.06e-05 ***
as.factor(BioID)R000053   9.409e-01   2.573e-01    3.657 0.000263 ***
as.factor(BioID)R000395  -3.347e-01   7.677e-01   -0.436 0.662947
as.factor(BioID)R000409   8.774e-02   5.000e-01    0.175 0.860716
as.factor(BioID)R000435   3.245e-01   8.776e-01    0.370 0.711624
as.factor(BioID)R000486   8.595e-01   3.076e-01    2.794 0.005260 **
as.factor(BioID)R000487   1.276e-01   5.929e-01    0.215 0.829644
as.factor(BioID)R000515   8.807e-01   2.659e-01    3.312 0.000944 ***
as.factor(BioID)R000575  -8.584e-03   8.203e-02   -0.105 0.916672
as.factor(BioID)R000576   7.923e-01   5.448e-01    1.454 0.146088
as.factor(BioID)R000577   9.268e-01   1.791e-01    5.176 2.54e-07 ***
as.factor(BioID)R000578   1.057e-01   6.967e-01    0.152 0.879468
as.factor(BioID)R000580   1.495e-01   2.412e-01    0.620 0.535324
as.factor(BioID)R000582  -3.248e-02   1.535e-01   -0.212 0.832429
as.factor(BioID)R000583  -4.602e-02   1.717e-01   -0.268 0.788665
as.factor(BioID)R000585  -5.121e-03   5.154e-01   -0.010 0.992074
as.factor(BioID)R000586  -2.963e-02   1.265e-01   -0.234 0.814831
as.factor(BioID)R000587   2.687e-01   7.152e-01    0.376 0.707195
as.factor(BioID)R000588   1.148e+00   3.732e-01    3.077 0.002124 **
as.factor(BioID)R000591   2.032e-01   4.310e-01    0.472 0.637288
as.factor(BioID)R000592   1.646e-01   5.447e-01    0.302 0.762569
as.factor(BioID)R000593   7.141e-02   2.920e-01    0.245 0.806829
as.factor(BioID)R000597   1.684e-01   5.021e-01    0.335 0.737349
as.factor(BioID)R000598   3.491e-02   1.890e-01    0.185 0.853505
as.factor(BioID)R000599   8.205e-01   5.598e-01    1.466 0.142939
as.factor(BioID)R000601   2.493e-01   8.368e-01    0.298 0.765835
as.factor(BioID)R000602   8.561e-01   4.532e-01    1.889 0.059030 .
as.factor(BioID)R000603   2.059e-01   5.865e-01    0.351 0.725515
as.factor(BioID)R000604   9.574e-02   2.667e-01    0.359 0.719668
as.factor(BioID)R000606   1.182e+00   5.013e-01    2.358 0.018498 *
as.factor(BioID)R000607   1.290e+00   7.178e-01    1.797 0.072465 .
as.factor(BioID)R000609   9.665e-03   8.194e-02    0.118 0.906125
as.factor(BioID)R000610   3.689e-02   1.421e-01    0.260 0.795190
as.factor(BioID)R000612   2.613e-01   8.282e-01    0.316 0.752411
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as.factor(BioID)R000614   6.248e-01  1.700e+00   0.367 0.713330
as.factor(BioID)S000018   2.619e-01  7.904e-01   0.331 0.740446
as.factor(BioID)S000030   7.590e-01  5.981e-01   1.269 0.204644
as.factor(BioID)S000051   9.832e-01  1.268e+00   0.775 0.438390
as.factor(BioID)S000185   7.623e-01  5.091e-01   1.497 0.134452
as.factor(BioID)S000248   9.436e-01  2.005e-01   4.707 2.72e-06 ***
as.factor(BioID)S000250   2.252e-03  3.430e-01   0.007 0.994761
as.factor(BioID)S000344   7.763e-01  5.293e-01   1.467 0.142662
as.factor(BioID)S000364  -1.836e-01  4.327e-01  -0.424 0.671496
as.factor(BioID)S000480   7.722e-01  5.136e-01   1.503 0.132925
as.factor(BioID)S000510   7.415e-01  6.525e-01   1.136 0.255970
as.factor(BioID)S000522   1.430e-01  1.157e+00   0.124 0.901636
as.factor(BioID)S000583  -2.889e-01  6.413e-01  -0.450 0.652472
as.factor(BioID)S001145   1.095e+00  4.605e-01   2.377 0.017559 *
as.factor(BioID)S001148  -1.578e-01  4.401e-01  -0.359 0.719891
as.factor(BioID)S001150   8.230e-01  4.342e-01   1.896 0.058188 .
as.factor(BioID)S001154  -5.872e-02  1.811e-01  -0.324 0.745827
as.factor(BioID)S001156   9.817e-01  1.892e-01   5.188 2.38e-07 ***
as.factor(BioID)S001157   8.184e-01  4.827e-01   1.695 0.090212 .
as.factor(BioID)S001165   8.879e-01  2.504e-01   3.546 0.000402 ***
as.factor(BioID)S001168   9.505e-01  1.428e-01   6.656 3.79e-11 ***
as.factor(BioID)S001170   8.915e-01  3.590e-01   2.483 0.013129 *
as.factor(BioID)S001172   7.761e-02  2.826e-01   0.275 0.783617
as.factor(BioID)S001175   1.052e+00  1.224e-01   8.594  < 2e-16 ***
as.factor(BioID)S001176   7.600e-02  3.513e-01   0.216 0.828744
as.factor(BioID)S001180   7.175e-01  8.323e-01   0.862 0.388738
as.factor(BioID)S001183   1.661e-01  5.071e-01   0.328 0.743238
as.factor(BioID)S001185   1.101e+00  2.211e-01   4.978 7.10e-07 ***
as.factor(BioID)S001187  -4.900e-02  2.630e-01  -0.186 0.852227
as.factor(BioID)S001188   2.593e-01  8.888e-01   0.292 0.770508
as.factor(BioID)S001189   1.983e-01  5.333e-01   0.372 0.710060
as.factor(BioID)S001190   8.203e-01  6.396e-01   1.282 0.199882
as.factor(BioID)S001192   9.098e-02  2.843e-01   0.320 0.749027
as.factor(BioID)S001193   9.321e-01  2.179e-01   4.278 1.99e-05 ***
as.factor(BioID)S001195   2.088e-01  6.045e-01   0.345 0.729854
as.factor(BioID)S001196   7.184e-01  3.146e-01   2.283 0.022527 *
as.factor(BioID)S001199   5.524e-02  1.717e-01   0.322 0.747692
as.factor(BioID)S001200   1.003e+00  1.183e-01   8.485  < 2e-16 ***
as.factor(BioID)S001201   8.395e-01  5.538e-01   1.516 0.129726
as.factor(BioID)S001205   1.059e+00  2.184e-01   4.847 1.37e-06 ***
as.factor(BioID)S001207   9.542e-01  3.902e-01   2.446 0.014558 *
as.factor(BioID)S001208   1.281e+00  6.180e-01   2.073 0.038323 *
as.factor(BioID)S001209   9.625e-01  4.496e-01   2.141 0.032427 *
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as.factor(BioID)S001211   9.973e-01   2.563e-01    3.891 0.000104 ***
as.factor(BioID)S001212   1.484e-02   1.126e-01    0.132 0.895120
as.factor(BioID)S001213   1.945e-02   1.060e-01    0.183 0.854505
as.factor(BioID)S001214   3.680e-01   1.062e+00    0.346 0.729038
as.factor(BioID)S001215   1.103e+00   2.408e-01    4.580 5.00e-06 ***
as.factor(BioID)S001216   1.108e+00   3.080e-01    3.598 0.000330 ***
as.factor(BioID)T000193   1.015e+00   2.359e-01    4.303 1.79e-05 ***
as.factor(BioID)T000238   6.720e-03   2.370e-01    0.028 0.977381
as.factor(BioID)T000460   8.059e-01   4.396e-01    1.833 0.066947 .
as.factor(BioID)T000462  -1.849e-01   4.635e-01   -0.399 0.689960
as.factor(BioID)T000463  -1.730e-01   5.057e-01   -0.342 0.732359
as.factor(BioID)T000465   9.603e-01   1.246e-01    7.705 2.22e-14 ***
as.factor(BioID)T000467  -3.260e-05   1.548e-01    0.000 0.999832
as.factor(BioID)T000468   9.113e-01   3.253e-01    2.801 0.005153 **
as.factor(BioID)T000469   1.033e+00   8.182e-02   12.619  < 2e-16 ***
as.factor(BioID)T000470  -4.075e-02   1.249e-01   -0.326 0.744237
as.factor(BioID)T000472   1.126e+00   3.136e-01    3.591 0.000339 ***
as.factor(BioID)T000474   9.274e-01   2.088e-01    4.441 9.52e-06 ***
as.factor(BioID)T000475   4.289e-02   1.308e-01    0.328 0.742966
as.factor(BioID)T000477   1.719e-02   1.277e-01    0.135 0.892870
as.factor(BioID)T000478   2.782e-02   1.345e-01    0.207 0.836203
as.factor(BioID)T000479   2.480e-01   6.912e-01    0.359 0.719806
as.factor(BioID)T000480   2.206e-01   6.745e-01    0.327 0.743733
as.factor(BioID)T000481   1.364e+00   7.993e-01    1.706 0.088167 .
as.factor(BioID)T000482   1.082e+00   2.105e-01    5.140 3.08e-07 ***
as.factor(BioID)U000031   2.621e-01   5.720e-01    0.458 0.646896
as.factor(BioID)U000040   1.359e+00   9.221e-01    1.474 0.140607
as.factor(BioID)V000081   1.019e+00   2.910e-01    3.501 0.000476 ***
as.factor(BioID)V000108   7.809e-01   4.887e-01    1.598 0.110261
as.factor(BioID)V000130   9.488e-01   1.366e-01    6.946 5.35e-12 ***
as.factor(BioID)V000131   9.296e-01   2.120e-01    4.384 1.24e-05 ***
as.factor(BioID)V000132   8.844e-01   1.986e-01    4.452 9.05e-06 ***
as.factor(BioID)V000133   1.080e+00   4.980e-01    2.168 0.030300 *
as.factor(BioID)W000187   9.546e-01   4.618e-01    2.067 0.038865 *
as.factor(BioID)W000413  -2.297e-01   6.421e-01   -0.358 0.720577
as.factor(BioID)W000791  -2.738e-01   6.549e-01   -0.418 0.675965
as.factor(BioID)W000795  -1.421e-02   2.309e-01   -0.062 0.950938
as.factor(BioID)W000796   1.877e-01   6.809e-01    0.276 0.782816
as.factor(BioID)W000797   8.929e-01   2.345e-01    3.808 0.000145 ***
as.factor(BioID)W000798   3.855e-02   2.087e-01    0.185 0.853486
as.factor(BioID)W000799   8.298e-01   5.268e-01    1.575 0.115403
as.factor(BioID)W000804  -9.639e-02   2.183e-01   -0.442 0.658897
as.factor(BioID)W000806   5.658e-02   2.680e-01    0.211 0.832794
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as.factor(BioID)W000808   9.725e-01  1.340e-01   7.256 6.08e-13 ***
as.factor(BioID)W000809   1.695e-01  3.656e-01   0.464 0.643025
as.factor(BioID)W000810   1.568e-01  5.293e-01   0.296 0.767014
as.factor(BioID)W000812   5.986e-02  1.330e-01   0.450 0.652834
as.factor(BioID)W000813   1.145e-01  2.606e-01   0.440 0.660260
as.factor(BioID)W000814   2.171e-01  8.293e-01   0.262 0.793487
as.factor(BioID)W000815   1.698e-01  4.652e-01   0.365 0.715101
as.factor(BioID)W000816   1.216e-01  4.737e-01   0.257 0.797443
as.factor(BioID)W000820   5.954e-02  1.561e-01   0.381 0.703027
as.factor(BioID)W000821   2.232e-01  6.047e-01   0.369 0.712103
as.factor(BioID)W000822   1.216e+00  6.620e-01   1.837 0.066431 .
as.factor(BioID)W000823   5.686e-01  2.024e-01   2.810 0.005018 **
as.factor(BioID)W000825   1.105e+00  2.552e-01   4.328 1.59e-05 ***
as.factor(BioID)W000826   9.965e-01  2.918e-01   3.415 0.000653 ***
as.factor(BioID)Y000033  -4.375e-01  1.032e+00  -0.424 0.671775
as.factor(BioID)Y000062   9.800e-01  9.871e-02   9.928  < 2e-16 ***
as.factor(BioID)Y000063   6.159e-02  3.189e-01   0.193 0.846904
as.factor(BioID)Y000065   3.715e-01  1.070e+00   0.347 0.728585
as.factor(BioID)Y000066          NA         NA      NA       NA
as.factor(BioID)Z000017          NA         NA      NA       NA
seniority                 2.074e-02  4.457e-02   0.465 0.641758
anti_env_dummy           -7.019e-05  1.146e-02  -0.006 0.995115
pro_env_dummy            -4.784e-03  7.117e-03  -0.672 0.501544
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.1093 on 1679 degrees of freedom
  (97 observations deleted due to missingness)
Multiple R-squared:  0.9638,    Adjusted R-squared:  0.9523
F-statistic: 83.32 on 537 and 1679 DF,  p-value: < 2.2e-16
```

Using actual contributions instead of pro_env and anti_env dummy makes the coefficients more significant!

The difference between the ols before and this ols is the individual fixed effects instead of state effects. so we are fixing for individiuals so we dont include person specific changes in the analysis and for the same person can see how their voting changes.

this is very useful since this way we account for changes that previously we could not account for, since they are either immesurable or just endogenous in this analysis that change the amount of contributions representatives receive, such as:

- difference in eloquence between representatives
- difference in connections to special interest groups

- difference in the amount of time spent on the campaign trail
- difference in the amount of time spent in office
- professional history with contributions (i.e. previous profession, previous income, etc. before history in office)
- high explanation of the model (multiple R^2 = 0.96)

Downsides of this model are however that the model is incredibly strict, so:

- cannot include 2 FEs that are strict, i.e. state (50 states) and individuals (about 570 individuals)
- cannot include time fixed effects, since the model is already too strict
- not much significance

Interpretation:

We are fixing for individuals to determine whether changes in contributions can be associated with changes in voting behavior for each representative. Only few representatives are significant, i.e. V000133, S000051, P00025, G000578... out of these 4 representatives with significant coefficients, two changed their voting behavior once.

- Marshall (Mark) Sanfordfrom anti -> pro environment (which means that when you hold constant for this reperesentative, then a change in from anti to pro env means 0.49 units more likely to change their vote?)
- Mark Gaetz from anti to pro envrionmental vote. (for Gaetz, this is 0.2880450 units more likely to change their vote from anti to pro environmental vote)

LPM per Vote

This LPM is more specific since it only includes the each seperate vote, but all contributions of the votes leading up to it. E.g. In ols_4_2 I include not only the vote 4, but also the contributions of the vote 3 which is on the same topic. this way it is easier to analyse whether the contributions from the previous relevant votes have an effect on the voting behavior of the representatives. -> **remove recency bias** attached to the 6mo prior vote

Does this change the coefficients? Since in the previous model we were fixing for instances, this shouldnt change anything, we could not see how the coefficients change over time. Why use this format - if we could fix year in model before ?

We do this because we want to see how prior contributions in similar votes could affect the voting. ### vote and all contributions leading up to the vote with state FEs

can fix for states here, but not for instances, since this is already just that, and not for year and individuals, since these are all the same too.

```
# Vote 4_2
view(df_vote_4_2)
ols_4_2 <- plm(Vote4_minus ~ Contribution_3_minus + Contribution_3_plus + Contribution_4_minu
```

Warning in pdata.frame(data, index): duplicate couples (id-time) in resulting pdata.frame
 to find out which, use, e.g., table(index(your_pdataframe), useNA = "ifany")

```
summary(ols_4_2)
```

Oneway (individual) effect Within Model

Call:
plm(formula = Vote4_minus ~ Contribution_3_minus + Contribution_3_plus +
    Contribution_4_minus + Contribution_4_plus + seniority_114 +
    nominate_dim1 + nominate_dim2 + gender + pro_env_dummy +
    anti_env_dummy, data = df_vote_4_2, model = "within", index = c("state",
    "party"))

Unbalanced Panel: n = 46, T = 1-45, N = 332

Residuals:
    Min. 1st Qu.   Median 3rd Qu.   Max.
-0.79396 -0.21720 0.00000 0.21463 1.06153

Coefficients:
                        Estimate Std. Error t-value Pr(>|t|)
Contribution_3_minus 4.3495e-06 1.2592e-06 3.4543 0.0006384 ***
Contribution_3_plus -1.5177e-05 1.0816e-05 -1.4033 0.1616474
Contribution_4_minus 2.8648e-06 1.0955e-06 2.6150 0.0094128 **
Contribution_4_plus   2.7911e-06 1.2965e-05 0.2153 0.8297018
seniority_114   -1.8833e-02 5.5709e-03 -3.3806 0.0008277 ***
nominate_dim1   1.0195e+00 1.7938e-01 5.6832 3.356e-08 ***
nominate_dim2   1.1693e-01 1.4339e-01 0.8155 0.4154812
genderM   2.1898e-01 5.7297e-02 3.8218 0.0001638 ***
pro_env_dummy   1.1338e-02 6.2500e-02 0.1814 0.8561815
anti_env_dummy   3.1421e-02 8.2448e-02 0.3811 0.7034204

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Total Sum of Squares: 57.118
Residual Sum of Squares: 38.594
```

```
R-Squared:       0.32431
Adj. R-Squared: 0.18966
F-statistic: 13.2471 on 10 and 276 DF, p-value: < 2.22e-16
```

```
# Vote 51_2
ols_51_2 <- plm(Vote51_minus ~ Contribution_3_minus + Contribution_3_plus + Contribution_4_m
summary(ols_51_2)
```

```
Oneway (individual) effect Within Model

Call:
plm(formula = Vote51_minus ~ Contribution_3_minus + Contribution_3_plus +
    Contribution_4_minus + Contribution_4_plus + Contribution_51_minus +
    Contribution_51_plus + seniority_1151 + party + nominate_dim1 +
    nominate_dim2 + gender + pro_env_dummy + anti_env_dummy,
    data = df_vote_51_2, model = "within", index = c("state"))

Unbalanced Panel: n = 45, T = 1-39, N = 281

Residuals:
     Min.   1st Qu.    Median   3rd Qu.      Max.
-0.848277 -0.026441  0.000000  0.030687  0.808670

Coefficients:
                        Estimate  Std. Error t-value  Pr(>|t|)
Contribution_3_minus   9.2140e-07  5.9396e-07  1.5513  0.122250
Contribution_3_plus   -8.1021e-06  5.0527e-06 -1.6035  0.110234
Contribution_4_minus  -1.1362e-07  5.4758e-07 -0.2075  0.835809
Contribution_4_plus   -1.2166e-05  4.5386e-06 -2.6806  0.007898 **
Contribution_51_minus  3.8857e-07  4.4354e-07  0.8761  0.381926
Contribution_51_plus  -9.3277e-07  3.4160e-06 -0.2731  0.785062
seniority_1151         1.0673e-03  2.2859e-03  0.4669  0.641023
partyR                 9.4772e-01  2.4208e-02 39.1493 < 2.2e-16 ***
nominate_dim1         -4.4587e-02  7.9063e-02 -0.5639  0.573361
nominate_dim2          9.4747e-02  5.7819e-02  1.6387  0.102692
genderM                3.2406e-03  2.3106e-02  0.1402  0.888592
pro_env_dummy          2.6298e-02  2.2236e-02  1.1827  0.238197
anti_env_dummy         4.1973e-02  3.1590e-02  1.3286  0.185321
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Total Sum of Squares:    50.56
```

```
Residual Sum of Squares: 3.9051
R-Squared:      0.92276
Adj. R-Squared: 0.90302
F-statistic: 204.936 on 13 and 223 DF, p-value: < 2.22e-16
```

```
# Vote 52_2
ols_52_2 <- plm(Vote52_minus ~ Contribution_3_minus + Contribution_3_plus + Contribution_4_m
summary(ols_52_2)
```

```
Oneway (individual) effect Within Model

Call:
plm(formula = Vote52_minus ~ Contribution_3_minus + Contribution_3_plus +
    Contribution_4_minus + Contribution_4_plus + Contribution_51_minus +
    Contribution_51_plus + Contribution_52_minus + Contribution_52_plus +
    seniority_1152 + party + nominate_dim1 + nominate_dim2 +
    gender + pro_env_dummy + anti_env_dummy, data = df_vote_52_2,
    model = "within", index = c("state"))

Unbalanced Panel: n = 45, T = 1-34, N = 268

Residuals:
      Min.     1st Qu.      Median     3rd Qu.        Max.
-0.89843798 -0.03361441  0.00096878  0.04373188  0.84351121

Coefficients:
                         Estimate  Std. Error t-value  Pr(>|t|)
Contribution_3_minus  -2.4067e-07  8.3605e-07 -0.2879   0.77373
Contribution_3_plus   -4.3165e-06  6.4806e-06 -0.6661   0.50611
Contribution_4_minus  -1.0036e-07  7.3751e-07 -0.1361   0.89189
Contribution_4_plus    6.6762e-06  5.9969e-06  1.1133   0.26687
Contribution_51_minus  4.0724e-06  1.7775e-06  2.2910   0.02296 *
Contribution_51_plus   8.5020e-06  5.0695e-06  1.6771   0.09502 .
Contribution_52_minus -2.7300e-06  1.4941e-06 -1.8272   0.06910 .
Contribution_52_plus  -1.4157e-05  3.0291e-06 -4.6736 5.314e-06 ***
seniority_1152        -2.1121e-03  2.8913e-03 -0.7305   0.46592
partyR                 8.8526e-01  3.0613e-02 28.9177 < 2.2e-16 ***
nominate_dim1          3.9892e-02  1.0256e-01  0.3889   0.69771
nominate_dim2          3.9675e-02  7.7107e-02  0.5145   0.60741
genderM                4.1150e-02  2.8994e-02  1.4193   0.15731
pro_env_dummy          1.7033e-02  2.7304e-02  0.6238   0.53342
anti_env_dummy         5.0035e-02  4.3327e-02  1.1548   0.24949
```

```
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Total Sum of Squares:     46.843
Residual Sum of Squares: 5.6483
R-Squared:       0.87942
Adj. R-Squared: 0.84522
F-statistic: 101.134 on 15 and 208 DF, p-value: < 2.22e-16
```

```
# Vote 6_2
ols_6_2 <- plm(Vote6_minus ~ Contribution_3_minus + Contribution_3_plus + Contribution_4_minu
summary(ols_6_2)
```

```
Oneway (individual) effect Within Model

Call:
plm(formula = Vote6_minus ~ Contribution_3_minus + Contribution_3_plus +
    Contribution_4_minus + Contribution_4_plus + Contribution_51_minus +
    Contribution_51_plus + Contribution_52_minus + Contribution_52_plus +
    Contribution_6_minus + Contribution_6_plus + seniority_116 +
    party + nominate_dim1 + nominate_dim2 + gender + pro_env_dummy +
    anti_env_dummy, data = df_vote_6_2, model = "within", index = c("state"))

Unbalanced Panel: n = 42, T = 1-34, N = 224

Residuals:
      Min.    1st Qu.     Median    3rd Qu.       Max.
-0.4727858 -0.0214771 -0.0027863  0.0124646  0.9372705

Coefficients:
                        Estimate  Std. Error t-value  Pr(>|t|)
Contribution_3_minus  -2.0502e-06  5.7393e-07 -3.5722 0.0004642 ***
Contribution_3_plus   -2.5997e-06  4.3407e-06 -0.5989 0.5500497
Contribution_4_minus   3.7107e-09  4.7783e-07  0.0078 0.9938133
Contribution_4_plus    6.1685e-06  3.7126e-06  1.6615 0.0985140 .
Contribution_51_minus  3.6897e-06  1.2149e-06  3.0370 0.0027778 **
Contribution_51_plus  -3.8942e-07  5.2048e-06 -0.0748 0.9404492
Contribution_52_minus -1.7538e-06  1.0518e-06 -1.6674 0.0973291 .
Contribution_52_plus  -1.4213e-06  4.8284e-06 -0.2944 0.7688473
Contribution_6_minus   1.2000e-08  4.5678e-07  0.0263 0.9790728
Contribution_6_plus   -2.2133e-06  9.8655e-06 -0.2244 0.8227606
seniority_116         -2.1524e-03  1.8804e-03 -1.1446 0.2540154
```

```
partyR                        9.7702e-01  2.0573e-02 47.4904 < 2.2e-16 ***
nominate_dim1                -3.7533e-02  6.6732e-02 -0.5625 0.5745727
nominate_dim2                 7.0570e-02  5.0176e-02  1.4064 0.1614755
genderM                       2.3008e-02  1.8072e-02  1.2731 0.2047665
pro_env_dummy                 5.5802e-03  2.9821e-02  0.1871 0.8517931
anti_env_dummy                1.2590e-02  2.6285e-02  0.4790 0.6325723
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1


Total Sum of Squares:     38.836
Residual Sum of Squares: 1.4101
R-Squared:       0.96369
Adj. R-Squared: 0.95093
F-statistic: 257.614 on 17 and 165 DF, p-value: < 2.22e-16
```

```
# Vote 7_2
view(df_vote_7_2)
ols_7_2 <- plm(Vote7_minus ~ Contribution_3_minus + Contribution_3_plus + Contribution_4_min
summary(ols_7_2)
```

```
Oneway (individual) effect Within Model

Call:
plm(formula = Vote7_minus ~ Contribution_3_minus + Contribution_3_plus +
    Contribution_4_minus + Contribution_4_plus + Contribution_51_minus +
    Contribution_51_plus + Contribution_52_minus + Contribution_52_plus +
    Contribution_6_minus + Contribution_6_plus + Contribution_7_minus +
    Contribution_7_plus + seniority_117 + party + gender + pro_env_dummy +
    anti_env_dummy + nominate_dim1 + nominate_dim2, data = df_vote_7_2,
    model = "within", index = c("state"))

Unbalanced Panel: n = 38, T = 1-30, N = 179

Residuals:
      Min.     1st Qu.      Median      3rd Qu.        Max.
-4.3224e-01 -2.5864e-02 -2.4144e-15   2.6120e-02  2.6912e-01

Coefficients:
                       Estimate  Std. Error t-value  Pr(>|t|)
Contribution_3_minus -1.9145e-06 5.9773e-07 -3.2030  0.001735 **
Contribution_3_plus  -2.4562e-06 4.2255e-06 -0.5813  0.562121
Contribution_4_minus -2.4510e-06 5.5125e-07 -4.4463 1.939e-05 ***
```

```
Contribution_4_plus      -1.7205e-05  3.5986e-06 -4.7811 4.921e-06 ***
Contribution_51_minus     5.8359e-06  1.1615e-06  5.0244 1.749e-06 ***
Contribution_51_plus     -1.5560e-06  5.0671e-06 -0.3071  0.759302
Contribution_52_minus    -2.2717e-06  1.0841e-06 -2.0954  0.038201 *
Contribution_52_plus      2.7410e-06  4.2222e-06  0.6492  0.517443
Contribution_6_minus      1.3637e-06  5.4545e-07  2.5001  0.013743 *
Contribution_6_plus      -9.6421e-06  7.2868e-06 -1.3232  0.188235
Contribution_7_minus     -5.6068e-07  4.9777e-07 -1.1264  0.262216
Contribution_7_plus       9.9513e-06  8.0779e-06  1.2319  0.220349
seniority_117             3.4662e-04  1.7875e-03  0.1939  0.846565
partyR                    9.5806e-01  2.0127e-02 47.6016 < 2.2e-16 ***
genderM                   5.0855e-03  1.6847e-02  0.3019  0.763267
pro_env_dummy            -9.6070e-03  2.8221e-02 -0.3404  0.734126
anti_env_dummy            1.3249e-02  2.1717e-02  0.6101  0.542951
nominate_dim1             7.6090e-02  6.5826e-02  1.1559  0.249972
nominate_dim2             8.4126e-02  4.7185e-02  1.7829  0.077088 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1


Total Sum of Squares:    26.033
Residual Sum of Squares: 0.68962
R-Squared:      0.97351
Adj. R-Squared: 0.96135
F-statistic: 235.968 on 19 and 122 DF, p-value: < 2.22e-16
```

Why dont the anti_env_dummy coefficients show up? Are they singularities?

LPM with consistent Representatives

with control variables

```
df_long_no_change <- df_long %>%
    filter(Vote_change == 0) %>%
    select(-Vote_change)

ols_no_change <- lm(Vote ~ . - state - BioID, data = df_long_no_change)
summary(ols_no_change)
```

```
Call:
lm(formula = Vote ~ . - state - BioID, data = df_long_no_change)

Residuals:
     Min       1Q   Median       3Q      Max
-0.97173 -0.01672 -0.00456  0.00837  0.96082

Coefficients:
                    Estimate Std. Error  t value Pr(>|t|)
(Intercept)        1.373e+00  4.488e-01    3.060 0.002244 **
district           1.056e-03  2.204e-04    4.791 1.80e-06 ***
partyR            -9.684e-01  5.293e-03 -182.978  < 2e-16 ***
birthday          -1.799e-04  2.285e-04   -0.787 0.431120
genderM            1.008e-03  5.298e-03    0.190 0.849178
nominate_dim1     -7.613e-02  1.676e-02   -4.542 5.94e-06 ***
nominate_dim2     -3.746e-02  1.251e-02   -2.995 0.002783 **
GeographicalNE     3.872e-02  6.527e-03    5.932 3.57e-09 ***
GeographicalSO     1.341e-02  5.381e-03    2.492 0.012790 *
GeographicalWE     6.452e-03  6.438e-03    1.002 0.316359
Instance           1.112e-04  1.030e-04    1.079 0.280516
seniority         -2.143e-03  6.046e-04   -3.545 0.000403 ***
Contribution_minus -8.040e-08  8.633e-08   -0.931 0.351790
Contribution_plus  1.334e-06  9.545e-07    1.398 0.162324
Dmajority          1.133e-02  5.001e-03    2.266 0.023577 *
anti_env_dummy    -1.096e-02  7.555e-03   -1.451 0.146880
pro_env_dummy      4.386e-03  5.389e-03    0.814 0.415847
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.08503 on 1796 degrees of freedom
  (401 observations deleted due to missingness)
Multiple R-squared:  0.9713,    Adjusted R-squared:  0.971
F-statistic:  3798 on 16 and 1796 DF,  p-value: < 2.2e-16
```

party & year FE

```
ols_party_no_change <- lm(Vote ~ district + birthday + nominate_dim1 + nominate_dim2 + Geogra
summary(ols_party_no_change)
```

```
Call:
lm(formula = Vote ~ district + birthday + nominate_dim1 + nominate_dim2 +
    Geographical + as.factor(party) + as.factor(Instance) + seniority +
    Contribution_minus + Contribution_plus + gender + pro_env_dummy +
    anti_env_dummy, data = df_long)

Residuals:
     Min       1Q   Median       3Q      Max
-0.98664 -0.04059 -0.01140  0.02301  1.00436

Coefficients:
                        Estimate Std. Error  t value Pr(>|t|)
(Intercept)           -4.263e-01  7.842e-01   -0.544  0.58680
district               7.851e-04  3.719e-04    2.111  0.03489 *
birthday               7.414e-04  3.994e-04    1.856  0.06355 .
nominate_dim1         -1.412e-01  2.852e-02   -4.950 8.10e-07 ***
nominate_dim2         -6.979e-02  2.135e-02   -3.269  0.00110 **
GeographicalNE         7.292e-02  1.123e-02    6.490 1.09e-10 ***
GeographicalSO         8.676e-03  9.407e-03    0.922  0.35645
GeographicalWE         1.943e-02  1.124e-02    1.729  0.08400 .
as.factor(party)R     -9.011e-01  8.864e-03 -101.662  < 2e-16 ***
as.factor(Instance)4   1.007e-02  1.206e-02    0.835  0.40400
as.factor(Instance)6   3.505e-02  1.237e-02    2.833  0.00465 **
as.factor(Instance)7   2.546e-02  1.309e-02    1.945  0.05196 .
as.factor(Instance)51  2.387e-02  1.223e-02    1.952  0.05107 .
as.factor(Instance)52  3.305e-02  1.232e-02    2.683  0.00737 **
seniority              1.643e-03  1.042e-03    1.578  0.11484
Contribution_minus    -6.107e-07  1.479e-07   -4.130 3.79e-05 ***
Contribution_plus      7.200e-06  1.402e-06    5.137 3.08e-07 ***
genderM               -2.513e-02  9.246e-03   -2.718  0.00663 **
pro_env_dummy         -6.747e-03  9.173e-03   -0.736  0.46206
anti_env_dummy        -2.101e-02  1.318e-02   -1.594  0.11119
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.1516 on 1881 degrees of freedom
  (413 observations deleted due to missingness)
Multiple R-squared:  0.9088,    Adjusted R-squared:  0.9079
F-statistic: 986.8 on 19 and 1881 DF,  p-value: < 2.2e-16
```

with state & year FE

```
ols_no_change_state_fe <- lm(Vote ~ as.factor(Geographical) + as.factor(Instance) + district
summary(ols_no_change_state_fe)
```

```
Call:
lm(formula = Vote ~ as.factor(Geographical) + as.factor(Instance) +
    district + party + birthday + nominate_dim1 + nominate_dim2 +
    seniority + Contribution_minus + Contribution_plus + gender +
    pro_env_dummy + anti_env_dummy, data = df_long_no_change)

Residuals:
     Min       1Q   Median       3Q      Max
-0.96882 -0.01703 -0.00472  0.00885  0.95921

Coefficients:
                            Estimate Std. Error  t value Pr(>|t|)
(Intercept)                1.374e+00  4.499e-01    3.053 0.002301 **
as.factor(Geographical)NE  3.864e-02  6.530e-03    5.918 3.91e-09 ***
as.factor(Geographical)SO  1.333e-02  5.383e-03    2.477 0.013352 *
as.factor(Geographical)WE  6.489e-03  6.440e-03    1.008 0.313821
as.factor(Instance)4       5.668e-03  6.954e-03    0.815 0.415118
as.factor(Instance)6       1.619e-02  7.084e-03    2.286 0.022398 *
as.factor(Instance)7       1.267e-02  7.499e-03    1.690 0.091241 .
as.factor(Instance)51      5.138e-03  7.049e-03    0.729 0.466117
as.factor(Instance)52      1.146e-02  7.086e-03    1.617 0.106064
district                   1.055e-03  2.205e-04    4.784 1.86e-06 ***
partyR                    -9.685e-01  5.298e-03 -182.794  < 2e-16 ***
birthday                  -1.812e-04  2.292e-04   -0.791 0.429233
nominate_dim1             -7.634e-02  1.677e-02   -4.553 5.65e-06 ***
nominate_dim2             -3.739e-02  1.251e-02   -2.988 0.002849 **
seniority                 -2.140e-03  6.070e-04   -3.526 0.000433 ***
Contribution_minus        -8.368e-08  8.647e-08   -0.968 0.333321
Contribution_plus          1.341e-06  9.551e-07    1.405 0.160324
genderM                    1.039e-03  5.301e-03    0.196 0.844713
pro_env_dummy              4.250e-03  5.392e-03    0.788 0.430654
anti_env_dummy            -1.093e-02  7.562e-03   -1.445 0.148700
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Residual standard error: 0.08506 on 1793 degrees of freedom
  (401 observations deleted due to missingness)
Multiple R-squared:  0.9713,     Adjusted R-squared:  0.971
F-statistic:  3196 on 19 and 1793 DF,  p-value: < 2.2e-16
```

Here, using geographical regions instead of state fixed effects creates more significant results. Also, need to remove Majority because too specific?

with individual FEs

```
ols_no_change_ind_fe <- lm(Vote ~ nominate_dim1 + nominate_dim2 + as.factor(Instance) + as.fa
summary(ols_no_change_ind_fe)
```

```
Call:
lm(formula = Vote ~ nominate_dim1 + nominate_dim2 + as.factor(Instance) +
    as.factor(BioID) + seniority + Contribution_minus + Contribution_plus +
    Dmajority, data = df_long_no_change)

Residuals:
     Min        1Q    Median        3Q       Max
-0.24950 -0.00040   0.00022   0.00089   0.74727

Coefficients: (3 not defined because of singularities)
                          Estimate Std. Error t value Pr(>|t|)
(Intercept)              -9.196e-03  2.606e-01  -0.035  0.97185
nominate_dim1             3.157e-02  5.884e-01   0.054  0.95723
nominate_dim2            -3.517e-02  2.213e-01  -0.159  0.87377
as.factor(Instance)4     -1.234e-03  8.880e-03  -0.139  0.88946
as.factor(Instance)6     -7.955e-04  2.632e-02  -0.030  0.97589
as.factor(Instance)7     -4.133e-03  3.504e-02  -0.118  0.90612
as.factor(Instance)51    -2.307e-03  1.757e-02  -0.131  0.89558
as.factor(Instance)52    -1.512e-03  1.758e-02  -0.086  0.93146
as.factor(BioID)A000367   1.128e-02  2.552e-01   0.044  0.96475
as.factor(BioID)A000369   1.410e-04  1.605e-02   0.009  0.99299
as.factor(BioID)A000370   9.924e-01  2.413e-02  41.121  < 2e-16 ***
as.factor(BioID)A000371   1.003e+00  5.532e-02  18.132  < 2e-16 ***
as.factor(BioID)A000372  -3.674e-03  1.994e-01  -0.018  0.98530
as.factor(BioID)A000374  -8.806e-05  1.056e-01  -0.001  0.99933
as.factor(BioID)A000375  -1.043e-02  1.255e-01  -0.083  0.93380
```

```
as.factor(BioID)A000376  1.021e+00  1.608e-01   6.351 2.77e-10 ***
as.factor(BioID)A000377 -8.506e-04  4.063e-02  -0.021  0.98330
as.factor(BioID)A000378  1.021e+00  7.334e-02  13.918  < 2e-16 ***
as.factor(BioID)B000213 -2.476e-02  9.607e-02  -0.258  0.79662
as.factor(BioID)B000287  9.880e-01  4.587e-02  21.538  < 2e-16 ***
as.factor(BioID)B000574  1.005e+00  4.228e-02  23.764  < 2e-16 ***
as.factor(BioID)B000755 -1.149e-02  4.496e-02  -0.256  0.79824
as.factor(BioID)B000911  9.873e-01  7.280e-02  13.562  < 2e-16 ***
as.factor(BioID)B001227  9.891e-01  3.747e-02  26.394  < 2e-16 ***
as.factor(BioID)B001248 -1.142e-02  7.080e-02  -0.161  0.87184
as.factor(BioID)B001250 -1.260e-02  5.013e-02  -0.251  0.80158
as.factor(BioID)B001251  9.937e-01  3.932e-02  25.270  < 2e-16 ***
as.factor(BioID)B001255  1.347e-03  1.902e-02   0.071  0.94356
as.factor(BioID)B001257 -9.291e-03  5.165e-02  -0.180  0.85725
as.factor(BioID)B001260 -5.162e-03  6.265e-02  -0.082  0.93435
as.factor(BioID)B001269  1.135e-02  5.229e-02   0.217  0.82815
as.factor(BioID)B001270  9.905e-01  8.885e-02  11.148  < 2e-16 ***
as.factor(BioID)B001271 -3.709e-03  4.505e-02  -0.082  0.93440
as.factor(BioID)B001273 -4.119e-03  1.073e-01  -0.038  0.96939
as.factor(BioID)B001274 -4.716e-04  1.855e-01  -0.003  0.99797
as.factor(BioID)B001275  6.575e-03  3.273e-02   0.201  0.84081
as.factor(BioID)B001278  1.007e+00  4.499e-02  22.387  < 2e-16 ***
as.factor(BioID)B001281  9.944e-01  1.802e-02  55.186  < 2e-16 ***
as.factor(BioID)B001282  2.793e-03  7.298e-02   0.038  0.96948
as.factor(BioID)B001283 -8.412e-03  1.667e-01  -0.050  0.95977
as.factor(BioID)B001284  4.242e-03  2.733e-02   0.155  0.87667
as.factor(BioID)B001285  9.994e-01  8.662e-02  11.538  < 2e-16 ***
as.factor(BioID)B001286  1.002e+00  1.180e-01   8.487  < 2e-16 ***
as.factor(BioID)B001287  1.000e+00  1.246e-01   8.029 1.89e-15 ***
as.factor(BioID)B001289 -3.304e-03  1.367e-01  -0.024  0.98072
as.factor(BioID)B001290 -7.111e-03  2.787e-01  -0.026  0.97965
as.factor(BioID)B001291 -1.177e-02  1.715e-01  -0.069  0.94526
as.factor(BioID)B001292  9.996e-01  2.129e-02  46.953  < 2e-16 ***
as.factor(BioID)B001293 -1.148e-03  2.601e-02  -0.044  0.96479
as.factor(BioID)B001294  1.075e-02  1.451e-01   0.074  0.94094
as.factor(BioID)B001295 -2.045e-03  3.294e-02  -0.062  0.95051
as.factor(BioID)B001296  1.000e+00  1.475e-02  67.834  < 2e-16 ***
as.factor(BioID)B001297  3.017e-03  2.057e-01   0.015  0.98830
as.factor(BioID)B001298  6.365e-03  5.726e-02   0.111  0.91150
as.factor(BioID)B001299 -9.477e-03  1.401e-01  -0.068  0.94609
as.factor(BioID)B001300  9.967e-01  6.406e-02  15.559  < 2e-16 ***
as.factor(BioID)B001301 -1.910e-03  2.177e-02  -0.088  0.93010
as.factor(BioID)B001302  2.710e-03  3.376e-01   0.008  0.99359
```

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as.factor(BioID)B001303    1.004e+00   2.979e-02   33.694  < 2e-16 ***
as.factor(BioID)B001304    1.001e+00   4.274e-02   23.421  < 2e-16 ***
as.factor(BioID)B001306    1.521e-03   5.800e-02    0.026  0.97908
as.factor(BioID)B001307    1.689e-02   1.483e-01    0.114  0.90935
as.factor(BioID)B001309    2.169e-03   2.165e-01    0.010  0.99201
as.factor(BioID)C000059   -8.320e-03   9.630e-02   -0.086  0.93117
as.factor(BioID)C000266   -1.643e-02   5.370e-02   -0.306  0.75966
as.factor(BioID)C000537    9.873e-01   4.751e-02   20.784  < 2e-16 ***
as.factor(BioID)C000714    9.871e-01   1.273e-01    7.752 1.60e-14 ***
as.factor(BioID)C000754    9.904e-01   2.336e-01    4.239 2.37e-05 ***
as.factor(BioID)C000984    9.859e-01   6.763e-02   14.578  < 2e-16 ***
as.factor(BioID)C001036    9.925e-01   6.387e-02   15.539  < 2e-16 ***
as.factor(BioID)C001037    9.830e-01   6.593e-02   14.910  < 2e-16 ***
as.factor(BioID)C001038    9.879e-01   7.785e-02   12.689  < 2e-16 ***
as.factor(BioID)C001045    9.011e-04   5.503e-02    0.016  0.98694
as.factor(BioID)C001048   -2.896e-03   5.483e-02   -0.053  0.95788
as.factor(BioID)C001051    4.585e-03   8.929e-02    0.051  0.95905
as.factor(BioID)C001053    4.259e-03   4.183e-02    0.102  0.91893
as.factor(BioID)C001055    1.002e+00   1.372e-01    7.303 4.42e-13 ***
as.factor(BioID)C001061    9.876e-01   4.946e-02   19.969  < 2e-16 ***
as.factor(BioID)C001066    9.909e-01   3.614e-02   27.418  < 2e-16 ***
as.factor(BioID)C001067    9.921e-01   1.150e-01    8.628  < 2e-16 ***
as.factor(BioID)C001068    1.002e+00   1.335e-02   75.017  < 2e-16 ***
as.factor(BioID)C001069    9.930e-01   8.817e-02   11.262  < 2e-16 ***
as.factor(BioID)C001072    9.906e-01   4.261e-02   23.250  < 2e-16 ***
as.factor(BioID)C001076   -5.567e-03   1.500e-01   -0.037  0.97040
as.factor(BioID)C001078    9.957e-01   9.679e-02   10.287  < 2e-16 ***
as.factor(BioID)C001080    1.002e+00   7.710e-02   12.996  < 2e-16 ***
as.factor(BioID)C001083    1.003e+00   9.964e-02   10.070  < 2e-16 ***
as.factor(BioID)C001084    1.003e+00   1.534e-02   65.360  < 2e-16 ***
as.factor(BioID)C001087    2.274e-03   5.532e-02    0.041  0.96722
as.factor(BioID)C001090    9.960e-01   6.445e-02   15.454  < 2e-16 ***
as.factor(BioID)C001091    9.970e-01   2.285e-02   43.626  < 2e-16 ***
as.factor(BioID)C001092    3.990e-03   2.366e-02    0.169  0.86610
as.factor(BioID)C001093   -7.682e-03   1.160e-01   -0.066  0.94721
as.factor(BioID)C001094    2.778e-03   1.915e-02    0.145  0.88465
as.factor(BioID)C001097    9.945e-01   4.073e-02   24.413  < 2e-16 ***
as.factor(BioID)C001101    1.002e+00   7.629e-02   13.141  < 2e-16 ***
as.factor(BioID)C001103    1.524e-03   1.295e-01    0.012  0.99061
as.factor(BioID)C001105    1.376e-02   5.220e-02    0.264  0.79214
as.factor(BioID)C001107    1.009e+00   1.061e-01    9.506  < 2e-16 ***
as.factor(BioID)C001108   -9.257e-03   9.784e-02   -0.095  0.92463
as.factor(BioID)C001109    2.526e-02   1.649e-01    0.153  0.87826
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as.factor(BioID)C001110   1.008e+00   5.078e-02   19.852   < 2e-16 ***
as.factor(BioID)C001111   1.005e+00   1.073e-01    9.359   < 2e-16 ***
as.factor(BioID)C001112   1.003e+00   5.582e-02   17.966   < 2e-16 ***
as.factor(BioID)C001114   2.394e-04   4.203e-02    0.006   0.99546
as.factor(BioID)C001117   1.007e+00   2.326e-01    4.329 1.59e-05 ***
as.factor(BioID)C001118  -5.980e-03   2.137e-01   -0.028   0.97768
as.factor(BioID)C001119   1.024e+00   9.144e-02   11.196   < 2e-16 ***
as.factor(BioID)C001120   6.176e-03   6.571e-02    0.094   0.92513
as.factor(BioID)C001121   1.007e+00   3.950e-02   25.491   < 2e-16 ***
as.factor(BioID)D000096   9.898e-01   3.417e-02   28.972   < 2e-16 ***
as.factor(BioID)D000191   9.756e-01   1.385e-01    7.045 2.75e-12 ***
as.factor(BioID)D000197   9.929e-01   2.985e-02   33.264   < 2e-16 ***
as.factor(BioID)D000216   9.823e-01   1.018e-01    9.645   < 2e-16 ***
as.factor(BioID)D000399   9.931e-01   4.491e-02   22.115   < 2e-16 ***
as.factor(BioID)D000482   9.878e-01   1.283e-01    7.701 2.35e-14 ***
as.factor(BioID)D000533  -1.263e-02   9.204e-02   -0.137   0.89085
as.factor(BioID)D000598   9.914e-01   9.593e-02   10.335   < 2e-16 ***
as.factor(BioID)D000600  -4.176e-03   1.124e-01   -0.037   0.97037
as.factor(BioID)D000604  -2.449e-03   1.388e-01   -0.018   0.98593
as.factor(BioID)D000610   9.948e-01   3.815e-02   26.074   < 2e-16 ***
as.factor(BioID)D000612   5.078e-03   5.822e-02    0.087   0.93051
as.factor(BioID)D000614  -6.780e-03   4.884e-02   -0.139   0.88960
as.factor(BioID)D000615  -1.304e-02   1.573e-01   -0.083   0.93392
as.factor(BioID)D000616  -1.127e-02   7.977e-02   -0.141   0.88767
as.factor(BioID)D000617   1.003e+00   6.950e-02   14.429   < 2e-16 ***
as.factor(BioID)D000619   4.944e-03   7.429e-02    0.067   0.94695
as.factor(BioID)D000620   1.000e+00   9.907e-02   10.095   < 2e-16 ***
as.factor(BioID)D000621  -9.525e-03   1.424e-01   -0.067   0.94668
as.factor(BioID)D000623   1.005e+00   1.185e-01    8.476   < 2e-16 ***
as.factor(BioID)D000624   1.001e+00   1.528e-02   65.479   < 2e-16 ***
as.factor(BioID)D000625   5.138e-03   1.112e-01    0.046   0.96315
as.factor(BioID)D000626  -4.016e-04   1.925e-01   -0.002   0.99834
as.factor(BioID)D000627   9.991e-01   6.508e-02   15.353   < 2e-16 ***
as.factor(BioID)D000628   6.174e-03   1.156e-01    0.053   0.95741
as.factor(BioID)D000629   1.011e+00   5.773e-02   17.507   < 2e-16 ***
as.factor(BioID)D000630   1.012e+00   7.403e-02   13.674   < 2e-16 ***
as.factor(BioID)D000631   9.964e-01   3.073e-02   32.429   < 2e-16 ***
as.factor(BioID)E000179   9.810e-01   1.181e-01    8.308   < 2e-16 ***
as.factor(BioID)E000215   9.957e-01   4.831e-02   20.610   < 2e-16 ***
as.factor(BioID)E000288   1.007e+00   1.374e-01    7.329 3.66e-13 ***
as.factor(BioID)E000290   9.964e-01   9.657e-02   10.318   < 2e-16 ***
as.factor(BioID)E000291   5.739e-03   3.614e-02    0.159   0.87383
as.factor(BioID)E000293   1.000e+00   6.968e-02   14.356   < 2e-16 ***
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as.factor(BioID)E000294 -2.071e-03  3.328e-02  -0.062  0.95037
as.factor(BioID)E000296  9.975e-01  4.211e-02  23.689  < 2e-16 ***
as.factor(BioID)E000297  9.980e-01  1.281e-01   7.789 1.20e-14 ***
as.factor(BioID)E000298 -8.039e-03  1.353e-01  -0.059  0.95261
as.factor(BioID)E000299  1.006e+00  9.317e-02  10.798  < 2e-16 ***
as.factor(BioID)F000030  9.875e-01  5.695e-02  17.340  < 2e-16 ***
as.factor(BioID)F000372 -4.839e-03  1.150e-01  -0.042  0.96645
as.factor(BioID)F000448 -1.964e-02  1.613e-01  -0.122  0.90312
as.factor(BioID)F000449 -6.087e-03  1.096e-01  -0.056  0.95571
as.factor(BioID)F000450 -1.192e-02  1.068e-01  -0.112  0.91116
as.factor(BioID)F000451  5.534e-03  1.300e-01   0.043  0.96605
as.factor(BioID)F000454  1.005e+00  1.062e-01   9.459  < 2e-16 ***
as.factor(BioID)F000455  9.893e-01  8.240e-02  12.006  < 2e-16 ***
as.factor(BioID)F000456 -1.258e-02  7.835e-02  -0.161  0.87244
as.factor(BioID)F000458 -3.822e-03  6.954e-02  -0.055  0.95618
as.factor(BioID)F000459  6.240e-03  6.151e-02   0.101  0.91921
as.factor(BioID)F000460 -1.039e-02  5.869e-02  -0.177  0.85949
as.factor(BioID)F000461 -1.620e-03  1.155e-01  -0.014  0.98881
as.factor(BioID)F000462  9.961e-01  2.908e-02  34.256  < 2e-16 ***
as.factor(BioID)F000464  1.005e+00  1.165e-01   8.627  < 2e-16 ***
as.factor(BioID)F000465 -2.052e-03  1.381e-01  -0.015  0.98815
as.factor(BioID)F000466  1.009e+00  1.500e-01   6.731 2.34e-11 ***
as.factor(BioID)F000468  1.027e+00  2.125e-01   4.833 1.47e-06 ***
as.factor(BioID)G000289 -2.184e-02  8.795e-02  -0.248  0.80391
as.factor(BioID)G000377 -8.533e-03  5.401e-02  -0.158  0.87449
as.factor(BioID)G000535  9.875e-01  4.387e-02  22.510  < 2e-16 ***
as.factor(BioID)G000546 -9.350e-03  3.610e-02  -0.259  0.79564
as.factor(BioID)G000548 -1.117e-02  1.488e-01  -0.075  0.94018
as.factor(BioID)G000551  9.913e-01  1.012e-01   9.790  < 2e-16 ***
as.factor(BioID)G000552 -4.734e-03  1.571e-01  -0.030  0.97596
as.factor(BioID)G000553  9.975e-01  2.094e-02  47.641  < 2e-16 ***
as.factor(BioID)G000556  1.011e+00  4.552e-02  22.212  < 2e-16 ***
as.factor(BioID)G000558  3.291e-04  2.228e-02   0.015  0.98822
as.factor(BioID)G000559  9.978e-01  8.408e-02  11.867  < 2e-16 ***
as.factor(BioID)G000560 -1.840e-02  1.457e-01  -0.126  0.89951
as.factor(BioID)G000563  2.699e-04  6.306e-02   0.004  0.99659
as.factor(BioID)G000565  1.167e-03  2.287e-01   0.005  0.99593
as.factor(BioID)G000566 -1.456e-02  1.160e-01  -0.126  0.90011
as.factor(BioID)G000568  2.019e-03  9.957e-02   0.020  0.98382
as.factor(BioID)G000571  1.008e+00  6.123e-02  16.471  < 2e-16 ***
as.factor(BioID)G000574  9.978e-01  1.329e-02  75.056  < 2e-16 ***
as.factor(BioID)G000576 -2.958e-03  1.328e-01  -0.022  0.98224
as.factor(BioID)G000577 -3.548e-03  1.679e-02  -0.211  0.83267
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as.factor(BioID)G000579 -4.506e-03  1.663e-02  -0.271  0.78650
as.factor(BioID)G000583  1.013e+00  1.251e-01   8.093 1.14e-15 ***
as.factor(BioID)G000584 -6.662e-04  2.137e-02  -0.031  0.97514
as.factor(BioID)G000585  1.003e+00  1.229e-01   8.158 6.81e-16 ***
as.factor(BioID)G000586  1.027e+00  2.015e-01   5.100 3.80e-07 ***
as.factor(BioID)G000587  1.000e+00  3.068e-01   3.261  0.00113 **
as.factor(BioID)G000588  1.320e-02  6.820e-02   0.194  0.84650
as.factor(BioID)G000589 -1.153e-02  2.042e-01  -0.056  0.95498
as.factor(BioID)G000590 -1.102e-02  1.514e-01  -0.073  0.94197
as.factor(BioID)G000591 -3.506e-03  8.359e-02  -0.042  0.96655
as.factor(BioID)G000592  1.019e+00  1.289e-01   7.908 4.84e-15 ***
as.factor(BioID)H000324  9.813e-01  6.369e-02  15.409  < 2e-16 ***
as.factor(BioID)H000636  9.943e-01  8.694e-02  11.437  < 2e-16 ***
as.factor(BioID)H000874  9.818e-01  1.331e-01   7.377 2.58e-13 ***
as.factor(BioID)H001034  1.000e+00  9.096e-02  10.994  < 2e-16 ***
as.factor(BioID)H001036 -2.020e-02  1.291e-01  -0.156  0.87569
as.factor(BioID)H001038  9.914e-01  9.170e-02  10.811  < 2e-16 ***
as.factor(BioID)H001045  9.810e-03  4.769e-02   0.206  0.83705
as.factor(BioID)H001047  1.004e+00  1.001e-01  10.030  < 2e-16 ***
as.factor(BioID)H001048 -9.926e-03  5.672e-02  -0.175  0.86111
as.factor(BioID)H001050  9.950e-01  6.248e-02  15.925  < 2e-16 ***
as.factor(BioID)H001052 -2.602e-03  1.883e-01  -0.014  0.98898
as.factor(BioID)H001053 -1.520e-03  4.915e-02  -0.031  0.97533
as.factor(BioID)H001055 -2.911e-03  8.515e-02  -0.034  0.97273
as.factor(BioID)H001056 -3.505e-04  5.528e-02  -0.006  0.99494
as.factor(BioID)H001057 -5.940e-04  2.487e-01  -0.002  0.99809
as.factor(BioID)H001058 -1.054e-02  5.268e-02  -0.200  0.84142
as.factor(BioID)H001059 -8.161e-03  3.213e-02  -0.254  0.79951
as.factor(BioID)H001063  1.007e+00  3.778e-02  26.660  < 2e-16 ***
as.factor(BioID)H001064  1.001e+00  6.220e-02  16.100  < 2e-16 ***
as.factor(BioID)H001066  1.002e+00  3.718e-02  26.956  < 2e-16 ***
as.factor(BioID)H001067 -3.401e-03  7.459e-02  -0.046  0.96364
as.factor(BioID)H001068  1.012e+00  9.351e-02  10.821  < 2e-16 ***
as.factor(BioID)H001071 -8.628e-03  2.516e-01  -0.034  0.97265
as.factor(BioID)H001072  3.759e-03  5.095e-02   0.074  0.94119
as.factor(BioID)H001073  8.133e-03  5.655e-02   0.144  0.88567
as.factor(BioID)H001074  5.268e-03  4.433e-02   0.119  0.90542
as.factor(BioID)H001077  1.869e-04  1.729e-01   0.001  0.99914
as.factor(BioID)H001078  5.083e-03  9.701e-02   0.052  0.95822
as.factor(BioID)H001081  1.004e+00  4.522e-02  22.210  < 2e-16 ***
as.factor(BioID)H001085  1.012e+00  5.444e-02  18.593  < 2e-16 ***
as.factor(BioID)H001088  6.728e-03  1.050e-01   0.064  0.94894
as.factor(BioID)H001090  1.019e+00  9.819e-02  10.377  < 2e-16 ***
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as.factor(BioID)I000056 -1.544e-02  5.965e-02  -0.259  0.79581
as.factor(BioID)I000057  9.917e-01  1.124e-01   8.820  < 2e-16 ***
as.factor(BioID)J000032  9.843e-01  6.492e-02  15.162  < 2e-16 ***
as.factor(BioID)J000126  9.848e-01  5.329e-02  18.480  < 2e-16 ***
as.factor(BioID)J000174 -1.712e-02  8.283e-02  -0.207  0.83630
as.factor(BioID)J000288  9.886e-01  3.538e-02  27.945  < 2e-16 ***
as.factor(BioID)J000289 -1.297e-02  1.703e-01  -0.076  0.93932
as.factor(BioID)J000290 -1.146e-02  4.378e-02  -0.262  0.79348
as.factor(BioID)J000292  8.896e-04  2.727e-02   0.033  0.97398
as.factor(BioID)J000294  9.941e-01  3.502e-02  28.389  < 2e-16 ***
as.factor(BioID)J000295  9.505e-03  6.863e-02   0.138  0.88988
as.factor(BioID)J000297  9.904e-03  3.874e-02   0.256  0.79824
as.factor(BioID)J000298  1.005e+00  2.149e-01   4.678 3.14e-06 ***
as.factor(BioID)J000299 -8.463e-03  8.292e-02  -0.102  0.91871
as.factor(BioID)J000301  9.663e-05  5.516e-02   0.002  0.99860
as.factor(BioID)J000302 -8.330e-03  8.958e-02  -0.093  0.92592
as.factor(BioID)K000009  9.823e-01  1.500e-01   6.550 7.70e-11 ***
as.factor(BioID)K000188  9.907e-01  1.623e-01   6.104 1.30e-09 ***
as.factor(BioID)K000210 -1.389e-02  1.898e-01  -0.073  0.94169
as.factor(BioID)K000362 -1.150e-02  9.424e-02  -0.122  0.90292
as.factor(BioID)K000363 -9.114e-03  3.534e-02  -0.258  0.79649
as.factor(BioID)K000368  1.002e+00  1.720e-01   5.824 6.91e-09 ***
as.factor(BioID)K000375  9.989e-01  6.156e-02  16.227  < 2e-16 ***
as.factor(BioID)K000376  8.540e-03  3.722e-02   0.229  0.81855
as.factor(BioID)K000378  1.241e-02  7.573e-02   0.164  0.86986
as.factor(BioID)K000379  1.001e+00  2.218e-02  45.147  < 2e-16 ***
as.factor(BioID)K000380  1.001e+00  2.395e-02  41.802  < 2e-16 ***
as.factor(BioID)K000381  9.973e-01  8.442e-02  11.813  < 2e-16 ***
as.factor(BioID)K000382  1.002e+00  9.774e-02  10.257  < 2e-16 ***
as.factor(BioID)K000385  9.929e-01  2.342e-02  42.399  < 2e-16 ***
as.factor(BioID)K000386  1.003e+00  1.501e-01   6.681 3.25e-11 ***
as.factor(BioID)K000388 -2.553e-03  1.641e-01  -0.016  0.98759
as.factor(BioID)K000389  1.002e+00  9.208e-02  10.884  < 2e-16 ***
as.factor(BioID)K000390  1.005e+00  3.458e-02  29.069  < 2e-16 ***
as.factor(BioID)K000391  1.001e+00  5.746e-02  17.417  < 2e-16 ***
as.factor(BioID)K000392  5.218e-03  1.333e-01   0.039  0.96879
as.factor(BioID)K000394  1.009e+00  4.327e-02  23.311  < 2e-16 ***
as.factor(BioID)K000395 -4.977e-05  8.038e-02  -0.001  0.99951
as.factor(BioID)L000263  9.810e-01  1.407e-01   6.973 4.51e-12 ***
as.factor(BioID)L000287  9.782e-01  7.370e-02  13.273  < 2e-16 ***
as.factor(BioID)L000397  9.974e-01  2.641e-02  37.771  < 2e-16 ***
as.factor(BioID)L000480  9.835e-01  1.138e-01   8.640  < 2e-16 ***
as.factor(BioID)L000491 -2.422e-03  4.749e-02  -0.051  0.95933
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as.factor(BioID)L000551   9.945e-01   1.784e-01    5.574 2.91e-08 ***
as.factor(BioID)L000554  -3.293e-03   1.687e-01   -0.020  0.98443
as.factor(BioID)L000557   9.865e-01   8.998e-02   10.964  < 2e-16 ***
as.factor(BioID)L000559   9.907e-01   7.693e-02   12.878  < 2e-16 ***
as.factor(BioID)L000560   9.933e-01   6.829e-02   14.547  < 2e-16 ***
as.factor(BioID)L000562   9.890e-01   1.074e-01    9.207  < 2e-16 ***
as.factor(BioID)L000563   1.000e+00   1.307e-01    7.652 3.39e-14 ***
as.factor(BioID)L000564  -1.019e-02   1.466e-01   -0.070  0.94460
as.factor(BioID)L000565   9.958e-01   1.244e-01    8.002 2.33e-15 ***
as.factor(BioID)L000566  -2.983e-03   6.296e-02   -0.047  0.96222
as.factor(BioID)L000569  -2.023e-03   2.795e-02   -0.072  0.94232
as.factor(BioID)L000573   2.903e-03   2.636e-01    0.011  0.99122
as.factor(BioID)L000576  -2.946e-03   9.013e-02   -0.033  0.97393
as.factor(BioID)L000578  -9.233e-03   5.782e-02   -0.160  0.87316
as.factor(BioID)L000579   1.006e+00   7.286e-02   13.810  < 2e-16 ***
as.factor(BioID)L000580   9.993e-01   7.669e-02   13.031  < 2e-16 ***
as.factor(BioID)L000581   9.952e-01   1.826e-02   54.496  < 2e-16 ***
as.factor(BioID)L000582   1.004e+00   2.152e-02   46.654  < 2e-16 ***
as.factor(BioID)L000583  -1.370e-02   1.429e-01   -0.096  0.92366
as.factor(BioID)L000584  -6.345e-03   7.031e-02   -0.090  0.92811
as.factor(BioID)L000585   2.422e-03   5.086e-02    0.048  0.96202
as.factor(BioID)L000586   1.003e+00   8.887e-02   11.287  < 2e-16 ***
as.factor(BioID)L000587   1.934e-03   8.221e-02    0.024  0.98124
as.factor(BioID)L000588   1.012e+00   1.356e-01    7.467 1.34e-13 ***
as.factor(BioID)L000590   1.013e+00   7.075e-02   14.321  < 2e-16 ***
as.factor(BioID)L000591   1.019e+00   7.917e-02   12.867  < 2e-16 ***
as.factor(BioID)L000592   1.014e+00   1.505e-01    6.743 2.16e-11 ***
as.factor(BioID)L000593   1.006e+00   3.410e-02   29.495  < 2e-16 ***
as.factor(BioID)M000087   9.909e-01   6.835e-02   14.497  < 2e-16 ***
as.factor(BioID)M000312   9.906e-01   5.840e-02   16.961  < 2e-16 ***
as.factor(BioID)M000404   9.772e-01   1.032e-01    9.469  < 2e-16 ***
as.factor(BioID)M000689  -1.535e-02   7.408e-02   -0.207  0.83583
as.factor(BioID)M001137   9.855e-01   8.461e-02   11.647  < 2e-16 ***
as.factor(BioID)M001143   9.926e-01   4.056e-02   24.475  < 2e-16 ***
as.factor(BioID)M001144  -1.488e-02   1.014e-01   -0.147  0.88336
as.factor(BioID)M001150  -9.845e-03   1.100e-01   -0.090  0.92869
as.factor(BioID)M001151  -1.577e-04   1.162e-01   -0.001  0.99892
as.factor(BioID)M001156  -1.019e-02   4.881e-02   -0.209  0.83472
as.factor(BioID)M001157  -6.561e-03   3.428e-02   -0.191  0.84826
as.factor(BioID)M001158  -1.206e-02   9.010e-02   -0.134  0.89352
as.factor(BioID)M001159  -7.540e-03   3.545e-02   -0.213  0.83160
as.factor(BioID)M001160   9.938e-01   6.246e-02   15.911  < 2e-16 ***
as.factor(BioID)M001163   9.933e-01   2.743e-02   36.207  < 2e-16 ***
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as.factor(BioID)M001165 -1.481e-03  2.510e-02  -0.059  0.95295
as.factor(BioID)M001166  1.001e+00  1.058e-01   9.453  < 2e-16 ***
as.factor(BioID)M001177 -3.339e-03  1.926e-01  -0.017  0.98617
as.factor(BioID)M001180  2.651e-03  6.691e-02   0.040  0.96840
as.factor(BioID)M001182  3.587e-03  2.767e-01   0.013  0.98966
as.factor(BioID)M001184  9.844e-03  2.641e-01   0.037  0.97027
as.factor(BioID)M001187 -5.170e-03  1.248e-01  -0.041  0.96697
as.factor(BioID)M001188  1.003e+00  1.720e-02  58.301  < 2e-16 ***
as.factor(BioID)M001189 -7.255e-03  8.087e-02  -0.090  0.92853
as.factor(BioID)M001191  1.004e+00  1.547e-01   6.489 1.15e-10 ***
as.factor(BioID)M001193  1.181e-02  9.577e-02   0.123  0.90189
as.factor(BioID)M001194 -2.956e-04  3.719e-02  -0.008  0.99366
as.factor(BioID)M001195 -1.878e-03  1.120e-01  -0.017  0.98662
as.factor(BioID)M001196  1.001e+00  8.790e-02  11.382  < 2e-16 ***
as.factor(BioID)M001199  1.008e+00  9.127e-02  11.042  < 2e-16 ***
as.factor(BioID)M001200  9.974e-01  3.116e-02  32.015  < 2e-16 ***
as.factor(BioID)M001201  7.244e-03  6.145e-02   0.118  0.90617
as.factor(BioID)M001202  1.008e+00  1.386e-01   7.274 5.45e-13 ***
as.factor(BioID)M001203  1.005e+00  7.004e-02  14.354  < 2e-16 ***
as.factor(BioID)M001204  2.770e-03  9.377e-02   0.030  0.97643
as.factor(BioID)M001205 -2.842e-03  7.885e-02  -0.036  0.97125
as.factor(BioID)M001206  1.003e+00  3.967e-02  25.295  < 2e-16 ***
as.factor(BioID)M001208  1.009e+00  3.988e-02  25.290  < 2e-16 ***
as.factor(BioID)N000002  9.927e-01  4.880e-02  20.341  < 2e-16 ***
as.factor(BioID)N000015  9.812e-01  1.115e-01   8.804  < 2e-16 ***
as.factor(BioID)N000127  1.009e+00  3.794e-02  26.589  < 2e-16 ***
as.factor(BioID)N000179  9.917e-01  2.919e-02  33.971  < 2e-16 ***
as.factor(BioID)N000181 -5.961e-03  2.103e-02  -0.283  0.77690
as.factor(BioID)N000182 -7.543e-03  1.269e-01  -0.059  0.95259
as.factor(BioID)N000184  4.881e-03  2.960e-02   0.165  0.86904
as.factor(BioID)N000185 -6.121e-03  3.293e-02  -0.186  0.85255
as.factor(BioID)N000188  1.005e+00  4.731e-02  21.242  < 2e-16 ***
as.factor(BioID)N000189  1.044e-02  3.890e-02   0.269  0.78834
as.factor(BioID)N000190 -4.788e-03  3.119e-01  -0.015  0.98776
as.factor(BioID)N000191  1.005e+00  3.989e-02  25.187  < 2e-16 ***
as.factor(BioID)O000168 -2.009e-03  9.733e-02  -0.021  0.98354
as.factor(BioID)O000170  1.013e+00  4.325e-02  23.412  < 2e-16 ***
as.factor(BioID)O000171  1.009e+00  1.082e-01   9.326  < 2e-16 ***
as.factor(BioID)O000172  1.034e+00  1.607e-01   6.434 1.64e-10 ***
as.factor(BioID)O000173  1.034e+00  1.605e-01   6.439 1.58e-10 ***
as.factor(BioID)P000034  9.838e-01  1.121e-01   8.776  < 2e-16 ***
as.factor(BioID)P000096  9.847e-01  1.211e-01   8.130 8.52e-16 ***
as.factor(BioID)P000197  9.813e-01  7.533e-02  13.026  < 2e-16 ***
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as.factor(BioID)P000258  2.626e-01  1.308e-01   2.008  0.04480 *
as.factor(BioID)P000373 -1.969e-02  6.632e-02  -0.297  0.76663
as.factor(BioID)P000523  9.806e-01  1.628e-01   6.022 2.13e-09 ***
as.factor(BioID)P000588 -1.072e-02  3.684e-02  -0.291  0.77103
as.factor(BioID)P000591 -1.540e-02  1.052e-01  -0.146  0.88362
as.factor(BioID)P000592 -1.591e-02  7.465e-02  -0.213  0.83129
as.factor(BioID)P000593  9.964e-01  1.119e-01   8.908  < 2e-16 ***
as.factor(BioID)P000594 -3.930e-04  1.787e-02  -0.022  0.98245
as.factor(BioID)P000597  1.003e+00  3.690e-02  27.192  < 2e-16 ***
as.factor(BioID)P000598  1.020e+00  6.575e-02  15.516  < 2e-16 ***
as.factor(BioID)P000599 -5.053e-04  9.552e-02  -0.005  0.99578
as.factor(BioID)P000601  4.412e-03  1.253e-01   0.035  0.97191
as.factor(BioID)P000602 -6.954e-03  1.443e-01  -0.048  0.96158
as.factor(BioID)P000604  9.924e-01  5.208e-02  19.054  < 2e-16 ***
as.factor(BioID)P000605  1.777e-03  2.161e-01   0.008  0.99344
as.factor(BioID)P000606  1.503e-03  1.244e-01   0.012  0.99037
as.factor(BioID)P000607  1.010e+00  1.543e-01   6.544 8.03e-11 ***
as.factor(BioID)P000608  1.002e+00  1.518e-01   6.601 5.54e-11 ***
as.factor(BioID)P000609 -9.860e-03  1.575e-01  -0.063  0.95008
as.factor(BioID)P000611  4.179e-03  2.507e-02   0.167  0.86760
as.factor(BioID)P000613  1.005e+00  6.460e-02  15.551  < 2e-16 ***
as.factor(BioID)P000614  1.014e+00  6.841e-02  14.824  < 2e-16 ***
as.factor(BioID)P000615 -9.995e-04  8.089e-02  -0.012  0.99014
as.factor(BioID)P000616  1.007e+00  5.866e-02  17.168  < 2e-16 ***
as.factor(BioID)P000617  1.032e+00  1.757e-01   5.871 5.25e-09 ***
as.factor(BioID)P000618  1.012e+00  7.837e-02  12.918  < 2e-16 ***
as.factor(BioID)Q000023  1.003e+00  4.594e-02  21.829  < 2e-16 ***
as.factor(BioID)R000053  9.857e-01  5.233e-02  18.835  < 2e-16 ***
as.factor(BioID)R000395 -1.652e-02  1.516e-01  -0.109  0.91322
as.factor(BioID)R000409 -1.400e-02  1.013e-01  -0.138  0.89014
as.factor(BioID)R000486  9.843e-01  6.137e-02  16.040  < 2e-16 ***
as.factor(BioID)R000487 -1.425e-02  1.199e-01  -0.119  0.90536
as.factor(BioID)R000515  9.850e-01  5.337e-02  18.455  < 2e-16 ***
as.factor(BioID)R000575  1.576e-03  1.639e-02   0.096  0.92338
as.factor(BioID)R000576  9.951e-01  1.079e-01   9.224  < 2e-16 ***
as.factor(BioID)R000577  9.952e-01  3.535e-02  28.152  < 2e-16 ***
as.factor(BioID)R000582 -1.042e-02  3.189e-02  -0.327  0.74393
as.factor(BioID)R000583 -8.942e-03  3.464e-02  -0.258  0.79634
as.factor(BioID)R000586 -4.389e-04  2.513e-02  -0.017  0.98607
as.factor(BioID)R000587 -7.857e-04  1.425e-01  -0.006  0.99560
as.factor(BioID)R000588  1.002e+00  7.407e-02  13.528  < 2e-16 ***
as.factor(BioID)R000591  1.727e-02  8.531e-02   0.202  0.83961
as.factor(BioID)R000592 -6.855e-03  1.093e-01  -0.063  0.95001
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as.factor(BioID)R000593 -7.250e-03  5.923e-02  -0.122  0.90260
as.factor(BioID)R000597 -3.080e-03  1.003e-01  -0.031  0.97549
as.factor(BioID)R000598 -6.397e-03  3.892e-02  -0.164  0.86946
as.factor(BioID)R000599  1.001e+00  1.114e-01   8.988  < 2e-16 ***
as.factor(BioID)R000601 -9.927e-03  1.677e-01  -0.059  0.95280
as.factor(BioID)R000602  1.001e+00  9.013e-02  11.101  < 2e-16 ***
as.factor(BioID)R000603 -9.847e-04  1.167e-01  -0.008  0.99327
as.factor(BioID)R000604  2.636e-04  5.315e-02   0.005  0.99604
as.factor(BioID)R000606  1.001e+00  9.957e-02  10.055  < 2e-16 ***
as.factor(BioID)R000607  1.009e+00  1.419e-01   7.110 1.74e-12 ***
as.factor(BioID)R000609 -2.055e-03  1.645e-02  -0.125  0.90062
as.factor(BioID)R000610 -1.856e-03  2.832e-02  -0.066  0.94775
as.factor(BioID)R000612 -7.677e-03  1.655e-01  -0.046  0.96300
as.factor(BioID)R000614  5.718e-03  3.375e-01   0.017  0.98648
as.factor(BioID)S000018 -7.729e-03  1.583e-01  -0.049  0.96106
as.factor(BioID)S000030  9.861e-01  1.181e-01   8.353  < 2e-16 ***
as.factor(BioID)S000185  9.793e-01  1.008e-01   9.715  < 2e-16 ***
as.factor(BioID)S000248  9.881e-01  4.078e-02  24.230  < 2e-16 ***
as.factor(BioID)S000250 -1.583e-02  7.045e-02  -0.225  0.82223
as.factor(BioID)S000344  9.899e-01  1.045e-01   9.471  < 2e-16 ***
as.factor(BioID)S000364 -8.703e-03  8.545e-02  -0.102  0.91888
as.factor(BioID)S000480  9.790e-01  1.018e-01   9.615  < 2e-16 ***
as.factor(BioID)S000510  9.927e-01  1.291e-01   7.688 2.60e-14 ***
as.factor(BioID)S000583 -2.158e-02  1.267e-01  -0.170  0.86474
as.factor(BioID)S001145  9.882e-01  9.314e-02  10.610  < 2e-16 ***
as.factor(BioID)S001148 -1.144e-03  8.734e-02  -0.013  0.98955
as.factor(BioID)S001150  9.924e-01  8.577e-02  11.570  < 2e-16 ***
as.factor(BioID)S001154 -8.658e-04  3.581e-02  -0.024  0.98071
as.factor(BioID)S001156  9.887e-01  3.923e-02  25.204  < 2e-16 ***
as.factor(BioID)S001157  9.962e-01  9.562e-02  10.419  < 2e-16 ***
as.factor(BioID)S001165  9.918e-01  4.947e-02  20.050  < 2e-16 ***
as.factor(BioID)S001168  9.905e-01  2.918e-02  33.948  < 2e-16 ***
as.factor(BioID)S001170  1.000e+00  7.123e-02  14.042  < 2e-16 ***
as.factor(BioID)S001172 -4.596e-03  5.674e-02  -0.081  0.93546
as.factor(BioID)S001175  1.005e+00  2.432e-02  41.325  < 2e-16 ***
as.factor(BioID)S001176 -9.012e-03  7.139e-02  -0.126  0.89957
as.factor(BioID)S001180  1.000e+00  1.654e-01   6.046 1.84e-09 ***
as.factor(BioID)S001183 -3.347e-03  1.012e-01  -0.033  0.97362
as.factor(BioID)S001185  1.007e+00  4.367e-02  23.058  < 2e-16 ***
as.factor(BioID)S001187  5.681e-03  5.285e-02   0.107  0.91441
as.factor(BioID)S001188 -1.213e-02  1.783e-01  -0.068  0.94578
as.factor(BioID)S001189  1.021e-03  1.060e-01   0.010  0.99232
as.factor(BioID)S001190  1.007e+00  1.279e-01   7.870 6.49e-15 ***
```

```
as.factor(BioID)S001192 -3.057e-03  5.698e-02  -0.054  0.95722
as.factor(BioID)S001193  9.988e-01  4.313e-02  23.159  < 2e-16 ***
as.factor(BioID)S001195 -2.217e-03  1.205e-01  -0.018  0.98532
as.factor(BioID)S001199 -6.466e-04  3.418e-02  -0.019  0.98491
as.factor(BioID)S001200  1.003e+00  2.370e-02  42.337  < 2e-16 ***
as.factor(BioID)S001201  1.005e+00  1.107e-01   9.082  < 2e-16 ***
as.factor(BioID)S001205  9.961e-01  4.377e-02  22.756  < 2e-16 ***
as.factor(BioID)S001207  1.012e+00  7.916e-02  12.782  < 2e-16 ***
as.factor(BioID)S001208  1.026e+00  1.225e-01   8.370  < 2e-16 ***
as.factor(BioID)S001209  1.016e+00  9.162e-02  11.088  < 2e-16 ***
as.factor(BioID)S001211  1.009e+00  5.211e-02  19.372  < 2e-16 ***
as.factor(BioID)S001212  1.589e-03  2.231e-02   0.071  0.94324
as.factor(BioID)S001213 -1.005e-03  2.099e-02  -0.048  0.96181
as.factor(BioID)S001214 -2.148e-03  2.113e-01  -0.010  0.99189
as.factor(BioID)S001215  1.008e+00  4.757e-02  21.186  < 2e-16 ***
as.factor(BioID)S001216  1.017e+00  6.228e-02  16.325  < 2e-16 ***
as.factor(BioID)T000193  9.907e-01  4.811e-02  20.593  < 2e-16 ***
as.factor(BioID)T000238 -1.056e-02  4.854e-02  -0.217  0.82789
as.factor(BioID)T000460  9.875e-01  8.678e-02  11.380  < 2e-16 ***
as.factor(BioID)T000462 -1.153e-02  9.146e-02  -0.126  0.89966
as.factor(BioID)T000463  7.488e-05  1.005e-01   0.001  0.99941
as.factor(BioID)T000465  9.978e-01  2.450e-02  40.718  < 2e-16 ***
as.factor(BioID)T000467  6.233e-03  3.143e-02   0.198  0.84283
as.factor(BioID)T000468  1.003e+00  6.498e-02  15.436  < 2e-16 ***
as.factor(BioID)T000469  1.001e+00  1.612e-02  62.099  < 2e-16 ***
as.factor(BioID)T000470 -7.597e-03  2.543e-02  -0.299  0.76518
as.factor(BioID)T000472  1.002e+00  6.215e-02  16.129  < 2e-16 ***
as.factor(BioID)T000474  9.981e-01  4.132e-02  24.156  < 2e-16 ***
as.factor(BioID)T000475  6.000e-03  2.606e-02   0.230  0.81792
as.factor(BioID)T000477 -2.623e-03  2.580e-02  -0.102  0.91902
as.factor(BioID)T000478 -2.390e-03  2.710e-02  -0.088  0.92974
as.factor(BioID)T000479  5.703e-04  1.374e-01   0.004  0.99669
as.factor(BioID)T000480 -4.536e-03  1.345e-01  -0.034  0.97311
as.factor(BioID)T000481  1.034e+00  1.586e-01   6.520 9.40e-11 ***
as.factor(BioID)T000482  1.002e+00  4.154e-02  24.136  < 2e-16 ***
as.factor(BioID)U000040  1.007e+00  1.826e-01   5.516 4.05e-08 ***
as.factor(BioID)V000081  9.881e-01  5.944e-02  16.625  < 2e-16 ***
as.factor(BioID)V000108  9.851e-01  9.651e-02  10.208  < 2e-16 ***
as.factor(BioID)V000130  9.958e-01  2.700e-02  36.886  < 2e-16 ***
as.factor(BioID)V000133  1.027e+00  1.024e-01  10.031  < 2e-16 ***
as.factor(BioID)W000187  9.738e-01  9.535e-02  10.213  < 2e-16 ***
as.factor(BioID)W000413 -5.891e-03  1.270e-01  -0.046  0.96302
as.factor(BioID)W000791 -1.231e-02  1.293e-01  -0.095  0.92414
```

```
as.factor(BioID)W000795 -1.282e-02  4.773e-02  -0.269  0.78825
as.factor(BioID)W000796 -1.227e-02  1.372e-01  -0.089  0.92872
as.factor(BioID)W000797  9.912e-01  4.635e-02  21.384  < 2e-16 ***
as.factor(BioID)W000798 -6.605e-03  4.261e-02  -0.155  0.87684
as.factor(BioID)W000799  9.998e-01  1.046e-01   9.560  < 2e-16 ***
as.factor(BioID)W000804 -1.146e-02  4.364e-02  -0.263  0.79284
as.factor(BioID)W000806 -7.860e-03  5.448e-02  -0.144  0.88530
as.factor(BioID)W000808  9.908e-01  2.791e-02  35.492  < 2e-16 ***
as.factor(BioID)W000809  1.628e-02  7.257e-02   0.224  0.82248
as.factor(BioID)W000810 -7.154e-03  1.062e-01  -0.067  0.94631
as.factor(BioID)W000812  4.468e-03  2.629e-02   0.170  0.86506
as.factor(BioID)W000813  4.550e-03  5.146e-02   0.088  0.92955
as.factor(BioID)W000814 -1.555e-02  1.671e-01  -0.093  0.92586
as.factor(BioID)W000815 -4.289e-04  9.258e-02  -0.005  0.99630
as.factor(BioID)W000816 -9.675e-03  9.563e-02  -0.101  0.91943
as.factor(BioID)W000820  1.434e-03  3.100e-02   0.046  0.96310
as.factor(BioID)W000821  1.460e-03  1.201e-01   0.012  0.99030
as.factor(BioID)W000822  9.954e-01  1.322e-01   7.531 8.34e-14 ***
as.factor(BioID)W000825  1.009e+00  5.058e-02  19.948  < 2e-16 ***
as.factor(BioID)W000826  1.011e+00  5.945e-02  17.011  < 2e-16 ***
as.factor(BioID)Y000033 -1.903e-02  2.039e-01  -0.093  0.92565
as.factor(BioID)Y000062  1.000e+00  1.962e-02  50.998  < 2e-16 ***
as.factor(BioID)Y000063 -8.587e-03  6.462e-02  -0.133  0.89430
as.factor(BioID)Y000065 -2.564e-03  2.131e-01  -0.012  0.99040
as.factor(BioID)Y000066         NA         NA      NA       NA
as.factor(BioID)Z000017         NA         NA      NA       NA
seniority               1.369e-03  8.799e-03   0.156  0.87640
Contribution_minus     -3.826e-09  3.552e-08  -0.108  0.91422
Contribution_plus      -1.980e-07  2.728e-07  -0.726  0.46804
Dmajority                      NA         NA      NA       NA
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.02158 on 1605 degrees of freedom
  (94 observations deleted due to missingness)
Multiple R-squared:  0.9986,    Adjusted R-squared:  0.9981
F-statistic:  2211 on 514 and 1605 DF,  p-value: < 2.2e-16
```

For this, since fixing individuals is so specific, we need to remove the anti and pro env. dummy, since they are already included in the individual fixed effects. (if a rep receives contribution once, this is automatically 1, i.e. never changes for an individual).

LPM with vote changing Representatives

Here is what this dataframe looks like

```
kable(df_vote_change[1:15, ], format = "html")
```

BioID	GovtrackID	opensecrets_id	first_name	last_name	state	district	party	name
B000490	400030	N00002674	Sanford D.,Sanford	Bishop	GA	2	D	bishop s
B000490	400030	N00002674	Sanford D.,Sanford	Bishop	GA	2	D	bishop s
B000490	400030	N00002674	Sanford D.,Sanford	Bishop	GA	2	D	bishop s
B000490	400030	N00002674	Sanford D.,Sanford	Bishop	GA	2	D	bishop s
B000490	400030	N00002674	Sanford D.,Sanford	Bishop	GA	2	D	bishop s
B000490	400030	N00002674	Sanford D.,Sanford	Bishop	GA	2	D	bishop s
C001059	400618	N00026341	Jim	Costa	CA	NA	D	costa jin
C001059	400618	N00026341	Jim	Costa	CA	NA	D	costa jin
C001059	400618	N00026341	Jim	Costa	CA	NA	D	costa jin
C001059	400618	N00026341	Jim	Costa	CA	NA	D	costa jin
C001059	400618	N00026341	Jim	Costa	CA	NA	D	costa jin
C001059	400618	N00026341	Jim	Costa	CA	NA	D	costa jin
C001063	400657	N00024978	Henry	Cuellar	TX	28	D	cuellar h
C001063	400657	N00024978	Henry	Cuellar	TX	28	D	cuellar h
C001063	400657	N00024978	Henry	Cuellar	TX	28	D	cuellar h

with control variables

Using the same model as above with the same specifications (control varaibels, then generous FE (state, year), then strict FE (individuals)) but using only those representatives that changed their voting behavior over time.

```
df_vote_change <- df_vote_change %>% select(-c(GovtrackID, opensecrets_id, Vote_change_dummy
view(df_vote_change)
ols_change <- lm(Vote ~ . - state - anti_env_dummy - BioID - vote_change_to_pro - vote_change
summary(ols_change)
```

```
Call:
lm(formula = Vote ~ . - state - anti_env_dummy - BioID - vote_change_to_pro -
    vote_change_to_anti, data = df_vote_change)
```

```
Residuals:
    Min      1Q  Median      3Q     Max
-0.8909 -0.3269  0.1439  0.2794  0.6973

Coefficients:
                    Estimate Std. Error t value Pr(>|t|)
(Intercept)        1.592e+01  2.380e+01   0.669   0.5066
district           1.001e-02  8.286e-03   1.208   0.2327
partyR             7.575e-02  3.420e-01   0.221   0.8257
birthday          -8.005e-03  1.213e-02  -0.660   0.5122
genderM           -2.114e-01  2.983e-01  -0.709   0.4820
nominate_dim1      1.496e-01  9.771e-01   0.153   0.8789
nominate_dim2     -1.716e-02  6.212e-01  -0.028   0.9781
GeographicalNE    -7.365e-02  2.750e-01  -0.268   0.7899
GeographicalSO     7.384e-02  4.072e-01   0.181   0.8568
GeographicalWE    -1.762e-01  3.139e-01  -0.561   0.5772
Instance           9.169e-03  3.540e-03   2.590   0.0126 *
seniority          5.490e-03  2.399e-02   0.229   0.8200
Contribution_minus -3.235e-06  2.909e-06  -1.112   0.2715
Contribution_plus  1.044e-05  8.965e-06   1.165   0.2498
Dmajority          4.665e-01  2.109e-01   2.211   0.0317 *
pro_env_dummy     -4.236e-02  1.713e-01  -0.247   0.8057
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.4756 on 49 degrees of freedom
  (73 observations deleted due to missingness)
Multiple R-squared:  0.2796,    Adjusted R-squared:  0.0591
F-statistic: 1.268 on 15 and 49 DF,  p-value: 0.258
```

```r
# instead of vote, use vote_change_to_pro and vote_change_to_anti...
ols_change_2 <- lm(vote_change_to_anti ~ . - state - BioID - vote_change_to_pro, data = df_vo
summary(ols_change_2)
```

```
Call:
lm(formula = vote_change_to_anti ~ . - state - BioID - vote_change_to_pro,
    data = df_vote_change)

Residuals:
    Min      1Q  Median      3Q     Max
-0.3088 -0.1719 -0.0506  0.1435  0.7797
```

```
Coefficients:
                     Estimate Std. Error t value Pr(>|t|)
(Intercept)         -2.280e+01  1.359e+01  -1.678   0.0999 .
district            -8.040e-03  5.014e-03  -1.604   0.1155
partyR              -1.588e-01  1.914e-01  -0.830   0.4108
birthday             1.198e-02  6.940e-03   1.726   0.0908 .
genderM             -1.292e-01  1.677e-01  -0.771   0.4448
nominate_dim1        7.532e-03  5.472e-01   0.014   0.9891
nominate_dim2       -5.947e-01  3.469e-01  -1.714   0.0931 .
GeographicalNE       7.286e-02  1.541e-01   0.473   0.6386
GeographicalSO       3.848e-01  2.279e-01   1.688   0.0980 .
GeographicalWE       2.609e-01  1.772e-01   1.472   0.1477
Instance             8.046e-04  2.108e-03   0.382   0.7045
Vote                -3.847e-01  7.979e-02  -4.821 1.54e-05 ***
seniority            1.885e-02  1.355e-02   1.391   0.1709
Contribution_minus  -4.159e-07  1.762e-06  -0.236   0.8144
Contribution_plus    2.389e-06  5.076e-06   0.471   0.6400
Dmajority            8.040e-02  1.236e-01   0.651   0.5184
anti_env_dummy      -2.174e-01  1.523e-01  -1.428   0.1600
pro_env_dummy       -4.857e-02  9.584e-02  -0.507   0.6147
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.2656 on 47 degrees of freedom
  (73 observations deleted due to missingness)
Multiple R-squared:  0.4692,    Adjusted R-squared:  0.2771
F-statistic: 2.443 on 17 and 47 DF,  p-value: 0.008088
```

Compared to before we see multiple things, on the one hand the Adjusted R^2 is lower than in the other models where it averages to about 0.91, here only 0.25. This is because the model is more specific, i.e. only includes those representatives who changed their voting behavior, which are only 23 in total our ot 574 (?), whereas there are 31 changes in votes to be seen in total.

So, we need to take all these results with caution, since 23 out of 547 (?) is not an incredibly small sample size, and thus makes the model less robust.

Here, we need to remove the anti_env_dummy and district because of singularities, because all have received anti_env contributions, so the coefficient is not defined. -> remove district too, too few obs.

with geography & year FEs

```
ols_change_fe <- lm(Vote ~ as.factor(Geographical) + as.factor(Instance) + party + birthday
summary(ols_change_fe)
```

```
Call:
lm(formula = Vote ~ as.factor(Geographical) + as.factor(Instance) +
    party + birthday + district + nominate_dim1 + nominate_dim2 +
    seniority + Contribution_minus + Contribution_plus + gender +
    pro_env_dummy, data = df_vote_change)

Residuals:
     Min       1Q   Median       3Q      Max
-0.89754 -0.31018  0.02546  0.31298  0.71966

Coefficients:
                              Estimate Std. Error t value Pr(>|t|)
(Intercept)                  8.878e+00  1.737e+01   0.511  0.61085
as.factor(Geographical)NE    1.391e-02  2.284e-01   0.061  0.95161
as.factor(Geographical)SO   -5.432e-02  2.953e-01  -0.184  0.85462
as.factor(Geographical)WE   -9.995e-02  2.483e-01  -0.402  0.68858
as.factor(Instance)4         1.481e-01  1.560e-01   0.950  0.34557
as.factor(Instance)6         6.442e-01  2.087e-01   3.087  0.00291 **
as.factor(Instance)7         5.084e-01  2.193e-01   2.319  0.02338 *
as.factor(Instance)51        4.791e-01  1.683e-01   2.847  0.00581 **
as.factor(Instance)52        5.533e-01  1.743e-01   3.174  0.00225 **
partyR                      -3.271e-01  2.408e-01  -1.359  0.17873
birthday                    -4.277e-03  8.837e-03  -0.484  0.62991
district                     3.778e-03  6.520e-03   0.579  0.56425
nominate_dim1                6.094e-01  7.742e-01   0.787  0.43392
nominate_dim2               -3.395e-01  4.694e-01  -0.723  0.47202
seniority                    1.042e-02  1.958e-02   0.532  0.59639
Contribution_minus          -2.323e-06  2.262e-06  -1.027  0.30798
Contribution_plus            7.124e-06  8.191e-06   0.870  0.38746
genderM                     -2.835e-01  2.351e-01  -1.206  0.23204
pro_env_dummy               -1.019e-02  1.373e-01  -0.074  0.94104
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.4481 on 69 degrees of freedom
```

```
  (50 observations deleted due to missingness)
Multiple R-squared:  0.3699,    Adjusted R-squared:  0.2055
F-statistic:  2.25 on 18 and 69 DF,  p-value: 0.008556
```

```r
# same thing with vote_change_to_anti
ols_change_fe_2 <- lm(vote_change_to_anti ~ as.factor(Geographical) + as.factor(Instance) + 
summary(ols_change_fe_2)
```

```
Call:
lm(formula = vote_change_to_anti ~ as.factor(Geographical) +
    as.factor(Instance) + party + birthday + district + nominate_dim1 +
    nominate_dim2 + seniority + Contribution_minus + Contribution_plus +
    gender + pro_env_dummy, data = df_vote_change)

Residuals:
     Min       1Q   Median       3Q      Max
-0.48447 -0.13676 -0.06298  0.05519  0.85229

Coefficients:
                              Estimate Std. Error t value Pr(>|t|)
(Intercept)                 -1.788e+01  1.402e+01  -1.275   0.2080
as.factor(Geographical)NE    1.442e-01  1.742e-01   0.828   0.4114
as.factor(Geographical)SO    2.028e-01  2.193e-01   0.925   0.3594
as.factor(Geographical)WE    3.494e-01  1.993e-01   1.753   0.0855 .
as.factor(Instance)4         2.929e-01  2.433e-01   1.204   0.2341
as.factor(Instance)6         7.093e-02  2.475e-01   0.287   0.7756
as.factor(Instance)7         3.569e-01  2.492e-01   1.432   0.1581
as.factor(Instance)51        1.130e-01  2.407e-01   0.469   0.6407
as.factor(Instance)52        2.488e-01  2.405e-01   1.035   0.3056
partyR                      -2.763e-01  1.841e-01  -1.501   0.1395
birthday                     9.132e-03  7.109e-03   1.285   0.2046
district                    -7.886e-03  4.826e-03  -1.634   0.1083
nominate_dim1                1.976e-01  6.030e-01   0.328   0.7444
nominate_dim2               -5.529e-01  3.554e-01  -1.556   0.1258
seniority                    1.745e-02  1.519e-02   1.149   0.2559
Contribution_minus          -9.504e-08  1.838e-06  -0.052   0.9590
Contribution_plus           -3.441e-06  5.840e-06  -0.589   0.5583
genderM                     -3.001e-02  1.740e-01  -0.172   0.8637
pro_env_dummy               -1.000e-02  1.069e-01  -0.094   0.9258
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
Residual standard error: 0.3032 on 52 degrees of freedom
  (67 observations deleted due to missingness)
Multiple R-squared:  0.2422,    Adjusted R-squared:  -0.02011
F-statistic: 0.9233 on 18 and 52 DF,  p-value: 0.5558
```

Here remove majority because it is a singularity…

with party & year FEs

```
ols_party_change <- lm(Vote ~ district + birthday + nominate_dim1 + nominate_dim2 + Geographi
summary(ols_party_change)
```

```
Call:
lm(formula = Vote ~ district + birthday + nominate_dim1 + nominate_dim2 +
    Geographical + as.factor(party) + as.factor(Instance) + seniority +
    Contribution_minus + Contribution_plus + gender + pro_env_dummy +
    anti_env_dummy, data = df_long)

Residuals:
     Min       1Q   Median       3Q      Max
-0.98664 -0.04059 -0.01140  0.02301  1.00436

Coefficients:
                        Estimate Std. Error  t value Pr(>|t|)
(Intercept)           -4.263e-01  7.842e-01   -0.544  0.58680
district               7.851e-04  3.719e-04    2.111  0.03489 *
birthday               7.414e-04  3.994e-04    1.856  0.06355 .
nominate_dim1         -1.412e-01  2.852e-02   -4.950 8.10e-07 ***
nominate_dim2         -6.979e-02  2.135e-02   -3.269  0.00110 **
GeographicalNE         7.292e-02  1.123e-02    6.490 1.09e-10 ***
GeographicalSO         8.676e-03  9.407e-03    0.922  0.35645
GeographicalWE         1.943e-02  1.124e-02    1.729  0.08400 .
as.factor(party)R     -9.011e-01  8.864e-03 -101.662  < 2e-16 ***
as.factor(Instance)4   1.007e-02  1.206e-02    0.835  0.40400
as.factor(Instance)6   3.505e-02  1.237e-02    2.833  0.00465 **
as.factor(Instance)7   2.546e-02  1.309e-02    1.945  0.05196 .
as.factor(Instance)51  2.387e-02  1.223e-02    1.952  0.05107 .
as.factor(Instance)52  3.305e-02  1.232e-02    2.683  0.00737 **
```

```
seniority                1.643e-03  1.042e-03    1.578  0.11484
Contribution_minus      -6.107e-07  1.479e-07   -4.130 3.79e-05 ***
Contribution_plus        7.200e-06  1.402e-06    5.137 3.08e-07 ***
genderM                 -2.513e-02  9.246e-03   -2.718  0.00663 **
pro_env_dummy           -6.747e-03  9.173e-03   -0.736  0.46206
anti_env_dummy          -2.101e-02  1.318e-02   -1.594  0.11119
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.1516 on 1881 degrees of freedom
  (413 observations deleted due to missingness)
Multiple R-squared:  0.9088,    Adjusted R-squared:  0.9079
F-statistic: 986.8 on 19 and 1881 DF,  p-value: < 2.2e-16
```

```r
# same thing with vote_change_to_anti
ols_party_change_2 <- lm(vote_change_to_anti ~ district + birthday + nominate_dim1 + nominate
summary(ols_party_change_2)
```

```
Call:
lm(formula = vote_change_to_anti ~ district + birthday + nominate_dim1 +
    nominate_dim2 + Geographical + as.factor(party) + as.factor(Instance) +
    seniority + Contribution_minus + Contribution_plus + gender +
    pro_env_dummy, data = df_vote_change)

Residuals:
     Min       1Q   Median       3Q      Max
-0.48447 -0.13676 -0.06298  0.05519  0.85229

Coefficients:
                        Estimate Std. Error t value Pr(>|t|)
(Intercept)           -1.788e+01  1.402e+01   -1.275   0.2080
district              -7.886e-03  4.826e-03   -1.634   0.1083
birthday               9.132e-03  7.109e-03    1.285   0.2046
nominate_dim1          1.976e-01  6.030e-01    0.328   0.7444
nominate_dim2         -5.529e-01  3.554e-01   -1.556   0.1258
GeographicalNE         1.442e-01  1.742e-01    0.828   0.4114
GeographicalSO         2.028e-01  2.193e-01    0.925   0.3594
GeographicalWE         3.494e-01  1.993e-01    1.753   0.0855 .
as.factor(party)R     -2.763e-01  1.841e-01   -1.501   0.1395
as.factor(Instance)4   2.929e-01  2.433e-01    1.204   0.2341
as.factor(Instance)6   7.093e-02  2.475e-01    0.287   0.7756
```

```
as.factor(Instance)7     3.569e-01  2.492e-01   1.432   0.1581
as.factor(Instance)51    1.130e-01  2.407e-01   0.469   0.6407
as.factor(Instance)52    2.488e-01  2.405e-01   1.035   0.3056
seniority                1.745e-02  1.519e-02   1.149   0.2559
Contribution_minus      -9.504e-08  1.838e-06  -0.052   0.9590
Contribution_plus       -3.441e-06  5.840e-06  -0.589   0.5583
genderM                 -3.001e-02  1.740e-01  -0.172   0.8637
pro_env_dummy           -1.000e-02  1.069e-01  -0.094   0.9258
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.3032 on 52 degrees of freedom
  (67 observations deleted due to missingness)
Multiple R-squared:  0.2422,    Adjusted R-squared:  -0.02011
F-statistic: 0.9233 on 18 and 52 DF,  p-value: 0.5558
```

with state & year FEs

```
ols_change_state <- lm(Vote ~ as.factor(state) + as.factor(Instance) + birthday + district +
summary(ols_change_state)
```

```
Call:
lm(formula = Vote ~ as.factor(state) + as.factor(Instance) +
    birthday + district + nominate_dim1 + nominate_dim2 + seniority +
    Contribution_minus + Contribution_plus + gender + pro_env_dummy,
    data = df_vote_change)

Residuals:
     Min       1Q   Median       3Q      Max
-0.91853 -0.25729  0.01564  0.25735  0.85653

Coefficients:
                     Estimate Std. Error t value Pr(>|t|)
(Intercept)         1.163e+01  2.139e+01   0.544  0.58862
as.factor(state)CO -1.779e-01  5.819e-01  -0.306  0.76082
as.factor(state)FL -4.983e-02  4.505e-01  -0.111  0.91228
as.factor(state)GA  4.037e-01  6.077e-01   0.664  0.50901
as.factor(state)IL -2.560e-01  6.197e-01  -0.413  0.68096
as.factor(state)MI  2.229e-01  5.611e-01   0.397  0.69260
```

```
as.factor(state)NJ      5.305e-02  6.001e-01   0.088  0.92984
as.factor(state)NY      2.882e-02  3.735e-01   0.077  0.93876
as.factor(state)PA      2.960e-01  6.414e-01   0.461  0.64606
as.factor(state)SC      3.445e-01  6.612e-01   0.521  0.60422
as.factor(state)TX      6.003e-01  4.134e-01   1.452  0.15156
as.factor(state)WA      1.450e-01  6.277e-01   0.231  0.81812
as.factor(Instance)4    1.323e-01  1.596e-01   0.829  0.41046
as.factor(Instance)6    6.695e-01  2.136e-01   3.135  0.00263 **
as.factor(Instance)7    5.428e-01  2.257e-01   2.405  0.01917 *
as.factor(Instance)51   4.863e-01  1.734e-01   2.804  0.00674 **
as.factor(Instance)52   5.619e-01  1.791e-01   3.136  0.00262 **
birthday               -5.792e-03  1.082e-02  -0.535  0.59449
district               -1.665e-04  2.190e-02  -0.008  0.99396
nominate_dim1           1.037e+00  1.328e+00   0.781  0.43789
nominate_dim2          -9.382e-01  7.360e-01  -1.275  0.20719
seniority               9.161e-03  2.329e-02   0.393  0.69542
Contribution_minus     -1.398e-06  2.633e-06  -0.531  0.59734
Contribution_plus       7.983e-06  8.520e-06   0.937  0.35245
genderM                -4.560e-01  2.846e-01  -1.602  0.11418
pro_env_dummy          -8.525e-02  1.566e-01  -0.544  0.58808
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.4541 on 62 degrees of freedom
  (50 observations deleted due to missingness)
Multiple R-squared:  0.4185,    Adjusted R-squared:  0.1841
F-statistic: 1.785 on 25 and 62 DF,  p-value: 0.03375
```

```
# same thing with vote_change_to_anti
ols_change_state_2 <- lm(vote_change_to_anti ~ as.factor(state) + as.factor(Instance) + birth
summary(ols_change_state_2)
```

```
Call:
lm(formula = vote_change_to_anti ~ as.factor(state) + as.factor(Instance) +
    birthday + district + nominate_dim1 + nominate_dim2 + seniority +
    Contribution_minus + Contribution_plus + gender + pro_env_dummy,
    data = df_vote_change)

Residuals:
     Min       1Q   Median       3Q      Max
-0.52898 -0.10911 -0.03166  0.09531  0.73809
```

```
Coefficients:
                        Estimate Std. Error t value Pr(>|t|)
(Intercept)            -9.779e+00  1.675e+01  -0.584  0.56225
as.factor(state)CO     -8.910e-01  4.351e-01  -2.048  0.04647 *
as.factor(state)FL     -7.078e-01  3.687e-01  -1.920  0.06123 .
as.factor(state)GA     -4.807e-01  4.758e-01  -1.010  0.31783
as.factor(state)IL     -1.245e+00  4.620e-01  -2.694  0.00990 **
as.factor(state)MI     -8.494e-01  4.457e-01  -1.906  0.06310 .
as.factor(state)NJ     -9.866e-01  4.672e-01  -2.112  0.04029 *
as.factor(state)NY     -8.236e-01  3.032e-01  -2.717  0.00932 **
as.factor(state)PA     -1.326e+00  4.824e-01  -2.749  0.00858 **
as.factor(state)SC     -3.454e-01  5.073e-01  -0.681  0.49950
as.factor(state)TX     -3.218e-02  3.150e-01  -0.102  0.91907
as.factor(state)WA     -1.120e+00  4.820e-01  -2.324  0.02471 *
as.factor(Instance)4    3.688e-01  2.380e-01   1.549  0.12828
as.factor(Instance)6    9.842e-02  2.434e-01   0.404  0.68784
as.factor(Instance)7    4.173e-01  2.465e-01   1.693  0.09742 .
as.factor(Instance)51   1.739e-01  2.363e-01   0.736  0.46542
as.factor(Instance)52   3.012e-01  2.365e-01   1.273  0.20945
birthday                5.804e-03  8.477e-03   0.685  0.49707
district               -2.751e-02  1.573e-02  -1.749  0.08715 .
nominate_dim1          -6.943e-01  9.781e-01  -0.710  0.48145
nominate_dim2          -1.221e+00  5.244e-01  -2.329  0.02442 *
seniority               7.077e-05  1.715e-02   0.004  0.99673
Contribution_minus     -5.582e-07  2.007e-06  -0.278  0.78222
Contribution_plus      -4.660e-07  5.885e-06  -0.079  0.93723
genderM                -1.190e-01  2.017e-01  -0.590  0.55796
pro_env_dummy          -2.443e-02  1.260e-01  -0.194  0.84709
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.2932 on 45 degrees of freedom
  (67 observations deleted due to missingness)
Multiple R-squared:  0.3869,    Adjusted R-squared:  0.04635
F-statistic: 1.136 on 25 and 45 DF,  p-value: 0.3465
```

remove party due to singularities.

checking differences in party

```
ols_change_D <- lm(Vote ~ . - party - Geographical - anti_env_dummy - BioID, data = df_vote_
summary(ols_change_D)
```

```
Call:
lm(formula = Vote ~ . - party - Geographical - anti_env_dummy -
    BioID, data = df_vote_change)

Residuals:
     Min       1Q   Median       3Q      Max
-0.59700 -0.15615  0.01333  0.14696  0.49839

Coefficients:
                       Estimate Std. Error t value Pr(>|t|)
(Intercept)          -1.601e+00  1.762e+01  -0.091   0.9281
stateCO              -9.878e-01  5.102e-01  -1.936   0.0599 .
stateFL              -6.948e-01  4.261e-01  -1.631   0.1108
stateGA              -3.853e-01  5.167e-01  -0.746   0.4602
stateIL              -1.300e+00  5.810e-01  -2.237   0.0309 *
stateMI              -5.356e-01  4.907e-01  -1.092   0.2816
stateNJ              -8.244e-01  5.508e-01  -1.497   0.1423
stateNY              -6.968e-01  3.429e-01  -2.032   0.0488 *
statePA              -8.046e-01  6.265e-01  -1.284   0.2064
stateSC              -1.391e-01  5.727e-01  -0.243   0.8094
stateTX               5.591e-01  3.589e-01   1.558   0.1272
stateWA              -9.315e-01  5.875e-01  -1.586   0.1207
district             -2.544e-02  2.054e-02  -1.238   0.2228
birthday              1.795e-03  8.925e-03   0.201   0.8416
genderM              -5.776e-01  2.144e-01  -2.694   0.0103 *
nominate_dim1         4.641e-01  1.047e+00   0.443   0.6601
nominate_dim2        -1.642e+00  7.178e-01  -2.288   0.0275 *
Instance              4.124e-03  2.323e-03   1.776   0.0834 .
seniority             1.725e-02  1.847e-02   0.934   0.3558
Contribution_minus   -3.325e-06  2.014e-06  -1.651   0.1066
Contribution_plus     7.998e-06  5.860e-06   1.365   0.1799
Dmajority             3.647e-01  1.354e-01   2.693   0.0103 *
vote_change_to_pro    5.046e-01  9.051e-02   5.576 1.87e-06 ***
vote_change_to_anti  -7.597e-01  1.545e-01  -4.916 1.55e-05 ***
pro_env_dummy        -7.613e-02  1.265e-01  -0.602   0.5508
```

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.2946 on 40 degrees of freedom
  (73 observations deleted due to missingness)
Multiple R-squared: 0.7744,   Adjusted R-squared: 0.639
F-statistic: 5.721 on 24 and 40 DF, p-value: 6.978e-07

```
ols_change_R <- lm(Vote ~ . - party - Geographical - anti_env_dummy - BioID, data = df_vote_
summary(ols_change_R)
```

Call:
lm(formula = Vote ~ . - party - Geographical - anti_env_dummy -
    BioID, data = df_vote_change)

Residuals:
     Min   1Q   Median   3Q   Max
-0.59700 -0.15615 0.01333 0.14696 0.49839

Coefficients:
                    Estimate Std. Error t value Pr(>|t|)
(Intercept)   -1.601e+00 1.762e+01 -0.091   0.9281
stateCO   -9.878e-01 5.102e-01 -1.936   0.0599 .
stateFL   -6.948e-01 4.261e-01 -1.631   0.1108
stateGA   -3.853e-01 5.167e-01 -0.746   0.4602
stateIL   -1.300e+00 5.810e-01 -2.237   0.0309 *
stateMI   -5.356e-01 4.907e-01 -1.092   0.2816
stateNJ   -8.244e-01 5.508e-01 -1.497   0.1423
stateNY   -6.968e-01 3.429e-01 -2.032   0.0488 *
statePA   -8.046e-01 6.265e-01 -1.284   0.2064
stateSC   -1.391e-01 5.727e-01 -0.243   0.8094
stateTX   5.591e-01 3.589e-01   1.558   0.1272
stateWA   -9.315e-01 5.875e-01 -1.586   0.1207
district   -2.544e-02 2.054e-02 -1.238   0.2228
birthday   1.795e-03 8.925e-03   0.201   0.8416
genderM   -5.776e-01 2.144e-01 -2.694   0.0103 *
nominate_dim1   4.641e-01 1.047e+00   0.443   0.6601
nominate_dim2   -1.642e+00 7.178e-01 -2.288   0.0275 *
Instance   4.124e-03 2.323e-03   1.776   0.0834 .
seniority   1.725e-02 1.847e-02   0.934   0.3558
Contribution_minus -3.325e-06 2.014e-06 -1.651   0.1066

```
Contribution_plus      7.998e-06  5.860e-06   1.365    0.1799
Dmajority              3.647e-01  1.354e-01   2.693    0.0103 *
vote_change_to_pro     5.046e-01  9.051e-02   5.576 1.87e-06 ***
vote_change_to_anti   -7.597e-01  1.545e-01  -4.916 1.55e-05 ***
pro_env_dummy         -7.613e-02  1.265e-01  -0.602    0.5508
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.2946 on 40 degrees of freedom
  (73 observations deleted due to missingness)
Multiple R-squared:  0.7744,    Adjusted R-squared:  0.639
F-statistic: 5.721 on 24 and 40 DF,  p-value: 6.978e-07
```

We remove anti_env_dummy because of singularities, since all representatives have received contributions from anti environmental groups.

Already here we can see that the coefficients are less significant on average with only instance being significant, with 0.01 units more likely to change their vote from anti to pro environmental vote, further during the years. Moreover, we see that for a change in vote from anti-environmental to pro-environmental

with individual & year FEs

```
# view(df_vote_change)
ols_change_ind_fe <- lm(Vote ~ as.factor(BioID) + as.factor(Instance) + Contribution_minus +
summary(ols_change_ind_fe)
```

```
Call:
lm(formula = Vote ~ as.factor(BioID) + as.factor(Instance) +
    Contribution_minus + Contribution_plus, data = df_vote_change)

Residuals:
     Min       1Q   Median       3Q      Max
-0.91762 -0.31210  0.02747  0.26199  0.79455

Coefficients:
                         Estimate Std. Error t value Pr(>|t|)
(Intercept)             1.595e-01  2.197e-01   0.726 0.470419
as.factor(BioID)C001059 -1.236e-01  2.829e-01  -0.437 0.663661
```

```
as.factor(BioID)C001063 -4.397e-01  2.872e-01  -1.531 0.130502
as.factor(BioID)C001077 -5.353e-01  3.502e-01  -1.529 0.131046
as.factor(BioID)C001106 -2.380e-02  3.216e-01  -0.074 0.941238
as.factor(BioID)G000410  1.539e-01  2.968e-01   0.518 0.605877
as.factor(BioID)G000578 -5.028e-01  3.214e-01  -1.564 0.122430
as.factor(BioID)G000581 -1.487e-01  2.975e-01  -0.500 0.618901
as.factor(BioID)H001051  2.434e-01  3.769e-01   0.646 0.520608
as.factor(BioID)K000387 -4.193e-01  3.313e-01  -1.266 0.210031
as.factor(BioID)L000567 -3.087e-01  2.925e-01  -1.055 0.294990
as.factor(BioID)M001181 -1.372e-01  3.234e-01  -0.424 0.672797
as.factor(BioID)R000435  2.214e-01  3.252e-01   0.681 0.498387
as.factor(BioID)R000578 -9.935e-02  3.241e-01  -0.306 0.760183
as.factor(BioID)R000580 -3.496e-01  2.962e-01  -1.180 0.242110
as.factor(BioID)R000585 -6.064e-01  2.767e-01  -2.192 0.031870 *
as.factor(BioID)S000051 -3.916e-02  2.938e-01  -0.133 0.894370
as.factor(BioID)S000522 -1.065e-01  2.726e-01  -0.391 0.697321
as.factor(BioID)S001196 -2.962e-02  2.792e-01  -0.106 0.915842
as.factor(BioID)U000031 -3.227e-01  3.166e-01  -1.019 0.311864
as.factor(BioID)V000131  1.342e-01  2.615e-01   0.513 0.609531
as.factor(BioID)V000132  1.664e-01  2.587e-01   0.643 0.522263
as.factor(BioID)W000823 -4.045e-01  3.750e-01  -1.079 0.284605
as.factor(Instance)4     1.868e-01  1.522e-01   1.227 0.224109
as.factor(Instance)6     7.256e-01  1.868e-01   3.884 0.000238 ***
as.factor(Instance)7     7.283e-01  1.884e-01   3.865 0.000253 ***
as.factor(Instance)51    5.479e-01  1.598e-01   3.429 0.001039 **
as.factor(Instance)52    6.672e-01  1.624e-01   4.109 0.000110 ***
Contribution_minus       2.298e-06  2.711e-06   0.848 0.399561
Contribution_plus        6.493e-06  8.289e-06   0.783 0.436167
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 0.4481 on 67 degrees of freedom
  (41 observations deleted due to missingness)
Multiple R-squared:  0.4438,    Adjusted R-squared:  0.203
F-statistic: 1.843 on 29 and 67 DF,  p-value: 0.02055
```

```r
# same thing with vote_change_to_anti
ols_change_ind_fe_2 <- lm(vote_change_to_anti ~ as.factor(BioID) + as.factor(Instance) + Cont
summary(ols_change_ind_fe_2)
```

```
Call:
```

```
lm(formula = vote_change_to_anti ~ as.factor(BioID) + as.factor(Instance) +
    Contribution_minus + Contribution_plus, data = df_vote_change)


Residuals:
    Min      1Q   Median      3Q      Max
-0.50157 -0.12397 -0.01686  0.08233  0.79858


Coefficients:
                          Estimate Std. Error t value Pr(>|t|)
(Intercept)              1.106e-01  2.418e-01   0.458   0.6493
as.factor(BioID)C001059 -7.050e-02  2.210e-01  -0.319   0.7511
as.factor(BioID)C001063 -2.636e-01  2.189e-01  -1.204   0.2345
as.factor(BioID)C001077 -2.435e-01  2.779e-01  -0.876   0.3854
as.factor(BioID)C001106 -3.401e-01  2.651e-01  -1.283   0.2056
as.factor(BioID)G000410 -3.295e-01  2.320e-01  -1.420   0.1620
as.factor(BioID)G000578 -4.553e-01  2.652e-01  -1.717   0.0925 .
as.factor(BioID)G000581 -3.416e-01  2.342e-01  -1.458   0.1512
as.factor(BioID)H001051 -5.110e-01  3.565e-01  -1.433   0.1582
as.factor(BioID)K000387  2.718e-01  2.800e-01   0.971   0.3364
as.factor(BioID)L000567 -3.450e-01  2.305e-01  -1.497   0.1410
as.factor(BioID)M001181 -3.641e-01  2.669e-01  -1.364   0.1788
as.factor(BioID)R000435 -4.694e-01  2.687e-01  -1.747   0.0870 .
as.factor(BioID)R000578 -3.962e-01  2.689e-01  -1.473   0.1472
as.factor(BioID)R000580 -3.319e-01  2.319e-01  -1.431   0.1588
as.factor(BioID)R000585 -3.103e-01  2.049e-01  -1.515   0.1364
as.factor(BioID)S000051 -4.043e-01  2.321e-01  -1.742   0.0879 .
as.factor(BioID)S000522 -1.314e-01  2.086e-01  -0.630   0.5319
as.factor(BioID)S001196 -1.645e-01  2.006e-01  -0.820   0.4162
as.factor(BioID)U000031 -2.321e-01  2.319e-01  -1.001   0.3219
as.factor(BioID)V000131 -1.284e-01  1.847e-01  -0.695   0.4903
as.factor(BioID)V000132 -3.839e-01  1.951e-01  -1.967   0.0549 .
as.factor(BioID)W000823  9.058e-02  2.665e-01   0.340   0.7355
as.factor(Instance)4     4.003e-01  2.587e-01   1.547   0.1284
as.factor(Instance)6     2.357e-01  2.596e-01   0.908   0.3684
as.factor(Instance)7     4.045e-01  2.587e-01   1.563   0.1246
as.factor(Instance)51    1.950e-01  2.558e-01   0.762   0.4496
as.factor(Instance)52    3.213e-01  2.548e-01   1.261   0.2134
Contribution_minus      -2.708e-06  2.245e-06  -1.206   0.2337
Contribution_plus        4.329e-07  6.256e-06   0.069   0.9451
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1


Residual standard error: 0.3152 on 48 degrees of freedom
```

```
   (60 observations deleted due to missingness)
Multiple R-squared:  0.3358,     Adjusted R-squared:  -0.06545
F-statistic: 0.8369 on 29 and 48 DF,  p-value: 0.6915
```

To make this work, we have to remove the control variables from before, i.e. party, district, Geographical and state, gender, nominate_dim1&2, and pro- and anti_env_dummy and birthday since these are already included in the individual fixed effects, i.e. these dont chance over time in an individual. Also, seniority and Dmajority are just NAs since this sample size is too small.

What is interesting to see here, is the fact that instances are highly significant. Meaning that for a change in vote, the instance of change is most likely with 0.74 units for vote7 and then 0.72 units for vote 6, and then 53. This is interesting since it shows that the instance of change is more likely to happen in the later votes.

Logit of all Representatives

all representatives

with control variables

```
full_logit <- glm(Vote ~ . - state - BioID, family = binomial(link = "logit"), data = df_long
summary(full_logit)
```

```
Call:
glm(formula = Vote ~ . - state - BioID, family = binomial(link = "logit"),
    data = df_long)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-3.2281  -0.1457  -0.0417   0.0833   3.3671

Coefficients:
                  Estimate Std. Error z value Pr(>|z|)
(Intercept)      -2.869e+01  3.666e+01  -0.783 0.433789
district          7.340e-03  1.823e-02   0.403 0.687230
partyR           -8.436e+00  5.262e-01 -16.031  < 2e-16 ***
Vote_change       4.008e-01  3.916e-01   1.024 0.306011
birthday          1.799e-02  1.863e-02   0.966 0.334286
```

```
genderM                 -1.208e+00  4.968e-01  -2.431 0.015065 *
nominate_dim1           -2.705e+00  1.496e+00  -1.808 0.070639 .
nominate_dim2           -3.449e+00  1.102e+00  -3.131 0.001744 **
GeographicalNE           2.351e+00  5.597e-01   4.201 2.65e-05 ***
GeographicalSO           6.326e-02  4.891e-01   0.129 0.897089
GeographicalWE           6.749e-01  5.613e-01   1.202 0.229175
Instance                 2.821e-02  9.371e-03   3.011 0.002607 **
seniority                2.866e-02  5.020e-02   0.571 0.568110
Contribution_minus      -2.135e-05  8.481e-06  -2.517 0.011824 *
Contribution_plus        9.944e-05  3.621e-05   2.746 0.006026 **
Dmajority                1.622e+00  4.796e-01   3.381 0.000722 ***
anti_env_dummy          -7.252e-01  6.113e-01  -1.186 0.235503
pro_env_dummy            2.651e-01  4.345e-01   0.610 0.541753
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1


(Dispersion parameter for binomial family taken to be 1)


    Null deviance: 2632.06  on 1900  degrees of freedom
Residual deviance:  311.58  on 1883  degrees of freedom
  (413 observations deleted due to missingness)
AIC: 347.58


Number of Fisher Scoring iterations: 8
```

with log transformed contributions

```
cols <- c("Contribution_plus", "Contribution_minus")
df_long[cols] <- lapply(df_long[cols], function(x) log(x + 1))

full_logit_log <- glm(Vote ~ . - state - BioID, family = binomial(link = "logit"), data = df_
summary(full_logit_log)
```

```
Call:
glm(formula = Vote ~ . - state - BioID, family = binomial(link = "logit"),
    data = df_long)

Deviance Residuals:
    Min       1Q    Median       3Q       Max
```

```
-3.2909  -0.1428  -0.0420    0.0828    3.1929

Coefficients:
                        Estimate Std. Error z value Pr(>|z|)
(Intercept)           -24.147741  36.062100  -0.670 0.503103
district                0.003638   0.017619   0.206 0.836419
partyR                 -8.470502   0.538712 -15.724  < 2e-16 ***
Vote_change             0.515223   0.378765   1.360 0.173745
birthday                0.015688   0.018340   0.855 0.392354
genderM                -1.135114   0.494849  -2.294 0.021799 *
nominate_dim1          -2.680033   1.509152  -1.776 0.075757 .
nominate_dim2          -3.378781   1.124512  -3.005 0.002659 **
GeographicalNE          2.306056   0.560957   4.111 3.94e-05 ***
GeographicalSO         -0.020477   0.480132  -0.043 0.965981
GeographicalWE          0.753004   0.552919   1.362 0.173239
Instance                0.030388   0.009379   3.240 0.001196 **
seniority               0.016360   0.049416   0.331 0.740601
Contribution_minus     -0.425574   0.158521  -2.685 0.007261 **
Contribution_plus       0.467132   0.207103   2.256 0.024099 *
Dmajority               1.638044   0.485525   3.374 0.000741 ***
anti_env_dummy          2.776675   1.577183   1.761 0.078318 .
pro_env_dummy          -2.840655   1.576006  -1.802 0.071476 .
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 2632.06  on 1900  degrees of freedom
Residual deviance:  313.57  on 1883  degrees of freedom
  (413 observations deleted due to missingness)
AIC: 349.57

Number of Fisher Scoring iterations: 8
```

with geographical & year FEs

use the package {bife} to use fixed effects in a logit model, since the glm function does not allow for fixed effects in a logit model, it is only for linear models.

```
full_logit_geo <- bife(Vote ~ district + party + birthday + nominate_dim1 + nominate_dim2 + s
    data = df_long,
    model = "logit"
```

```
)
summary(full_logit_geo)
```

binomial - logit link

Vote ~ district + party + birthday + nominate_dim1 + nominate_dim2 +
    seniority + Contribution_minus + Contribution_plus + gender +
    pro_env_dummy + anti_env_dummy + as.factor(Instance) | Geographical

Estimates:

	Estimate	Std. error	z value	Pr(> |z|)	
district	0.006154	0.016764	0.367	0.713534	
partyR	-8.542809	0.552073	-15.474	< 2e-16	***
birthday	0.023251	0.017743	1.310	0.190042	
nominate_dim1	-3.326268	1.458830	-2.280	0.022602	*
nominate_dim2	-3.151010	1.114133	-2.828	0.004681	**
seniority	0.040313	0.046539	0.866	0.386373	
Contribution_minus	-0.481313	0.160668	-2.996	0.002738	**
Contribution_plus	0.499922	0.210771	2.372	0.017698	*
genderM	-1.104824	0.494948	-2.232	0.025602	*
pro_env_dummy	-3.057877	1.604364	-1.906	0.056654	.
anti_env_dummy	3.290619	1.592082	2.067	0.038747	*
as.factor(Instance)4	0.666081	0.596310	1.117	0.263992	
as.factor(Instance)6	2.366722	0.666295	3.552	0.000382	***
as.factor(Instance)7	1.619147	0.692177	2.339	0.019325	*
as.factor(Instance)51	1.558957	0.628168	2.482	0.013074	*
as.factor(Instance)52	2.074271	0.630273	3.291	0.000998	***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

residual deviance= 312.02,
null deviance= 2632.06,
n= 1901, N= 4

(413 observation(s) deleted due to missingness)

Number of Fisher Scoring Iterations: 8

Average individual fixed effect= -38.264

with state & year fixed effects

```
full_logit_state <- bife(Vote ~ district + party + birthday + nominate_dim1 + nominate_dim2 +
    data = df_long,
    model = "logit"
)
summary(full_logit_state)
```

```
binomial - logit link

Vote ~ district + party + birthday + nominate_dim1 + nominate_dim2 +
    seniority + Contribution_minus + Contribution_plus + gender +
    pro_env_dummy + anti_env_dummy + factor(Instance) | state

Estimates:
                      Estimate Std. error z value Pr(> |z|)
district              1.483e-02  2.530e-02   0.586  0.557815
partyR               -3.967e+01  1.568e+03  -0.025  0.979809
birthday              2.995e-02  1.958e-02   1.529  0.126211
nominate_dim1        -4.280e+00  1.899e+00  -2.254  0.024190 *
nominate_dim2        -1.988e+00  1.233e+00  -1.613  0.106776
seniority             3.920e-05  5.387e-02   0.001  0.999419
Contribution_minus  -4.726e-01  2.088e-01  -2.263  0.023652 *
Contribution_plus     5.025e-01  2.569e-01   1.956  0.050431 .
genderM              -1.340e+00  6.775e-01  -1.978  0.047973 *
pro_env_dummy        -2.926e+00  1.956e+00  -1.496  0.134734
anti_env_dummy        3.246e+00  2.040e+00   1.592  0.111494
factor(Instance)4     7.365e-01  6.433e-01   1.145  0.252267
factor(Instance)6     2.731e+00  7.430e-01   3.676  0.000237 ***
factor(Instance)7     2.006e+00  7.769e-01   2.582  0.009824 **
factor(Instance)51    1.978e+00  6.942e-01   2.850  0.004375 **
factor(Instance)52    2.243e+00  6.849e-01   3.275  0.001057 **
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

residual deviance= 222.37,
null deviance= 2308.69,
n= 1668, N= 32

( 413 observation(s) deleted due to missingness )
( 233 observation(s) deleted due to perfect classification )
```

```
Number of Fisher Scoring Iterations: 21
```

```
Average individual fixed effect= -32.671
```

Logit per Vote

doesnt work yet, why?

```
# # Vote 4_2
# view(df_vote_4_2)
# logit_4_2 <- bife(gender ~ Contribution_3_minus + Contribution_4_minus + Contribution_4_plu
#     data = df_vote_4_2,
#     model = "logit"
# )
# summary(logit_4_2)
# # + seniority_114 + gender + pro_env_dummy
# # Vote4_minus ~ Contribution_3_minus + Contribution_3_plus + Contribution_4_minus + Contri
# # nominate_dim1 + nominate_dim2

# # Vote 51_2
# logit_51_2 <- bife(Vote51_minus ~ Contribution_3_minus + Contribution_3_plus + Contributio
#     data = df_vote_51_2,
#     model = "logit"
# )
```

need to remove dw-nominate scores, since they create a glm.fit error - too accurate 0 or 1 values.

need to remove anti_env_dummy and district because of singularities, since all have received anti_env contributions, so the coefficient is not defined.

individual and year fixed effects

```
logit_ind_fe <- bife(Vote ~ nominate_dim1 + nominate_dim2 + Contribution_minus + Contribution
summary(logit_ind_fe)
```

binomial - logit link

```
Vote ~ nominate_dim1 + nominate_dim2 + Contribution_minus + Contribution_plus |
    BioID

Estimates:
                    Estimate Std. error z value Pr(> |z|)
nominate_dim1      -4.359e+15  6.683e+15  -0.652     0.514
nominate_dim2       1.418e+15  3.901e+15   0.364     0.716
Contribution_minus -5.771e-02  1.261e-01  -0.458     0.647
Contribution_plus  -4.445e-02  8.807e-02  -0.505     0.614


residual deviance= 118.29,
null deviance= 139.93,
n= 101, N= 24

( 97 observation(s) deleted due to missingness )
( 2116 observation(s) deleted due to perfect classification )

Number of Fisher Scoring Iterations: 25

Average individual fixed effect= 9.655394e+14
```

create model summaries

LPM models

```
main_ols <- stargazer(full_ols, ols_party_plm, ols_geo_plm, ols_ind_fe_plm, ols_state_fe_plm
```

			Dependent va
			Vote
	OLS		
	(1)	(2)	(3)
district	0.001**	0.001*	0.001
	(0.0004)	(0.0004)	(0.00
partyR	-0.901***	-0.911***	-0.902

	(1)	(2)	(3)
	(0.009)	(0.008)	(0.00
birthday	0.001*	0.001*	0.001
	(0.0004)	(0.0004)	(0.00
genderM	-0.025***	-0.025***	-0.020
	(0.009)	(0.009)	(0.00
nominate_dim1	-0.141***	-0.123***	-0.141
	(0.029)	(0.028)	(0.02
nominate_dim2	-0.070***	-0.074***	-0.069
	(0.021)	(0.022)	(0.02
GeographicalNE	0.073***	0.073***	
	(0.011)	(0.011)	
GeographicalSO	0.009	0.004	
	(0.009)	(0.009)	
GeographicalWE	0.019*	0.016	
	(0.011)	(0.011)	
Instance	0.0005***		
	(0.0002)		
seniority	0.002	0.001	0.002
	(0.001)	(0.001)	(0.00
Contribution_minus	-0.00000***		-0.0000
	(0.00000)		(0.000
Contribution_plus	0.00001***		0.0000
	(0.00000)		(0.000
Dmajority	0.024***		
	(0.009)		
anti_env_dummy	-0.021	-0.028**	-0.02
	(0.013)	(0.013)	(0.01
pro_env_dummy	-0.007	0.007	-0.0
	(0.009)	(0.008)	(0.00

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```
Constant                           -0.416
                                   (0.782)


------------------------------------------------------------------------------------------
Observations                       1,901                    1,901                      1,90
R2                                 0.909                    0.906                      0.89
Adjusted R2                        0.908                    0.905                      0.89
Residual Std. Error     0.152 (df = 1884)
F Statistic          1,172.471*** (df = 16; 1884) 1,514.624*** (df = 12; 1883) 1,465.286*** (
==========================================================================================
Note:
```

```r
basic_ols <- stargazer(full_ols_dummy, full_ols, full_ols_log, type = "text")
```

```
==========================================================================================
                                         Dependent variable:
                           ---------------------------------------------------------------
                                               Vote
                                 (1)                      (2)
                           ---------------------------------------------------------------
district                        0.001*                   0.001**                     (
                                (0.0004)                 (0.0004)                     (

partyR                         -0.911***                -0.901***                   -0
                                (0.008)                  (0.009)                     (

Vote_change_dummy                                                                    0
                                                                                     (

birthday                        0.001*                   0.001*                      (
                                (0.0004)                 (0.0004)                     (

genderM                        -0.025***                -0.025***                   -0
                                (0.009)                  (0.009)                     (

nominate_dim1                  -0.122***                -0.141***                   -0
                                (0.028)                  (0.029)                     (

nominate_dim2                  -0.075***                -0.070***                   -0
                                (0.022)                  (0.021)                     (
```

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GeographicalNE	0.074***	0.073***	0
	(0.011)	(0.011)	(
GeographicalSO	0.004	0.009	-
	(0.009)	(0.009)	(
GeographicalWE	0.016	0.019*	(
	(0.011)	(0.011)	(
Instance	0.001***	0.0005***	0
	(0.0002)	(0.0002)	(
seniority	0.001	0.002	(
	(0.001)	(0.001)	(
Contribution_minus		-0.00000***	
		(0.00000)	
Contribution_plus		0.00001***	
		(0.00000)	
Dmajority	0.025***	0.024***	0
	(0.009)	(0.009)	(
anti_env_dummy	-0.028**	-0.021	0
	(0.013)	(0.013)	(
pro_env_dummy	0.007	-0.007	-(
	(0.008)	(0.009)	(
Contribution_plus_log			0
			(
Contribution_minus_log			-0
			(
Constant	-0.351	-0.416	(
	(0.787)	(0.782)	(
Observations	1,901	1,901	
R2	0.907	0.909	(

```
Adjusted R2                            0.906                              0.908                          (
Residual Std. Error            0.153 (df = 1886)               0.152 (df = 1884)              0.148
F Statistic                1,313.433*** (df = 14; 1886) 1,172.471*** (df = 16; 1884) 1,156.946***
================================================================================================
Note:                                                                             *p<0.1; **p
```

```
# party_ols <- stargazer(ols_party, ols_party_dummy, type = "text")
# geo_ols <- stargazer(ols_geo, ols_geo_log, type = "text")
# state_ols <- stargazer(ols_state_fe, ols_state_fe_log, ols_state_fe_dummy, type = "text")
# ind_ols <- stargazer(ols_ind_fe, ols_ind_fe_log, ols_ind_fe_dummy, type = "text")
# ols_per_vote <- stargazer(ols_4_2, ols_51_2, ols_52_2, ols_6_2, ols_7_2, type = "text")
# consistent_ols <- stargazer(ols_no_change, ols_party_no_change, ols_no_change_state_fe, ols
```

```
# main ols
```