Empirical Assignment 6

Network Homophily and "Failing Fast" in Silicon Valley Venture Capital Investing

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Chapter 1

Investor Firm Status and Investment Diversification

1.1 Rsiena regression results and insights

In this part, I ran regression between different kinds of homophily and entrepreneur's attributes and waves of network between investors and entrepreneurs. For each industry, I first ran a regression almost with every homophily and attributes that I created; then I dropped those insignificant ones and ran further regression until it cannot convergent anymore. Also, I chose the recent 9 years or each industry since these industries that I worked on has not many records 10 years ago.

Retail

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Estimates, standard errors and convergence t-ratios

                                            Estimate    Standard    Convergence
                                                          Error       t-ratio
  1. rate constant SWsiena rate (period 1)    0.1000 (   0.0462  )    -0.0219
  2. rate constant SWsiena rate (period 2)    0.0813 (   0.0403  )     0.0384
  3. rate constant SWsiena rate (period 3)    0.1473 (   0.0565  )     0.0312
  4. rate constant SWsiena rate (period 4)    0.3330 (   0.0930  )    -0.0699
  5. rate constant SWsiena rate (period 5)    0.4102 (   0.1065  )     0.0834
  6. rate constant SWsiena rate (period 6)    0.2197 (   0.0709  )     0.0143
  7. rate constant SWsiena rate (period 7)    0.2655 (   0.0936  )    -0.0328
  8. rate constant SWsiena rate (period 8)    0.1970 (   0.0891  )    -0.0084
  9. eval outdegree (density)               -32.7087 (   6.7068  )    -0.0043
 10. eval 4-cycles (1)                         5.8440 (   2.9820  )     0.0036
 11. eval indegree - popularity (sqrt)        12.7580 (   3.9097  )     0.0147
 12. eval outdegree - activity (sqrt)         11.1604 (   5.3905  )    -0.0165
 13. eval out-in degree^(1/2) assortativity  -11.5631 (   3.7280  )     0.0144
 14. eval ethniceff                            4.3705 (   1.7285  )     0.0056
 15. eval gendereff                          556.8012 (  45.2552  )    -0.2522
 16. eval experienceeff                        0.4568 (   0.2063  )     0.0119
 17. eval entregender alter                 -557.1947 (  45.0964  )     0.1767
 18. eval entrerace alter                     -0.6025 (   0.5818  )    -0.0006
 19. eval entreround alter                     0.2428 (   0.0993  )     0.0211
 20. eval entrebus alter                      -0.7241 (   0.8003  )     0.0083
 21. eval entreexperience alter                0.8334 (   0.2302  )     0.0382
 22. eval entregeo alter                       0.9436 (   0.6597  )     0.0052

Overall maximum convergence ratio:    1.1913


Total of 2260 iteration steps.
```

Looking at the results, the coefficients really illustrate what factors influence investor's decision about whether or not to invest in an entrepreneur's startup in the retail industry. Since almost all of the convergence t-ratios are all less than 0.1, and the maximum convergence ratio is rather small (I tried my best but cannot achieve 0.25 here), I can draw following conclusions.

The coefficient of cycle4 is positive, indicating that the closure capturing network homophily has a positive effect on investors choosing to make an investment; the coefficients of outActSqrt and inPopSqrt are both positive, meaning that investors who fund many entrepreneurs' ventures tend to be more likely to do so going forward, and that entrepreneurs who are funded by many investors tend to be more likely to receive funding opportunities by more investors going forward; the coefficient of outInAss is negative, meaning that investors who fund many entrepreneurs' ventures do not tend to associate with entrepreneurs who receive many funding opportunities from investors, which means that investors tend to find those "treasure that has never been found before".

The coefficients of three dyadic predictors here are all positive, indicating that having ethnic, gender, and experience homophily could more likely lead to the investor investing the entrepreneur. The coefficients of entrepreneur's gender, race and business skills are negative, which indicates that female, white people and people not having a business background are more likely to be invested in in the retail industry. The coefficients of entrepreneur's investment round, experience and whether located in top10 cities are positive, indicating that the more rounds the entrepreneur has got, the longer he has immersed himself in the industry, more likely he can get investments – being located in the top 10 cities also helps.

Commercial service

```
Estimates, standard errors and convergence t-ratios

                                            Estimate    Standard    Convergence
                                                        Error        t-ratio
  1. rate constant SWsiena rate (period 1)    0.1439 (    0.0315 )     0.0185
  2. rate constant SWsiena rate (period 2)    0.1875 (    0.0379 )    -0.0160
  3. rate constant SWsiena rate (period 3)    0.2076 (    0.0395 )     0.0466
  4. rate constant SWsiena rate (period 4)    0.2017 (    0.0396 )    -0.0113
  5. rate constant SWsiena rate (period 5)    0.2255 (    0.0465 )     0.0097
  6. rate constant SWsiena rate (period 6)    0.2570 (    0.0525 )     0.0539
  7. rate constant SWsiena rate (period 7)    0.4352 (    0.0833 )    -0.0111
  8. rate constant SWsiena rate (period 8)    0.3373 (    0.0822 )    -0.0088
  9. eval outdegree (density)               -20.9466 ( 201.6869 )    -0.0087
 10. eval 4-cycles (1)                        15.1906 (  72.7601 )    -0.0008
 11. eval indegree - popularity (sqrt)        24.7504 ( 200.1038 )    -0.0379
 12. eval outdegree - activity (sqrt)         19.5426 ( 201.2437 )    -0.0382
 13. eval out-in degree^(1/2) assortativity  -25.7582 ( 199.9434 )     0.0045
 14. eval ethniceff                            5.4955 (    1.0935 )    -0.0124
 15. eval gendereff                            0.4877 (    1.3254 )     0.0058
 16. eval experienceeff                        0.6713 (    0.1186 )    -0.0239
 17. eval schooleff                            1.4232 (    0.6815 )     0.0132
 18. eval skillseff                           -0.5690 (    1.0947 )     0.0103
 19. eval entreschool alter                   -0.1872 (    0.6101 )    -0.0160
 20. eval entretech alter                      0.5690 (    0.4810 )     0.0575
 21. eval entregender alter                    0.0028 (    1.2700 )    -0.0125
 22. eval entrerace alter                     -0.8737 (    0.5093 )    -0.0122
 23. eval entreround alter                     0.5574 (    0.0723 )    -0.0077
 24. eval entrebus alter                      -0.3927 (    0.5431 )    -0.0025
 25. eval entreexperience alter                0.9077 (    0.1207 )     0.0474
 26. eval entregeo alter                       0.1478 (    0.2127 )    -0.0086

Overall maximum convergence ratio:    1.8927


Total of 2265 iteration steps.
```

Using similar way of analysis, we can see that the ethnic, gender, school and experience homophily can positively affect the investor to invest in the entrepreneur, while the coefficient of skills homophily is negative, indicating that investor and entrepreneur choose to be complementary to each other in terms of skills, which makes sense. In the same way, other personal attributes promote the investor to invest in an entrepreneur if their coefficients are positive, else not.

Healthcare Devices and Supplies

Estimates, standard errors and convergence t-ratios

	Estimate	Standard Error	Convergence t-ratio
1. rate constant SWsiena rate (period 1)	0.0229 (	0.0166)	0.0014
2. rate constant SWsiena rate (period 2)	0.0344 (	0.0199)	0.0045
3. rate constant SWsiena rate (period 3)	0.0459 (	0.0244)	0.0032
4. rate constant SWsiena rate (period 4)	0.0112 (	0.0115)	-0.0142
5. rate constant SWsiena rate (period 5)	0.0459 (	0.0232)	0.0420
6. rate constant SWsiena rate (period 6)	0.0807 (	0.0353)	-0.0245
7. rate constant SWsiena rate (period 7)	0.1287 (	0.0403)	-0.0377
8. rate constant SWsiena rate (period 8)	0.1140 (	0.0381)	-0.0147
9. rate constant SWsiena rate (period 9)	0.0440 (	0.0234)	-0.0127
10. rate constant SWsiena rate (period 10)	0.0886 (	0.0332)	-0.0410
11. rate constant SWsiena rate (period 11)	0.1453 (	0.0420)	-0.0588
12. rate constant SWsiena rate (period 12)	0.0858 (	0.0329)	-0.0033
13. rate constant SWsiena rate (period 13)	0.1790 (	0.0448)	0.0067
14. rate constant SWsiena rate (period 14)	0.2907 (	0.0675)	-0.0272
15. rate constant SWsiena rate (period 15)	0.1752 (	0.0455)	0.0069
16. rate constant SWsiena rate (period 16)	0.2462 (	0.0532)	0.0193
17. rate constant SWsiena rate (period 17)	0.1764 (	0.0468)	0.0273
18. rate constant SWsiena rate (period 18)	0.1623 (	0.0432)	0.0114
19. eval outdegree (density)	-13.3663 (	5.2075)	-0.0251
20. eval 4-cycles (1)	5.5801 (	2.7501)	0.0159
21. eval indegree - popularity (sqrt)	9.0726 (	5.1255)	-0.0507
22. eval outdegree - activity (sqrt)	8.8601 (	5.1055)	-0.0626
23. eval out-in degree^(1/2) assortativity	-7.8742 (	5.0125)	-0.0044
24. eval ethniceff	6.0044 (	3.4343)	0.0488
25. eval gendereff	0.1256 (	0.6204)	-0.0420
26. eval schooleff	-6.0331 (	18.3407)	0.0577
27. eval skillseff	-6.4576 (	14.1160)	0.0388
28. eval entregender alter	-0.5586 (	0.6221)	-0.0060
29. eval entrerace alter	-0.1234 (	0.3963)	0.0326
30. eval entreschool alter	-0.0710 (	0.5216)	0.0407
31. eval entrebus alter	-0.3406 (	0.3545)	0.0113
32. eval entretech alter	0.1924 (	0.4139)	-0.0484
33. eval entregeo alter	-0.3180 (	0.5474)	-0.0201

Overall maximum convergence ratio: 1.7057

Total of 2444 iteration steps.

Commercial product

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Estimates, standard errors and convergence t-ratios

                                              Estimate   Standard    Convergence
                                                          Error       t-ratio
  1. rate constant SWsiena rate (period 1)     0.1626  (  0.0521  )    0.0680
  2. rate constant SWsiena rate (period 2)     0.1615  (  0.0509  )   -0.0316
  3. rate constant SWsiena rate (period 3)     0.3619  (  0.0824  )    0.0663
  4. rate constant SWsiena rate (period 4)     0.2313  (  0.0661  )   -0.0220
  5. rate constant SWsiena rate (period 5)     0.4062  (  0.1003  )    0.0231
  6. rate constant SWsiena rate (period 6)     0.4312  (  0.1135  )    0.0091
  7. rate constant SWsiena rate (period 7)     0.5601  (  0.1860  )    0.0652
  8. rate constant SWsiena rate (period 8)     0.6551  (  0.2656  )   -0.0487
  9. eval outdegree (density)                 -8.5902  (  7.1812  )    0.0194
 10. eval 4-cycles (1)                        -1.2437  ( 32.2064  )    0.0316
 11. eval indegree - popularity (sqrt)         2.0577  (  4.9722  )    0.0030
 12. eval outdegree - activity (sqrt)         -0.1576  (  6.0407  )   -0.0218
 13. eval out-in degree^(1/2) assortativity   -0.5190  (  4.2576  )    0.0444
 14. eval ethniceff                            9.6878  (  1.1728  )    0.0161
 15. eval gendereff                           -1.0908  (  1.4284  )   -0.0302
 16. eval schooleff                            1.3805  (  2.1829  )    0.0487
 17. eval skillseff                            0.9705  (  3.3564  )    0.0669
 18. eval entregender alter                    2.9516  (  2.3675  )    0.0266
 19. eval entrerace alter                     -3.9680  (  1.8106  )   -0.0097
 20. eval entreschool alter                   -0.6343  (  2.0088  )   -0.0147
 21. eval entrebus alter                       1.3889  (  1.1803  )   -0.0075
 22. eval entretech alter                     -1.4849  (  2.7642  )    0.0376
 23. eval entregeo alter                      -0.0616  (  2.1261  )   -0.0578

Overall maximum convergence ratio:    2.0135


Total of 2336 iteration steps.
```

Pharmaceuticals and Biotechnology

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Estimates, standard errors and convergence t-ratios

                                              Estimate   Standard    Convergence
                                                          Error       t-ratio
  1. rate constant SWsiena rate (period 1)     0.1772  (  0.0613  )    0.0238
  2. rate constant SWsiena rate (period 2)     0.2142  (  0.0698  )   -0.0060
  3. rate constant SWsiena rate (period 3)     0.1369  (  0.0511  )   -0.0096
  4. rate constant SWsiena rate (period 4)     0.1394  (  0.0533  )    0.0222
  5. rate constant SWsiena rate (period 5)     0.2561  (  0.0772  )    0.0086
  6. rate constant SWsiena rate (period 6)     0.2134  (  0.0654  )    0.0411
  7. rate constant SWsiena rate (period 7)     0.4463  (  0.1069  )    0.0228
  8. rate constant SWsiena rate (period 8)     0.1940  (  0.0580  )    0.0289
  9. eval outdegree (density)                 -1.8656  (  5.5345  )    0.0924
 10. eval 4-cycles (1)                         1.4646  (  2.8648  )    0.0316
 11. eval indegree - popularity (sqrt)        -2.1690  (  5.2312  )    0.0851
 12. eval outdegree - activity (sqrt)          0.3660  (  4.9652  )    0.1009
 13. eval out-in degree^(1/2) assortativity   -0.2618  (  4.6958  )    0.1183
 14. eval ethniceff                            3.9610  (  1.3030  )    0.0318
 15. eval gendereff                           -0.6850  (  0.7452  )    0.0430
 16. eval schooleff                          -71.5426  ( 68.9841  )    0.5664
 17. eval skillseff                            1.1376  (  2.2278  )   -0.0362
 18. eval entregender alter                    0.3653  (  0.9108  )    0.0065
 19. eval entrerace alter                     -0.7852  (  0.7717  )   -0.0262
 20. eval entreschool alter                    0.5214  (  0.4611  )    0.1074
 21. eval entrebus alter                       0.2750  (  0.3846  )    0.0983
 22. eval entretech alter                     -0.7590  (  1.6657  )    0.0265
 23. eval entregeo alter                       0.6014  (  0.5536  )   -0.0839

Overall maximum convergence ratio:    1.1596


Total of 2336 iteration steps.
```

1.2 Conclusion

You can easily check the influence of those significant homophily or entrepreneur's attributes in the 5 industries' network. Each industry has its own features of homophily.

Those homophily push the entrepreneurs to 'fail fast', because they find giving up easily does not mean much for their future path – what matters more is the homophily between them and the investors. So they would choose to quickly give up a startup firm if they sensed that it would not have a rather big possibility to succeed. That's kind of based on their knowledge of the homophily's influence on the investment network.

Chapter 2

Investor Firm Status and Investment Diversification

2.1 (Question A)

Regression between the homophily of investment decisions reflected in its local network and whether the firm goes out of business:

```
Call:
glm(formula = out_of_business ~ l4c_scaled + gender + ethnicity +
    age_diff + geo_dist + ivyplus + complementarity + male_exec +
    nonwhite_exec + ivyplus_exec + inv_long + inv_lat + year,
    family = "binomial", data = outcome)

Deviance Residuals:
    Min       1Q    Median       3Q       Max
-0.3944   -0.2377   -0.1833   -0.1355    3.8217

Coefficients:
                  Estimate Std. Error z value Pr(>|z|)
(Intercept)      4.428e+00  1.325e+01   0.334  0.73829
l4c_scaled      -5.906e-01  7.207e-02  -8.194 2.53e-16 ***
gender          -1.139e-01  1.658e-01  -0.687  0.49207
ethnicity        4.055e-01  1.475e-01   2.750  0.00596 **
age_diff        -1.889e-01  1.760e-02 -10.730  < 2e-16 ***
geo_dist         4.724e-08  2.722e-08   1.736  0.08259 .
ivyplus         -5.236e-01  2.215e-01  -2.364  0.01809 *
complementarity  1.028e-01  9.635e-02   1.067  0.28594
male_exec        5.648e-01  2.163e-01   2.611  0.00904 **
nonwhite_exec   -2.655e-03  1.540e-01  -0.017  0.98624
ivyplus_exec     7.913e-02  1.383e-01   0.572  0.56717
inv_long         3.068e-03  1.593e-03   1.926  0.05415 .
inv_lat         -2.003e-02  8.837e-03  -2.266  0.02343 *
year            -3.675e-03  6.568e-03  -0.560  0.57577
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 10189.3  on 52024  degrees of freedom
Residual deviance:  9732.8  on 52011  degrees of freedom
  (2929 observations deleted due to missingness)
AIC: 9760.8

Number of Fisher Scoring iterations: 8
```

As you can see from the result, ethnicity homophily and top school homophily are positively correlated with number of going out of business, which means these homophily would not help investors to avoid going out of business. While age homophily and top school homophily can help investors avoid going out of business.

2.2 (Question B)

First, I checked the distribution of y variable. It turns out to be like a Poisson distribution, so I chose to use passion(link='log') as the family of glm regression.

Histogram of outcome$successful_investments
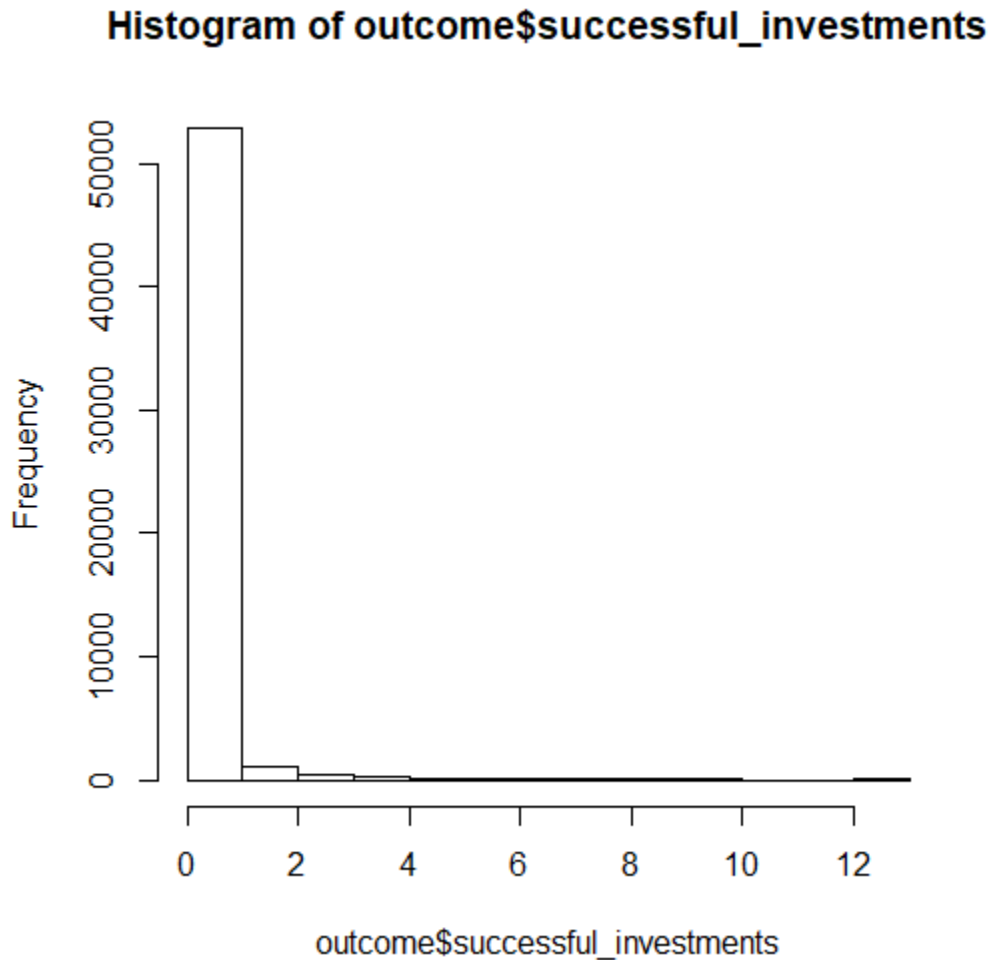
Regression between homophily and number of successful investments:

```
Call:
glm(formula = successful_investments ~ l4c_scaled + gender +
    ethnicity + age_diff + geo_dist + ivyplus + complementarity +
    male_exec + nonwhite_exec + ivyplus_exec + inv_long + inv_lat +
    year + l4c_avg + gender_avg + ethnicity_avg + age_diff_avg +
    geo_dist_avg + ivyplus_avg + complementarity_avg + male_exec_avg +
    nonwhite_exec_avg + ivyplus_exec_avg, family = poisson(link = "log"),
    data = outcome)

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-5.7507  -0.6825  -0.5821  -0.4665   6.5671

Coefficients:
                      Estimate Std. Error z value Pr(>|z|)
(Intercept)          1.305e+02  4.354e+00  29.979  < 2e-16 ***
l4c_scaled           4.748e-02  5.294e-03   8.968  < 2e-16 ***
gender              -1.727e-01  1.690e-01  -1.022 0.306707
ethnicity           -1.360e-01  1.007e-01  -1.351 0.176776
age_diff             1.259e-01  5.891e-03  21.373  < 2e-16 ***
geo_dist            -2.672e-08  1.851e-08  -1.444 0.148783
ivyplus             -6.538e-01  1.438e-01  -4.547 5.45e-06 ***
complementarity      3.188e-03  7.120e-02   0.045 0.964289
male_exec            1.316e-01  1.754e-01   0.750 0.453054
nonwhite_exec        3.016e-02  9.994e-02   0.302 0.762861
ivyplus_exec         3.727e-01  1.008e-01   3.697 0.000218 ***
inv_long            -4.911e-03  4.609e-04 -10.656  < 2e-16 ***
inv_lat              8.297e-03  2.854e-03   2.908 0.003643 **
year                -6.610e-02  2.158e-03 -30.636  < 2e-16 ***
l4c_avg              1.294e-03  1.690e-05  76.555  < 2e-16 ***
gender_avg           6.694e-01  1.869e-01   3.581 0.000343 ***
ethnicity_avg       -2.321e-01  1.130e-01  -2.053 0.040049 *
age_diff_avg        -1.544e-03  7.373e-03  -0.209 0.834125
geo_dist_avg         4.964e-08  2.141e-08   2.319 0.020415 *
ivyplus_avg          9.520e-01  1.678e-01   5.672 1.41e-08 ***
complementarity_avg -3.059e-01  8.138e-02  -3.758 0.000171 ***
male_exec_avg       -4.894e-01  1.953e-01  -2.506 0.012211 *
nonwhite_exec_avg   -3.248e-03  1.133e-01  -0.029 0.977131
ivyplus_exec_avg    -6.667e-01  1.185e-01  -5.626 1.85e-08 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

(Dispersion parameter for poisson family taken to be 1)

    Null deviance: 49003  on 52024  degrees of freedom
Residual deviance: 41649  on 52001  degrees of freedom
  (2929 observations deleted due to missingness)
AIC: 60159

Number of Fisher Scoring iterations: 6
```

After checking the coefficients of those significant variables, I can conclude that top school homophily cannot help investors achieve more successful investments, while age homophily could.

2.3 (Question C)

Regression between homophily and startups' being benefit:

```
Call:
multinom(formula = company_state ~ l4c_scaled + gender + ethnicity +
    age_diff + geo_dist + ivyplus + complementarity + male_exec +
    nonwhite_exec + ivyplus_exec + comp_lon + comp_lat + year,
    data = state)

Coefficients:
                   (Intercept) l4c_scaled     gender ethnicity     age_diff     geo_dist    ivyplus
Exit                186.441323  0.4381072  0.8360011 0.2951224  1.194351e-02 -3.037248e-07  0.7860045
Generating revenue -288.032186  0.4203304  0.1477674 0.2515909 -1.979534e-05 -1.714051e-07  0.8469624
Not profitable       -8.790595  0.7125965  0.6223250 8.9152027  1.800463e-01 -2.374027e-07 -2.5835065
Out of business     159.323146  0.4472242 -0.4659560 0.7692369  2.398779e-02 -3.227187e-07  0.3815110
Profitable           52.666913  0.3945598  1.1152240 0.8160843  3.766465e-02  1.228325e-08  0.5548557
Startup             -63.201555  0.3963752 -0.1800012 0.5721802  8.080599e-02 -2.465334e-07  0.8264651
                   complementarity  male_exec nonwhite_exec ivyplus_exec      comp_lon    comp_lat          year
Exit                   -0.95015474 0.082625916  -0.068862935 -0.124742531 -0.003437161 -0.02484067 -0.091956538
Generating revenue     -0.72195207 0.002111769   0.007151966 -0.143108876 -0.002235510 -0.04267429  0.145054453
Not profitable         -0.04297519 0.238157377  -0.007546508  0.122747601  0.016823559  0.06329483 -0.001914255
Out of business        -1.01351444 0.099446801   0.099148149  0.050335101 -0.009788564 -0.08526149 -0.077478457
Profitable             -0.96665206 0.131173115  -0.200004229  0.006290531 -0.002002496  0.01437047 -0.027188971
Startup                -0.97421437 -0.038956136   0.057933723 -0.036973496 -0.009697395 -0.08754116  0.032907926

Std. Errors:
                   (Intercept)   l4c_scaled       gender    ethnicity     age_diff     geo_dist      ivyplus
Exit               9.529067e-09 2.487217e-09 8.481358e-09 6.375706e-09 5.263523e-08 1.926945e-08 1.029484e-09
Generating revenue 8.691622e-09 8.612425e-09 6.344684e-09 4.181865e-09 4.146984e-08 1.616511e-08 7.423360e-10
Not profitable     1.606329e-08 1.531290e-08 1.358754e-08 1.602781e-08 1.579798e-07 3.370574e-08 2.994483e-10
Out of business    9.921191e-09 3.006820e-09 7.600200e-09 7.483200e-09 6.163469e-08 2.096231e-08 8.577373e-10
Profitable         1.149828e-08 3.567156e-09 1.048202e-08 9.258797e-09 7.860017e-08 2.064806e-08 1.139094e-09
Startup            9.867527e-09 2.981757e-09 7.740582e-09 6.982795e-09 7.887236e-08 2.010025e-08 1.296891e-09
                   complementarity    male_exec nonwhite_exec ivyplus_exec     comp_lon     comp_lat         year
Exit               7.107774e-09 8.726497e-09  1.816990e-09 2.170774e-09 9.734724e-07 3.726372e-07 1.917125e-05
Generating revenue 9.199145e-09 7.670682e-09  2.122164e-09 1.806527e-09 8.585923e-07 3.441207e-07 1.750544e-05
Not profitable     1.122073e-08 1.447580e-08  2.667613e-09 4.422592e-09 1.511514e-06 6.473513e-07 3.235164e-05
Out of business    6.837604e-09 8.929276e-09  2.185320e-09 2.545656e-09 1.029543e-06 3.804273e-07 1.996516e-05
Profitable         7.292031e-09 1.055243e-08  1.817479e-09 2.847020e-09 1.171060e-06 4.545393e-07 2.314445e-05
Startup            6.900617e-09 8.769708e-09  2.225158e-09 2.535883e-09 1.038199e-06 3.773279e-07 1.987181e-05

Residual Deviance: 85994.63
AIC: 86162.63
```

z-score:

```
> z = summary(model)$coefficients/summary(model)$standard.errors
> z
                   (Intercept)  l4c_scaled    gender ethnicity   age_diff    geo_dist      ivyplus complementarity
Exit               19565537921  176143556  98569250  46288577  226910.916 -15.7619836    763493877      -133678233
Generating revenue -33139059968   48805121  23289958  60162376    -477.343 -10.6033993   1140942203       -78480344
Not profitable      -547247301   46535706  45801144 556233403 1139679.136  -7.0433922  -8627555102       -3829981
Out of business    16058872138  148736600 -61308379 102795185  389192.965 -15.3951889    444787694      -148226543
Profitable          4580416295  110609039 106393989  88141502  479193.054   0.5948864    487102499      -132562793
Startup            -6405004572  132933434 -23254217  81941435 1024515.877 -12.2651881    637266696      -141177861
                     male_exec nonwhite_exec ivyplus_exec   comp_lon    comp_lat         year
Exit                 9468394.4    -37899460    -57464529  -3530.826   -66661.81 -4796.58498
Generating revenue    275303.9      3370128    -79217692  -2603.693  -124009.63  8286.25095
Not profitable      16452106.8     -2828937     27754674  11130.269    97775.08   -59.17028
Out of business     11137162.9     45370074     19772938  -9507.683  -224120.33 -3880.68267
Profitable          12430603.8   -110044892      2209514  -1709.986    31615.47 -1174.75126
Startup             -4442124.8     26035780    -14580125  -9340.598  -232002.90  1656.01090
```

p-value:

```
> (1 - pnorm(abs(z), 0, 1)) * 2
                 (Intercept) l4c_scaled gender ethnicity age_diff      geo_dist ivyplus complementarity male_exec
Exit                       0          0      0         0        0 0.000000e+00       0               0         0
Generating revenue         0          0      0         0        0 0.000000e+00       0               0         0
Not profitable             0          0      0         0        0 1.876055e-12       0               0         0
Out of business            0          0      0         0        0 0.000000e+00       0               0         0
Profitable                 0          0      0         0        0 5.519194e-01       0               0         0
Startup                    0          0      0         0        0 0.000000e+00       0               0         0
                 nonwhite_exec ivyplus_exec comp_lon comp_lat year
Exit                         0            0        0        0    0
Generating revenue           0            0        0        0    0
Not profitable               0            0        0        0    0
Out of business              0            0        0        0    0
Profitable                   0            0        0        0    0
Startup                      0            0        0        0    0
> |
```

The p-value are all below 0.05, indicating that they are all significant. Looking back into the regression results, in terms of Exit, gender, ethnicity, age, skills and top school homophily have positive coefficients, meaning that they could help entrepreneurs' ventures achieving Exit while geographic homophily could not; In terms of Profitable, all of the homophily have positive effect to help the entrepreneurs' ventures to be profitable.

Looking through the trajectory of a startup, most of the homophily can help them to be profitable and exit, but cannot guarantee to have a positive effect on avoiding out of business and generating revenue which is breaking even. Overall, failing fast through homophily has a mixed effect on a startup's fate. As an entrepreneur, he should not bet all his life on homophily, other stuff that can reasonably lead to success should be relied on.