Statistical Analysis

# Revised model.

#Read the dataset  
license.df<-read\_xlsx("Data/upload\_date.xlsx",1)  
#Create the factors  
license.df$license<-as.factor(license.df$license)  
license.df$Type <-as.factor(license.df$Type )  
#Call the mlogit library  
license.df<-na.omit(license.df)  
license.df$license = relevel(license.df$license, ref = "Creative Commons - Attribution - Share Alike")  
  
#Classify  
license.df <- license.df %>%   
 mutate(license.choice=  
 ifelse(license %in% c("All Rights Reserved", "Attribution - Non-Commercial - No Derivatives","Attribution - Non-Commercial - Share Alike","Creative Commons - Attribution - Non-Commercial"),"1", ifelse(license %in% c("BSD License", "Creative Commons - Attribution", "Creative Commons - Attribution - Share Alike"),"2",  
 ifelse(license %in% c("Creative Commons - Attribution - No Derivatives"),"1","3"))))  
  
#Key event  
license.df<-license.df %>%   
 mutate(key.event=ifelse(upload\_date<"2012-09-24","1",  
 ifelse(upload\_date<"2013-11-05","2","3")))  
  
#  
temp <- license.df %>%   
 group\_by(thing\_author\_id,key.event) %>%   
 summarize(n\_conut = n(),  
 larger = sum(inv > 0),  
 zero = sum(inv == 0))  
#Classify  
temp <- temp %>%   
 mutate(appropriability\_strategy=ifelse(larger>0 & zero>0,"private-collective",  
 ifelse(larger>0 & zero==0, "free-riding","private"))) %>%   
 select(-n\_conut,-larger,-zero)  
#Convert to factor  
temp$appropriability\_strategy<-as.factor(temp$appropriability\_strategy)   
  
#Join with the license.df  
license.df <- full\_join(license.df, temp, by=c("thing\_author\_id","key.event"))  
  
#Define the reference (free-riding)  
license.df <- within(license.df, appropriability\_strategy <- relevel(appropriability\_strategy, ref = "private"))

#Call the library  
multi1 <- multinom(license.choice~1+files\_count+thing\_like\_count+key.event, data=license.df, maxit = 10000)

## # weights: 18 (10 variable)  
## initial value 130891.963909   
## iter 10 value 89686.998290  
## iter 20 value 77293.667871  
## iter 30 value 77263.626016  
## final value 77263.616414   
## converged

Dependent variable:

2

3

(1)

(2)

files\_count

-0.008\*\*\*

0.003

(0.001)

(0.002)

thing\_like\_count

-0.002\*\*\*

-0.001\*\*\*

(0.0001)

(0.0003)

key.event2

0.318\*\*\*

-1.575\*\*\*

(0.022)

(0.037)

key.event3

0.374\*\*\*

-1.693\*\*\*

(0.022)

(0.037)

Constant

1.171\*\*\*

-0.180\*\*\*

(0.019)

(0.026)

Akaike Inf. Crit.

154,547.200

154,547.200

Note:

*p<0.1;* ***p<0.05;*** p<0.01

Dependent variable:

2

3

(1)

(2)

files\_count

0.992\*\*\*

1.003

(0.001)

(0.002)

thing\_like\_count

0.998\*\*\*

0.999\*\*\*

(0.0001)

(0.0003)

key.event2

1.375\*\*\*

0.207\*\*\*

(0.022)

(0.037)

key.event3

1.454\*\*\*

0.184\*\*\*

(0.022)

(0.037)

Constant

3.224\*\*\*

0.835\*\*\*

(0.019)

(0.026)

Akaike Inf. Crit.

154,547.200

154,547.200

Note:

*p<0.1;* ***p<0.05;*** p<0.01

#Call the library  
multi1 <- multinom(license.choice~1+ files\_count+thing\_like\_count+key.event+appropriability\_strategy, data=license.df, maxit = 10000)

## # weights: 24 (14 variable)  
## initial value 130891.963909   
## iter 10 value 88497.866211  
## iter 20 value 77303.666105  
## final value 77150.688163   
## converged

Dependent variable:

2

3

(1)

(2)

files\_count

-0.008\*\*\*

0.002

(0.001)

(0.002)

thing\_like\_count

-0.002\*\*\*

-0.002\*\*\*

(0.0001)

(0.0003)

key.event2

0.330\*\*\*

-1.533\*\*\*

(0.023)

(0.039)

key.event3

0.377\*\*\*

-1.624\*\*\*

(0.023)

(0.040)

appropriability\_strategyfree-riding

-0.116\*\*\*

-0.094\*\*

(0.020)

(0.046)

appropriability\_strategyprivate-collective

-0.187\*\*\*

0.163\*\*\*

(0.019)

(0.034)

Constant

1.274\*\*\*

-0.268\*\*\*

(0.022)

(0.033)

Akaike Inf. Crit.

154,329.400

154,329.400

Note:

*p<0.1;* ***p<0.05;*** p<0.01

Dependent variable:

2

3

(1)

(2)

files\_count

0.992\*\*\*

1.002

(0.001)

(0.002)

thing\_like\_count

0.998\*\*\*

0.998\*\*\*

(0.0001)

(0.0003)

key.event2

1.391\*\*\*

0.216\*\*\*

(0.023)

(0.039)

key.event3

1.458\*\*\*

0.197\*\*\*

(0.023)

(0.040)

appropriability\_strategyfree-riding

0.890\*\*\*

0.910\*\*

(0.020)

(0.046)

appropriability\_strategyprivate-collective

0.829\*\*\*

1.178\*\*\*

(0.019)

(0.034)

Constant

3.576\*\*\*

0.765\*\*\*

(0.022)

(0.033)

Akaike Inf. Crit.

154,329.400

154,329.400

Note:

*p<0.1;* ***p<0.05;*** p<0.01

#Call the library  
multi1 <- multinom(license.choice~1+ files\_count+thing\_like\_count+key.event+appropriability\_strategy+(appropriability\_strategy\*key.event), data=license.df, maxit = 10000)

## # weights: 36 (22 variable)  
## initial value 130891.963909   
## iter 10 value 87962.551409  
## iter 20 value 82320.048175  
## iter 30 value 77062.131074  
## final value 77056.753231   
## converged

Dependent variable:

2

3

(1)

(2)

files\_count

-0.008\*\*\*

0.002

(0.001)

(0.002)

thing\_like\_count

-0.002\*\*\*

-0.002\*\*\*

(0.0001)

(0.0003)

key.event2

0.610\*\*\*

-1.063\*\*\*

(0.037)

(0.067)

key.event3

0.583\*\*\*

-1.484\*\*\*

(0.036)

(0.070)

appropriability\_strategyfree-riding

1.005\*\*\*

0.753\*\*\*

(0.163)

(0.204)

appropriability\_strategyprivate-collective

0.096\*\*\*

0.458\*\*\*

(0.037)

(0.049)

key.event2:appropriability\_strategyfree-riding

-1.306\*\*\*

-1.299\*\*\*

(0.166)

(0.219)

key.event3:appropriability\_strategyfree-riding

-1.114\*\*\*

-0.697\*\*\*

(0.165)

(0.217)

key.event2:appropriability\_strategyprivate-collective

-0.383\*\*\*

-0.625\*\*\*

(0.048)

(0.085)

key.event3:appropriability\_strategyprivate-collective

-0.394\*\*\*

-0.362\*\*\*

(0.048)

(0.091)

Constant

1.102\*\*\*

-0.445\*\*\*

(0.028)

(0.039)

Akaike Inf. Crit.

154,157.500

154,157.500

Note:

*p<0.1;* ***p<0.05;*** p<0.01

Dependent variable:

2

3

(1)

(2)

files\_count

0.992\*\*\*

1.002

(0.001)

(0.002)

thing\_like\_count

0.998\*\*\*

0.998\*\*\*

(0.0001)

(0.0003)

key.event2

1.841\*\*\*

0.345\*\*\*

(0.037)

(0.067)

key.event3

1.791\*\*\*

0.227\*\*\*

(0.036)

(0.070)

appropriability\_strategyfree-riding

2.731\*\*\*

2.123\*\*\*

(0.163)

(0.204)

appropriability\_strategyprivate-collective

1.101\*\*\*

1.580\*\*\*

(0.037)

(0.049)

key.event2:appropriability\_strategyfree-riding

0.271\*\*\*

0.273\*\*\*

(0.166)

(0.219)

key.event3:appropriability\_strategyfree-riding

0.328\*\*\*

0.498\*\*\*

(0.165)

(0.217)

key.event2:appropriability\_strategyprivate-collective

0.682\*\*\*

0.535\*\*\*

(0.048)

(0.085)

key.event3:appropriability\_strategyprivate-collective

0.675\*\*\*

0.696\*\*\*

(0.048)

(0.091)

Constant

3.009\*\*\*

0.641\*\*\*

(0.028)

(0.039)

Akaike Inf. Crit.

154,157.500

154,157.500

Note:

*p<0.1;* ***p<0.05;*** p<0.01