PRESCRIPTIVE MODELS AND DATA ANALYTICS
Problem Set #3: Diff-in-diff
Application: Online Word-of-Mouth

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1 Measuring the impact of online word-of-mouth

You are trying to measure the impact of online word-of-mouth on product demand in the Chinese TV market. Specifically, you are interested in finding out whether consumers' tweets about a TV show lead to higher viewership of the show. You obtain episode-level data of ratings (market-share in terms of viewership) for a large set of TV shows as well as information on the number of tweets on Sina Weibo (the Chinese version of Twitter) mentioning the name of the show on the day on which a specific episode aired. You also have data on ratings for a set of shows in Hong Kong, where Sina Weibo has almost no market penetration because Hong Kong residents mainly use Twitter (which is blocked in mainland China). For this homework use the data-set weibo data.csv.

1.1 Simple regression

Question 1. Load the data and regress (log) ratings of each show onto the (log) number of tweets per episode. Do you think

this regression gives you the causal effect of tweets on show viewership? If not, do you think your estimate will be biased upwards or downwards?

This regression does not give us the causal effect of tweets on show viewership because shows with higher ratings are more likely to have higher viewership and higher number of tweets. Hence, the regression overestimates the actual effect of number of tweets.

```python
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import os
import sys
import statsmodels.api as sm
from statsmodels.formula.api import ols
import warnings
warnings.filterwarnings('ignore')
```

```python
# Load dataset
weibo_data = pd.read_csv('weibo_data.csv')

# Print the number of rows and columns
print(weibo_data.shape)

# Print the first few rows
weibo_data.head()
```

(11427, 9)

	location	show_id	episode_num	censor_dummy	log_rating	log_tweet	av_tweets	day_id	mainland_dummy
0	Mainland China	1	1	1	0.475764	0.000000	3.692308	33	1
1	Mainland China	1	2	0	0.468479	0.000000	3.692308	34	1
2	Mainland China	1	3	0	0.581327	1.386294	3.692308	35	1
3	Mainland China	1	4	0	0.547851	0.000000	3.692308	36	1
4	Mainland China	1	5	0	0.483728	1.386294	3.692308	37	1

```python
# Fit a linear regression model
model = ols('log_rating ~ log_tweet', data = weibo_data).fit()
```

```
# Print the model summary
print(model.summary())
```

```
                            OLS Regression Results
==============================================================================
Dep. Variable:              log_rating   R-squared:                       0.111
Model:                             OLS   Adj. R-squared:                  0.111
Method:                  Least Squares   F-statistic:                     987.9
Date:                 Fri, 01 Mar 2024   Prob (F-statistic):           2.00e-204
Time:                         19:52:18   Log-Likelihood:                 -87.734
No. Observations:                 7899   AIC:                             179.5
Df Residuals:                     7897   BIC:                             193.4
Df Model:                            1
Covariance Type:             nonrobust
==============================================================================
                 coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
Intercept      0.2664      0.003     81.566      0.000       0.260       0.273
log_tweet      0.0310      0.001     31.431      0.000       0.029       0.033
==============================================================================
Omnibus:                      2518.070   Durbin-Watson:                   0.367
Prob(Omnibus):                   0.000   Jarque-Bera (JB):             9432.121
Skew:                            1.564   Prob(JB):                         0.00
Kurtosis:                        7.344   Cond. No.                         4.03
==============================================================================

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.
```

1.2 Geographic Diff-in-diff

Question 1. During the time period of your data, the Chinese government blocked the entire Sina Weibo platform due to a political scandal for three days (a dummy for those three days called censor dummy is included in the data). Assume that the censorship constitutes an exogenous shock that affected the number of tweets during the three days it lasted. You want to exploit this shock in order to analyze whether ratings decreased during the censorship.

(a) Run a regression of episode-level (log) ratings on show fixed effects and the censorship dummy using only data from mainland China. Interpret the coefficient on the censorship dummy. Is this result what you expected?

The coefficient on the censorship dummy is -0.0122. This means that shows had lower viewership during the censorship period as compared to periods before and after the censorship.

```
In [ ]:  # Fit a linear regression model
         model = ols('log_rating ~ censor_dummy + C(show_id)', data = weibo_data.loc[weibo_data.mainland_dummy == 1]).fit()

         # Print the model summary
         print(model.summary())
```

```
                          OLS Regression Results
==============================================================================
Dep. Variable:             log_rating   R-squared:                       0.881
Model:                            OLS   Adj. R-squared:                  0.878
Method:                 Least Squares   F-statistic:                     294.5
Date:                Fri, 01 Mar 2024   Prob (F-statistic):               0.00
Time:                        19:52:18   Log-Likelihood:                 7841.0
No. Observations:                7899   AIC:                         -1.529e+04
Df Residuals:                    7705   BIC:                         -1.394e+04
Df Model:                         193
Covariance Type:            nonrobust
==============================================================================
                    coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
Intercept          0.5577      0.024     22.981      0.000       0.510       0.605
C(show_id)[T.2]   -0.0066      0.026     -0.255      0.799      -0.058       0.044
C(show_id)[T.3]    0.3293      0.028     11.641      0.000       0.274       0.385
C(show_id)[T.4]    0.1961      0.027      7.279      0.000       0.143       0.249
C(show_id)[T.5]    0.6104      0.027     22.687      0.000       0.558       0.663
C(show_id)[T.6]    0.0072      0.028      0.254      0.799      -0.048       0.062
C(show_id)[T.7]   -0.1057      0.027     -3.928      0.000      -0.158      -0.053
C(show_id)[T.8]    0.9448      0.027     35.113      0.000       0.892       0.998
C(show_id)[T.9]   -0.1490      0.029     -5.188      0.000      -0.205      -0.093
C(show_id)[T.10]   0.0973      0.042      2.316      0.021       0.015       0.180
C(show_id)[T.11]  -0.4176      0.036    -11.688      0.000      -0.488      -0.348
C(show_id)[T.12]  -0.4595      0.047     -9.703      0.000      -0.552      -0.367
C(show_id)[T.13]  -0.4038      0.032    -12.480      0.000      -0.467      -0.340
C(show_id)[T.14]  -0.3806      0.027    -14.123      0.000      -0.433      -0.328
C(show_id)[T.15]  -0.4001      0.026    -15.136      0.000      -0.452      -0.348
C(show_id)[T.16]  -0.3591      0.028    -12.925      0.000      -0.414      -0.305
C(show_id)[T.17]  -0.3245      0.040     -8.061      0.000      -0.403      -0.246
C(show_id)[T.18]  -0.3145      0.028    -11.288      0.000      -0.369      -0.260
C(show_id)[T.19]  -0.4088      0.039    -10.535      0.000      -0.485      -0.333
C(show_id)[T.20]  -0.0668      0.039     -1.722      0.085      -0.143       0.009
C(show_id)[T.21]   0.0576      0.034      1.680      0.093      -0.010       0.125
C(show_id)[T.22]  -0.1948      0.029     -6.696      0.000      -0.252      -0.138
C(show_id)[T.23]  -0.2692      0.044     -6.075      0.000      -0.356      -0.182
C(show_id)[T.24]  -0.1161      0.042     -2.763      0.006      -0.199      -0.034
C(show_id)[T.25]   0.1245      0.030      4.137      0.000       0.066       0.184
C(show_id)[T.26]  -0.2750      0.026    -10.454      0.000      -0.327      -0.223
C(show_id)[T.27]  -0.3948      0.028    -14.131      0.000      -0.450      -0.340
C(show_id)[T.28]  -0.3045      0.027    -11.181      0.000      -0.358      -0.251
C(show_id)[T.29]   0.2390      0.027      8.744      0.000       0.185       0.293
C(show_id)[T.30]  -0.3106      0.027    -11.543      0.000      -0.363      -0.258
```

	coef	std err	t	P>|t|	[0.025	0.975]
C(show_id)[T.31]	−0.2652	0.052	−5.149	0.000	−0.366	−0.164
C(show_id)[T.32]	−0.2499	0.027	−9.140	0.000	−0.303	−0.196
C(show_id)[T.33]	−0.4498	0.040	−11.178	0.000	−0.529	−0.371
C(show_id)[T.34]	−0.2248	0.040	−5.586	0.000	−0.304	−0.146
C(show_id)[T.35]	−0.2208	0.032	−6.978	0.000	−0.283	−0.159
C(show_id)[T.36]	−0.2604	0.039	−6.712	0.000	−0.336	−0.184
C(show_id)[T.37]	−0.0412	0.027	−1.530	0.126	−0.094	0.012
C(show_id)[T.38]	−0.0107	0.027	−0.396	0.692	−0.063	0.042
C(show_id)[T.39]	−0.4141	0.028	−14.823	0.000	−0.469	−0.359
C(show_id)[T.40]	−0.1540	0.025	−6.134	0.000	−0.203	−0.105
C(show_id)[T.41]	−0.1973	0.027	−7.258	0.000	−0.251	−0.144
C(show_id)[T.42]	−0.2689	0.027	−9.963	0.000	−0.322	−0.216
C(show_id)[T.43]	−0.4213	0.036	−11.796	0.000	−0.491	−0.351
C(show_id)[T.44]	−0.1871	0.039	−4.823	0.000	−0.263	−0.111
C(show_id)[T.45]	−0.3439	0.025	−13.617	0.000	−0.393	−0.294
C(show_id)[T.46]	−0.2584	0.039	−6.662	0.000	−0.334	−0.182
C(show_id)[T.47]	−0.3910	0.036	−10.946	0.000	−0.461	−0.321
C(show_id)[T.48]	−0.3320	0.033	−10.133	0.000	−0.396	−0.268
C(show_id)[T.49]	−0.3819	0.027	−14.173	0.000	−0.435	−0.329
C(show_id)[T.50]	−0.2985	0.027	−11.093	0.000	−0.351	−0.246
C(show_id)[T.51]	−0.3603	0.030	−11.886	0.000	−0.420	−0.301
C(show_id)[T.52]	0.1329	0.032	4.201	0.000	0.071	0.195
C(show_id)[T.53]	0.0655	0.030	2.190	0.029	0.007	0.124
C(show_id)[T.54]	0.0563	0.030	1.884	0.060	−0.002	0.115
C(show_id)[T.55]	−0.1419	0.027	−5.259	0.000	−0.195	−0.089
C(show_id)[T.56]	−0.1912	0.027	−7.094	0.000	−0.244	−0.138
C(show_id)[T.57]	−0.1531	0.027	−5.699	0.000	−0.206	−0.100
C(show_id)[T.58]	−0.1989	0.027	−7.391	0.000	−0.252	−0.146
C(show_id)[T.59]	−0.2999	0.039	−7.732	0.000	−0.376	−0.224
C(show_id)[T.60]	−0.3053	0.039	−7.869	0.000	−0.381	−0.229
C(show_id)[T.61]	−0.3052	0.027	−11.308	0.000	−0.358	−0.252
C(show_id)[T.62]	−0.2531	0.028	−9.005	0.000	−0.308	−0.198
C(show_id)[T.63]	−0.1378	0.026	−5.378	0.000	−0.188	−0.088
C(show_id)[T.64]	−0.1769	0.039	−4.559	0.000	−0.253	−0.101
C(show_id)[T.65]	−0.2777	0.025	−10.929	0.000	−0.328	−0.228
C(show_id)[T.66]	−0.1087	0.039	−2.802	0.005	−0.185	−0.033
C(show_id)[T.67]	0.2095	0.027	7.787	0.000	0.157	0.262
C(show_id)[T.68]	−0.2902	0.026	−11.134	0.000	−0.341	−0.239
C(show_id)[T.69]	−0.1903	0.031	−6.183	0.000	−0.251	−0.130
C(show_id)[T.70]	−0.2812	0.032	−8.793	0.000	−0.344	−0.219
C(show_id)[T.71]	−0.1064	0.026	−4.118	0.000	−0.157	−0.056
C(show_id)[T.72]	−0.0863	0.040	−2.144	0.032	−0.165	−0.007
C(show_id)[T.73]	−0.2168	0.025	−8.579	0.000	−0.266	−0.167
C(show_id)[T.74]	−0.1267	0.029	−4.394	0.000	−0.183	−0.070

C(show_id)[T.75]	−0.1058	0.028	−3.838	0.000	−0.160	−0.052
C(show_id)[T.76]	−0.1374	0.042	−3.269	0.001	−0.220	−0.055
C(show_id)[T.77]	−0.3006	0.026	−11.734	0.000	−0.351	−0.250
C(show_id)[T.78]	−0.2103	0.027	−7.692	0.000	−0.264	−0.157
C(show_id)[T.79]	−0.2180	0.029	−7.493	0.000	−0.275	−0.161
C(show_id)[T.80]	0.5798	0.039	14.947	0.000	0.504	0.656
C(show_id)[T.81]	−0.1689	0.042	−4.018	0.000	−0.251	−0.086
C(show_id)[T.82]	−0.4152	0.027	−15.430	0.000	−0.468	−0.362
C(show_id)[T.83]	0.0490	0.028	1.725	0.085	−0.007	0.105
C(show_id)[T.84]	−0.0692	0.033	−2.113	0.035	−0.133	−0.005
C(show_id)[T.85]	−0.3601	0.035	−10.296	0.000	−0.429	−0.292
C(show_id)[T.86]	−0.4329	0.029	−15.137	0.000	−0.489	−0.377
C(show_id)[T.87]	0.1624	0.029	5.555	0.000	0.105	0.220
C(show_id)[T.88]	−0.0691	0.030	−2.326	0.020	−0.127	−0.011
C(show_id)[T.89]	−0.4498	0.027	−16.717	0.000	−0.503	−0.397
C(show_id)[T.90]	−0.4114	0.027	−15.289	0.000	−0.464	−0.359
C(show_id)[T.91]	0.4388	0.029	15.218	0.000	0.382	0.495
C(show_id)[T.92]	−0.1812	0.026	−7.072	0.000	−0.231	−0.131
C(show_id)[T.93]	−0.3936	0.026	−14.873	0.000	−0.445	−0.342
C(show_id)[T.94]	−0.2023	0.034	−5.895	0.000	−0.270	−0.135
C(show_id)[T.95]	−0.3465	0.027	−12.878	0.000	−0.399	−0.294
C(show_id)[T.96]	−0.0315	0.030	−1.047	0.295	−0.091	0.027
C(show_id)[T.97]	−0.4610	0.031	−14.716	0.000	−0.522	−0.400
C(show_id)[T.98]	−0.0936	0.040	−2.326	0.020	−0.172	−0.015
C(show_id)[T.99]	−0.0431	0.038	−1.147	0.251	−0.117	0.031
C(show_id)[T.100]	−0.4240	0.027	−15.759	0.000	−0.477	−0.371
C(show_id)[T.101]	−0.1688	0.030	−5.713	0.000	−0.227	−0.111
C(show_id)[T.102]	−0.1684	0.037	−4.603	0.000	−0.240	−0.097
C(show_id)[T.103]	0.2215	0.029	7.535	0.000	0.164	0.279
C(show_id)[T.104]	−0.3838	0.027	−14.402	0.000	−0.436	−0.332
C(show_id)[T.105]	−0.4839	0.028	−17.544	0.000	−0.538	−0.430
C(show_id)[T.106]	−0.4856	0.035	−13.884	0.000	−0.554	−0.417
C(show_id)[T.107]	−0.1575	0.044	−3.554	0.000	−0.244	−0.071
C(show_id)[T.108]	−0.3879	0.047	−8.197	0.000	−0.481	−0.295
C(show_id)[T.109]	−0.4548	0.027	−16.930	0.000	−0.508	−0.402
C(show_id)[T.110]	−0.4938	0.027	−18.352	0.000	−0.547	−0.441
C(show_id)[T.111]	−0.0805	0.039	−2.076	0.038	−0.157	−0.004
C(show_id)[T.112]	−0.2104	0.034	−6.130	0.000	−0.278	−0.143
C(show_id)[T.113]	−0.4476	0.027	−16.635	0.000	−0.500	−0.395
C(show_id)[T.114]	−0.4467	0.032	−13.969	0.000	−0.509	−0.384
C(show_id)[T.115]	−0.0939	0.027	−3.453	0.001	−0.147	−0.041
C(show_id)[T.116]	−0.0184	0.027	−0.669	0.504	−0.072	0.035
C(show_id)[T.117]	−0.5072	0.027	−18.850	0.000	−0.560	−0.454
C(show_id)[T.118]	−0.2399	0.030	−8.120	0.000	−0.298	−0.182

C(show_id)[T.119]	0.0233	0.029	0.792	0.428	−0.034	0.081
C(show_id)[T.120]	−0.5069	0.027	−18.839	0.000	−0.560	−0.454
C(show_id)[T.121]	−0.4063	0.026	−15.859	0.000	−0.457	−0.356
C(show_id)[T.122]	−0.2782	0.032	−8.599	0.000	−0.342	−0.215
C(show_id)[T.123]	−0.4044	0.027	−15.029	0.000	−0.457	−0.352
C(show_id)[T.124]	−0.1183	0.027	−4.319	0.000	−0.172	−0.065
C(show_id)[T.125]	−0.4519	0.027	−16.797	0.000	−0.505	−0.399
C(show_id)[T.126]	−0.3026	0.031	−9.746	0.000	−0.363	−0.242
C(show_id)[T.127]	−0.4422	0.029	−15.126	0.000	−0.500	−0.385
C(show_id)[T.128]	0.2168	0.030	7.205	0.000	0.158	0.276
C(show_id)[T.129]	−0.3519	0.034	−10.253	0.000	−0.419	−0.285
C(show_id)[T.130]	0.3642	0.027	13.732	0.000	0.312	0.416
C(show_id)[T.131]	−0.3842	0.027	−14.280	0.000	−0.437	−0.331
C(show_id)[T.132]	−0.4154	0.026	−16.212	0.000	−0.466	−0.365
C(show_id)[T.133]	−0.1217	0.034	−3.546	0.000	−0.189	−0.054
C(show_id)[T.134]	−0.3873	0.027	−14.394	0.000	−0.440	−0.335
C(show_id)[T.135]	−0.5056	0.031	−16.290	0.000	−0.566	−0.445
C(show_id)[T.136]	−0.2899	0.039	−7.474	0.000	−0.366	−0.214
C(show_id)[T.137]	0.1096	0.039	2.826	0.005	0.034	0.186
C(show_id)[T.138]	0.0512	0.036	1.433	0.152	−0.019	0.121
C(show_id)[T.139]	0.0184	0.047	0.388	0.698	−0.074	0.111
C(show_id)[T.140]	−0.0781	0.039	−2.013	0.044	−0.154	−0.002
C(show_id)[T.141]	−0.2202	0.044	−4.969	0.000	−0.307	−0.133
C(show_id)[T.142]	−0.0471	0.029	−1.641	0.101	−0.103	0.009
C(show_id)[T.143]	0.2847	0.027	10.734	0.000	0.233	0.337
C(show_id)[T.144]	−0.4396	0.028	−15.539	0.000	−0.495	−0.384
C(show_id)[T.145]	−0.2847	0.029	−9.832	0.000	−0.342	−0.228
C(show_id)[T.146]	−0.3386	0.027	−12.582	0.000	−0.391	−0.286
C(show_id)[T.147]	−0.1054	0.029	−3.586	0.000	−0.163	−0.048
C(show_id)[T.148]	−0.4085	0.035	−11.681	0.000	−0.477	−0.340
C(show_id)[T.149]	−0.4073	0.031	−13.233	0.000	−0.468	−0.347
C(show_id)[T.150]	−0.3747	0.027	−13.946	0.000	−0.427	−0.322
C(show_id)[T.151]	−0.3422	0.029	−11.968	0.000	−0.398	−0.286
C(show_id)[T.152]	−0.3334	0.026	−12.742	0.000	−0.385	−0.282
C(show_id)[T.153]	−0.2226	0.037	−6.086	0.000	−0.294	−0.151
C(show_id)[T.154]	−0.0785	0.027	−2.919	0.004	−0.131	−0.026
C(show_id)[T.155]	−0.2759	0.026	−10.755	0.000	−0.326	−0.226
C(show_id)[T.156]	−0.4339	0.040	−10.782	0.000	−0.513	−0.355
C(show_id)[T.157]	−0.0142	0.027	−0.527	0.599	−0.067	0.039
C(show_id)[T.158]	−0.5026	0.028	−18.266	0.000	−0.557	−0.449
C(show_id)[T.159]	−0.3070	0.029	−10.735	0.000	−0.363	−0.251
C(show_id)[T.160]	−0.2390	0.030	−8.087	0.000	−0.297	−0.181
C(show_id)[T.161]	−0.5118	0.031	−16.487	0.000	−0.573	−0.451
C(show_id)[T.162]	0.1052	0.030	3.538	0.000	0.047	0.163

```
C(show_id)[T.163]    -0.3372    0.047     -7.128    0.000    -0.430    -0.244
C(show_id)[T.164]    -0.4668    0.042    -11.106    0.000    -0.549    -0.384
C(show_id)[T.165]    -0.5188    0.027    -18.979    0.000    -0.572    -0.465
C(show_id)[T.166]     0.1836    0.027      6.824    0.000     0.131     0.236
C(show_id)[T.167]    -0.2237    0.039     -5.767    0.000    -0.300    -0.148
C(show_id)[T.168]    -0.3328    0.034     -9.864    0.000    -0.399    -0.267
C(show_id)[T.169]    -0.5157    0.027    -19.168    0.000    -0.568    -0.463
C(show_id)[T.170]    -0.4375    0.030    -14.720    0.000    -0.496    -0.379
C(show_id)[T.171]    -0.4048    0.027    -15.023    0.000    -0.458    -0.352
C(show_id)[T.172]    -0.4294    0.027    -15.642    0.000    -0.483    -0.376
C(show_id)[T.173]    -0.2058    0.030     -6.924    0.000    -0.264    -0.148
C(show_id)[T.174]    -0.5162    0.027    -19.184    0.000    -0.569    -0.463
C(show_id)[T.175]    -0.3510    0.034    -10.227    0.000    -0.418    -0.284
C(show_id)[T.176]    -0.4848    0.027    -18.018    0.000    -0.538    -0.432
C(show_id)[T.177]    -0.4348    0.051     -8.447    0.000    -0.536    -0.334
C(show_id)[T.178]    -0.5085    0.027    -18.899    0.000    -0.561    -0.456
C(show_id)[T.179]    -0.4180    0.031    -13.465    0.000    -0.479    -0.357
C(show_id)[T.180]    -0.4570    0.028    -16.210    0.000    -0.512    -0.402
C(show_id)[T.181]    -0.3677    0.038     -9.780    0.000    -0.441    -0.294
C(show_id)[T.182]    -0.4900    0.026    -18.497    0.000    -0.542    -0.438
C(show_id)[T.183]    -0.5107    0.036    -14.297    0.000    -0.581    -0.441
C(show_id)[T.184]    -0.4848    0.035    -13.863    0.000    -0.553    -0.416
C(show_id)[T.185]    -0.4844    0.036    -13.562    0.000    -0.554    -0.414
C(show_id)[T.186]    -0.4953    0.028    -17.675    0.000    -0.550    -0.440
C(show_id)[T.187]    -0.4481    0.027    -16.655    0.000    -0.501    -0.395
C(show_id)[T.188]    -0.4413    0.040    -10.968    0.000    -0.520    -0.362
C(show_id)[T.189]    -0.5051    0.027    -18.770    0.000    -0.558    -0.452
C(show_id)[T.190]    -0.2664    0.047     -5.631    0.000    -0.359    -0.174
C(show_id)[T.191]    -0.5113    0.027    -19.004    0.000    -0.564    -0.459
C(show_id)[T.192]    -0.3730    0.028    -13.093    0.000    -0.429    -0.317
C(show_id)[T.193]    -0.3140    0.027    -11.669    0.000    -0.367    -0.261
censor_dummy         -0.0122    0.004     -2.939    0.003    -0.020    -0.004
==============================================================================
Omnibus:                      925.798   Durbin-Watson:                   1.979
Prob(Omnibus):                  0.000   Jarque-Bera (JB):             8690.487
Skew:                           0.167   Prob(JB):                         0.00
Kurtosis:                       8.128   Cond. No.                         333.
==============================================================================

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.
```

(b) Was it necessary to control for show fixed effects in the regression above? If you ran the regression without show fixed effects, how would the interpretation of the coefficient on the censorship dummy differ?

Yes, it is necessary to control for show fixed effects in the regression above because the show itself might be correlated to censorship. For example, if the show has higher frequency during censorship or if more people watched a particular show because of censorship. So, in order to separate the effect of this correlation for each show, we need to introduce show fixed effects.

(c) Run the same regression as in part (a), but use only data from Hong Kong (and not mainland China). Make sure to control for show fixed effects. Interpret the coefficient on the censorship dummy. Is this result what you expected?

The coefficient on the censorship dummy is 0.0106, but it's statistically insignificant (p-value ~ 0.3). Hence, we cannot reject the null. This means that censorship had virtually no effect on ratings in Hong Kong. This is exactly what we expected because censorship wasn't implemented in Hong Kong and hence, the ratings would remain consistent irrespective of censorship in Mainland China.

In [ ]:
```python
# Fit a linear regression model
model = ols('log_rating ~ censor_dummy + C(show_id)', data = weibo_data.loc[weibo_data.mainland_dummy == 0]).fit()

# Print the model summary
print(model.summary())
```

```
                              OLS Regression Results
==============================================================================
Dep. Variable:             log_rating   R-squared:                       0.974
Model:                             OLS   Adj. R-squared:                  0.973
Method:                  Least Squares   F-statistic:                     967.6
Date:                 Fri, 01 Mar 2024   Prob (F-statistic):               0.00
Time:                        19:52:19   Log-Likelihood:                  1799.1
No. Observations:                3528   AIC:                            -3332.
Df Residuals:                    3395   BIC:                            -2512.
Df Model:                         132
Covariance Type:            nonrobust
==============================================================================
                     coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
Intercept           0.1792      0.021      8.721      0.000       0.139       0.219
C(show_id)[T.195]  -0.0885      0.026     -3.471      0.001      -0.139      -0.039
C(show_id)[T.196]  -0.1130      0.026     -4.302      0.000      -0.164      -0.061
C(show_id)[T.197]  -0.0564      0.031     -1.823      0.068      -0.117       0.004
C(show_id)[T.198]  -0.0744      0.030     -2.468      0.014      -0.134      -0.015
C(show_id)[T.199]  -0.0889      0.034     -2.588      0.010      -0.156      -0.022
C(show_id)[T.200]  -0.0509      0.032     -1.572      0.116      -0.114       0.013
C(show_id)[T.201]  -0.0777      0.051     -1.519      0.129      -0.178       0.023
C(show_id)[T.202]   0.1033      0.056      1.835      0.067      -0.007       0.214
C(show_id)[T.203]  -0.0874      0.060     -1.465      0.143      -0.204       0.030
C(show_id)[T.204]  -0.1058      0.053     -1.977      0.048      -0.211      -0.001
C(show_id)[T.205]  -0.0633      0.069     -0.913      0.362      -0.199       0.073
C(show_id)[T.206]   0.0269      0.032      0.850      0.395      -0.035       0.089
C(show_id)[T.207]   0.0189      0.060      0.317      0.752      -0.098       0.136
C(show_id)[T.208]   0.0901      0.056      1.601      0.109      -0.020       0.200
C(show_id)[T.209]  -0.0746      0.107     -0.698      0.485      -0.284       0.135
C(show_id)[T.210]  -0.0389      0.064     -0.609      0.543      -0.164       0.086
C(show_id)[T.211]  -0.0932      0.032     -2.902      0.004      -0.156      -0.030
C(show_id)[T.212]   0.1896      0.051      3.705      0.000       0.089       0.290
C(show_id)[T.213]   0.0068      0.069      0.098      0.922      -0.129       0.143
C(show_id)[T.214]  -0.0413      0.053     -0.771      0.440      -0.146       0.064
C(show_id)[T.215]  -0.1218      0.029     -4.211      0.000      -0.178      -0.065
C(show_id)[T.216]  -0.1186      0.029     -4.102      0.000      -0.175      -0.062
C(show_id)[T.217]   1.6126      0.029     55.772      0.000       1.556       1.669
C(show_id)[T.218]   1.0250      0.027     38.024      0.000       0.972       1.078
C(show_id)[T.219]   0.9015      0.028     32.242      0.000       0.847       0.956
C(show_id)[T.220]   0.9375      0.031     30.505      0.000       0.877       0.998
C(show_id)[T.221]   0.7289      0.031     23.559      0.000       0.668       0.790
C(show_id)[T.224]   1.2124      0.036     34.074      0.000       1.143       1.282
C(show_id)[T.225]   0.8504      0.028     30.417      0.000       0.796       0.905
```

C(show_id)[T.226]	0.8169	0.031	26.755	0.000	0.757	0.877
C(show_id)[T.227]	0.6119	0.032	18.893	0.000	0.548	0.675
C(show_id)[T.230]	0.1908	0.031	6.249	0.000	0.131	0.251
C(show_id)[T.231]	0.9379	0.041	23.147	0.000	0.858	1.017
C(show_id)[T.232]	1.0302	0.053	19.262	0.000	0.925	1.135
C(show_id)[T.233]	0.6131	0.053	11.464	0.000	0.508	0.718
C(show_id)[T.234]	0.3358	0.043	7.734	0.000	0.251	0.421
C(show_id)[T.235]	0.8780	0.053	16.416	0.000	0.773	0.983
C(show_id)[T.236]	0.7364	0.060	12.346	0.000	0.619	0.853
C(show_id)[T.237]	0.4937	0.053	9.230	0.000	0.389	0.599
C(show_id)[T.238]	1.2043	0.056	21.405	0.000	1.094	1.315
C(show_id)[T.239]	0.8482	0.069	12.226	0.000	0.712	0.984
C(show_id)[T.240]	0.7019	0.069	10.117	0.000	0.566	0.838
C(show_id)[T.241]	0.8249	0.031	26.662	0.000	0.764	0.886
C(show_id)[T.242]	0.9207	0.053	17.215	0.000	0.816	1.026
C(show_id)[T.243]	0.6832	0.033	20.525	0.000	0.618	0.748
C(show_id)[T.244]	1.0521	0.053	19.671	0.000	0.947	1.157
C(show_id)[T.245]	1.1162	0.047	23.527	0.000	1.023	1.209
C(show_id)[T.246]	1.0905	0.077	14.182	0.000	0.940	1.241
C(show_id)[T.247]	1.2093	0.054	22.596	0.000	1.104	1.314
C(show_id)[T.248]	0.7680	0.033	23.075	0.000	0.703	0.833
C(show_id)[T.249]	0.5136	0.034	15.124	0.000	0.447	0.580
C(show_id)[T.250]	0.6744	0.036	18.954	0.000	0.605	0.744
C(show_id)[T.251]	0.7703	0.069	11.103	0.000	0.634	0.906
C(show_id)[T.252]	0.5213	0.107	4.878	0.000	0.312	0.731
C(show_id)[T.253]	−0.1097	0.025	−4.323	0.000	−0.159	−0.060
C(show_id)[T.254]	0.0919	0.064	1.437	0.151	−0.034	0.217
C(show_id)[T.255]	−0.1585	0.053	−2.964	0.003	−0.263	−0.054
C(show_id)[T.256]	−0.0531	0.064	−0.830	0.407	−0.178	0.072
C(show_id)[T.257]	−0.1402	0.030	−4.649	0.000	−0.199	−0.081
C(show_id)[T.258]	0.1811	0.064	2.835	0.005	0.056	0.306
C(show_id)[T.259]	0.2121	0.053	3.966	0.000	0.107	0.317
C(show_id)[T.260]	−0.1179	0.053	−2.204	0.028	−0.223	−0.013
C(show_id)[T.261]	−0.1268	0.031	−4.069	0.000	−0.188	−0.066
C(show_id)[T.262]	−0.1238	0.031	−4.030	0.000	−0.184	−0.064
C(show_id)[T.263]	0.0708	0.049	1.440	0.150	−0.026	0.167
C(show_id)[T.264]	−0.1507	0.064	−2.360	0.018	−0.276	−0.025
C(show_id)[T.265]	0.0232	0.053	0.433	0.665	−0.082	0.128
C(show_id)[T.266]	−0.0245	0.028	−0.875	0.382	−0.079	0.030
C(show_id)[T.267]	−0.1356	0.053	−2.535	0.011	−0.240	−0.031
C(show_id)[T.268]	−0.0899	0.028	−3.214	0.001	−0.145	−0.035
C(show_id)[T.269]	−0.0809	0.038	−2.111	0.035	−0.156	−0.006
C(show_id)[T.270]	0.0952	0.025	3.792	0.000	0.046	0.144
C(show_id)[T.271]	−0.0330	0.053	−0.617	0.537	−0.138	0.072

	coef	std err	t	P>|t|	[0.025	0.975]
C(show_id)[T.272]	−0.0720	0.053	−1.346	0.178	−0.177	0.033
C(show_id)[T.273]	−0.0713	0.028	−2.550	0.011	−0.126	−0.016
C(show_id)[T.274]	0.1892	0.029	6.483	0.000	0.132	0.246
C(show_id)[T.275]	0.2441	0.037	6.582	0.000	0.171	0.317
C(show_id)[T.276]	0.3378	0.053	6.316	0.000	0.233	0.443
C(show_id)[T.277]	0.4527	0.039	11.615	0.000	0.376	0.529
C(show_id)[T.278]	0.6239	0.034	18.561	0.000	0.558	0.690
C(show_id)[T.279]	0.8960	0.053	16.752	0.000	0.791	1.001
C(show_id)[T.280]	0.4088	0.053	7.644	0.000	0.304	0.514
C(show_id)[T.281]	0.5469	0.031	17.676	0.000	0.486	0.608
C(show_id)[T.282]	0.5515	0.032	17.444	0.000	0.489	0.613
C(show_id)[T.283]	0.3980	0.064	6.231	0.000	0.273	0.523
C(show_id)[T.284]	0.3086	0.053	5.769	0.000	0.204	0.413
C(show_id)[T.285]	0.4551	0.056	8.089	0.000	0.345	0.565
C(show_id)[T.286]	0.6259	0.036	17.361	0.000	0.555	0.697
C(show_id)[T.287]	0.0052	0.056	0.092	0.927	−0.105	0.116
C(show_id)[T.288]	0.4651	0.053	8.696	0.000	0.360	0.570
C(show_id)[T.289]	0.3339	0.053	6.244	0.000	0.229	0.439
C(show_id)[T.290]	0.3621	0.060	6.070	0.000	0.245	0.479
C(show_id)[T.291]	0.5183	0.028	18.468	0.000	0.463	0.573
C(show_id)[T.292]	2.5601	0.028	90.862	0.000	2.505	2.615
C(show_id)[T.294]	2.6095	0.042	61.603	0.000	2.526	2.693
C(show_id)[T.295]	2.9411	0.031	95.702	0.000	2.881	3.001
C(show_id)[T.296]	3.0864	0.031	99.761	0.000	3.026	3.147
C(show_id)[T.298]	2.7465	0.031	89.950	0.000	2.687	2.806
C(show_id)[T.299]	2.5671	0.031	84.076	0.000	2.507	2.627
C(show_id)[T.300]	2.4179	0.031	79.189	0.000	2.358	2.478
C(show_id)[T.304]	2.9807	0.064	46.658	0.000	2.855	3.106
C(show_id)[T.306]	2.9255	0.060	49.045	0.000	2.809	3.042
C(show_id)[T.307]	2.8461	0.064	44.552	0.000	2.721	2.971
C(show_id)[T.308]	3.2094	0.038	83.796	0.000	3.134	3.284
C(show_id)[T.312]	2.7383	0.060	45.907	0.000	2.621	2.855
C(show_id)[T.313]	3.2514	0.038	84.894	0.000	3.176	3.326
C(show_id)[T.314]	2.8646	0.045	64.225	0.000	2.777	2.952
C(show_id)[T.319]	3.2469	0.039	83.305	0.000	3.170	3.323
C(show_id)[T.320]	−0.0934	0.037	−2.517	0.012	−0.166	−0.021
C(show_id)[T.321]	0.2315	0.043	5.330	0.000	0.146	0.317
C(show_id)[T.322]	0.6868	0.033	20.832	0.000	0.622	0.751
C(show_id)[T.323]	−0.1099	0.041	−2.656	0.008	−0.191	−0.029
C(show_id)[T.324]	−0.1339	0.031	−4.297	0.000	−0.195	−0.073
C(show_id)[T.325]	0.4457	0.069	6.424	0.000	0.310	0.582
C(show_id)[T.326]	0.7742	0.053	14.475	0.000	0.669	0.879
C(show_id)[T.327]	−0.0339	0.051	−0.663	0.508	−0.134	0.066
C(show_id)[T.328]	−0.0094	0.028	−0.335	0.737	−0.064	0.045

C(show_id)[T.329]	0.6008	0.029	21.059	0.000	0.545	0.657
C(show_id)[T.330]	0.1449	0.030	4.859	0.000	0.086	0.203
C(show_id)[T.331]	-0.0504	0.053	-0.943	0.346	-0.155	0.054
C(show_id)[T.332]	0.2980	0.024	12.376	0.000	0.251	0.345
C(show_id)[T.333]	-0.1323	0.031	-4.306	0.000	-0.193	-0.072
C(show_id)[T.334]	-0.1131	0.028	-4.015	0.000	-0.168	-0.058
C(show_id)[T.335]	0.5346	0.053	9.995	0.000	0.430	0.639
C(show_id)[T.336]	0.7099	0.069	10.232	0.000	0.574	0.846
C(show_id)[T.337]	0.1923	0.053	3.595	0.000	0.087	0.297
C(show_id)[T.338]	-0.1144	0.053	-2.139	0.033	-0.219	-0.010
C(show_id)[T.339]	0.5488	0.056	9.753	0.000	0.438	0.659
C(show_id)[T.340]	-0.0179	0.028	-0.639	0.523	-0.073	0.037
C(show_id)[T.341]	-0.0791	0.088	-0.898	0.369	-0.252	0.094
C(show_id)[T.342]	0.2129	0.032	6.683	0.000	0.150	0.275
censor_dummy	0.0106	0.011	0.954	0.340	-0.011	0.032

```
==============================================================================
Omnibus:                      611.130   Durbin-Watson:                   2.001
Prob(Omnibus):                  0.000   Jarque-Bera (JB):             5575.834
Skew:                           0.550   Prob(JB):                         0.00
Kurtosis:                       9.060   Cond. No.                         97.1
==============================================================================

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.
```

(d) Using data from both Hong Kong and mainland China, implement a difference-in-differences regression with mainland China as the treatment group and Hong Kong as the control group. In other words, you want to show that the censorship event had a differential effect in mainland China relative to Hong Kong. Make sure to control for show fixed effects. Interpret the relevant coefficients of this regression.

We confirm that censorship had a negative effect on ratings in Mainland China as compared to Hong Kong as seen in previous parts. The difference of this effect between Hong Kong and Mainland China is given by the coeffiecient on censor_dummy:mainland_dummy which is equal to -0.0227.

```
In [ ]:  # Fit a linear regression model
         model = ols('log_rating ~ censor_dummy:mainland_dummy + censor_dummy + C(show_id)', data = weibo_data).fit()

         # Print the model summary
         print(model.summary())
```

```
                              OLS Regression Results
==============================================================================
Dep. Variable:              log_rating   R-squared:                       0.964
Model:                              OLS   Adj. R-squared:                  0.963
Method:                   Least Squares   F-statistic:                     910.8
Date:                  Fri, 01 Mar 2024   Prob (F-statistic):               0.00
Time:                          19:52:19   Log-Likelihood:                 9018.9
No. Observations:                 11427   AIC:                         -1.738e+04
Df Residuals:                     11100   BIC:                         -1.498e+04
Df Model:                           326
Covariance Type:              nonrobust
==============================================================================
                     coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
Intercept          0.5577      0.030     18.713      0.000       0.499       0.616
C(show_id)[T.2]   -0.0066      0.032     -0.207      0.836      -0.069       0.056
C(show_id)[T.3]    0.3293      0.035      9.478      0.000       0.261       0.397
C(show_id)[T.4]    0.1961      0.033      5.927      0.000       0.131       0.261
C(show_id)[T.5]    0.6104      0.033     18.473      0.000       0.546       0.675
C(show_id)[T.6]    0.0072      0.035      0.207      0.836      -0.061       0.075
C(show_id)[T.7]   -0.1057      0.033     -3.198      0.001      -0.170      -0.041
C(show_id)[T.8]    0.9448      0.033     28.591      0.000       0.880       1.010
C(show_id)[T.9]   -0.1490      0.035     -4.224      0.000      -0.218      -0.080
C(show_id)[T.10]   0.0973      0.052      1.886      0.059      -0.004       0.199
C(show_id)[T.11]  -0.4176      0.044     -9.517      0.000      -0.504      -0.332
C(show_id)[T.12]  -0.4595      0.058     -7.901      0.000      -0.573      -0.345
C(show_id)[T.13]  -0.4038      0.040    -10.162      0.000      -0.482      -0.326
C(show_id)[T.14]  -0.3806      0.033    -11.500      0.000      -0.445      -0.316
C(show_id)[T.15]  -0.4001      0.032    -12.324      0.000      -0.464      -0.336
C(show_id)[T.16]  -0.3591      0.034    -10.525      0.000      -0.426      -0.292
C(show_id)[T.17]  -0.3245      0.049     -6.564      0.000      -0.421      -0.228
C(show_id)[T.18]  -0.3145      0.034     -9.191      0.000      -0.382      -0.247
C(show_id)[T.19]  -0.4088      0.048     -8.578      0.000      -0.502      -0.315
C(show_id)[T.20]  -0.0668      0.048     -1.402      0.161      -0.160       0.027
C(show_id)[T.21]   0.0576      0.042      1.368      0.171      -0.025       0.140
C(show_id)[T.22]  -0.1948      0.036     -5.452      0.000      -0.265      -0.125
C(show_id)[T.23]  -0.2692      0.054     -4.947      0.000      -0.376      -0.163
C(show_id)[T.24]  -0.1161      0.052     -2.250      0.024      -0.217      -0.015
C(show_id)[T.25]   0.1245      0.037      3.369      0.001       0.052       0.197
C(show_id)[T.26]  -0.2750      0.032     -8.512      0.000      -0.338      -0.212
C(show_id)[T.27]  -0.3948      0.034    -11.506      0.000      -0.462      -0.328
C(show_id)[T.28]  -0.3045      0.033     -9.104      0.000      -0.370      -0.239
C(show_id)[T.29]   0.2390      0.034      7.120      0.000       0.173       0.305
C(show_id)[T.30]  -0.3106      0.033     -9.399      0.000      -0.375      -0.246
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C(show_id)[T.31]	-0.2652	0.063	-4.193	0.000	-0.389	-0.141
C(show_id)[T.32]	-0.2499	0.034	-7.443	0.000	-0.316	-0.184
C(show_id)[T.33]	-0.4498	0.049	-9.102	0.000	-0.547	-0.353
C(show_id)[T.34]	-0.2248	0.049	-4.549	0.000	-0.322	-0.128
C(show_id)[T.35]	-0.2208	0.039	-5.682	0.000	-0.297	-0.145
C(show_id)[T.36]	-0.2604	0.048	-5.465	0.000	-0.354	-0.167
C(show_id)[T.37]	-0.0412	0.033	-1.246	0.213	-0.106	0.024
C(show_id)[T.38]	-0.0107	0.033	-0.323	0.747	-0.075	0.054
C(show_id)[T.39]	-0.4141	0.034	-12.070	0.000	-0.481	-0.347
C(show_id)[T.40]	-0.1540	0.031	-4.995	0.000	-0.214	-0.094
C(show_id)[T.41]	-0.1973	0.033	-5.910	0.000	-0.263	-0.132
C(show_id)[T.42]	-0.2689	0.033	-8.112	0.000	-0.334	-0.204
C(show_id)[T.43]	-0.4213	0.044	-9.605	0.000	-0.507	-0.335
C(show_id)[T.44]	-0.1871	0.048	-3.927	0.000	-0.280	-0.094
C(show_id)[T.45]	-0.3439	0.031	-11.088	0.000	-0.405	-0.283
C(show_id)[T.46]	-0.2584	0.048	-5.425	0.000	-0.352	-0.165
C(show_id)[T.47]	-0.3910	0.044	-8.913	0.000	-0.477	-0.305
C(show_id)[T.48]	-0.3320	0.040	-8.251	0.000	-0.411	-0.253
C(show_id)[T.49]	-0.3819	0.033	-11.540	0.000	-0.447	-0.317
C(show_id)[T.50]	-0.2985	0.033	-9.033	0.000	-0.363	-0.234
C(show_id)[T.51]	-0.3603	0.037	-9.679	0.000	-0.433	-0.287
C(show_id)[T.52]	0.1329	0.039	3.420	0.001	0.057	0.209
C(show_id)[T.53]	0.0655	0.037	1.783	0.075	-0.007	0.138
C(show_id)[T.54]	0.0563	0.037	1.534	0.125	-0.016	0.128
C(show_id)[T.55]	-0.1419	0.033	-4.282	0.000	-0.207	-0.077
C(show_id)[T.56]	-0.1912	0.033	-5.776	0.000	-0.256	-0.126
C(show_id)[T.57]	-0.1531	0.033	-4.640	0.000	-0.218	-0.088
C(show_id)[T.58]	-0.1989	0.033	-6.018	0.000	-0.264	-0.134
C(show_id)[T.59]	-0.2999	0.048	-6.295	0.000	-0.393	-0.207
C(show_id)[T.60]	-0.3053	0.048	-6.407	0.000	-0.399	-0.212
C(show_id)[T.61]	-0.3052	0.033	-9.207	0.000	-0.370	-0.240
C(show_id)[T.62]	-0.2531	0.035	-7.332	0.000	-0.321	-0.185
C(show_id)[T.63]	-0.1378	0.031	-4.379	0.000	-0.199	-0.076
C(show_id)[T.64]	-0.1769	0.048	-3.712	0.000	-0.270	-0.083
C(show_id)[T.65]	-0.2777	0.031	-8.899	0.000	-0.339	-0.217
C(show_id)[T.66]	-0.1087	0.048	-2.281	0.023	-0.202	-0.015
C(show_id)[T.67]	0.2095	0.033	6.341	0.000	0.145	0.274
C(show_id)[T.68]	-0.2902	0.032	-9.066	0.000	-0.353	-0.227
C(show_id)[T.69]	-0.1903	0.038	-5.034	0.000	-0.264	-0.116
C(show_id)[T.70]	-0.2812	0.039	-7.160	0.000	-0.358	-0.204
C(show_id)[T.71]	-0.1064	0.032	-3.353	0.001	-0.169	-0.044
C(show_id)[T.72]	-0.0863	0.049	-1.746	0.081	-0.183	0.011
C(show_id)[T.73]	-0.2168	0.031	-6.985	0.000	-0.278	-0.156
C(show_id)[T.74]	-0.1267	0.035	-3.578	0.000	-0.196	-0.057

C(show_id)[T.75]	−0.1058	0.034	−3.125	0.002	−0.172	−0.039
C(show_id)[T.76]	−0.1374	0.052	−2.661	0.008	−0.239	−0.036
C(show_id)[T.77]	−0.3006	0.031	−9.555	0.000	−0.362	−0.239
C(show_id)[T.78]	−0.2103	0.034	−6.264	0.000	−0.276	−0.144
C(show_id)[T.79]	−0.2180	0.036	−6.101	0.000	−0.288	−0.148
C(show_id)[T.80]	0.5798	0.048	12.171	0.000	0.486	0.673
C(show_id)[T.81]	−0.1689	0.052	−3.272	0.001	−0.270	−0.068
C(show_id)[T.82]	−0.4152	0.033	−12.564	0.000	−0.480	−0.350
C(show_id)[T.83]	0.0490	0.035	1.405	0.160	−0.019	0.117
C(show_id)[T.84]	−0.0692	0.040	−1.721	0.085	−0.148	0.010
C(show_id)[T.85]	−0.3601	0.043	−8.383	0.000	−0.444	−0.276
C(show_id)[T.86]	−0.4329	0.035	−12.326	0.000	−0.502	−0.364
C(show_id)[T.87]	0.1624	0.036	4.523	0.000	0.092	0.233
C(show_id)[T.88]	−0.0691	0.037	−1.894	0.058	−0.141	0.002
C(show_id)[T.89]	−0.4498	0.033	−13.612	0.000	−0.515	−0.385
C(show_id)[T.90]	−0.4114	0.033	−12.450	0.000	−0.476	−0.347
C(show_id)[T.91]	0.4388	0.035	12.391	0.000	0.369	0.508
C(show_id)[T.92]	−0.1812	0.031	−5.758	0.000	−0.243	−0.120
C(show_id)[T.93]	−0.3936	0.032	−12.110	0.000	−0.457	−0.330
C(show_id)[T.94]	−0.2023	0.042	−4.800	0.000	−0.285	−0.120
C(show_id)[T.95]	−0.3465	0.033	−10.486	0.000	−0.411	−0.282
C(show_id)[T.96]	−0.0315	0.037	−0.853	0.394	−0.104	0.041
C(show_id)[T.97]	−0.4610	0.038	−11.982	0.000	−0.536	−0.386
C(show_id)[T.98]	−0.0936	0.049	−1.894	0.058	−0.190	0.003
C(show_id)[T.99]	−0.0431	0.046	−0.934	0.350	−0.134	0.047
C(show_id)[T.100]	−0.4240	0.033	−12.831	0.000	−0.489	−0.359
C(show_id)[T.101]	−0.1688	0.036	−4.652	0.000	−0.240	−0.098
C(show_id)[T.102]	−0.1684	0.045	−3.748	0.000	−0.256	−0.080
C(show_id)[T.103]	0.2215	0.036	6.135	0.000	0.151	0.292
C(show_id)[T.104]	−0.3838	0.033	−11.727	0.000	−0.448	−0.320
C(show_id)[T.105]	−0.4839	0.034	−14.285	0.000	−0.550	−0.417
C(show_id)[T.106]	−0.4856	0.043	−11.305	0.000	−0.570	−0.401
C(show_id)[T.107]	−0.1575	0.054	−2.894	0.004	−0.264	−0.051
C(show_id)[T.108]	−0.3879	0.058	−6.675	0.000	−0.502	−0.274
C(show_id)[T.109]	−0.4548	0.033	−13.785	0.000	−0.520	−0.390
C(show_id)[T.110]	−0.4938	0.033	−14.943	0.000	−0.559	−0.429
C(show_id)[T.111]	−0.0805	0.048	−1.690	0.091	−0.174	0.013
C(show_id)[T.112]	−0.2104	0.042	−4.992	0.000	−0.293	−0.128
C(show_id)[T.113]	−0.4476	0.033	−13.545	0.000	−0.512	−0.383
C(show_id)[T.114]	−0.4467	0.039	−11.375	0.000	−0.524	−0.370
C(show_id)[T.115]	−0.0939	0.033	−2.812	0.005	−0.159	−0.028
C(show_id)[T.116]	−0.0184	0.034	−0.544	0.586	−0.084	0.048
C(show_id)[T.117]	−0.5072	0.033	−15.349	0.000	−0.572	−0.442
C(show_id)[T.118]	−0.2399	0.036	−6.612	0.000	−0.311	−0.169

C(show_id)[T.119]	0.0233	0.036	0.645	0.519	−0.047	0.094
C(show_id)[T.120]	−0.5069	0.033	−15.340	0.000	−0.572	−0.442
C(show_id)[T.121]	−0.4063	0.031	−12.914	0.000	−0.468	−0.345
C(show_id)[T.122]	−0.2782	0.040	−7.002	0.000	−0.356	−0.200
C(show_id)[T.123]	−0.4044	0.033	−12.237	0.000	−0.469	−0.340
C(show_id)[T.124]	−0.1183	0.034	−3.517	0.000	−0.184	−0.052
C(show_id)[T.125]	−0.4519	0.033	−13.677	0.000	−0.517	−0.387
C(show_id)[T.126]	−0.3026	0.038	−7.936	0.000	−0.377	−0.228
C(show_id)[T.127]	−0.4422	0.036	−12.317	0.000	−0.513	−0.372
C(show_id)[T.128]	0.2168	0.037	5.867	0.000	0.144	0.289
C(show_id)[T.129]	−0.3519	0.042	−8.349	0.000	−0.434	−0.269
C(show_id)[T.130]	0.3642	0.033	11.181	0.000	0.300	0.428
C(show_id)[T.131]	−0.3842	0.033	−11.628	0.000	−0.449	−0.319
C(show_id)[T.132]	−0.4154	0.031	−13.201	0.000	−0.477	−0.354
C(show_id)[T.133]	−0.1217	0.042	−2.888	0.004	−0.204	−0.039
C(show_id)[T.134]	−0.3873	0.033	−11.721	0.000	−0.452	−0.323
C(show_id)[T.135]	−0.5056	0.038	−13.264	0.000	−0.580	−0.431
C(show_id)[T.136]	−0.2899	0.048	−6.086	0.000	−0.383	−0.197
C(show_id)[T.137]	0.1096	0.048	2.301	0.021	0.016	0.203
C(show_id)[T.138]	0.0512	0.044	1.167	0.243	−0.035	0.137
C(show_id)[T.139]	0.0184	0.058	0.316	0.752	−0.096	0.132
C(show_id)[T.140]	−0.0781	0.048	−1.639	0.101	−0.171	0.015
C(show_id)[T.141]	−0.2202	0.054	−4.046	0.000	−0.327	−0.114
C(show_id)[T.142]	−0.0471	0.035	−1.336	0.182	−0.116	0.022
C(show_id)[T.143]	0.2847	0.033	8.740	0.000	0.221	0.349
C(show_id)[T.144]	−0.4396	0.035	−12.652	0.000	−0.508	−0.371
C(show_id)[T.145]	−0.2847	0.036	−8.006	0.000	−0.354	−0.215
C(show_id)[T.146]	−0.3386	0.033	−10.245	0.000	−0.403	−0.274
C(show_id)[T.147]	−0.1054	0.036	−2.920	0.004	−0.176	−0.035
C(show_id)[T.148]	−0.4085	0.043	−9.511	0.000	−0.493	−0.324
C(show_id)[T.149]	−0.4073	0.038	−10.775	0.000	−0.481	−0.333
C(show_id)[T.150]	−0.3747	0.033	−11.356	0.000	−0.439	−0.310
C(show_id)[T.151]	−0.3422	0.035	−9.745	0.000	−0.411	−0.273
C(show_id)[T.152]	−0.3334	0.032	−10.376	0.000	−0.396	−0.270
C(show_id)[T.153]	−0.2226	0.045	−4.956	0.000	−0.311	−0.135
C(show_id)[T.154]	−0.0785	0.033	−2.377	0.017	−0.143	−0.014
C(show_id)[T.155]	−0.2759	0.032	−8.757	0.000	−0.338	−0.214
C(show_id)[T.156]	−0.4339	0.049	−8.779	0.000	−0.531	−0.337
C(show_id)[T.157]	−0.0142	0.033	−0.429	0.668	−0.079	0.051
C(show_id)[T.158]	−0.5026	0.034	−14.873	0.000	−0.569	−0.436
C(show_id)[T.159]	−0.3070	0.035	−8.741	0.000	−0.376	−0.238
C(show_id)[T.160]	−0.2390	0.036	−6.585	0.000	−0.310	−0.168
C(show_id)[T.161]	−0.5118	0.038	−13.425	0.000	−0.587	−0.437
C(show_id)[T.162]	0.1052	0.037	2.880	0.004	0.034	0.177

C(show_id)[T.163]	−0.3372	0.058	−5.804	0.000	−0.451	−0.223
C(show_id)[T.164]	−0.4668	0.052	−9.043	0.000	−0.568	−0.366
C(show_id)[T.165]	−0.5188	0.034	−15.454	0.000	−0.585	−0.453
C(show_id)[T.166]	0.1836	0.033	5.556	0.000	0.119	0.248
C(show_id)[T.167]	−0.2237	0.048	−4.696	0.000	−0.317	−0.130
C(show_id)[T.168]	−0.3328	0.041	−8.032	0.000	−0.414	−0.252
C(show_id)[T.169]	−0.5157	0.033	−15.607	0.000	−0.581	−0.451
C(show_id)[T.170]	−0.4375	0.036	−11.986	0.000	−0.509	−0.366
C(show_id)[T.171]	−0.4048	0.033	−12.232	0.000	−0.470	−0.340
C(show_id)[T.172]	−0.4294	0.034	−12.736	0.000	−0.496	−0.363
C(show_id)[T.173]	−0.2058	0.037	−5.638	0.000	−0.277	−0.134
C(show_id)[T.174]	−0.5162	0.033	−15.620	0.000	−0.581	−0.451
C(show_id)[T.175]	−0.3510	0.042	−8.328	0.000	−0.434	−0.268
C(show_id)[T.176]	−0.4848	0.033	−14.671	0.000	−0.550	−0.420
C(show_id)[T.177]	−0.4348	0.063	−6.878	0.000	−0.559	−0.311
C(show_id)[T.178]	−0.5085	0.033	−15.389	0.000	−0.573	−0.444
C(show_id)[T.179]	−0.4180	0.038	−10.964	0.000	−0.493	−0.343
C(show_id)[T.180]	−0.4570	0.035	−13.199	0.000	−0.525	−0.389
C(show_id)[T.181]	−0.3677	0.046	−7.964	0.000	−0.458	−0.277
C(show_id)[T.182]	−0.4900	0.033	−15.061	0.000	−0.554	−0.426
C(show_id)[T.183]	−0.5107	0.044	−11.642	0.000	−0.597	−0.425
C(show_id)[T.184]	−0.4848	0.043	−11.288	0.000	−0.569	−0.401
C(show_id)[T.185]	−0.4844	0.044	−11.043	0.000	−0.570	−0.398
C(show_id)[T.186]	−0.4953	0.034	−14.392	0.000	−0.563	−0.428
C(show_id)[T.187]	−0.4481	0.033	−13.562	0.000	−0.513	−0.383
C(show_id)[T.188]	−0.4413	0.049	−8.930	0.000	−0.538	−0.344
C(show_id)[T.189]	−0.5051	0.033	−15.284	0.000	−0.570	−0.440
C(show_id)[T.190]	−0.2664	0.058	−4.585	0.000	−0.380	−0.152
C(show_id)[T.191]	−0.5113	0.033	−15.474	0.000	−0.576	−0.447
C(show_id)[T.192]	−0.3730	0.035	−10.661	0.000	−0.442	−0.304
C(show_id)[T.193]	−0.3140	0.033	−9.502	0.000	−0.379	−0.249
C(show_id)[T.194]	−0.3785	0.034	−11.273	0.000	−0.444	−0.313
C(show_id)[T.195]	−0.4671	0.032	−14.640	0.000	−0.530	−0.405
C(show_id)[T.196]	−0.4915	0.032	−15.241	0.000	−0.555	−0.428
C(show_id)[T.197]	−0.4349	0.035	−12.600	0.000	−0.503	−0.367
C(show_id)[T.198]	−0.4529	0.034	−13.272	0.000	−0.520	−0.386
C(show_id)[T.199]	−0.4674	0.036	−12.879	0.000	−0.539	−0.396
C(show_id)[T.200]	−0.4294	0.035	−12.178	0.000	−0.499	−0.360
C(show_id)[T.201]	−0.4562	0.046	−9.880	0.000	−0.547	−0.366
C(show_id)[T.202]	−0.2753	0.049	−5.568	0.000	−0.372	−0.178
C(show_id)[T.203]	−0.4659	0.052	−9.024	0.000	−0.567	−0.365
C(show_id)[T.204]	−0.4843	0.048	−10.163	0.000	−0.578	−0.391
C(show_id)[T.205]	−0.4418	0.058	−7.602	0.000	−0.556	−0.328
C(show_id)[T.206]	−0.3516	0.035	−10.086	0.000	−0.420	−0.283

C(show_id)[T.207]	−0.3596	0.052	−6.965	0.000	−0.461	−0.258
C(show_id)[T.208]	−0.2884	0.049	−5.835	0.000	−0.385	−0.192
C(show_id)[T.209]	−0.4531	0.084	−5.369	0.000	−0.619	−0.288
C(show_id)[T.210]	−0.4174	0.054	−7.669	0.000	−0.524	−0.311
C(show_id)[T.211]	−0.4717	0.035	−13.430	0.000	−0.541	−0.403
C(show_id)[T.212]	−0.1889	0.046	−4.089	0.000	−0.279	−0.098
C(show_id)[T.213]	−0.3717	0.058	−6.396	0.000	−0.486	−0.258
C(show_id)[T.214]	−0.4198	0.048	−8.810	0.000	−0.513	−0.326
C(show_id)[T.215]	−0.5003	0.034	−14.928	0.000	−0.566	−0.435
C(show_id)[T.216]	−0.4971	0.034	−14.835	0.000	−0.563	−0.431
C(show_id)[T.217]	1.2341	0.034	36.825	0.000	1.168	1.300
C(show_id)[T.218]	0.6465	0.033	19.849	0.000	0.583	0.710
C(show_id)[T.219]	0.5229	0.033	15.823	0.000	0.458	0.588
C(show_id)[T.220]	0.5590	0.034	16.241	0.000	0.492	0.626
C(show_id)[T.221]	0.3503	0.035	10.150	0.000	0.283	0.418
C(show_id)[T.224]	0.8338	0.037	22.556	0.000	0.761	0.906
C(show_id)[T.225]	0.4719	0.033	14.279	0.000	0.407	0.537
C(show_id)[T.226]	0.4384	0.034	12.777	0.000	0.371	0.506
C(show_id)[T.227]	0.2334	0.035	6.618	0.000	0.164	0.303
C(show_id)[T.230]	−0.1877	0.034	−5.471	0.000	−0.255	−0.120
C(show_id)[T.231]	0.5593	0.040	14.072	0.000	0.481	0.637
C(show_id)[T.232]	0.6517	0.048	13.677	0.000	0.558	0.745
C(show_id)[T.233]	0.2346	0.048	4.924	0.000	0.141	0.328
C(show_id)[T.234]	−0.0428	0.041	−1.032	0.302	−0.124	0.038
C(show_id)[T.235]	0.4995	0.048	10.483	0.000	0.406	0.593
C(show_id)[T.236]	0.3579	0.052	6.932	0.000	0.257	0.459
C(show_id)[T.237]	0.1151	0.048	2.417	0.016	0.022	0.209
C(show_id)[T.238]	0.8258	0.049	16.706	0.000	0.729	0.923
C(show_id)[T.239]	0.4697	0.058	8.082	0.000	0.356	0.584
C(show_id)[T.240]	0.3234	0.058	5.565	0.000	0.209	0.437
C(show_id)[T.241]	0.4464	0.035	12.931	0.000	0.379	0.514
C(show_id)[T.242]	0.5422	0.048	11.379	0.000	0.449	0.636
C(show_id)[T.243]	0.3047	0.036	8.525	0.000	0.235	0.375
C(show_id)[T.244]	0.6736	0.048	14.136	0.000	0.580	0.767
C(show_id)[T.245]	0.7376	0.044	16.813	0.000	0.652	0.824
C(show_id)[T.246]	0.7120	0.063	11.256	0.000	0.588	0.836
C(show_id)[T.247]	0.8307	0.048	17.424	0.000	0.737	0.924
C(show_id)[T.248]	0.3895	0.036	10.899	0.000	0.319	0.460
C(show_id)[T.249]	0.1351	0.036	3.744	0.000	0.064	0.206
C(show_id)[T.250]	0.2959	0.037	8.004	0.000	0.223	0.368
C(show_id)[T.251]	0.3918	0.058	6.742	0.000	0.278	0.506
C(show_id)[T.252]	0.1427	0.084	1.691	0.091	−0.023	0.308
C(show_id)[T.253]	−0.4882	0.032	−15.332	0.000	−0.551	−0.426
C(show_id)[T.254]	−0.2866	0.054	−5.261	0.000	−0.393	−0.180

C(show_id)[T.255]	−0.5370	0.048	−11.270	0.000	−0.630	−0.444
C(show_id)[T.256]	−0.4316	0.054	−7.922	0.000	−0.538	−0.325
C(show_id)[T.257]	−0.5187	0.034	−15.200	0.000	−0.586	−0.452
C(show_id)[T.258]	−0.1974	0.054	−3.628	0.000	−0.304	−0.091
C(show_id)[T.259]	−0.1664	0.048	−3.492	0.000	−0.260	−0.073
C(show_id)[T.260]	−0.4964	0.048	−10.418	0.000	−0.590	−0.403
C(show_id)[T.261]	−0.5053	0.035	−14.592	0.000	−0.573	−0.437
C(show_id)[T.262]	−0.5024	0.034	−14.598	0.000	−0.570	−0.435
C(show_id)[T.263]	−0.3077	0.045	−6.845	0.000	−0.396	−0.220
C(show_id)[T.264]	−0.5293	0.054	−9.724	0.000	−0.636	−0.423
C(show_id)[T.265]	−0.3554	0.048	−7.457	0.000	−0.449	−0.262
C(show_id)[T.266]	−0.4030	0.033	−12.193	0.000	−0.468	−0.338
C(show_id)[T.267]	−0.5141	0.048	−10.789	0.000	−0.608	−0.421
C(show_id)[T.268]	−0.4684	0.033	−14.173	0.000	−0.533	−0.404
C(show_id)[T.269]	−0.4594	0.038	−11.937	0.000	−0.535	−0.384
C(show_id)[T.270]	−0.2833	0.032	−8.927	0.000	−0.345	−0.221
C(show_id)[T.271]	−0.4115	0.048	−8.637	0.000	−0.505	−0.318
C(show_id)[T.272]	−0.4505	0.048	−9.454	0.000	−0.544	−0.357
C(show_id)[T.273]	−0.4498	0.033	−13.610	0.000	−0.515	−0.385
C(show_id)[T.274]	−0.1893	0.034	−5.625	0.000	−0.255	−0.123
C(show_id)[T.275]	−0.1344	0.038	−3.555	0.000	−0.208	−0.060
C(show_id)[T.276]	−0.0407	0.048	−0.854	0.393	−0.134	0.053
C(show_id)[T.277]	0.0742	0.039	1.909	0.056	−0.002	0.150
C(show_id)[T.278]	0.2454	0.036	6.833	0.000	0.175	0.316
C(show_id)[T.279]	0.5175	0.048	10.859	0.000	0.424	0.611
C(show_id)[T.280]	0.0303	0.048	0.636	0.525	−0.063	0.124
C(show_id)[T.281]	0.1684	0.035	4.877	0.000	0.101	0.236
C(show_id)[T.282]	0.1729	0.035	4.960	0.000	0.105	0.241
C(show_id)[T.283]	0.0195	0.054	0.359	0.720	−0.087	0.126
C(show_id)[T.284]	−0.0699	0.048	−1.468	0.142	−0.163	0.023
C(show_id)[T.285]	0.0766	0.049	1.550	0.121	−0.020	0.174
C(show_id)[T.286]	0.2473	0.037	6.645	0.000	0.174	0.320
C(show_id)[T.287]	−0.3733	0.049	−7.553	0.000	−0.470	−0.276
C(show_id)[T.288]	0.0866	0.048	1.817	0.069	−0.007	0.180
C(show_id)[T.289]	−0.0446	0.048	−0.936	0.350	−0.138	0.049
C(show_id)[T.290]	−0.0165	0.052	−0.319	0.750	−0.118	0.085
C(show_id)[T.291]	0.1398	0.033	4.223	0.000	0.075	0.205
C(show_id)[T.292]	2.1816	0.033	65.803	0.000	2.117	2.247
C(show_id)[T.294]	2.2309	0.041	54.651	0.000	2.151	2.311
C(show_id)[T.295]	2.5626	0.034	74.463	0.000	2.495	2.630
C(show_id)[T.296]	2.7079	0.035	78.448	0.000	2.640	2.776
C(show_id)[T.298]	2.3680	0.034	69.010	0.000	2.301	2.435
C(show_id)[T.299]	2.1886	0.034	63.782	0.000	2.121	2.256
C(show_id)[T.300]	2.0394	0.034	59.434	0.000	1.972	2.107

C(show_id)[T.304]	2.6022	0.054	47.809	0.000	2.495	2.709
C(show_id)[T.306]	2.5469	0.052	49.329	0.000	2.446	2.648
C(show_id)[T.307]	2.4676	0.054	45.337	0.000	2.361	2.574
C(show_id)[T.308]	2.8309	0.038	73.573	0.000	2.755	2.906
C(show_id)[T.312]	2.3598	0.052	45.703	0.000	2.259	2.461
C(show_id)[T.313]	2.8729	0.038	74.665	0.000	2.797	2.948
C(show_id)[T.314]	2.4861	0.042	58.981	0.000	2.403	2.569
C(show_id)[T.319]	2.8684	0.039	73.813	0.000	2.792	2.945
C(show_id)[T.320]	−0.4719	0.038	−12.482	0.000	−0.546	−0.398
C(show_id)[T.321]	−0.1470	0.041	−3.547	0.000	−0.228	−0.066
C(show_id)[T.322]	0.3083	0.036	8.667	0.000	0.239	0.378
C(show_id)[T.323]	−0.4885	0.040	−12.133	0.000	−0.567	−0.410
C(show_id)[T.324]	−0.5124	0.035	−14.797	0.000	−0.580	−0.445
C(show_id)[T.325]	0.0672	0.058	1.156	0.248	−0.047	0.181
C(show_id)[T.326]	0.3957	0.048	8.304	0.000	0.302	0.489
C(show_id)[T.327]	−0.4124	0.046	−8.931	0.000	−0.503	−0.322
C(show_id)[T.328]	−0.3879	0.033	−11.737	0.000	−0.453	−0.323
C(show_id)[T.329]	0.2222	0.033	6.669	0.000	0.157	0.288
C(show_id)[T.330]	−0.2337	0.034	−6.882	0.000	−0.300	−0.167
C(show_id)[T.331]	−0.4290	0.048	−9.002	0.000	−0.522	−0.336
C(show_id)[T.332]	−0.0805	0.031	−2.575	0.010	−0.142	−0.019
C(show_id)[T.333]	−0.5109	0.034	−14.845	0.000	−0.578	−0.443
C(show_id)[T.334]	−0.4916	0.033	−14.829	0.000	−0.557	−0.427
C(show_id)[T.335]	0.1561	0.048	3.275	0.001	0.063	0.249
C(show_id)[T.336]	0.3314	0.058	5.702	0.000	0.217	0.445
C(show_id)[T.337]	−0.1862	0.048	−3.908	0.000	−0.280	−0.093
C(show_id)[T.338]	−0.4929	0.048	−10.345	0.000	−0.586	−0.400
C(show_id)[T.339]	0.1702	0.049	3.444	0.001	0.073	0.267
C(show_id)[T.340]	−0.3964	0.033	−11.994	0.000	−0.461	−0.332
C(show_id)[T.341]	−0.4576	0.071	−6.445	0.000	−0.597	−0.318
C(show_id)[T.342]	−0.1656	0.035	−4.733	0.000	−0.234	−0.097
censor_dummy:mainland_dummy	−0.0227	0.010	−2.328	0.020	−0.042	−0.004
censor_dummy	0.0106	0.008	1.267	0.205	−0.006	0.027

Omnibus:	2111.802	Durbin−Watson:		1.991
Prob(Omnibus):	0.000	Jarque−Bera (JB):		31172.319
Skew:	0.455	Prob(JB):		0.00
Kurtosis:	11.040	Cond. No.		519.

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

1.3 Across-show Diff-in-diff

From this question onward, use only observations from shows in mainland China.

Question 1. The variable av tweets denotes the average number of tweets associated with an episode of each show (outside of the censored time period). Therefore, this variable is show specific, but it does not vary over time. We can use this variable to capture the general level of social media interest in each show. Generate a set of three dummy variables based on the av tweets variable: The first dummy is equal to one for shows with fewer than 5 tweets per episode, the second dummy is equal to one for shows with at least 5 but less than 100 tweets per episode, and the third dummy should be equal to one for shows with at least 100 tweets per episode.

(a) Run three separate regressions for shows with less than 5 tweets per episode, shows with 5 to 100 tweets per episode and shows with at least 100 tweets. What do you find in terms of impact of the censorship event across the three regressions?

I ran three separate regressions for the three buckets as defined. Across the three regressions, we observe that shows with low and medium average tweets aren't affected by censorship as much as shows with high average tweets. This makes sense because the reduction or difference in number of tweets due to censorship is higher for shows with higher tweets than with medium or lower tweets. Hence, the net impact is also higher for shows with higher number of tweets.

```python
weibo_data['less5'] = 0
weibo_data['atleast5'] = 0
weibo_data['atleast100'] = 0
weibo_data.loc[weibo_data['av_tweets'] < 5, 'less5'] = 1
weibo_data.loc[(weibo_data['av_tweets'] >= 5) & (weibo_data['av_tweets'] < 100), 'atleast5'] = 1
weibo_data.loc[weibo_data['av_tweets'] >= 100, 'atleast100'] = 1
```

```python
# Fit a linear regression model
model = ols('log_rating ~ censor_dummy + C(show_id)', data = weibo_data.loc[(weibo_data.mainland_dummy == 1) & (weibo_

# Print the model summary
print(model.summary())
```

```
                           OLS Regression Results
==============================================================================
Dep. Variable:             log_rating   R-squared:                       0.844
Model:                            OLS   Adj. R-squared:                  0.840
Method:                 Least Squares   F-statistic:                     203.3
Date:                Fri, 01 Mar 2024   Prob (F-statistic):               0.00
Time:                        19:52:20   Log-Likelihood:                 4134.6
No. Observations:                3405   AIC:                            -8091.
Df Residuals:                    3316   BIC:                            -7545.
Df Model:                          88
Covariance Type:            nonrobust
==============================================================================
                     coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
Intercept          0.5573      0.019     28.637      0.000       0.519       0.595
C(show_id)[T.2]   -0.0064      0.021     -0.305      0.760      -0.047       0.035
C(show_id)[T.10]   0.0970      0.034      2.877      0.004       0.031       0.163
C(show_id)[T.11]  -0.4185      0.029    -14.604      0.000      -0.475      -0.362
C(show_id)[T.12]  -0.4623      0.038    -12.155      0.000      -0.537      -0.388
C(show_id)[T.16]  -0.3591      0.022    -16.118      0.000      -0.403      -0.315
C(show_id)[T.17]  -0.3261      0.032    -10.095      0.000      -0.389      -0.263
C(show_id)[T.19]  -0.4102      0.031    -13.175      0.000      -0.471      -0.349
C(show_id)[T.22]  -0.1946      0.023     -8.341      0.000      -0.240      -0.149
C(show_id)[T.23]  -0.2697      0.036     -7.590      0.000      -0.339      -0.200
C(show_id)[T.24]  -0.1165      0.034     -3.457      0.001      -0.183      -0.050
C(show_id)[T.27]  -0.3945      0.022    -17.610      0.000      -0.438      -0.351
C(show_id)[T.29]   0.2391      0.022     10.908      0.000       0.196       0.282
C(show_id)[T.30]  -0.3105      0.022    -14.389      0.000      -0.353      -0.268
C(show_id)[T.31]  -0.2675      0.041     -6.471      0.000      -0.349      -0.186
C(show_id)[T.32]  -0.2497      0.022    -11.391      0.000      -0.293      -0.207
C(show_id)[T.33]  -0.4501      0.032    -13.948      0.000      -0.513      -0.387
C(show_id)[T.34]  -0.2251      0.032     -6.975      0.000      -0.288      -0.162
C(show_id)[T.35]  -0.2212      0.025     -8.718      0.000      -0.271      -0.171
C(show_id)[T.42]  -0.2688      0.022    -12.419      0.000      -0.311      -0.226
C(show_id)[T.46]  -0.2586      0.031     -8.315      0.000      -0.320      -0.198
C(show_id)[T.47]  -0.3910      0.029    -13.653      0.000      -0.447      -0.335
C(show_id)[T.49]  -0.3818      0.022    -17.669      0.000      -0.424      -0.339
C(show_id)[T.52]   0.1325      0.025      5.222      0.000       0.083       0.182
C(show_id)[T.53]   0.0640      0.024      2.662      0.008       0.017       0.111
C(show_id)[T.57]  -0.1530      0.022     -7.101      0.000      -0.195      -0.111
C(show_id)[T.59]  -0.3001      0.031     -9.648      0.000      -0.361      -0.239
C(show_id)[T.60]  -0.3055      0.031     -9.820      0.000      -0.366      -0.244
C(show_id)[T.61]  -0.3051      0.022    -14.096      0.000      -0.348      -0.263
C(show_id)[T.64]  -0.1771      0.031     -5.692      0.000      -0.238      -0.116
```

C(show_id)[T.65]	−0.2775	0.020	−13.617	0.000	−0.317	−0.238
C(show_id)[T.68]	−0.2900	0.021	−13.875	0.000	−0.331	−0.249
C(show_id)[T.70]	−0.2814	0.026	−10.973	0.000	−0.332	−0.231
C(show_id)[T.71]	−0.1071	0.021	−5.166	0.000	−0.148	−0.066
C(show_id)[T.72]	−0.0866	0.032	−2.683	0.007	−0.150	−0.023
C(show_id)[T.74]	−0.1268	0.023	−5.484	0.000	−0.172	−0.081
C(show_id)[T.76]	−0.1378	0.034	−4.087	0.000	−0.204	−0.072
C(show_id)[T.78]	−0.2105	0.022	−9.603	0.000	−0.254	−0.168
C(show_id)[T.79]	−0.2181	0.023	−9.349	0.000	−0.264	−0.172
C(show_id)[T.81]	−0.1692	0.034	−5.022	0.000	−0.235	−0.103
C(show_id)[T.82]	−0.4150	0.022	−19.236	0.000	−0.457	−0.373
C(show_id)[T.85]	−0.3605	0.028	−12.854	0.000	−0.415	−0.306
C(show_id)[T.86]	−0.4327	0.023	−18.867	0.000	−0.478	−0.388
C(show_id)[T.89]	−0.4497	0.022	−20.841	0.000	−0.492	−0.407
C(show_id)[T.90]	−0.4113	0.022	−19.062	0.000	−0.454	−0.369
C(show_id)[T.92]	−0.1811	0.021	−8.813	0.000	−0.221	−0.141
C(show_id)[T.93]	−0.3934	0.021	−18.540	0.000	−0.435	−0.352
C(show_id)[T.100]	−0.4239	0.022	−19.646	0.000	−0.466	−0.382
C(show_id)[T.102]	−0.1690	0.029	−5.760	0.000	−0.227	−0.111
C(show_id)[T.105]	−0.4836	0.022	−21.866	0.000	−0.527	−0.440
C(show_id)[T.106]	−0.4860	0.028	−17.329	0.000	−0.541	−0.431
C(show_id)[T.107]	−0.1580	0.036	−4.446	0.000	−0.228	−0.088
C(show_id)[T.108]	−0.3897	0.038	−10.262	0.000	−0.464	−0.315
C(show_id)[T.110]	−0.4937	0.022	−22.881	0.000	−0.536	−0.451
C(show_id)[T.113]	−0.4475	0.022	−20.739	0.000	−0.490	−0.405
C(show_id)[T.115]	−0.0938	0.022	−4.302	0.000	−0.136	−0.051
C(show_id)[T.117]	−0.5071	0.022	−23.502	0.000	−0.549	−0.465
C(show_id)[T.118]	−0.2397	0.024	−10.118	0.000	−0.286	−0.193
C(show_id)[T.123]	−0.4043	0.022	−18.736	0.000	−0.447	−0.362
C(show_id)[T.124]	−0.1182	0.022	−5.383	0.000	−0.161	−0.075
C(show_id)[T.125]	−0.4518	0.022	−20.941	0.000	−0.494	−0.410
C(show_id)[T.131]	−0.3841	0.022	−17.803	0.000	−0.426	−0.342
C(show_id)[T.132]	−0.4152	0.021	−20.212	0.000	−0.456	−0.375
C(show_id)[T.139]	0.0177	0.038	0.466	0.641	−0.057	0.092
C(show_id)[T.140]	−0.0783	0.031	−2.518	0.012	−0.139	−0.017
C(show_id)[T.141]	−0.2207	0.036	−6.211	0.000	−0.290	−0.151
C(show_id)[T.144]	−0.4396	0.023	−19.379	0.000	−0.484	−0.395
C(show_id)[T.146]	−0.3384	0.022	−15.686	0.000	−0.381	−0.296
C(show_id)[T.149]	−0.4074	0.025	−16.506	0.000	−0.456	−0.359
C(show_id)[T.152]	−0.3332	0.021	−15.878	0.000	−0.374	−0.292
C(show_id)[T.154]	−0.0784	0.022	−3.634	0.000	−0.121	−0.036
C(show_id)[T.156]	−0.4342	0.032	−13.454	0.000	−0.497	−0.371
C(show_id)[T.157]	−0.0140	0.022	−0.651	0.515	−0.056	0.028
C(show_id)[T.160]	−0.2388	0.024	−10.077	0.000	−0.285	−0.192

```
C(show_id)[T.161]      -0.5116      0.025     -20.555      0.000      -0.560      -0.463
C(show_id)[T.163]      -0.3379      0.038      -8.906      0.000      -0.412      -0.263
C(show_id)[T.164]      -0.4672      0.034     -13.860      0.000      -0.533      -0.401
C(show_id)[T.165]      -0.5188      0.022     -23.665      0.000      -0.562      -0.476
C(show_id)[T.168]      -0.3328      0.027     -12.300      0.000      -0.386      -0.280
C(show_id)[T.169]      -0.5156      0.022     -23.898      0.000      -0.558      -0.473
C(show_id)[T.171]      -0.4047      0.022     -18.729      0.000      -0.447      -0.362
C(show_id)[T.178]      -0.5084      0.022     -23.563      0.000      -0.551      -0.466
C(show_id)[T.180]      -0.4568      0.023     -20.203      0.000      -0.501      -0.412
C(show_id)[T.181]      -0.3678      0.030     -12.202      0.000      -0.427      -0.309
C(show_id)[T.186]      -0.4950      0.022     -22.030      0.000      -0.539      -0.451
C(show_id)[T.189]      -0.5049      0.022     -23.403      0.000      -0.547      -0.463
C(show_id)[T.190]      -0.2670      0.038      -7.039      0.000      -0.341      -0.193
C(show_id)[T.191]      -0.5112      0.022     -23.694      0.000      -0.554      -0.469
censor_dummy           -0.0069      0.005      -1.326      0.185      -0.017       0.003
==============================================================================
Omnibus:                      500.093   Durbin-Watson:                   1.664
Prob(Omnibus):                  0.000   Jarque-Bera (JB):             3305.218
Skew:                           0.519   Prob(JB):                         0.00
Kurtosis:                       7.714   Cond. No.                         149.
==============================================================================

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.
```

In [ ]:
```python
# Fit a linear regression model
model = ols('log_rating ~ censor_dummy + C(show_id)', data = weibo_data.loc[(weibo_data.mainland_dummy == 1) & (weibo_

# Print the model summary
print(model.summary())
```

```
                         OLS Regression Results
==============================================================================
Dep. Variable:             log_rating   R-squared:                       0.888
Model:                            OLS   Adj. R-squared:                  0.886
Method:                 Least Squares   F-statistic:                     363.1
Date:                Fri, 01 Mar 2024   Prob (F-statistic):               0.00
Time:                        19:52:20   Log-Likelihood:                 2922.7
No. Observations:                2945   AIC:                            -5717.
Df Residuals:                    2881   BIC:                            -5334.
Df Model:                          63
Covariance Type:            nonrobust
==============================================================================
                    coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
Intercept          0.8858      0.015     60.838      0.000       0.857       0.914
C(show_id)[T.8]    0.6163      0.019     33.123      0.000       0.580       0.653
C(show_id)[T.14]  -0.7091      0.019    -37.988      0.000      -0.746      -0.672
C(show_id)[T.15]  -0.7285      0.018    -40.653      0.000      -0.764      -0.693
C(show_id)[T.18]  -0.6431      0.020    -32.232      0.000      -0.682      -0.604
C(show_id)[T.20]  -0.3966      0.034    -11.827      0.000      -0.462      -0.331
C(show_id)[T.21]  -0.2710      0.028     -9.590      0.000      -0.326      -0.216
C(show_id)[T.26]  -0.6034      0.018    -34.034      0.000      -0.638      -0.569
C(show_id)[T.28]  -0.6327      0.019    -33.162      0.000      -0.670      -0.595
C(show_id)[T.37]  -0.3697      0.019    -19.867      0.000      -0.406      -0.333
C(show_id)[T.40]  -0.4826      0.016    -30.357      0.000      -0.514      -0.451
C(show_id)[T.41]  -0.5259      0.019    -27.693      0.000      -0.563      -0.489
C(show_id)[T.43]  -0.7501      0.030    -25.053      0.000      -0.809      -0.691
C(show_id)[T.48]  -0.6611      0.026    -25.082      0.000      -0.713      -0.609
C(show_id)[T.50]  -0.6270      0.019    -33.697      0.000      -0.663      -0.590
C(show_id)[T.51]  -0.6896      0.023    -29.683      0.000      -0.735      -0.644
C(show_id)[T.54]  -0.2729      0.023    -12.021      0.000      -0.317      -0.228
C(show_id)[T.55]  -0.4704      0.019    -25.119      0.000      -0.507      -0.434
C(show_id)[T.58]  -0.5273      0.019    -28.343      0.000      -0.564      -0.491
C(show_id)[T.62]  -0.5814      0.020    -28.634      0.000      -0.621      -0.542
C(show_id)[T.66]  -0.4377      0.034    -13.050      0.000      -0.503      -0.372
C(show_id)[T.67]  -0.1190      0.019     -6.393      0.000      -0.155      -0.082
C(show_id)[T.69]  -0.5194      0.024    -21.786      0.000      -0.566      -0.473
C(show_id)[T.73]  -0.5453      0.016    -33.745      0.000      -0.577      -0.514
C(show_id)[T.75]  -0.4343      0.020    -22.196      0.000      -0.473      -0.396
C(show_id)[T.77]  -0.6291      0.017    -37.678      0.000      -0.662      -0.596
C(show_id)[T.84]  -0.3978      0.026    -15.089      0.000      -0.449      -0.346
C(show_id)[T.95]  -0.6750      0.019    -36.277      0.000      -0.711      -0.638
C(show_id)[T.98]  -0.4227      0.035    -12.008      0.000      -0.492      -0.354
C(show_id)[T.99]  -0.3720      0.032    -11.573      0.000      -0.435      -0.309
```

C(show_id)[T.104]	-0.7126	0.018	-39.107	0.000	-0.748	-0.677
C(show_id)[T.109]	-0.7833	0.019	-42.232	0.000	-0.820	-0.747
C(show_id)[T.114]	-0.7752	0.025	-30.545	0.000	-0.825	-0.725
C(show_id)[T.116]	-0.3477	0.019	-17.948	0.000	-0.386	-0.310
C(show_id)[T.120]	-0.8354	0.019	-44.897	0.000	-0.872	-0.799
C(show_id)[T.121]	-0.7348	0.017	-44.008	0.000	-0.768	-0.702
C(show_id)[T.126]	-0.6321	0.024	-26.140	0.000	-0.679	-0.585
C(show_id)[T.127]	-0.7708	0.022	-35.312	0.000	-0.814	-0.728
C(show_id)[T.128]	-0.1119	0.023	-4.870	0.000	-0.157	-0.067
C(show_id)[T.134]	-0.7158	0.019	-38.470	0.000	-0.752	-0.679
C(show_id)[T.135]	-0.8341	0.024	-34.479	0.000	-0.882	-0.787
C(show_id)[T.136]	-0.6189	0.034	-18.455	0.000	-0.685	-0.553
C(show_id)[T.142]	-0.3756	0.021	-17.782	0.000	-0.417	-0.334
C(show_id)[T.145]	-0.6131	0.021	-28.560	0.000	-0.655	-0.571
C(show_id)[T.147]	-0.4359	0.022	-19.773	0.000	-0.479	-0.393
C(show_id)[T.151]	-0.6712	0.021	-32.022	0.000	-0.712	-0.630
C(show_id)[T.153]	-0.5515	0.031	-17.811	0.000	-0.612	-0.491
C(show_id)[T.155]	-0.6044	0.017	-36.089	0.000	-0.637	-0.572
C(show_id)[T.158]	-0.8310	0.019	-42.669	0.000	-0.869	-0.793
C(show_id)[T.159]	-0.6353	0.021	-30.286	0.000	-0.676	-0.594
C(show_id)[T.166]	-0.1449	0.019	-7.786	0.000	-0.181	-0.108
C(show_id)[T.167]	-0.5527	0.034	-16.481	0.000	-0.618	-0.487
C(show_id)[T.170]	-0.7661	0.022	-34.097	0.000	-0.810	-0.722
C(show_id)[T.174]	-0.8447	0.019	-45.396	0.000	-0.881	-0.808
C(show_id)[T.175]	-0.6796	0.028	-24.050	0.000	-0.735	-0.624
C(show_id)[T.176]	-0.8133	0.019	-43.710	0.000	-0.850	-0.777
C(show_id)[T.177]	-0.7649	0.048	-16.065	0.000	-0.858	-0.672
C(show_id)[T.182]	-0.8184	0.018	-45.459	0.000	-0.854	-0.783
C(show_id)[T.184]	-0.8141	0.029	-28.033	0.000	-0.871	-0.757
C(show_id)[T.185]	-0.8132	0.030	-27.160	0.000	-0.872	-0.754
C(show_id)[T.187]	-0.7766	0.019	-41.740	0.000	-0.813	-0.740
C(show_id)[T.188]	-0.7704	0.035	-21.889	0.000	-0.839	-0.701
C(show_id)[T.193]	-0.6425	0.019	-34.529	0.000	-0.679	-0.606
censor_dummy	-0.0042	0.007	-0.610	0.542	-0.018	0.009

```
==============================================================================
Omnibus:                      344.985   Durbin-Watson:                  2.063
Prob(Omnibus):                  0.000   Jarque-Bera (JB):            1518.722
Skew:                           0.493   Prob(JB):                        0.00
Kurtosis:                       6.377   Cond. No.                        71.0
==============================================================================
```

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

```
In [ ]:  # Fit a linear regression model
         model = ols('log_rating ~ censor_dummy + C(show_id)', data = weibo_data.loc[(weibo_data.mainland_dummy == 1) & (weibo_

         # Print the model summary
         print(model.summary())
```

```
                           OLS Regression Results
==============================================================================
Dep. Variable:             log_rating   R-squared:                       0.850
Model:                            OLS   Adj. R-squared:                  0.846
Method:                 Least Squares   F-statistic:                     203.8
Date:                Fri, 01 Mar 2024   Prob (F-statistic):               0.00
Time:                        19:52:20   Log-Likelihood:                 1090.7
No. Observations:                1549   AIC:                            -2095.
Df Residuals:                    1506   BIC:                            -1866.
Df Model:                          42
Covariance Type:            nonrobust
==============================================================================
                     coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------------
Intercept          0.7549      0.016     48.152      0.000       0.724       0.786
C(show_id)[T.5]    0.4143      0.022     18.774      0.000       0.371       0.458
C(show_id)[T.6]   -0.1895      0.025     -7.650      0.000      -0.238      -0.141
C(show_id)[T.7]   -0.3019      0.022    -13.679      0.000      -0.345      -0.259
C(show_id)[T.9]   -0.3437      0.026    -13.311      0.000      -0.394      -0.293
C(show_id)[T.13]  -0.5975      0.033    -18.304      0.000      -0.662      -0.533
C(show_id)[T.25]  -0.0710      0.028     -2.493      0.013      -0.127      -0.015
C(show_id)[T.36]  -0.4552      0.043    -10.492      0.000      -0.540      -0.370
C(show_id)[T.38]  -0.2068      0.022     -9.373      0.000      -0.250      -0.164
C(show_id)[T.39]  -0.6109      0.024    -25.190      0.000      -0.658      -0.563
C(show_id)[T.44]  -0.3819      0.043     -8.803      0.000      -0.467      -0.297
C(show_id)[T.45]  -0.5401      0.018    -29.593      0.000      -0.576      -0.504
C(show_id)[T.56]  -0.3873      0.022    -17.481      0.000      -0.431      -0.344
C(show_id)[T.63]  -0.3339      0.019    -17.451      0.000      -0.371      -0.296
C(show_id)[T.80]   0.3850      0.043      8.873      0.000       0.300       0.470
C(show_id)[T.83]  -0.1471      0.025     -5.847      0.000      -0.196      -0.098
C(show_id)[T.87]  -0.0328      0.027     -1.220      0.223      -0.085       0.020
C(show_id)[T.88]  -0.2633      0.028     -9.473      0.000      -0.318      -0.209
C(show_id)[T.91]   0.2441      0.026      9.364      0.000       0.193       0.295
C(show_id)[T.94]  -0.3980      0.036    -11.049      0.000      -0.469      -0.327
C(show_id)[T.96]  -0.2230      0.029     -7.796      0.000      -0.279      -0.167
C(show_id)[T.97]  -0.6572      0.031    -21.359      0.000      -0.718      -0.597
C(show_id)[T.101] -0.3653      0.027    -13.309      0.000      -0.419      -0.311
C(show_id)[T.103]  0.0285      0.027      1.049      0.295      -0.025       0.082
C(show_id)[T.111] -0.2754      0.043     -6.347      0.000      -0.360      -0.190
C(show_id)[T.112] -0.4045      0.036    -11.226      0.000      -0.475      -0.334
C(show_id)[T.119] -0.1697      0.027     -6.240      0.000      -0.223      -0.116
C(show_id)[T.122] -0.4742      0.033    -14.541      0.000      -0.538      -0.410
C(show_id)[T.129] -0.5476      0.036    -15.201      0.000      -0.618      -0.477
C(show_id)[T.130]  0.1687      0.021      7.953      0.000       0.127       0.210
```

```
C(show_id)[T.133]        -0.3174         0.036         -8.811         0.000         -0.388         -0.247
C(show_id)[T.137]        -0.0852         0.043         -1.965         0.050         -0.170         -0.000
C(show_id)[T.138]        -0.1425         0.038         -3.710         0.000         -0.218         -0.067
C(show_id)[T.143]         0.0892         0.021          4.206         0.000          0.048          0.131
C(show_id)[T.148]        -0.6041         0.037        -16.270         0.000         -0.677         -0.531
C(show_id)[T.150]        -0.5709         0.022        -25.975         0.000         -0.614         -0.528
C(show_id)[T.162]        -0.0875         0.028         -3.143         0.002         -0.142         -0.033
C(show_id)[T.172]        -0.6254         0.023        -26.910         0.000         -0.671         -0.580
C(show_id)[T.173]        -0.3985         0.028        -14.314         0.000         -0.453         -0.344
C(show_id)[T.179]        -0.6133         0.030        -20.272         0.000         -0.673         -0.554
C(show_id)[T.183]        -0.7044         0.038        -18.343         0.000         -0.780         -0.629
C(show_id)[T.192]        -0.5668         0.025        -22.314         0.000         -0.617         -0.517
censor_dummy             -0.0335         0.011         -2.930         0.003         -0.056         -0.011
==============================================================================
Omnibus:                      168.640   Durbin-Watson:                   2.146
Prob(Omnibus):                  0.000   Jarque-Bera (JB):             1059.925
Skew:                          -0.283   Prob(JB):                     6.92e-231
Kurtosis:                       7.013   Cond. No.                         34.8
==============================================================================

Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.
```

(b) Run a difference-in-difference regression that allows for the censorship event to have a different effect for three sets of shows with the three different activity levels defined above. Interpret the relevant coefficients.

We confirm through the difference-in-difference coefficients on each of the three categories that the impact of censorship is highest for shows with higher average ratings and lowest for shows with lower average ratings.

```
In [ ]: # Fit a linear regression model
        model = ols('log_rating ~ censor_dummy:less5 + censor_dummy:atleast5 + censor_dummy:atleast100 + C(show_id) + C(show_

        # Print the model summary
        print(model.summary())
```

```
                          OLS Regression Results
==============================================================================
Dep. Variable:             log_rating   R-squared:                       0.881
Model:                            OLS   Adj. R-squared:                  0.878
Method:                 Least Squares   F-statistic:                     291.7
Date:                Fri, 01 Mar 2024   Prob (F-statistic):               0.00
Time:                        19:52:20   Log-Likelihood:                 7845.2
No. Observations:                7899   AIC:                         -1.530e+04
Df Residuals:                    7703   BIC:                         -1.393e+04
Df Model:                         195
Covariance Type:            nonrobust
==============================================================================
                    coef    std err          t      P>|t|      [0.025      0.975]
------------------------------------------------------------------------------
Intercept          0.5573      0.024     22.973      0.000       0.510       0.605
C(show_id)[T.2]   -0.0064      0.026     -0.245      0.807      -0.057       0.045
C(show_id)[T.3]    0.3285      0.028     11.606      0.000       0.273       0.384
C(show_id)[T.4]    0.1976      0.027      7.333      0.000       0.145       0.250
C(show_id)[T.5]    0.6119      0.027     22.743      0.000       0.559       0.665
C(show_id)[T.6]    0.0081      0.028      0.287      0.774      -0.047       0.063
C(show_id)[T.7]   -0.1043      0.027     -3.875      0.000      -0.157      -0.052
C(show_id)[T.8]    0.9448      0.027     35.119      0.000       0.892       0.998
C(show_id)[T.9]   -0.1461      0.029     -5.088      0.000      -0.202      -0.090
C(show_id)[T.10]   0.0970      0.042      2.308      0.021       0.015       0.179
C(show_id)[T.11]  -0.4185      0.036    -11.716      0.000      -0.489      -0.348
C(show_id)[T.12]  -0.4623      0.047     -9.751      0.000      -0.555      -0.369
C(show_id)[T.13]  -0.3999      0.032    -12.351      0.000      -0.463      -0.336
C(show_id)[T.14]  -0.3806      0.027    -14.127      0.000      -0.433      -0.328
C(show_id)[T.15]  -0.4000      0.026    -15.137      0.000      -0.452      -0.348
C(show_id)[T.16]  -0.3591      0.028    -12.930      0.000      -0.414      -0.305
C(show_id)[T.17]  -0.3261      0.040     -8.098      0.000      -0.405      -0.247
C(show_id)[T.18]  -0.3146      0.028    -11.295      0.000      -0.369      -0.260
C(show_id)[T.19]  -0.4102      0.039    -10.569      0.000      -0.486      -0.334
C(show_id)[T.20]  -0.0682      0.039     -1.757      0.079      -0.144       0.008
C(show_id)[T.21]   0.0575      0.034      1.675      0.094      -0.010       0.125
C(show_id)[T.22]  -0.1946      0.029     -6.691      0.000      -0.252      -0.138
C(show_id)[T.23]  -0.2697      0.044     -6.089      0.000      -0.356      -0.183
C(show_id)[T.24]  -0.1165      0.042     -2.773      0.006      -0.199      -0.034
C(show_id)[T.25]   0.1265      0.030      4.205      0.000       0.068       0.186
C(show_id)[T.26]  -0.2749      0.026    -10.453      0.000      -0.326      -0.223
C(show_id)[T.27]  -0.3945      0.028    -14.127      0.000      -0.449      -0.340
C(show_id)[T.28]  -0.3043      0.027    -11.176      0.000      -0.358      -0.251
C(show_id)[T.29]   0.2391      0.027      8.750      0.000       0.186       0.293
C(show_id)[T.30]  -0.3105      0.027    -11.543      0.000      -0.363      -0.258
```

C(show_id)[T.31]	−0.2675	0.052	−5.191	0.000	−0.368	−0.166
C(show_id)[T.32]	−0.2497	0.027	−9.137	0.000	−0.303	−0.196
C(show_id)[T.33]	−0.4501	0.040	−11.189	0.000	−0.529	−0.371
C(show_id)[T.34]	−0.2251	0.040	−5.595	0.000	−0.304	−0.146
C(show_id)[T.35]	−0.2212	0.032	−6.994	0.000	−0.283	−0.159
C(show_id)[T.36]	−0.2576	0.039	−6.641	0.000	−0.334	−0.182
C(show_id)[T.37]	−0.0412	0.027	−1.531	0.126	−0.094	0.012
C(show_id)[T.38]	−0.0092	0.027	−0.343	0.731	−0.062	0.044
C(show_id)[T.39]	−0.4133	0.028	−14.796	0.000	−0.468	−0.359
C(show_id)[T.40]	−0.1542	0.025	−6.140	0.000	−0.203	−0.105
C(show_id)[T.41]	−0.1975	0.027	−7.267	0.000	−0.251	−0.144
C(show_id)[T.42]	−0.2688	0.027	−9.963	0.000	−0.322	−0.216
C(show_id)[T.43]	−0.4216	0.036	−11.806	0.000	−0.492	−0.352
C(show_id)[T.44]	−0.1843	0.039	−4.752	0.000	−0.260	−0.108
C(show_id)[T.45]	−0.3425	0.025	−13.564	0.000	−0.392	−0.293
C(show_id)[T.46]	−0.2586	0.039	−6.670	0.000	−0.335	−0.183
C(show_id)[T.47]	−0.3910	0.036	−10.952	0.000	−0.461	−0.321
C(show_id)[T.48]	−0.3326	0.033	−10.150	0.000	−0.397	−0.268
C(show_id)[T.49]	−0.3818	0.027	−14.174	0.000	−0.435	−0.329
C(show_id)[T.50]	−0.2985	0.027	−11.096	0.000	−0.351	−0.246
C(show_id)[T.51]	−0.3612	0.030	−11.912	0.000	−0.421	−0.302
C(show_id)[T.52]	0.1325	0.032	4.189	0.000	0.070	0.194
C(show_id)[T.53]	0.0640	0.030	2.135	0.033	0.005	0.123
C(show_id)[T.54]	0.0555	0.030	1.857	0.063	−0.003	0.114
C(show_id)[T.55]	−0.1420	0.027	−5.261	0.000	−0.195	−0.089
C(show_id)[T.56]	−0.1897	0.027	−7.042	0.000	−0.243	−0.137
C(show_id)[T.57]	−0.1530	0.027	−5.697	0.000	−0.206	−0.100
C(show_id)[T.58]	−0.1989	0.027	−7.393	0.000	−0.252	−0.146
C(show_id)[T.59]	−0.3001	0.039	−7.740	0.000	−0.376	−0.224
C(show_id)[T.60]	−0.3055	0.039	−7.877	0.000	−0.381	−0.229
C(show_id)[T.61]	−0.3051	0.027	−11.308	0.000	−0.358	−0.252
C(show_id)[T.62]	−0.2529	0.028	−9.001	0.000	−0.308	−0.198
C(show_id)[T.63]	−0.1363	0.026	−5.323	0.000	−0.187	−0.086
C(show_id)[T.64]	−0.1771	0.039	−4.566	0.000	−0.253	−0.101
C(show_id)[T.65]	−0.2775	0.025	−10.924	0.000	−0.327	−0.228
C(show_id)[T.66]	−0.1092	0.039	−2.815	0.005	−0.185	−0.033
C(show_id)[T.67]	0.2095	0.027	7.788	0.000	0.157	0.262
C(show_id)[T.68]	−0.2900	0.026	−11.131	0.000	−0.341	−0.239
C(show_id)[T.69]	−0.1909	0.031	−6.203	0.000	−0.251	−0.131
C(show_id)[T.70]	−0.2814	0.032	−8.802	0.000	−0.344	−0.219
C(show_id)[T.71]	−0.1071	0.026	−4.144	0.000	−0.158	−0.056
C(show_id)[T.72]	−0.0866	0.040	−2.152	0.031	−0.165	−0.008
C(show_id)[T.73]	−0.2169	0.025	−8.582	0.000	−0.266	−0.167
C(show_id)[T.74]	−0.1268	0.029	−4.399	0.000	−0.183	−0.070

C(show_id)[T.75]	−0.1058	0.028	−3.837	0.000	−0.160	−0.052
C(show_id)[T.76]	−0.1378	0.042	−3.279	0.001	−0.220	−0.055
C(show_id)[T.77]	−0.3006	0.026	−11.736	0.000	−0.351	−0.250
C(show_id)[T.78]	−0.2105	0.027	−7.704	0.000	−0.264	−0.157
C(show_id)[T.79]	−0.2181	0.029	−7.500	0.000	−0.275	−0.161
C(show_id)[T.80]	0.5826	0.039	15.019	0.000	0.507	0.659
C(show_id)[T.81]	−0.1692	0.042	−4.028	0.000	−0.252	−0.087
C(show_id)[T.82]	−0.4150	0.027	−15.431	0.000	−0.468	−0.362
C(show_id)[T.83]	0.0505	0.028	1.778	0.075	−0.005	0.106
C(show_id)[T.84]	−0.0693	0.033	−2.116	0.034	−0.134	−0.005
C(show_id)[T.85]	−0.3605	0.035	−10.311	0.000	−0.429	−0.292
C(show_id)[T.86]	−0.4327	0.029	−15.135	0.000	−0.489	−0.377
C(show_id)[T.87]	0.1648	0.029	5.637	0.000	0.108	0.222
C(show_id)[T.88]	−0.0657	0.030	−2.210	0.027	−0.124	−0.007
C(show_id)[T.89]	−0.4497	0.027	−16.719	0.000	−0.502	−0.397
C(show_id)[T.90]	−0.4113	0.027	−15.291	0.000	−0.464	−0.359
C(show_id)[T.91]	0.4416	0.029	15.313	0.000	0.385	0.498
C(show_id)[T.92]	−0.1811	0.026	−7.070	0.000	−0.231	−0.131
C(show_id)[T.93]	−0.3934	0.026	−14.873	0.000	−0.445	−0.342
C(show_id)[T.94]	−0.2004	0.034	−5.841	0.000	−0.268	−0.133
C(show_id)[T.95]	−0.3465	0.027	−12.881	0.000	−0.399	−0.294
C(show_id)[T.96]	−0.0254	0.030	−0.842	0.400	−0.085	0.034
C(show_id)[T.97]	−0.4596	0.031	−14.675	0.000	−0.521	−0.398
C(show_id)[T.98]	−0.0942	0.040	−2.341	0.019	−0.173	−0.015
C(show_id)[T.99]	−0.0436	0.038	−1.159	0.247	−0.117	0.030
C(show_id)[T.100]	−0.4239	0.027	−15.760	0.000	−0.477	−0.371
C(show_id)[T.101]	−0.1677	0.030	−5.677	0.000	−0.226	−0.110
C(show_id)[T.102]	−0.1690	0.037	−4.620	0.000	−0.241	−0.097
C(show_id)[T.103]	0.2261	0.029	7.683	0.000	0.168	0.284
C(show_id)[T.104]	−0.3841	0.027	−14.414	0.000	−0.436	−0.332
C(show_id)[T.105]	−0.4836	0.028	−17.541	0.000	−0.538	−0.430
C(show_id)[T.106]	−0.4860	0.035	−13.901	0.000	−0.555	−0.417
C(show_id)[T.107]	−0.1580	0.044	−3.567	0.000	−0.245	−0.071
C(show_id)[T.108]	−0.3897	0.047	−8.232	0.000	−0.482	−0.297
C(show_id)[T.109]	−0.4549	0.027	−16.933	0.000	−0.508	−0.402
C(show_id)[T.110]	−0.4937	0.027	−18.355	0.000	−0.546	−0.441
C(show_id)[T.111]	−0.0778	0.039	−2.005	0.045	−0.154	−0.002
C(show_id)[T.112]	−0.2070	0.034	−6.029	0.000	−0.274	−0.140
C(show_id)[T.113]	−0.4475	0.027	−16.637	0.000	−0.500	−0.395
C(show_id)[T.114]	−0.4468	0.032	−13.974	0.000	−0.509	−0.384
C(show_id)[T.115]	−0.0938	0.027	−3.451	0.001	−0.147	−0.041
C(show_id)[T.116]	−0.0193	0.027	−0.701	0.483	−0.073	0.035
C(show_id)[T.117]	−0.5071	0.027	−18.853	0.000	−0.560	−0.454
C(show_id)[T.118]	−0.2397	0.030	−8.116	0.000	−0.298	−0.182

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C(show_id)[T.119]      0.0279     0.029      0.949    0.343     −0.030      0.086
C(show_id)[T.120]     −0.5069     0.027    −18.843    0.000     −0.560     −0.454
C(show_id)[T.121]     −0.4063     0.026    −15.862    0.000     −0.457     −0.356
C(show_id)[T.122]     −0.2767     0.032     −8.552    0.000     −0.340     −0.213
C(show_id)[T.123]     −0.4043     0.027    −15.030    0.000     −0.457     −0.352
C(show_id)[T.124]     −0.1182     0.027     −4.318    0.000     −0.172     −0.065
C(show_id)[T.125]     −0.4518     0.027    −16.799    0.000     −0.505     −0.399
C(show_id)[T.126]     −0.3036     0.031     −9.776    0.000     −0.365     −0.243
C(show_id)[T.127]     −0.4424     0.029    −15.134    0.000     −0.500     −0.385
C(show_id)[T.128]      0.2166     0.030      7.198    0.000      0.158      0.276
C(show_id)[T.129]     −0.3500     0.034    −10.199    0.000     −0.417     −0.283
C(show_id)[T.130]      0.3663     0.027     13.812    0.000      0.314      0.418
C(show_id)[T.131]     −0.3841     0.027    −14.282    0.000     −0.437     −0.331
C(show_id)[T.132]     −0.4152     0.026    −16.214    0.000     −0.465     −0.365
C(show_id)[T.133]     −0.1198     0.034     −3.491    0.000     −0.187     −0.053
C(show_id)[T.134]     −0.3873     0.027    −14.398    0.000     −0.440     −0.335
C(show_id)[T.135]     −0.5056     0.031    −16.293    0.000     −0.566     −0.445
C(show_id)[T.136]     −0.2904     0.039     −7.488    0.000     −0.366     −0.214
C(show_id)[T.137]      0.1124     0.039      2.897    0.004      0.036      0.188
C(show_id)[T.138]      0.0551     0.036      1.543    0.123     −0.015      0.125
C(show_id)[T.139]      0.0177     0.047      0.374    0.708     −0.075      0.110
C(show_id)[T.140]     −0.0783     0.039     −2.020    0.043     −0.154     −0.002
C(show_id)[T.141]     −0.2207     0.044     −4.982    0.000     −0.307     −0.134
C(show_id)[T.142]     −0.0472     0.029     −1.644    0.100     −0.103      0.009
C(show_id)[T.143]      0.2868     0.027     10.814    0.000      0.235      0.339
C(show_id)[T.144]     −0.4396     0.028    −15.546    0.000     −0.495     −0.384
C(show_id)[T.145]     −0.2846     0.029     −9.830    0.000     −0.341     −0.228
C(show_id)[T.146]     −0.3384     0.027    −12.583    0.000     −0.391     −0.286
C(show_id)[T.147]     −0.1074     0.029     −3.648    0.000     −0.165     −0.050
C(show_id)[T.148]     −0.4065     0.035    −11.625    0.000     −0.475     −0.338
C(show_id)[T.149]     −0.4074     0.031    −13.241    0.000     −0.468     −0.347
C(show_id)[T.150]     −0.3733     0.027    −13.896    0.000     −0.426     −0.321
C(show_id)[T.151]     −0.3428     0.029    −11.984    0.000     −0.399     −0.287
C(show_id)[T.152]     −0.3332     0.026    −12.737    0.000     −0.384     −0.282
C(show_id)[T.153]     −0.2230     0.037     −6.097    0.000     −0.295     −0.151
C(show_id)[T.154]     −0.0784     0.027     −2.916    0.004     −0.131     −0.026
C(show_id)[T.155]     −0.2759     0.026    −10.758    0.000     −0.326     −0.226
C(show_id)[T.156]     −0.4342     0.040    −10.793    0.000     −0.513     −0.355
C(show_id)[T.157]     −0.0140     0.027     −0.522    0.601     −0.067      0.039
C(show_id)[T.158]     −0.5025     0.028    −18.268    0.000     −0.556     −0.449
C(show_id)[T.159]     −0.3068     0.029    −10.732    0.000     −0.363     −0.251
C(show_id)[T.160]     −0.2388     0.030     −8.083    0.000     −0.297     −0.181
C(show_id)[T.161]     −0.5116     0.031    −16.489    0.000     −0.572     −0.451
C(show_id)[T.162]      0.1101     0.030      3.699    0.000      0.052      0.168
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C(show_id)[T.163]	-0.3379	0.047	-7.144	0.000	-0.431	-0.245
C(show_id)[T.164]	-0.4672	0.042	-11.119	0.000	-0.550	-0.385
C(show_id)[T.165]	-0.5188	0.027	-18.984	0.000	-0.572	-0.465
C(show_id)[T.166]	0.1836	0.027	6.825	0.000	0.131	0.236
C(show_id)[T.167]	-0.2242	0.039	-5.781	0.000	-0.300	-0.148
C(show_id)[T.168]	-0.3328	0.034	-9.867	0.000	-0.399	-0.267
C(show_id)[T.169]	-0.5156	0.027	-19.171	0.000	-0.568	-0.463
C(show_id)[T.170]	-0.4377	0.030	-14.729	0.000	-0.496	-0.379
C(show_id)[T.171]	-0.4047	0.027	-15.024	0.000	-0.458	-0.352
C(show_id)[T.172]	-0.4278	0.027	-15.583	0.000	-0.482	-0.374
C(show_id)[T.173]	-0.2009	0.030	-6.748	0.000	-0.259	-0.143
C(show_id)[T.174]	-0.5162	0.027	-19.188	0.000	-0.569	-0.463
C(show_id)[T.175]	-0.3512	0.034	-10.235	0.000	-0.418	-0.284
C(show_id)[T.176]	-0.4848	0.027	-18.022	0.000	-0.538	-0.432
C(show_id)[T.177]	-0.4365	0.051	-8.477	0.000	-0.537	-0.336
C(show_id)[T.178]	-0.5084	0.027	-18.902	0.000	-0.561	-0.456
C(show_id)[T.179]	-0.4157	0.031	-13.390	0.000	-0.477	-0.355
C(show_id)[T.180]	-0.4568	0.028	-16.207	0.000	-0.512	-0.402
C(show_id)[T.181]	-0.3678	0.038	-9.788	0.000	-0.441	-0.294
C(show_id)[T.182]	-0.4899	0.026	-18.499	0.000	-0.542	-0.438
C(show_id)[T.183]	-0.5068	0.036	-14.181	0.000	-0.577	-0.437
C(show_id)[T.184]	-0.4857	0.035	-13.886	0.000	-0.554	-0.417
C(show_id)[T.185]	-0.4847	0.036	-13.573	0.000	-0.555	-0.415
C(show_id)[T.186]	-0.4950	0.028	-17.673	0.000	-0.550	-0.440
C(show_id)[T.187]	-0.4482	0.027	-16.659	0.000	-0.501	-0.395
C(show_id)[T.188]	-0.4420	0.040	-10.984	0.000	-0.521	-0.363
C(show_id)[T.189]	-0.5049	0.027	-18.773	0.000	-0.558	-0.452
C(show_id)[T.190]	-0.2670	0.047	-5.647	0.000	-0.360	-0.174
C(show_id)[T.191]	-0.5112	0.027	-19.007	0.000	-0.564	-0.458
C(show_id)[T.192]	-0.3692	0.029	-12.947	0.000	-0.425	-0.313
C(show_id)[T.193]	-0.3140	0.027	-11.672	0.000	-0.367	-0.261
censor_dummy:less5	-0.0069	0.006	-1.063	0.288	-0.020	0.006
censor_dummy:atleast5	-0.0042	0.007	-0.609	0.542	-0.018	0.009
censor_dummy:atleast100	-0.0335	0.009	-3.918	0.000	-0.050	-0.017

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Omnibus:                925.888   Durbin-Watson:              1.982
Prob(Omnibus):            0.000   Jarque-Bera (JB):        8692.408
Skew:                     0.167   Prob(JB):                    0.00
Kurtosis:                 8.128   Cond. No.                    332.
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Notes:
[1] Standard Errors assume that the covariance matrix of the errors is correctly specified.

(c) Relate your findings across shows with different activity levels to the geographic difference-in-difference approach. Which regression is more informative regarding the impact of the censorship on ratings?

Both approaches are equally informative about the effect of geography or activity levels on the ratings of a show. We use the censorship period as a comparison point to assess this effect. It depends on the context of the problem to judge which approach should be used.