

Brace yourselves, pirates are coming!

The effects of Game of Thrones
leak on TV viewership

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File-sharing is a continuously hot topic



- Its effects can vary for different types of content.
- Its influence is changing over time.
- It might be especially harmful if it happens before the official premiere.

What happens when people are incentivised to switch to unauthorised sources?

The most relevant study for this presentation



NBC removes its content from Apple's iTunes store

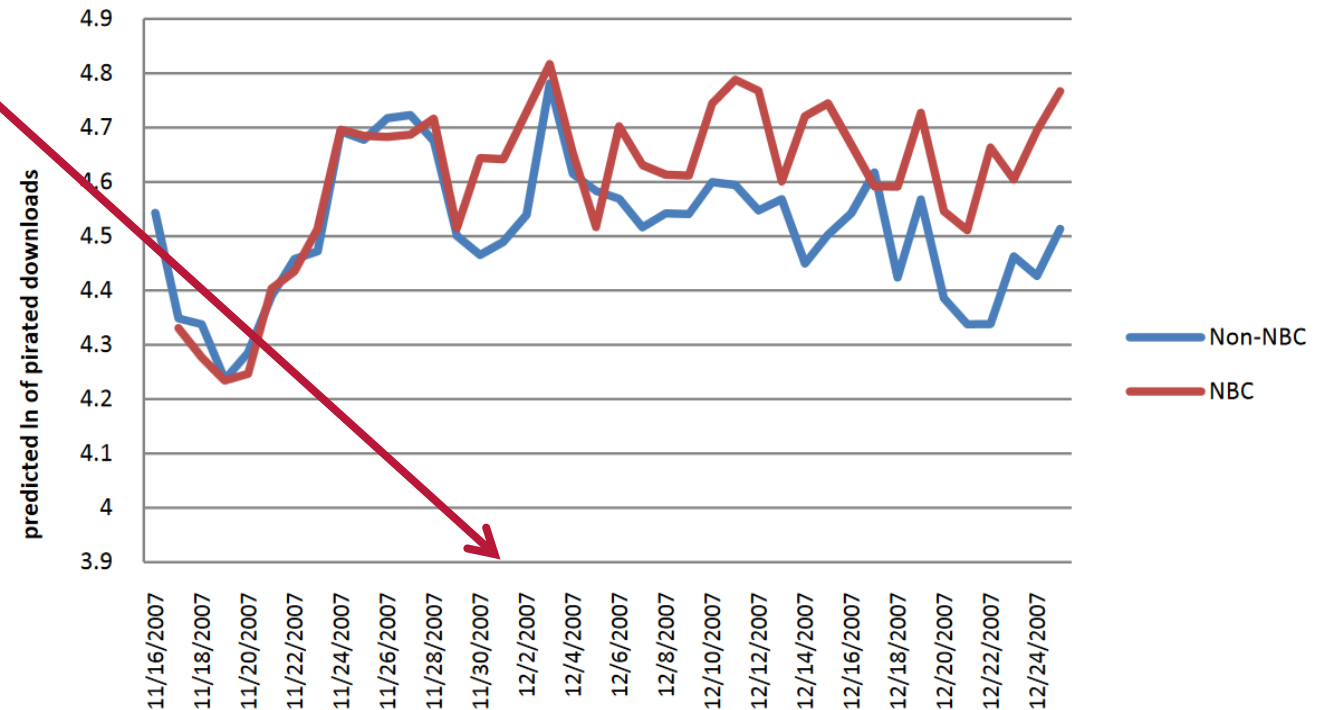
Main findings:

- Permanent increase in 'piracy'.
- Possible spillover effects on non-NBC content.

But:

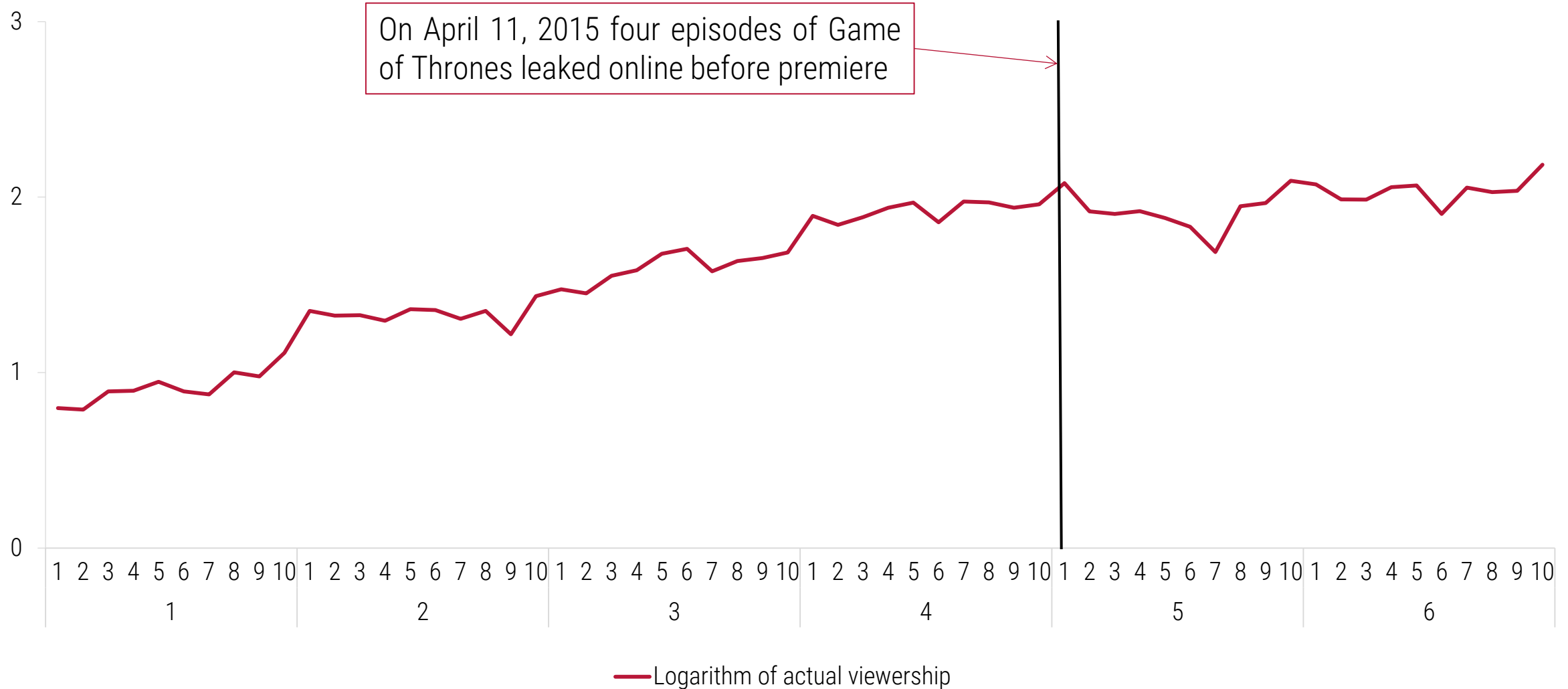
- No appropriate counterfactual for the spillover effect.

Figure 1: NBC vs. Non-NBC Piracy Surrounding December 1, 2007

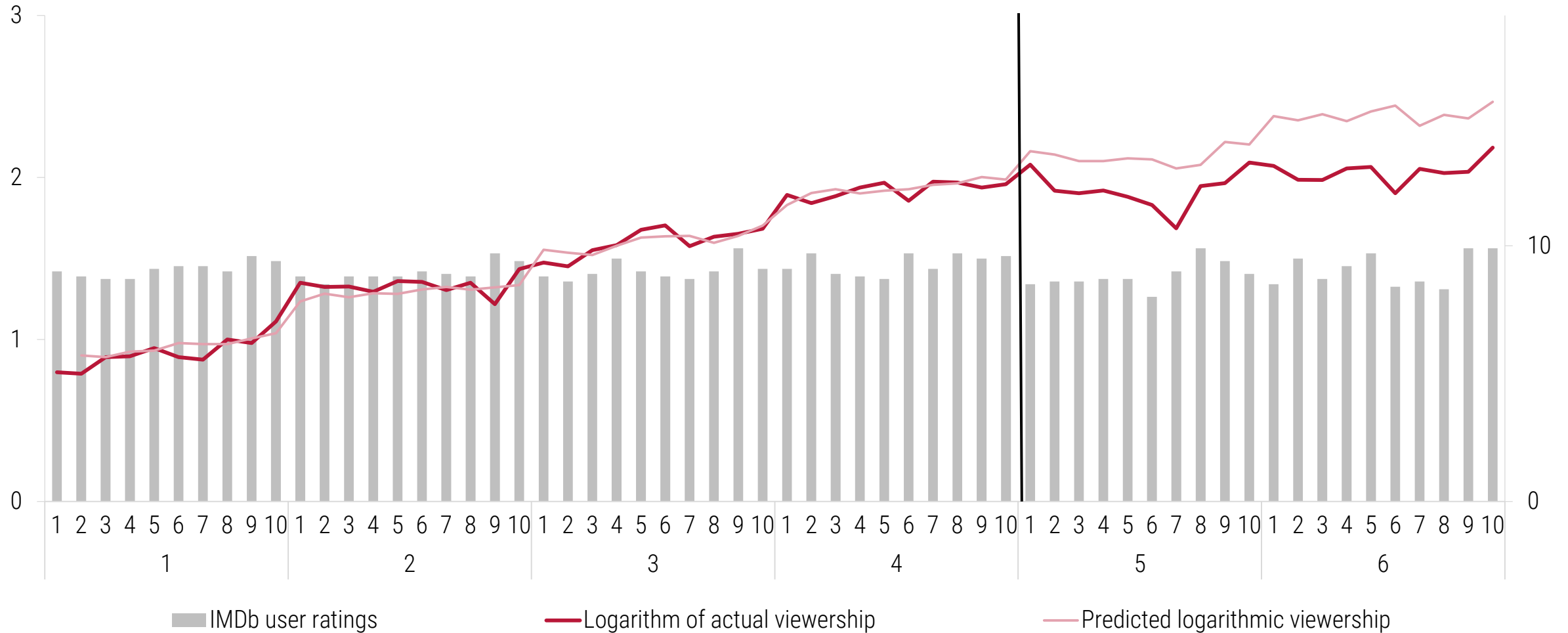


Source: Danaher, Dhanasobhon, Smith and Telang (2010).
Converting Pirates without Cannibalizing Purchasers. (...)

Brace yourselves, pirates are coming!

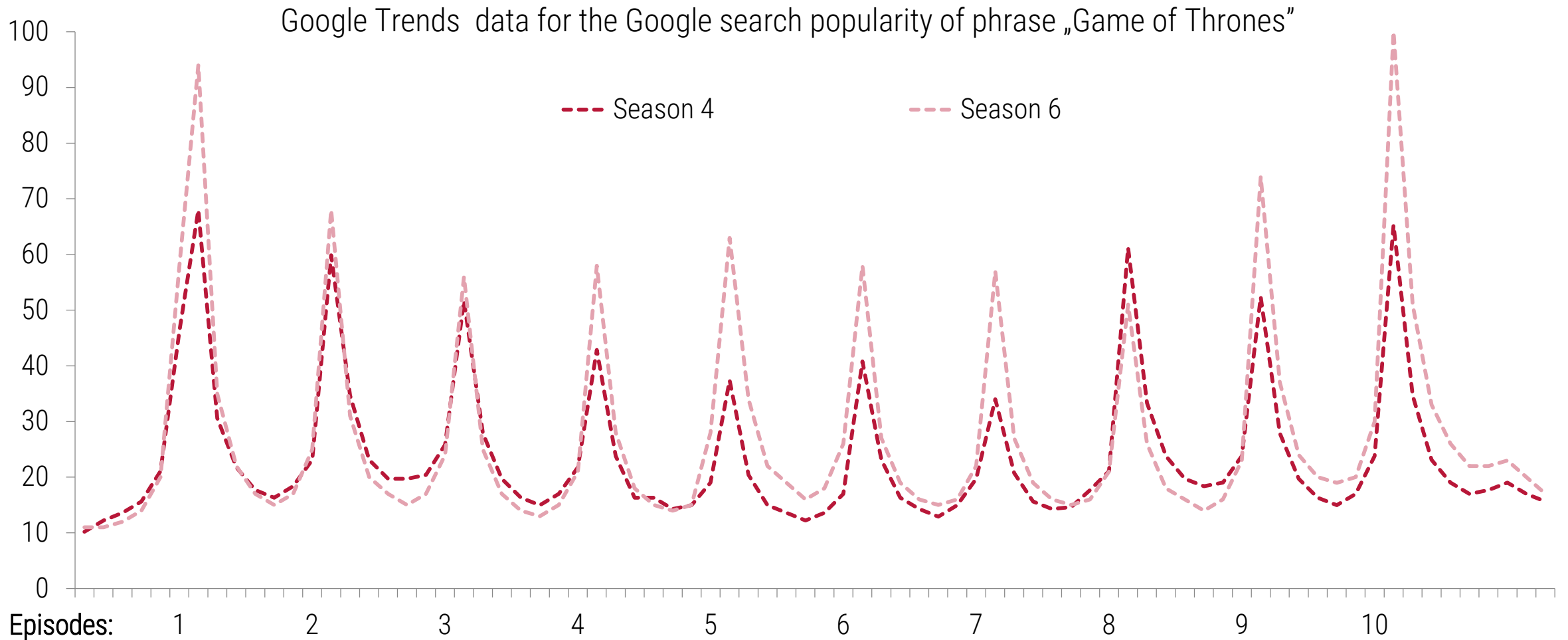


The viewership dropped, but ratings not so much

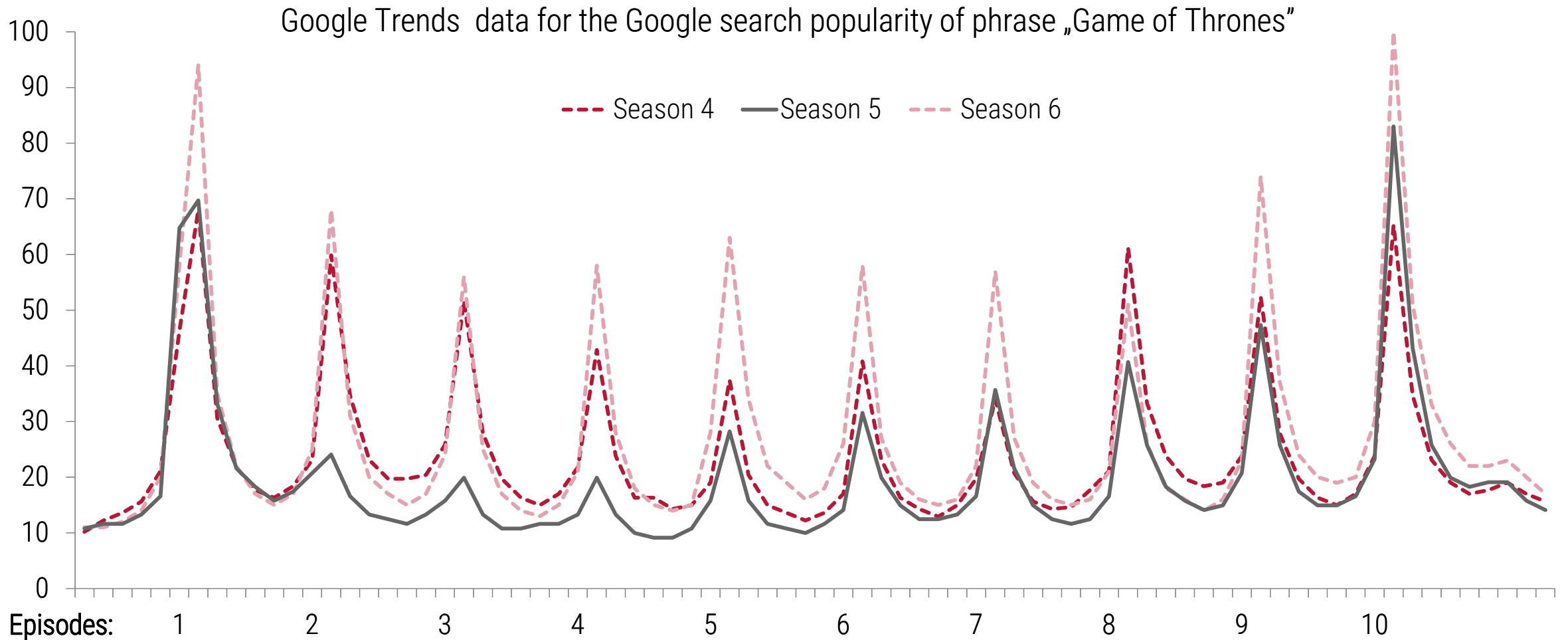


The predicted values are from a regression on seasons 1-4: $\text{viewership} \sim \text{lagged viewership} + \text{lagged rating}$.

Online interest in GoT season 5 focused around the leak



Online interest in GoT season 5 focused around the leak



The questions posed in this study



- Did the leak contribute to the drop in Game of Thrones viewership?
- Did the effects persist for more than the four leaked episodes?
- Was there a spillover effect?

Key identification strategy:

- Difference-in-Difference regressions on a sample of TV series.

Unique dataset compiled from several sources



- 71 shows / 308 seasons / 6,089 episodes.
- All shows had a season aired around the time of the GoT leak.
- Sources: Wikipedia (incl. Nielsen ratings), IMDb, Google Trends, Jinni, Netflix, TasteDive, Trakt.tv, Commonsensemedia.
- Information: first-day US viewers, viewer ratings, dates, genres, google search popularity, show recommendations for GoT viewers, themes and more.
- [Note: no unethical data collection was performed.]

The GoT viewership drop was specific of GoT



Difference-in-Difference panel regressions on viewership, with random and fixed effects

	GoT vs full sample		GoT vs recommended series	
	Random Effects	Fixed Effects	Random Effects	Fixed Effects
After Leak	-0.002	-0.002	-0.050**	-0.050**
GoT After Leak	-0.088***	-0.088***	-0.041*	-0.041
Ep. No. After Leak	0.000	0.000	-0.002	-0.002
GoT Ep. No. After Leak	-0.003***	-0.003***	-0.002	-0.002
GoT	0.503***		-0.529***	
Episodes	5,958	5,958	1,283	1,283
Shows	71	71	14	14
R-sq: within	0.821	0.821	0.871	0.871
R-sq: between	1	0.811	1	0.844

Controls: lagged rating, lagged viewers, genre dummies, show-specific trends and squared show trends.

Errors clustered at show-level. The ratings and viewers are in logarithms.

TV series sharing audience with GoT also evidenced lower viewership after the leak



Difference-in-Difference panel regressions on viewership, with random and fixed effects

	Whole sample		Only 2015 seasons	
	Random Effects	Fixed Effects	Random Effects	Fixed Effects
After Leak	0.010	0.010	0.017**	0.014
Recommended After Leak	-0.057**	-0.057**	-0.049**	-0.087***
Ep. No. After Leak	0.000	0.000	-0.003***	-0.012**
Recommended Ep. No. After Leak	-0.002	-0.002	0.020**	0.026***
Recommended	-0.480***		0.004	
Show-specific trends	Yes	Yes	No	No
Episodes	5,899	5,899	1,221	1,221
Shows	70	70	70	70
R-sq: within	0.818	0.818	0.337	0.397
R-sq: between	1	0.826	0.999	0.310

Controls: lagged rating, lagged viewers, genre dummies.

Errors clustered at show-level. The ratings and viewers are in logarithms.

Placebo tests confirm the findings for GoT viewership



- 1) Placebo leak year earlier (11.04.2014)
- 2) Placebo leak year later (11.04.2016)
- 3) Placebo leak at start of season 4 (05.04.2014)
- 4) Placebo leak at start of season 6 (23.04.2016)

GoT viewership:

- In all cases: no significant change in the viewership after the placebo leak.

Recommended series viewership:

- Significant changes in the viewership for year 2014 – need for further study.

Conclusions: the leak decreased the viewership of GoT



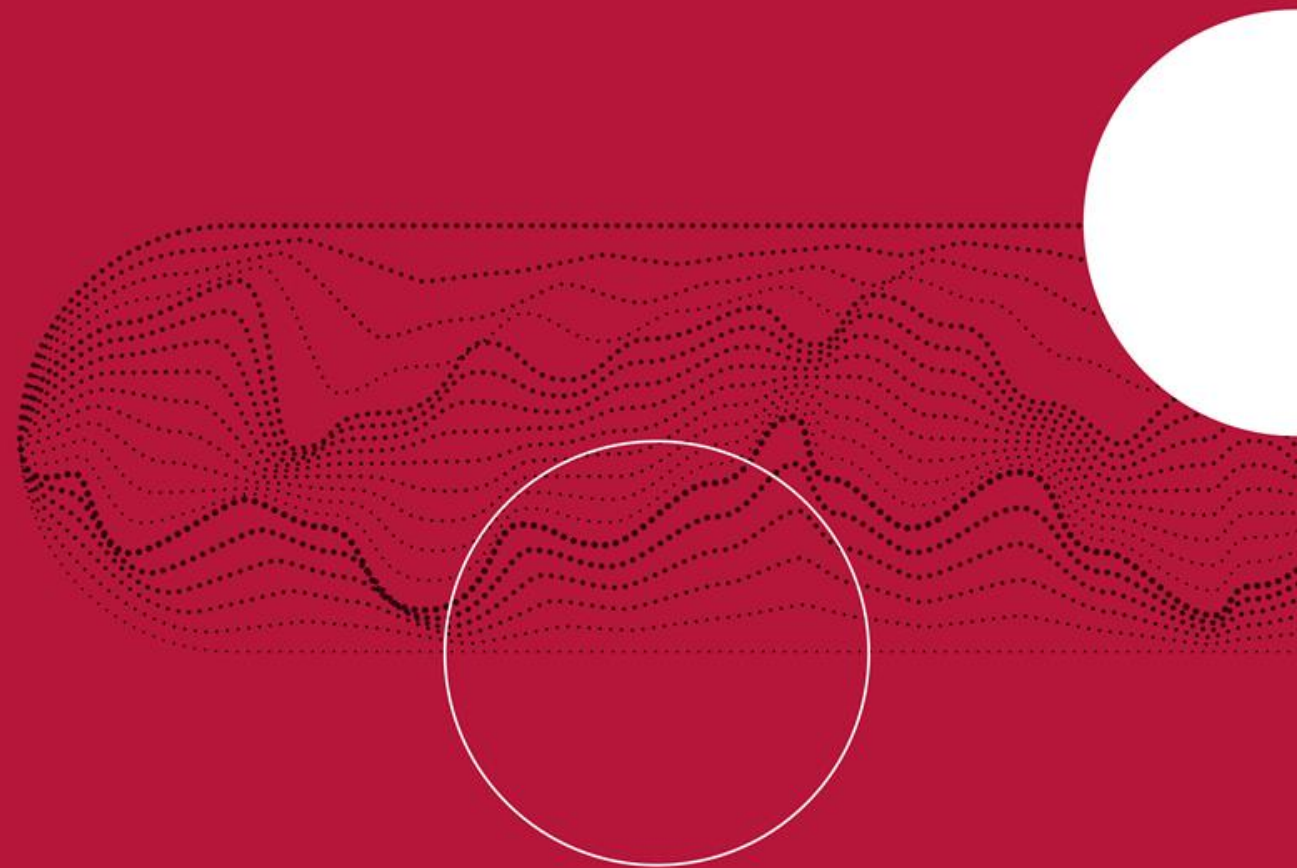
- The results suggest a drop in GoT viewership ranging from 4% to 9% of pre-leak viewership.
- The results also suggest that the viewership did not return to its previous path.
- Some evidence of spillover effects for other series.

The study will further benefit from:

- Propensity score matching.
- Analysis of google trends data for phrases „*show-name* watch online“, „*show-name* download“, etc.
- Real download data for episodes (being prepared by Muso).
- Incorporating more information – e.g. themes ratings from Commonsensemedia.

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Recommended shows, by source



Source	Shows in the sample	Source description
Jinni	Vikings	Jinni was a publically available website with a recommendation engine. Since 2015 it has been a payable service for larger companies in need of movie recommendation engines. However, archived copies of the recommendations for Game of Thrones viewers can be found, dating back to March and April 2015 (the approximate time of the leak). Only one recommendation coincides with the shows in my sample.
IMDb	Arrow, The Big Bang Theory, Flash, Gotham, Supernatural, Vikings	IMDb lists 12 non-personalised recommendations per show. I browsed the archived copies of the Game of Thrones page, between April 9 and June 15, 2015. Of all recommendations in these days, 6 coincided with the shows in my sample.
Netflix	Arrow, Blacklist, Flash, Gotham, Grimm, Originals, Reign, Vampire Diaries, Vikings	Netflix is a video streaming service with a marketing focus on audience discovery. It does not include Game of Thrones in its catalogue but lists recommendations of similar TV shows for those who look for it in the search engine. Of the 42 Netflix recommendations, 9 coincided with the shows in my sample.
TasteDive	Vikings, Gotham, Arrow, Americans	TasteDive (former TasteKid) presents numerous recommendations based on a specified TV series. Of the 50 first recommendations for those who like Game of Thrones, 4 coincided with the shows in my sample.
Trakt.tv	Agents of S.H.I.E.L.D, Flash	Trakt.tv offers 6 recommendations for a specified show. Two recommendations for those who like Game of Thrones coincide with shows in my sample.

Data description



Variable name	Mean	Min	Max	Std. Dev.	Note
Show-level					
Genre:					Comprises:
- <i>Action</i>	27%	0	1	-	Action
- <i>Comedy</i>	38%	0	1	-	Comedy, Sitcom
- <i>Crime</i>	49%	0	1	-	Crime, Thriller, Mystery
- <i>Drama</i>	73%	0	1	-	Drama
- <i>Romance</i>	14%	0	1	-	Romance
- <i>Supernatural</i>	32%	0	1	-	Sci-fi, Fantasy, Supernatural, Horror
Typical runtime	39.3 min	11 min	60 min	11.5	As listed by IMDb
Number of seasons	4.3	1	17	3.2	Aired (or being aired) at the time of data collection
Episodes per season	18.1	6	24	5.5	The numbers are for the show averages (e.g. the mean of the show averages)
Episodes per show	85.8	6	389	77.5	-
First day viewers in US (in millions)	5.8	0.76	17.1	3.7	The numbers are for the show averages (e.g. the mean of the show averages)
TV rating:					
- <i>PG</i>	21.1%	0	1	-	Parental Guidance Suggested
- <i>MA</i>	5.6%	0	1	-	Mature Audience Only
- <i>G</i>	1.4%	0	1	-	General Audience
- <i>14</i>	71.8%	0	1	-	Parents Strongly Cautioned
IMDb user rating	7.7	5.4	9.5	0.7	Average of episode ratings

Data description, continued



Variable name	Mean	Min	Max	Std. Dev.	Note
Network					
- <i>ABC</i>	22.5%	-	-	-	Some of the shows changed networks at some point. Because of this the shares do not sum up to 100%.
- <i>CBS</i>	21.1%	-	-	-	
- <i>NBC</i>	14.1%	-	-	-	
- <i>CW</i>	11.3%	-	-	-	
- <i>Fox</i>	11.3%	-	-	-	
- <i>Other</i>	25.4%	-	-	-	
Theme					
- <i>Consumerism</i>	0.6	0	4	0.9	The potential range for the values is 0 to 5.
- <i>Drinking, Drugs, Smoking</i>	2.2	0	4	1	
- <i>Language</i>	2.4	0	4	0.8	
- <i>Positive Messages</i>	1.3	0	4	1.2	
- <i>Positive Role Models</i>	1.4	0	4	1.2	
- <i>Sex</i>	2.5	0	5	1	
- <i>Violence</i>	2.6	0	5	1.4	

Data description, continued



Variable name	Mean	Min	Max	Std. Dev.	Note
Season-level					
Month of first episode:					
- <i>September</i>	57%	-	-	-	-
- <i>October</i>	15%	-	-	-	
- <i>March</i>	8%	-	-	-	
- <i>Other</i>	20%	-	-	-	
Month of last episode:					
- <i>May</i>	77%	-	-	-	-
- <i>April</i>	8%	-	-	-	
- <i>June</i>	6%	-	-	-	
- <i>Other</i>	9%	-	-	-	
Episode-level					
First day viewers in US	7.9	0.3	37.9	4.8	-
IMDb user rating	8.1	3	9.9	0.6	-