

Advertising on Twitch: The Effect of Targeted Streaming on  
Videogame Sales

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**Abstract**

The purpose of this study is to determine if there is a causal relationship between Twitch viewership and videogame sales and if so, to what magnitude. The study compares the peak viewership on Twitch to Steam's total ratings for 263 games released between 2013 and 2019 and 155 games released between 1998 and 2013 for a total of 418 observations. Steam ratings act as a proxy for the lower bound of sales. Peak viewership is instrumented on a binary variable tracking whether a game has appeared in Awesome Games Done Quick's bi-annual charity streams in order to correct for simultaneity between viewership and sales, then regressed along with relevant covariates. Initial results show that peak viewership is highly correlated at the 5% significance level with increased ratings, a proxy for sales. The two-stage least squares regression suggests that every additional 6.97 viewers on the peak viewership day is associated with one additional rating or one guaranteed sale. Since total Steam ratings is only a lower bound for sales, it's likely that true sales are significantly higher.

Keywords: Advertising, TSLS regression, sales, instrumented variable, videogame streaming

**I. Introduction**

Videogame streaming has seen large increases in viewership over the last decade and potentially provides an excellent advertising platform if properly utilized. The most obvious use would be to use Twitch streams as a way for videogame companies to reach their main demographic through targeted streams of their products. This practice has been in place for some time, with companies reaching out to individual popular streamers since the early 2010s but has recently expanded with the advent of Twitch's "bounty board", in which any partnered streamer can take and

complete “bounties”, or sponsored gameplay streams, from companies without direct contact between the two parties. This has led to a sharp increase in the amount of sponsored content on Twitch and leads to the key question of this study: how effective these sponsored streams are at inducing sales.

In 2014, Twitch boasted that it reached up to 50% of millennial males in the U.S. while garnering 1.8% of total internet traffic and 40% of streaming traffic (Fortney). Estimates suggest between 49% and 76% of Twitch’s viewers are males between the ages of 18 and 35. As of 2019, it is believed that 15 million unique viewers watch Twitch’s streams per day for a total of 2.72 billion hours per quarter (Fortney). According to Lifecourse, Twitch is as capable as Reddit at reaching this demographic and better than ESPN, YouTube, or Facebook. This means that if advertisers wish to reach millennial males, they should be using Twitch, and this is even more true for videogame developers. However, existing, publicly available literature focuses primarily on the profitability of the advertisements shown during ad breaks and not on the sponsored content. For Twitch viewers and potential advertisers, it’s important that there is transparency in the effectiveness of these sponsored streams.

## **2. Data**

The data for this study is primarily based off a publicly available dataset of 20,000 observations compiled on Kaggle.com with data scraped from steamdb.com. This data included variables for the total number of positive and negative ratings, release dates on Steam, price, estimated sales ranges, and user-generated tags defining the game genre. These were used to create the variables: “positive\_ratings\_ratio” with values between 0 and 1, “ratingstotal” which tracked total positive and negative ratings, “fps”, and “moba”. “Fps” and “moba” were combined into a single variable, “fps\_moba”, which is used to track the effect of these two popular genres. In addition to

this, data on the average monthly viewership across Twitch, “totalviewers”, peak viewership of a particular game on twitch, “peakviewers”, and the date it occurred, “day”, was scraped from sullygnome.com and twitchtracker.com. The 20,000 observation dataset was parsed down to only look at games with positive user ratings above 70% and total ratings above 2500 ratings. This 1057 observation data set was then cut down to 418, with a focus on games released after 2013 when Twitch began to gain in popularity and began to generate positive profits (Ewalt). A smaller number of observations before 2013 were included as a control for time-related variables. For these 418 observations, the data pulled from twitchtracker.com and sullygnome.com were combined with the public data set. Additional information on games in which peak viewership occurred due to a tournament or charity stream was based off released schedules from Twitch Rivals and AGDQ. Variables “tournament” and “charity\_stream” were tracked with binary variables. Observations that occurred during a tournament were excluded from the regression due to concerns over “viewbotting” in which companies use fake viewers to increase the audience size and the increased likelihood of attracting non-purchasing viewers in the case of larger tournaments (e.g. The International in DOTA 2). The summary statistics for the observations with and without tournaments are included in table 1. Comparing peakviewers and ratingstotal, it’s clear that the tournament observations are large outliers and would skew the results for the above-mentioned reasons.

As for using charity streams as an instrument for peak viewers, the summary statistics show that there is a negligible difference in the mean values of all variables except for peakviewers which is 3.7 times larger on average for charity streams than non-charity streams. While the sample size is smaller, it is above the often-used threshold of 30 observations. The correlation between ratingstotal and charity\_stream is nearly 0 while the correlation between peakviewers and

charity\_stream is 0.259. Given the weak correlation between peakviewers and charity\_stream, testing for a weak instrument will be important even though charity\_stream appears to be uncorrelated with ratingstotal and has some correlation with peakviewers, as graphs 3 and 4 show.

### 3. Analysis

The first stage of the TSLS regression used charity\_stream as an instrument for peakviewers, with price, totalviewers, and sequel as control variables. 6 tournament observations were excluded from the regression, leaving 412 observations. The equation is as follows:

$$Peakviewers_i = \beta_0 + \beta_1 * charity\_stream_i + \beta_2 * totalviewers_i + \beta_3 * price_i + \beta_4 * sequel_i + \beta_5 * fps\_moba_i + \varepsilon_i$$

The error term is then predicted using STATA and stored as “peak\_hat”. The regression is run again, with peak\_hat and ratingstotal as follows:

$$ratingstotal_i = \beta_0 + \beta_1 * peak\_hat_i + \beta_2 * totalviewers_i + \beta_3 * price_i + \beta_4 * sequel_i + \beta_5 * fps\_moba_i + \varepsilon_i$$

In both stages of the regression, charity\_stream, sequel, and fps\_moba are binary where a 1 means the variable is true and 0 means the variable is false for that observation. For example, a first-person shooter that appeared in AGDQ’s charity and is part of a series would have a value of 1 for all three variables. Price, totalviewers, peakviewers, and ratingstotal can take any positive value. This process was repeated for an additional 2SLS regression without the covariate fps\_moba over concerns of multicollinearity. Both regressions were also run using the ivregress command in STATA with approximately the same results. Due to the similarity, only the ivregress results are included.

#### 4. Results

The results of the first regression using `fps_moba` are shown below.

VARIABLES	(1) ratingstotal
peakviewers	0.144** (0.0694)
price	2.069 -268.1 (200.9)
sequel	-1.335 4,653 (5,100)
totalviewers	0.912 0.00290 (0.00811)
fps_moba	0.358 6,894 (6,411)
Constant	1.075 12,932 (8,042)
Observations	1.608 412
R-squared	0.196

Standard errors in parentheses

\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Table 4: Regression correlation coefficients and t-statistics

Other than peakviewers, the results for the other variables are statistically insignificant.

Peakviewers is statistically significant above the 5% level with a t-statistic of 2.07. With a correlation coefficient of 0.144, every additional viewer on the day of peak viewership leads to 0.144 additional ratings (i.e. 6.97 viewers leads to 1 additional rating). Since ratings act as a lower bound for sales – that is, only those that purchase can leave a rating—this increase in ratings suggests a statistically significant relationship between sales and Twitch viewership. In

order to verify significance of the instrument charity\_stream, F-statistics for the regression are provided below:

Variable	R <sup>2</sup>	Adjusted R <sup>2</sup>	Partial R <sup>2</sup>	F(1, 407)	Prob > F
peakviewers	0.1791	0.1690	0.1302	60.7976	0.0000
Minimum eigenvalue statistic = 60.7976					
Critical values		Number of endogenous regressors: 1			
H <sub>0</sub> : Instruments are weak		Number of excluded instruments: 1			
		10%	15%	20%	25%
2SLS size of nominal 5% Wald test		16.38	8.96	6.66	5.53
LIML size of nominal 5% Wald test		16.38	8.96	6.66	5.53

Table 5: Wald test F-statistic of 2SLS Regression

The F-stat is well above the minimum value of 16.38 for instrument significance. The second regression without fps\_moba is summarized below:

VARIABLES	(1) ratingstotal
peakviewers	0.157** (0.0639) 2.454
price	-324.2* (189.7) -1.709
sequel	6,252 (4,921) 1.270
totalviewers	0.00335 (0.00808) 0.414
Constant	13,560* (8,005) 1.694
Observations	412
R-squared	0.203

Standard errors in parentheses

\*\*\* p<0.01, \*\* p<0.05, \* p<0.1

Table 6: Regression Correlation Coefficients and t-statistics

Again, peakviewers is statistically significant at the 5% level, with a t-statistic of 2.45, along with price at the 10% significance level. Moba games and competitive fps games, which are typically high performers in terms of sales and viewership, tend to run on a free-to-play model and limited the significance of price in the previous regression. The regression shows a similar correlation between peakviewers and ratingstotal, with each additional viewer leading to 0.157 additional ratings (i.e. 6.37 viewers per additional rating). F-statistics for the second regression are provided below:

Variable	R <sup>2</sup>	Adjusted R <sup>2</sup>	Partial R <sup>2</sup>	F(1, 407)	Prob > F
peakviewers	0.1618	0.1535	0.1460	69.5683	0.0000
Minimum eigenvalue statistic = 69.5683					
Critical values		Number of endogenous regressors: 1			
H <sub>0</sub> : Instruments are weak		Number of excluded instruments: 1			
		10%	15%	20%	25%
2SLS size of nominal 5% Wald test		16.38	8.96	6.66	5.53
LIML size of nominal 5% Wald test		16.38	8.96	6.66	5.53

Table 7: Wald test F-statistics of 2SLS Regression

The F-statistic of 69.57 is well above the minimum value of 16.38, suggesting that the instrument `charity_stream` is a good instrument for peakviewers.

## 5. Limitations of the Model

The clearest limitation of the model is the lack of information on actual sales and the reliance on Steam ratings as a proxy. While this gives a good lower bound for the correlation, it does not take into account sales that occur through other venues (Battlenet, Amazon, GameStop, etc.) and does not capture the total sales through Steam. Additional data would be needed to solve this



issue. Similarly, there is an issue that controversial games would garner higher levels of ratings compared to sales. The model attempted to account for this by only including games with ratings above 70% but without actual sales data, it would be difficult to confirm if this measure was successful.

There is also the potential for games to have other unaccounted causes for increased viewership. More data on the number of streamers, sponsored streamers, and average viewers across streamers would help to account for the effect of these unknown events. Other issues include the possibility of mislabeled streams, game sales timed with sponsored Twitch streams, and other sources of advertisement, all of which might unduly increase the correlation between Twitch viewership and sales.

## **6. Conclusion**

There appears to be a clear and significant causal relationship between Twitch viewership and increased Steam ratings (i.e. sales). In both regressions, the correlation coefficient was approximately 0.15 ratings per viewer regardless of game genre, price, or whether the game was part of a series. Despite limitations in the applicability of the data due to the use of a proxy for sales, there appears to be a strong positive correlation between advertising through sponsored streams on Twitch and sales.

## **7. Disclosure**

The author declares that he has no relevant or financial interest in the research described or the companies references.

**8. Table**

	(1)	(2)	(3)	(4)
	tournament 0		tournament 1	
VARIABLES	N	mean	N	mean
positive_ratings_ratio	412	0.873	6	0.821
Price	412	13.75	6	15.16
peakviewers	412	50,230	6	478,167
totalviewers	412	929,241	6	1.145e+06
ratingstotal	412	22,022	6	736,266
Sequel	412	0.308	6	0.333
fps_moba	412	0.209	6	0.667

Table 1: Mean value of core variables sorted by tournament

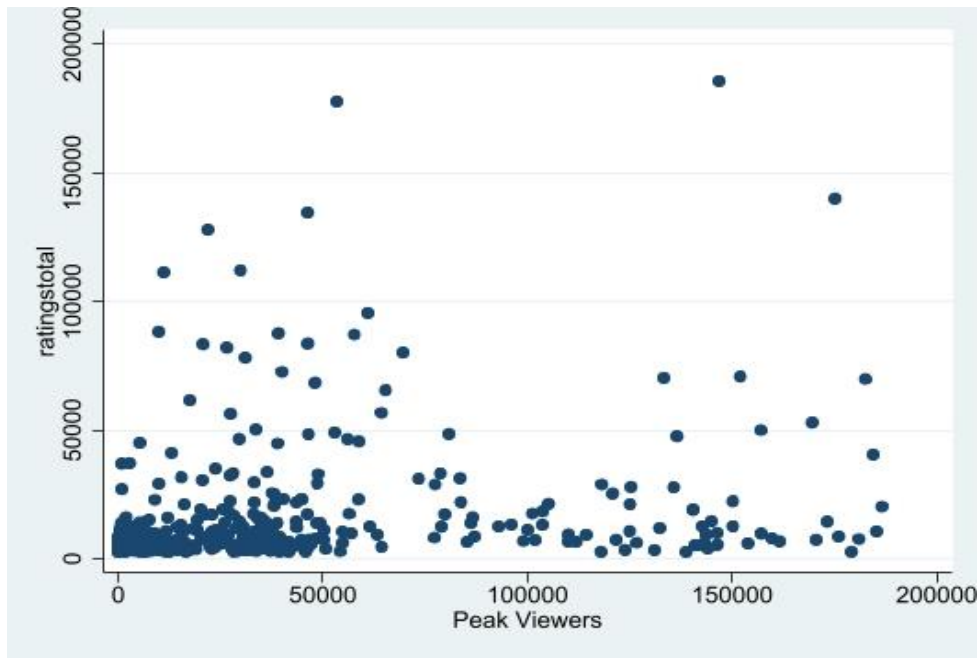
	(1)	(2)	(3)	(4)
	charity_stream 0		charity_stream 1	
VARIABLES	N	mean	N	mean
positive_ratings_ratio	365	0.867	47	0.922
Price	365	14.11	47	10.97
peakviewers	365	38,366	47	142,360
totalviewers	365	927,599	47	942,000
Ratingstotal	365	20,064	47	37,227
Sequel	365	0.312	47	0.277
fps_moba	365	0.184	47	0.404

Table 2: mean value of core variables excluding tournament results sorted by charity\_stream

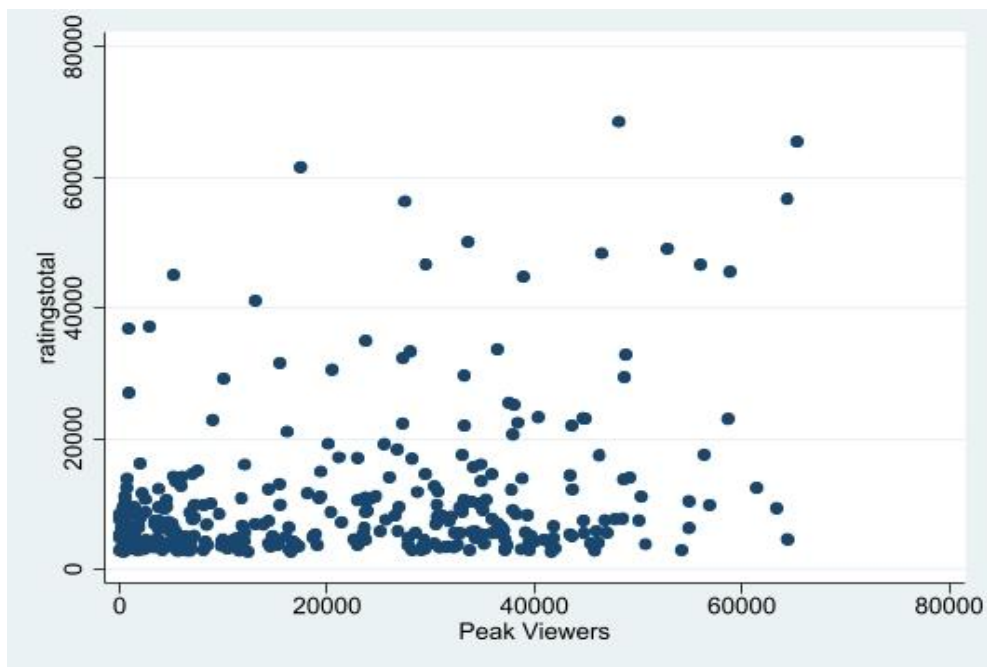
VARIABLES	(1) Correlation Coefficients
charity_stream	1
ratingstotal	0.0108
peakviewers	0.259

Table 3: correlation between instrument variable, regressor, and dependent variable

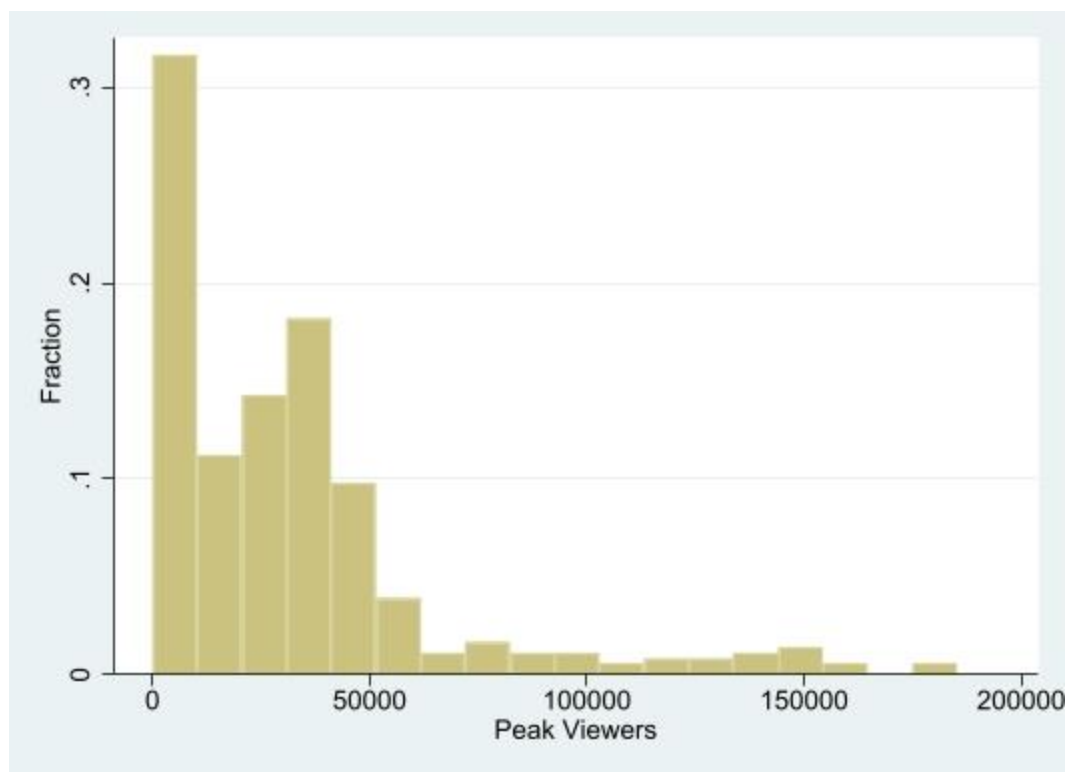
## 9. Graphs



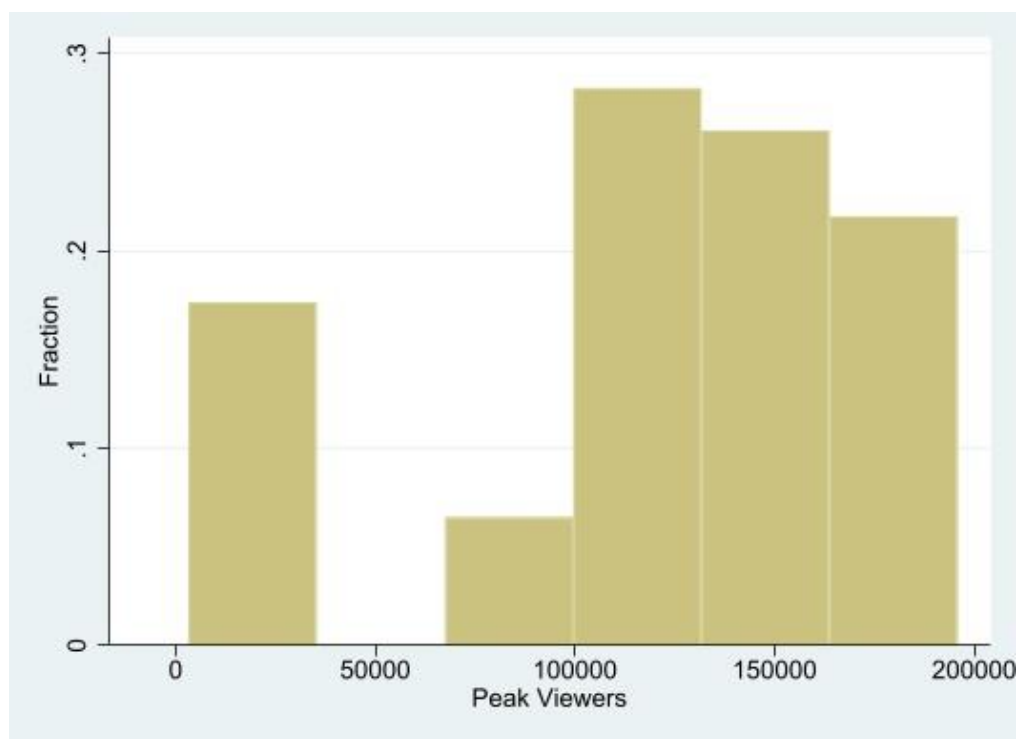
Graph 1: Scatterplot of ratingstotal versus peakviewers excluding large outliers greater than 200,000



Graph 2: Scatterplot of ratingstotal versus peakviewers excluding values greater than 70,000



Graph 3: Distribution of peakviewers for non-charity streams



Graph 4: Distribution of peakviewers for charity streams

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