Playing to Win: Exploring the Causal Relationship between Game Features and Positive User Feedback in the Steam Marketplace

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Abstract

This thesis paper examines the factors influencing positive ratings for video games on the Steam Marketplace. It investigates the impact of game design elements, such as achievements, as well as the effects of early access and free-to-play models on positive ratings. Using a Kaggle dataset of Steam games, a weighted least squares regression was run. The results show that the presence of achievements has a significant positive effect on positive ratings, indicating their value to players. Conversely, early access games have a negative relationship with positive ratings, as players focus on identifying bugs and providing feedback. Furthermore, longer playtime and higher prices are associated with higher positive ratings. These insights suggest that incorporating achievements and strategizing early access releases can enhance ratings, while engaging gameplay and pricing strategies should be considered.

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Introduction

Steam Marketplace is an online platform that provides gamers with access to a vast library of digital games, ranging from classic titles to new releases. It also includes social networking features, allowing users to connect with other players to share content and reviews. Video games have become a significant aspect of modern entertainment, with the industry generating $60.4 billion in revenue globally within 2021 alone (Urbanemujoe, 2022).

Understanding the factors that influence the success of video games is therefore of great importance to video game developers, investors, and policymakers. A recent survey by the Entertainment Software Association found that there are 215.5 million active video game players across all ages in the U.S, indicating a wide audience for this form of entertainment. The success of video games can be attributed to various factors, including their interactivity, storyline, and immersive experiences.

In this paper, I aim to investigate the factors that impact a video game's positive rating. I use a dataset obtained from Kaggle, which contains information on various video games available on the Steam platform, including but not limited to positive ratings, negative ratings, average playtime, median playtime, price, rating, number of platforms, genres, free to play, early access, lnpr, lnrating, and other variables. I focus on positive ratings as the dependent variable for this linear regression.

The main questions that I seek to answer are:

- What game design factors influence positive ratings for a video game that is listed on the steam marketplace, with my variable of interest being achievements
- How does early access/ free to play affect a video games overall positive ratings

The policy implications of this research are significant. Understanding what factors drive positive ratings for video games can help video game developers improve their products, potentially leading to higher sales, revenues, and sponsorships. Additionally, policymakers can use this information to create policies that support the video game industry and promote economic growth.

Previous studies have investigated factors that impact video game success, including user reviews, game genres, and marketing strategies. However, few studies have focused specifically on the impact of positive ratings on a video game's success. My study contributes to the existing literature by providing a more comprehensive understanding of the factors that drive positive ratings for video games.

The main results indicate that certain variables, such as average playtime and price, have a significant impact on positive ratings. Other variables, such as the number of platforms, free to play, and early access, statistically significant but early access has a negative relationship towards the dependent variable. By analyzing these results, we aim to provide insights that can inform the decision-making processes of video game developers and investors.

The rest of the paper is structured as follows: Section 2 provides a review of the relevant literature, Section 3 outlines our methodology, Section 4 presents our results, and Section 5 concludes with a discussion of the policy implications of our findings.

Literature Review

The success of video games has been a topic of interest for researchers and industry professionals alike, as the gaming industry generates significant revenue globally. Numerous studies have investigated the factors that impact video game success. For instance, user reviews, game genres, and marketing strategies have been shown to play a significant role in video game success. However, few studies have focused on what game features impact positive ratings for video games, which is the focus of this paper.

Upon reading David Bornie working paper which investigated if customer reviews really matter from the video game industry used an ordinary least square (OLS) regression. They surveyed their own data from over 6000 participants. Their study aimed to determine the contributions for expert reviews, personal reviews, and peer reviews on video game purchases for an individual. They found that expert reviews from specialized magazines had a positive and statistically significant effect on video game purchases, while personal reviews (trial versions) and peer reviews (offline and online word-of-mouth) did not have a significant effect. Overall, the study's conclusion was that expert reviews from specialized magazines have a positive impact on video game purchases, while personal and peer reviews may not have a significant effect.

This brought inspiration to my paper because I am incorporating steam marketplace which acts as a medium of exchange for game developers and consumers through a digital platform. It is a mixture of both expert reviews and personal and peer reviews as well, so I am interested to see what impacts these positive ratings and reviews for a video game.

As seen in an empirical study of early access games on the steam platform by Dayi Lin · Cor-Paul Bezemer · Ahmed E. Hassan explored how an early access release game to understand the characteristics and advantages of the early access model (EAG). Throughout their study they concluded that through EAG that inducting this method for a game developers' game would result in eliciting early feedback and more positive reviews to attract additional new players (Lin). To where I can understand where they are coming from, it dares me to ask the question does EAG games really result in a positive rating for a video game? My theory is that although EAG are a great advantage for game developers to utilize their consumers preferences and fix any bugs that they find, I believe that EAG have a negative relationship for positive ratings because EAG is a place for people to talk about their dislikes and bugs inside of the game.

In summary, video games success is determined by a lot of variables. One of the successful variables is positive ratings. This research will delve into the question of what impacts positive ratings for a video game in the steam marketplace platform. Evidence suggests that consumers, especially in the video game industry pay close attention to ratings and reviews as a determining factor on deciding whether to purchase the video game of interest or not.

Pre estimation discussion

After analyzing previous literature, I believe that the presence of achievements in a video game will result in more positive ratings. In addition, I predict that releasing your video game for early access will result in less positive ratings, while free to play video games I believe can go either way, leaning more towards having a positive relationship with total number of positive ratings for that video game.

Data and methodology

Question:

- Does the presence of achievements a video game offers its players to obtain affect the game's overall positive rating for it?
- What is the relationship for the game categories early access and free to play with a video game positive rating

Hypothesis:

I hypothesis that the presence of achievements a video game offers its players to obtain, there will be a positive relationship with an increase in overall positive ratings. While the presence of early access will have a negative relationship and free to play will have a positive relationship.

Variables:

- Has_achievements- Indicates whether the video game offers it players achievements. (which act as incentives to continue playing the game (retention rate) and/or make in game purchases)
- Rating- positive ratings / total ratings*100
- Average_playtime- Steam keeps count of every user in game hours played for every video game. (total hours played/ total people purchased the game)
- Price- the price of the video game at time of steam marketplace web scrap
- Num_platforms- the number of platforms the steam game is released on(Windows;Mac;Linex)

- Genreearlyaccess- if the game was offered to play before the official release date to the public
- Genrefreetoplay- The game does NOT cost any money to purchase and begin playing

Table 1:
Summary
Statistics

	mean	sd	min	max
positive_ratings	2816.042	17942.53	0	863507
has_achievements	.6232602	.4845974	0	1
rating	73.10565	17.66148	0	100
average_playtime	448.5197	3205.812	0	190625
price	7.118173	8.255575	0	78.99
num_platforms	1.649092	.8465522	1	3
genresfreetoplay	.1400094	.3470173	0	1
genresearlyaccess	.0556735	.2293037	0	1
N	8478			

Table 1 shows the summary statistics for all my variables which I gathered. I have three binary variables that I am using. You can also see that the lowest video game price was free while the most expensive cost 80 dollars. It is also important to note that my dataset originally had 27000 video games, once I was done cleaning it, I got it down to approximately 8500 video games.

Weighted Least Squares Regression:

After I cleaned and obtained all my data, I began to start putting my model to the test. My first regression that I ran was an ordinary least squares regression for my data that was cross

sectional. After further analysis I performed a hettest on my data to see if I could use this regression, found that it suffered from heteroskedasticity which denies that model, to combat this issue I simply ran a weighted least squares regression and it fixed the issue. The weighted least squares showed that all my variables were statistically significant showing both positive and negative casual effects to my model.

Below shows the model that I used to run my weighted least squares regression.

- pr=β0+β1has_achievements+β2rating+β3average_playtime+β4price+β5i.num_platforms +ui

Results and Discussion

Below are the results from my OLS, WLS & natural log of the dependent variable:

Table 2: Effects on Positive Ratings

	(1) OLS	(2) WLS	(3) lnpr
has_achievements	510.5	371.4***	0.342***
	(416.8)	(26.23)	(0.0351)
rating	76.59***	37.91***	0.0436***
	(11.21)	(3.850)	(0.000945)
average_playtime	0.869***	0.377***	0.0000463***
	(0.0596)	(0.0486)	(0.00000501)
price	231.0***	79.59***	0.0832***
	(25.19)	(11.61)	(0.00212)
1.num_platf	-315.2	-557.2***	0.0758*

orms			
	(542.7)	(22.85)	(0.0457)
2.num_platforms	1930.1***	546.5***	0.272***
	(477.8)	(99.64)	(0.0402)
genresfreetoplay	3537.0***	1406.4***	0.841***
	(591.2)	(193.8)	(0.0498)
genresearlyaccess	-799.8	-437.4***	0.409***
	(839.3)	(92.59)	(0.0706)
_cons	-6007.7***	-2419.0***	1.571***
	(835.3)	(299.3)	(0.0705)
N	8478	8478	8476
R^2	0.051	0.783	0.385
adj. R^2	0.050	0.782	0.384

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

My weighted least squares in the second column in Table 2 shows that all my variables are statistically significant. Having achievements is a positive coefficient which is what I was expecting. Achievements are optimal for video games as my results show that now consumers have a preference in achievements, suggesting players like in-depth and longer video games. From this analysis, offering your game has a negative coefficient, which confirms my theory about early release access games having a negative causal relationship towards positive ratings. Offering your game pre release date encourages players to critique and to find any glitches that the developers missed. It is an opportunity for game developers to get feedback back for the game to improve it.

Average playtime had a positive relationship towards positive ratings as well. Signaling to pay attention to what boosts retention rate for a video game. The more average playtime a video game can get increases its likelihood in receiving a positive rating. For each additional hour of average playtime increases positive ratings by .869.

Interestingly, the number of platforms on which a game is released, as well as whether the game is free to play, have mixed effects on positive ratings. While the number of platforms and free-to-play games show statistically significant relationships, the direction of their effects varies across the models.

In the third column of Table 2 I take the natural log of positive ratings to see the percent changes. I can interpret the third column for has_achievements since it is a binary code as the predicted value of positive ratings with achievements present in a video game is 34 percent greater than a video game that does not have achievements, holding rating, price, average playtime, platforms, and genres constant. I can also interpret my binary variable early access release games as the predicted value for positive ratings with early access release present is 40 percent less than if a video game did not get released early, holding all else constant.

Conclusion

The findings of this study shed light on the factors that impact positive ratings of video games in the Steam Marketplace. By analyzing a dataset of over 8,500 video games, several key findings emerged.

Overall, this study contributes to the existing literature by providing insights into the factors that drive positive ratings for video games. However, it is important to note that the results are based on a specific dataset and may not generalize to all video games on all platforms. Further research is needed to validate these findings and explore additional factors that influence positive ratings in the video game industry. Further research can also go into exploring what increases average playtime within a video game on the steam marketplace

The presence of achievements in a video game has a significant positive effect on positive ratings. This suggests that players appreciate the inclusion of achievements as they add depth and longevity to the gaming experience.

Early access release games have a negative relationship with positive ratings. Contrary to expectations, releasing a game in its early access phase, where players can provide feedback and identify bugs, tends to result in lower positive ratings. This suggests that early access players may focus more on the game's shortcomings and provide critical feedback rather than positive reviews.

Average playtime is positively related to positive ratings. Longer average playtime indicates higher player engagement, which in turn leads to more positive ratings. Developers should strive to create games that captivate players and keep them immersed for longer periods. Moreover, the price of a game also plays a role in its positive ratings. Higher-priced games tend to receive higher positive ratings, possibly indicating that players perceive greater value in games with a higher price point.

These findings provide valuable insights for video game developers, investors. Developers can focus on incorporating achievements into their games to enhance player

satisfaction and positive ratings. They should also carefully consider the timing and strategy of early access releases, as they may have unintended consequences on positive ratings. Additionally, understanding the relationship between average playtime and positive ratings can help developers create more engaging games. Lastly, pricing strategies should be considered, as higher-priced games tend to receive more positive ratings.

Citations

Bounie, David, et al. “Do Online Customer Reviews Matter? Evidence from the Video Game Industry.” SSRN, 9 Feb. 2020, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1091449.

Factors That Impact Video Game Sales - Causeweb. https://www.causeweb.org/usproc/sites/default/files/usclap/2017-2/Factors_that_Impact_Video_Game_Sales.pdf.

Halbrook, Yemaya J. *When and How Video Games Can Be Good: A Review of the Positive Effects ...* https://www.researchgate.net/publication/336956404_When_and_How_Video_Games_Can_Be_Good_A_Review_of_the_Positive_Effects_of_Video_Games_on_Well-Being.

Lin, Dayi, et al. “An Empirical Study of Early Access Games on the Steam Platform.” *ResearchGate*, https://www.researchgate.net/publication/329635682_An_empirical_study_of_early_access_games_on_the_steam_platform.

Trneny, Michal. *Machine Learning for Predicting Success of Video Games* . https://is.muni.cz/th/k2c5b/diploma_thesis_trneny.pdf.

“Undergraduate Statistics Project Competition and Electronic Undergraduate Statistics Research Conference.” USPROC, https://www.causeweb.org/usproc/.

Urbanemujoe. “2022 Essential Facts about the Video Game Industry.” *Entertainment Software Association*, 10 June 2022, https://www.theesa.com/resource/2022-essential-facts-about-the-video-game-industry/.