

# The Impact of Experience

## The Influences of User and Online Review Ratings on the Performance of Video Games in the US Market

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### ABSTRACT

Commercially successful video games easily sell more than one million units in the US market alone and gross more than \$ 100 million. Few research approaches have asked the question what makes a video game succeed in the market. This paper focuses on the role of external information sources. As video games are experience goods whose value for the consumer only becomes apparent after he or she has experienced the product, consumers seek external information in form of user and expert reviews to be able to judge if a video game will fulfil their needs or not. Good ratings by users and experts may promote the success of a given video game. Using a sample of 201 top selling games in the US market, a causal model predicting the influence of user and expert reviews on the success of video games in the US market is constructed, indicating that the perceived quality of a video game through external sources may explain up to 15% of a video game's distribution.

### Author Keywords

Experience goods, video game market, user ratings, online reviews

### VIDEO GAMES AND THE EXPERIENCE GOOD PROBLEMATIC

Since the 1970s the video game industry has witnessed an exceptional growth. After a brief decline in the 1980s, the industry has in the late 1990s reached an overall turnover that exceeds the theatrical revenues of movies and closes in on the music industry [27]. Successful video games such as Halo (2001, Microsoft) or Metal Gear Solid (1998, Konami) are able to generate revenues that are comparable to blockbuster movies and easily cross the \$ 100 million mark [18]. The most successful video game on a single platform in recent years, the controversial Grand Theft Auto Vice City (2003, Rockstar), sold roughly 6.5 million units, resulting in gross revenues of estimated \$ 250 million.

This article focuses on these successful video games. By "video games" a form of gaming software is meant that

requires a specific hardware platform (a gaming console) to be played upon. Since the late 1970s when gaming consoles such as the Fairchild F and the more successful Atari VCs introduced replaceable gaming cartridges video games are characterized as typical system goods [9], requiring a hardware platform (the console) to play the software (the game). Video games are troubled by the problem of interoperability. Console manufactures like Nintendo, Sony or Microsoft do only allow games that were especially designed for their consoles to be played upon them [27]. In order to distribute a video game for a certain platform, a licence fee for the console manufacturers needs to be paid and the game has to pass a rigid licensing process that guarantees the console manufactures that only games they approve of make it to their console [7, 28].

On the one hand this licensing procedure is an instrument to cross-finance the hardware sales but on the other hand it is also a measure to control the quality of video games that are published for a certain console. Still, several hundred games are released for successful gaming consoles. The Entertainment Software Rating Board ([www.esrb.org](http://www.esrb.org)) that is responsible for the age ratings in the US market indicates that there are 1.400 titles available for the Sony Playstation and 1.557 titles for the Sony Playstation 2. Only one year after the X-Box 360 was introduced in the market already 180 titles are rated for this platform.

Even if the consumers' choice is restricted by the fact that video gaming consoles are not interoperable they are confronted with an almost overwhelming offer. The consumers' decision is even more complicated as video games are typical experience goods. Comparable to other media products such as movies, music (CDs, MP3-files) the individuals do not know what the value of the product is until they have experienced it [23]. As Chang & Ki [4] argue with respect to movies the experience and enjoyment of the media product is the aim of the consumption experiences. This is equally valid for video games. The experience good problematic becomes even more critical

Situated Play, Proceedings of DiGRA 2007 Conference

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for video games when the prices of the product are regarded. In the cinema market the user has to invest two hours of his time and approximately five to ten dollars for experiencing the full product. With respect to video games the consequences are more severe [4]. Prices for video games may range from twenty (budget range) to seventy dollars (full range) and playing time easily exceeds 20 hours and playing may require several hours to adequately judge the quality of the game. The decision to buy the wrong game thus not only sacrifices a higher proportion of a user's entertainment budget than going to the movies but may require the user to spend some time before he realizes that the game he bought does not fully gratify his entertainment needs or that another game would have been better to satisfy this need.

As a result of the consumer decision for video games, the market for video games can be described as a 'market of super stars': A small number of "star" products account for the majority of revenues while a large number of products contributes only marginally to the overall market performance [22]. According to estimations, one fifth of the games released is responsible for four fifth of the cumulated revenues [28]. The question remains, what makes a product such a star product.

#### **SIGNALLING VIDEO GAME QUALITY**

As many media products such as video games are experience goods the users look out for external sources of information that may reduce the uncertainty their consuming decision is based upon. Research in reference to the film and movie market has indicated that these instruments may be genre [10], or the signalling function of a star [6] or an award [21]. Research also points at two aspects that are of particular importance to reduce uncertainty with respect to experience goods: the reviews a product receives from critics and the word of mouth it receives through the evaluation of other users [2, 3, 8, 13, 15, 16]. The risk to see a movie or buy a game one does not like is minimized if it has received good reviews and other people have already made good experiences with it.

The gaming industry has already acknowledged the importance of this signalling function of user and expert reviews for video games. A whole range of different magazines and website are devoted to the evaluation of video and computer games. With respect to the gaming press, Müller-Lietzkow and Urban [20] argue that it fulfils five functions for the consumer: They...

“inform the players about new games, test and rate them”

“entertain and inform the reader about the industry”

“test game hardware”

“give additional advices, cheats, and hints to win the game”

“offer advertising space” (2006, p. 6).

Thus, the gaming press fulfils several functions that aim at reducing the uncertainty in the consumer's buying decision. Müller-Lietzkow and Urban [20] are able to outline, that the industry is indeed aware of this signalling function of a game's quality for its economic performance. Publishers are therefore interested in receiving high rating in the gaming press and may even try to influence the rating process of the independent gaming magazines. Bounie et al. [4] carried out indigenous research on the role online reviews may play for consuming decisions. Based on a self-selective sample of online users they found that those who use information sources often are more likely to buy more games. Overall, they state “people who often consult internet sites and forums prior to making a purchase have a higher propensity to purchase video games”.

With the exception of these two approaches the role of the gaming press for the performance of video games has not been thoroughly analysed yet. Müller-Lietzkow and Urban's [20] article focuses on the relationship between game ratings and advertising expenditures. An empirical test of the influences of game ratings on the economic performance of video games is still missing while Bounie et al.'s [4] approach focuses on the influence on part of a very restricted set of customers (French students). Still, their research illustrates that the traditional gaming press is under pressure from a range of different websites such as [www.ign.com](http://www.ign.com), [www.gamespot.com](http://www.gamespot.com), [www.mobygames.com](http://www.mobygames.com), or [www.eurogamer.net](http://www.eurogamer.net) that provide the interested consumer with the same information as the gaming press but at a more regular interval. These online rating boards also offer additional services ranging from user comments and evaluations to video documents and game trailers. The website [www.gamespot.com](http://www.gamespot.com) for example rates thousands of games, provides the visitor with up to date news on game releases, and includes game-play footage and user reviews. Online sources, henceforth labelled as online press, seem to be one of the most important sources of information for gamers.

As a conclusion, it can be stated that the influence of game ratings through the gaming press, online sources or other users may be a central instrument to reduce the uncertainty in the consuming decision for a video game and may therefore be seen as a factor that impinges on the success of a given video game. This article focuses on this aspect. It is assumed that, good ratings (user and online press) will increase the attractiveness of a video game and will therefore result in higher sales figures for the game. The aim of this research paper is to deduce a model that describes the influence of the user and expert / critics ratings (press, online) on the economic performance of video games:

RQ1: Is there an empirical relationship between user and (online) press ratings and the economic performance of video games?

If so,

RQ2: What empirical evidences are there that, may...

RQ2a: explain in how far ratings impinge on the economic performance?

RQ2b: help to describe a causal model for the relationship between user and (online) press ratings and the economic performance of video games?

In order to deduce an appropriate research design and theoretical model it becomes necessary to investigate the existing approaches on consumer decisions for video games and ask the question in how far, the influence of user and (online) press ratings can be integrated in existing research models.

### **ANALYSING CONSUMER DECISIONS FOR VIDEO GAMES**

A better understanding, why a consumer chooses a particular video game may help to provide the video gaming industry with instruments to better match the consumer needs with the offer of available video games. In spite of the growing importance of matching consumer needs and the gaming software offer with more and more games competing for the user's entertainment budget, the research on consumer decision processes for video games is only in its beginning. Research based on the uses and gratification tradition [14, 19, 25] or approaches in psychological media entertainment research [11, 17, 26] set out to scrutinize what processes on the individual level may lead to an individual enjoying a game or not. Shaw et al. [24] propose a model that is based Action Theory and Social Cognitive Theory and analyses the different motivations users have to play video games. It is the aim of their approach to apply user data to determine certain quality indicators that may help to answer the question if a particular game will satisfy a user's gaming motivations. Shaw et al.'s [24] model offers an approach where the ratings of a group of users can be employed to deduce the preference of other user's for the same game. Their approach may thus in the future be successfully combined with a model that answers the question, why one game may be more successful than another. Still, these models on the individual level do not explain why a user picks a particular game from the range of various games that are available in the market.

Econometric models, seeing the media product itself and not the consumer as unit of analysis may be a second way to answer the question why consumers decide for a particular video game. Still, there are few approaches that have used the video game and not the user as primary unit of analysis. Implications on research designs may thus come from related research areas. The prediction of the theatrical success of movies seems to be such an area where econometric models seem to be successfully employed. In

the research on explaining the success of movies in the cinema market, several factors have been identified that impinge on a films success [4, 5]. Dependent variables are often gross box office revenues, first weekend performance or even profitability. Independent variables are in general production budget, marketing budget, or number of screens [6, 12, 16]. What all these approaches have in common is that they use a sample of movies and try to explain their performance in the market by certain factors using statistical models.

Initial approaches using the performance of video games in the market indicate that potential independent variables can be grouped into three complexes: game-play related variables, game-inherent and marketing factors, and platform factors. With game-play related variables such as game difficulty and learning curve the interactive aspect of video games is acknowledged linking the econometric research with findings from user centred approaches stating that game-play aspects impinge on the enjoyment of a certain game. Game-inherent and marketing variables such as release time, or ESRB rating indicate aspects that can be manipulated by the developers and publishers. A publisher can decide when to release a game. He may even try to influence the ESRB rating a game will receive by increasing or reducing for example the level of violence in the game. The third complex of variables – platform related variables – acknowledges the fact that video games in contrast to movies require a specific hardware platform to be played upon. The success of a given hardware platform impinges on the performance of a game released for that platform [15].

The strength of econometric models lies in the fact that approaches in the research of successful movies have successfully addressed the experience good problematic of movies [4] by integrating user and critics reviews as potential explanation variables in their models [2, 3, 8,13, 16]. Therefore, econometric approaches seeing the product and not the user as unit of analysis may be transferred to the analysis of video games. Here, user and critics reviews can be used as independent variables for a game's economic performance. In order to carry out empirical research on the influence game ratings may have on the success of video games in the market, a sample of video games is necessary.

### **A SAMPLE OF SUCCESSFUL VIDEO GAMES**

Secondary data on the video game market is hard to come by. Experiences from the movie market show that data quality is often dubious. Production and marketing figures are hard to come by. Gross revenues are only a slight indicator for a movies overall performance. However, industry sources like *Variety* or websites such as [www.imdb.com](http://www.imdb.com) or [www.boxofficemojo.com](http://www.boxofficemojo.com) gather secondary data that can be employed by researchers. Similar public sources for the video game industry are missing. An initial approach on the economic performance of video games in the US Market [15] used data from the

website [videogamecharts.com](http://videogamecharts.com). The website was launched in May 2006 and gathers information on the software and hardware sales in the US. The website offers a complete overview of games that sold more than one million units in the US market between 1995 and 2005. The tables indicate the name of the game, its publisher, the platform it achieved the sales on, and the number of units sold. 201 video games made it into this top-selling list. For the aim of this research this list of games was again used as the sample. It is by no means a random sample, so results of our research are not representative for the video game market in general. However, it is a complete sample of all the successful titles released between 1995 and 2005, whereby 'successful' games that sold more than one million units are meant. These top-selling games can indeed be seen as the star products. For example, of the more than 1.500 Playstation 2 games rated by the ESRB, only 63 made it in the top-selling sample (< 5%).

The number of units sold as gathered from [videogamecharts.com](http://videogamecharts.com) was used as an indicator for the gross economic performance and as a measurement for how popular a game had been with the consumer. As stated before, this indicator may be influenced by the system good characteristic of video games. A game that is released for a more dispersed platform may automatically be able to sell more units than a game for a not as successful hardware platform. To account for the different platform distributions a variable labelled "penetration rate" was deduced. The penetration rate is the percentage of installed consoles that were reached by a particular game. The number of units shipped world wide was used as an approximation for the installed base [15].

As independent variables, the initial research had relied on data from the website [www.gamespot.com](http://www.gamespot.com) (release dates, genre and ESRB rating). For the purpose of analysing the influence of ratings on the performance of video games, the website offers some important information. Similar to other online sources, the website rates its games on a 1 to 10 scale. It not only sums its review up with an average rating but gives individual ratings for game-play, graphic, sound, value, and a tilt factor. All website data was collected. Furthermore the website offers the opportunity to let the users themselves rate the games. For the games in the sample (Top-selling games), all games received an average user rating with numbers of users rating from 55 to 39.958. Compared to other popular website such as [www.ign.com](http://www.ign.com) these numbers of user ratings are substantially higher. A further strength of using the data from [www.gamespot.com](http://www.gamespot.com) is the connection of the website with the database [www.gamerankings.com](http://www.gamerankings.com). This combination allows [www.gamespot.com](http://www.gamespot.com) to offer an average rating score gathered from different websites that rate video games. Sources that this average score is based upon include [www.ign.com](http://www.ign.com), [www.gamespy.com](http://www.gamespy.com) or Electronic gaming

monthly<sup>1</sup>. The major online sources of information are included in the average rating, giving the researcher an approximation on the average review scores a game has received. The rating in this list was labelled "average online press rating". 197 games of the 201 games in the list had received such an average score with numbers of reviews ranging from 2 to 136. All these data were used as independent variables, resulting in three sets of variables: The *Gamespot* rating, the average user rating and the average online press rating.

#### **EMPIRICAL FINDINGS ON THE INFLUENCE OF RATINGS ON THE PERFORMANCE OF VIDEO GAMES**

Müller-Lietzkow and Urban [20] assume that a rating of 75%<sup>2</sup> is an essential precondition for a game to succeed in the market. Only ratings of 80% or more guarantee a profitable game. Their finding seems to receive some empirical support, when the average ratings for the 201 top-selling games are regarded. On average, all three sources rate these games with a least 8 points on their 1 to 10 scale (= 80%). On average, the score from Gamespot is significantly lower than the average user rating (paired t-Test,  $p = 0,000$ ,  $N = 196$ ) or the average online press rating (paired t-Test,  $p = 0,000$ ,  $N = 192$ ). No statistically significant differences between the average user and online press rating can be found (paired t-Test,  $p = 0,290$ ,  $N = 197$ ). All three indicators are highly correlated with each other<sup>3</sup>. The highest correlation can be found between the Gamespot and the average user rating ( $r = 0,875$ ,  $p = 0,000$ ,  $N = 196$ ).

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<sup>1</sup> the procedure to calculate the average rating can be found on [www.gamerankings.com](http://www.gamerankings.com)

<sup>2</sup> Ratings in German magazines that their research is based upon often use a percentage scale for evaluating games. Websites such as [www.ign.com](http://www.ign.com) and [www.gamespot.com](http://www.gamespot.com) use a 1 to 10 point scale. Both scales can be easily compared as scores under 10% are rarely if ever given to a game, thus a score of 75% equals 7,5 points.

<sup>3</sup> Correlation Average User Score - Average Online Press rating  $r = 0,847$ ,  $p = 0,000$ ,  $N = 197$ ; Average Online Press rating - Gamespot rating  $r = 0,812$ ,  $p = 0,000$ ,  $N = 192$ . As the data is from a complete list of top-selling games and not a random sample, the level of significance as indicated in this paper are only hypothetical. In a sample, that accounts for all units of the population, no level of significance can be indicated for projections as estimators from the sample are identical to the real values. Still for a better evaluation of the data, the levels of significance are indicated in this paper as if a random sample had been used.

**Table 1: Average Ratings**

	Minimum	Maximum	Mean (S.D.)
Score			8,13
Gamespot (N = 196)	2,7	10,0	(1,26)
Average User Rating (N = 201)	4,8	9,7	8,36 (0,84)
Average Online Press Rating (N = 197)	4,5	9,8	8,32 (0,97)

Three out of four of the games received a *Gamespot* rating of 7,5 or more (76%). With respect to the average user ratings even 85% of the games were rated better than 7,5 and four out of five games had an average online press rating of 7,5 or more (80%). Having a rating of more than 7,5 or 8,0 seems to be an essential factor to enter the realm of the top-selling games. Still, the minimum score a top-selling in the sample received can be substantially lower. Even games with scores of five or lower made it into the sample. This contradicts the view that a certain threshold in terms of ratings is required for a game to break-even (assuming that all the top-selling games achieved the break-even). High ratings are not given without consideration. A comparison with the *Gamespot* ratings of the top-rated games that were rated in the last 12 month (Jan. 2006 - 2007) illustrates, that ratings of above 9.0 are reserved for a minority of games. Scores of 8.0 - 8.9 are easier to come by but the majority of titles received ratings in the range of 7.0 - 7.9. Sadly, the game rating statistics of *Gamespot* do not indicate the number of games that received a rating of less than 7,0.

**Table 2: Number of top-rated games, Gamespot Jan. 2006 – Jan. 2007**

	Number of Games
Score 9,6 – 9,0	28
Score 8,9 – 8,0	125
Score 7,9 – 7,5	138
Score 7,0 – 7,4	165

Regarding top-rated games on Gamespot also illustrates that many of these games did not sell more than one million units. The game *Ninja Gaiden* (2004, Tecmo) for example received a rating of 9,4 but only sold 417.000 units (Penetration rate: 1,72%). This may probably due to the limited distribution of the *X-Box* platform it was released

for. The game *Vagrant Story* (2000, Square) released for the more popular *Playstation* received a Gamespot rating of 9,6 but sold only 219.000 units (Penetration rate: 0,21%) (data from [videogamecharts.com](http://videogamecharts.com)). There are several other examples of critically acclaimed games that did not sell exceptionally well.

These first findings illustrate that good ratings alone do not guarantee a game's success. Consumers do not base their decision solely on ratings. A game may receive good user and press ratings but due to other factors (a weak publisher, an exotic genre, bad marketing, a niche target group) it will never sell more than one million units. Still, we may ask the question if good ratings are an instrument to improve the market performance of games. If we can identify a positive connection between higher ratings and higher sales figures within the sample of top-selling games, this means that ratings are likely to influence the performance of top-selling games in a positive way. We may furthermore try to calculate the degree to which ratings impinge on the performance of video games and to what degree other variables are responsible for different performances within the sector of top-selling games.

The first step to analyse the relationship between economic performance and ratings is to relate the two variables. A simple correlation analysis indicates that there is a (significant) correlation between the economic performance and the ratings a game receives with respect to all variables. The strength of the correlation is rather moderate and strongest for the relationship between the penetration rate and the average online press ratings. With the exception of the *Gamespot* ratings, the correlation between the game ratings and the penetration rate are slightly stronger than the correlations with the number of units sold. As the penetration rate seems to be a more accurate approximation for the success of a game as the different platform distributions are controlled for, these findings seem to be plausible. Average user and online press ratings may be a better indicator to see how far a console may exploit the potential of the installed base than for the absolute number of units sold.

**Table 3: Correlation (Pearson) Rating and Economic Performance**

	Units	Penetration
Ø Online Press	0,348*	0,359*
Ø User	0,330**	0,341**
Gamespot	0,285***	0,263***

\* N = 197, significant on the 0,01 level.

\*\* N = 201, significant on the 0,01 level.

\*\*\* N = 196, significant on the 0,01 level.

Still, a correlation does not assume any causal relationship and may be influenced by a range of different factors. As

the number of user and reviews the average ratings are based on varies, the effect may be overshadowed by the fact that only a few good ratings for a not so widely discussed title resulted in high ratings. If the number of users or reviews are controlled the correlations remain stable when the average online press ratings are regarded. For the users, the strength of the correlations goes down. This may be due to the high variance in the number of reviews the titles in the sample received from the users.

**Table 4:** Partial-Correlation Rating and Economic Performance, controlled for number of users / reviews

	<b>Units</b>	<b>Penetration</b>
Ø Online Press	0,313*	0,305*
Ø User	0,184**	0,202**

\* N = 194, significant on the 0,01 level.

\*\* N = 198, significant on the 0,01 level.

Interestingly, the correlation between the number of users the ratings were based upon and the success of titles is even stronger than the correlation between the user's ratings. The quite obvious relationship that titles that sell well were also rated by a higher number of users is underlined. For the number of online press ratings the effects follow the same direction but are much weaker, probably due to the lower variance in terms of number of reviews compared to the number of user ratings.

**Table 5:** Correlation Number of Online Press Reviews / User Reviews and Economic Performance

	<b>Units</b>	<b>Penetration</b>
No. Online Press	0,161*	0,212*
No. User	0,457**	0,444**

\* N = 197, significant on the 0,05 level.

\*\* N = 201, significant on the 0,01 level.

As a first conclusion it can be stated that a modest correlation ranging from 0,2 to 0,4 between the economic performance of video games and different types of ratings can be identified. This correlation remains stable even if the number of reviews a game received is controlled. However, in the case of user ratings, the problem occurs that the average score a game receives is not independent from the number of users that rate a game. Furthermore, the individual ratings are related to each other. In sum this means, games that sell well also are rated by a higher number of user and games that are rated by a higher number of users are also correlated with higher user scores while user scores and press scores are related with each other. As

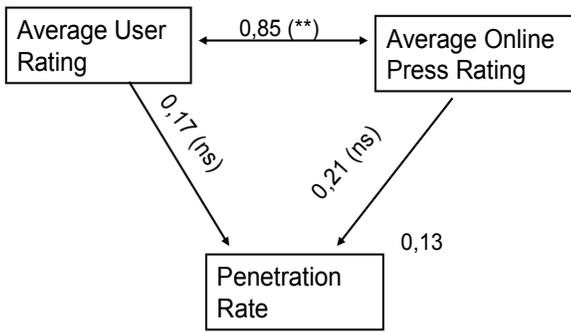
a consequence, when a causal model for the relationship between different ratings and economic performance is constructed the problem of multi-collinearity occurs. Different potential independent variables are highly correlated with each other. This has some implications for the conceptualisation of a causal model. No multivariate linear regression model can be assumed that sees the economic performance of a game as dependent variable and the different ratings as independent variables.

#### **A CAUSAL MODEL FOR THE INFLUENCE OF RATINGS ON THE ECONOMIC PERFORMANCE OF VIDEO GAMES**

In order to construct a causal model for the influence of user and online press ratings on the economic performance of video games, this article focuses on two different ratings and one independent variable. The penetration rate was used as dependent variable as here the distribution of the hardware platform is controlled. From the three available ratings the two average ratings on part of the users and the online press are used as dependent variables. The *Gamespot* rating is excluded as it represents only one score whereas the average online press rating combines the ratings of different similar websites thus reducing subjectivity or a potential website bias towards a certain genre or platform.

In the causal model it is assumed that user and online press ratings influence the performance of video games in the market. This direction seems to be plausible as in particular online press ratings are available before the game enters the market and may thus not be influenced by the game's performance. The influence of the user ratings however is more complicated, but it can be assumed that again these user ratings impinge on the economic performance of video games as they are used by consumers as information source to compensate for the missing information of a game's quality, reducing the experience good problematic for the consumer. User and online press ratings are in this sense seen as information consumers may use prior to their consuming decision.

As average user rating and average online press rating are related to each other, the easiest model would see both variables as correlated with each other. Both variables then influence the penetration rate in a positive way. In order to describe this - and all the following models - the structure-equation-modelling software AMOS was used to construct path diagrams. Estimations were based on the maximum likelihood procedure [1].

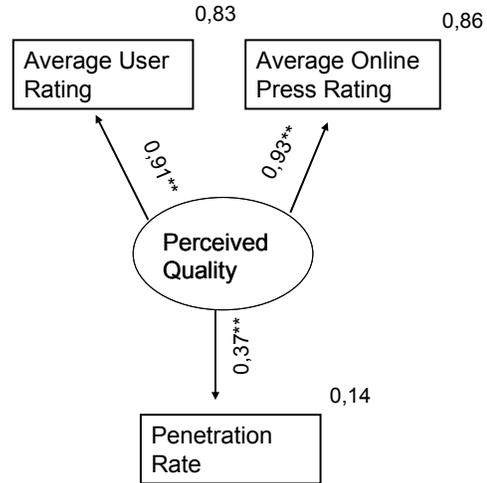


**Figure 1:** Path-Model Ratings – Penetration Rate. Model: No. of Sample Moments = 9. No. of parameters to be estimated = 9. Degrees of freedom (DF) = 0. Model just identified

Relationships between variables are indicated as standardized direct effects. The level of variance explained is indicated by squared multiple correlations<sup>4</sup>. The first causal model shows that from the two variables, the online press ratings have the higher impact on the penetration rate. Together both variables explain 13% of the total variance for the variable “penetration rate” and are highly correlated with  $r = 0,85$ .

In this first model, the relationship between online press and user ratings is not accounted for in an accurate way. Some theoretical considerations are necessary to adequately construct a causal model. Online press ratings and user ratings were used as a measure for the signalling function of external reviews on the quality of a certain game. By reading reviews, the potential buyer of a video game tries to reduce the experience good problem that he is not able to judge the quality of the product he is about to buy before he has used and experienced the good. He relies on external information of users and experts that have already experienced the product. As the statistical analysis indicates both average user and online press reviews are highly correlated. This points to the fact that both indicators measure the same phenomenon. We may assume that both indicators are observable measurements of a latent variable that may impinge on the economic performance of video games. This latent variable that is not open for direct observation is labelled “perceived quality” and stands for the perceived quality of video games by external sources such as other users and online press ratings. The “perceived

quality” of a video game can be measured in our data set through the use of the two variables “average user rating” and “average online press rating”. An empirical model, where these two variables are seen as manifestations for the latent variable “perceived quality” can be conducted.



**Figure 2:** 1st Path-Model Ratings – Perceived Quality - Penetration Rate. Model: No. of Sample Moments = 9. No. of parameters to be estimated = 9. Degrees of freedom (DF) = 0. Model just identified

The overall model is just identified, so that the data is modelled to accurately fit the model. Thus, no Goodness of Fit Indicators can be computed. This model explains 14% of the variance for the penetration rate. Both measurable manifest variables influence the latent variable “perceived quality” to almost equal proportions.

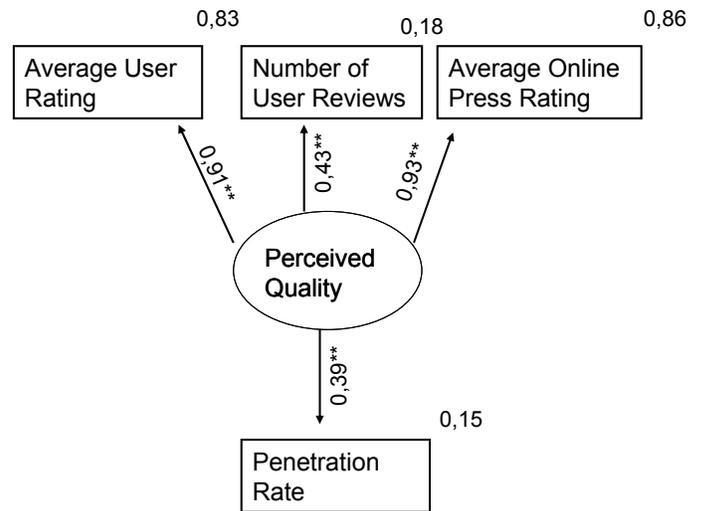
The initial research indicated that the number of users the user rating was based upon also is correlated to both the average user score and the penetration rate. Again, this variable may be seen as a further measurable variable for the “perceived quality”. It is highly correlated to the “average user score” and may partly impinge on the influence of this variable on the economic performance measured by the penetration rate. To account for the influence of the “number of reviews” this variable is also

<sup>4</sup> As we deal with a sample of all successful video games and not a probability sample, levels of significance for the effects are only given in brackets

integrated in the model by seeing it as a further manifest variable for the “perceived quality”<sup>5</sup>.

When the variable “number of users” is integrated in the model, the model is over-identified, thus allowing for an evaluation of the data fit, indicating if for example there is a model that would allow for a better integration of the variables. The results are mixed: The Chi-Square statistic (CMIN/DF) indicates that the overall model fit is not perfect (CMIN/DF < 2) and the Root Mean Square Error (RMSEA) is too high (RMSEA < 0,08) but Goodness of Fit Indices such as NFI are indicating an acceptable fit (NFI > 0,9). Overall, this model is a rather simple model with few degrees of freedoms, better model fits seem to be possible but for a first step, the model seems not to be completely unfit for the data. When looking at the model itself, it becomes apparent that the “number of users” is related to the latent variable “perceived quality” to a weaker extend then the two average ratings. The squared multiple correlation of the effect the “number of users” has on the latent variable “perceived quality” is 0,18. This is much lower than the 0,86 and 0,83 for the user and online press ratings. This seems to be plausible and further underlines the theoretical strength of the proposed model: The theoretical, latent variable is influenced by the user and online press ratings to an almost equal proportion. The number of users a rating is based upon may have an influence on the user rating score and can thus be seen as a background variable that also moderates the strengths of the “perceived quality” variable. Its direct influence on the “perceived quality” may thus be lower.

Overall the findings as presented in the last model indicate: Average user ratings and online press ratings can be used as a measurement for the latent variable “perceived quality”. Integrating the number of users in the model increases leads to a slightly higher explanation of variance for the dependent variable “penetration rate”. The “perceived quality” as measured in our model as an indicator for the information a consumer may receive through external sources that may reduce the experience good phenomenon of video games, impinges on the economic performance of top selling video games as measured by the penetration rate. A standardized direct effect of .39 can be measured, explaining 15% of the total variance. This means that the “perceived quality” of a top selling video game is to 15% responsible for its penetration rate. A high level of perceived quality has a moderate influence on the economic performance of top selling video games.



**Figure 3:** 2nd Path-Model Ratings – Perceived Quality - Penetration Rate. Model: No. of Sample Moments = 14. No. of parameters to be estimated = 12 Degrees of freedom (DF) = 2. Model just identified. CMIN/DF = 12,49; NFI = 0,926, RMSEA 0,240

**DISCUSSION**

Our initial research illustrated some findings on potential factors that may impinge on the performance of top selling video games [15]. The aim of this paper was to focus on one set of variables - game ratings by online press sources and users as sources of information for consumers. RQ1 can be easily answered: Empirical evidences indicate that there is a moderate relationship between different ratings and the economic performance of video games. The empirical analysis of these relationships using a sample of top-selling video games illustrates that user and online press ratings are not independent from each other. As for a causal model, these multi-collinearities have to be accounted for. A theoretical plausible model was proposed that saw user and online press ratings as manifest variables for the latent variable “perceived quality”. Both manifest variables have approximately the same influence on the latent variable. As user ratings in our model correlated highly with the number of users the ratings were based upon, the number of users was integrated in the model. This model explained 15% of total variance for the variable “penetration rate”. This means, for games that sold more than one million units,

<sup>5</sup> The number of press reviews is not integrated in the model as here the moderating effects are expected to be much lower and can therefore be neglected

15% of their penetration rate can be explained by the perceived quality of the product.

In order to fully judge the quality of the proposed model further research is necessary. Additional latent variables that may impinge on the economic performance of video games may be integrated in the model. Potential variables can be “game characteristics” (level of difficulty, genre) or “marketing” (release strategy). Without these further variables the real strength of the influence of the variable “perceived quality” cannot be judged. It is an interesting research question, if for example “marketing” factors such as release strategies have a stronger influence on the performance of video games than the perceived quality of a video game. As of yet, adequate data is missing. Furthermore, the proposed model was only tested for top-selling video games. A further test on a random sample of video games may provide some insights if the effects that were found in this sample can be generalized for the total population of video games released in a given period.

Despite all these limitations the overall strength of the proposed model lies in the fact that the different intertwining relationships between different rating variables are accounted for. In our sample the analytic strength of the model was proved. Explaining roughly one seventh of the total variance of the penetration rate indicates that the perceived quality of a game has an effect on a game’s economic performance that may not be neglected. In the light of this research the observed phenomenon that game publishers have a high interest in good reviews and ratings [20] has been underlined by empirical findings. Good reviews may not decide a game’s fate alone but they have a measurable effect on its performance. Game publishers are thus encouraged to test the perceived quality of a game prior to its release in order to predict its performance. Results from our sample indicate that using both user and expert reviews may provide a good instrument to measure the perceived quality of a game.

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