

# The Age Rating Impact on Consumer Video Game Choices

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**Abstract:** This growing video game industry has a self-regulating board that provides age-appropriateness ratings for all games released. We look at the effects of these age ratings on game success. In particular, are consumers using these ratings when making purchase decisions, and if so, do consumers tend to prefer more family-friendly games or games that include mature content? In addition to age ratings, we explored various game attributes over the period of 2005-2013 to see what makes some games more appealing to consumers. We find that attributes such as game genre, quality, ESRB (Entertainment Software Ratings Board) age rating, console type, and whether the distributor is a member of the Entertainment Software Association all influence purchase decisions of consumers in the video game market. We also find that consumers tend to prefer games with an ESRB age rating of *M* (mature content) when purchasing games for XBOX and PlayStation consoles; however, consumers tend to prefer games with an *E* (appropriate for everyone) rating on the more family-friendly Nintendo console.

*Keywords:* video games, age rating, games, entertainment, Electronic Software Association, Electronic Software Ratings Board

*JEL Classification:* D00, L82, L25

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## 1. Introduction

Movie box office and music industry revenues regularly make big headlines and have been the focus of research across various disciplines, yet the revenues generated by these two industries are often dwarfed by another entertainment industry – the video game industry. The Take Two Interactive video game, *Grand Theft Auto V*, brought in \$1 billion in worldwide revenues in just three days, making it the most successful entertainment launch in history (Kain 2013). The second most successful entertainment launch was *Call of Duty: Black Ops 2*, another video game that brought in \$500 million in worldwide revenues on its first day (Their 2013). *Grand Theft Auto V* broke this record in September 2013 with \$800 million in worldwide revenues on the first day (Goldfarb 2013). Worldwide sales of *Grand Theft Auto* products have now topped \$2.5 billion (Ahmad 2016).

The video game industry is now a major player in the competition for consumer entertainment dollars. In 2010, revenues for the music industry reached \$6.9 billion, box office movie revenues were \$10.6 billion, and video game revenues were \$23 billion (Sieberg 2011). In 2011, US movie sales hit \$9.42 billion, while US gaming sales topped \$17 billion (Bronkhorst 2012). The revenues brought in by the video game industry are clearly substantial, yet with the exception of Chung (2005), no research to our knowledge has been done on individual game success or the age rating

impact on consumer game choices. Like movies, video games carry age-appropriateness ratings that may impact consumer choices.

With the video game industry predicted to be the fastest growing form of media over the next few years, questions of how various factors affect game revenues will become increasingly important (“Shoot ‘em up” 2011). As discussed in the next section, previous research has focused on the “console wars,” or competition between major players in the console market and business strategies for console producers. However, there is a clear lack of research on age rating impacts and other game attributes that are most appealing to consumers. Far from a fad, video games are growing in popularity and are even being used to train soldiers and surgeons (Rosser et al. 2007). Because of this gap in the empirical literature and the growing importance of video games as a consumer entertainment choice, we believe research in this area to be increasingly important.

## 2. Literature review

Perhaps because the video game industry is still relatively new, there is little previous work on the subject. The empirical research on the industry focuses almost exclusively on network effects and competition between game console producers such as Microsoft XBOX, Sony PlayStation, Nintendo Wii (see Gallagher and Park 2002; Williams 2002; Schilling 2003; Clements and Ohashi 2005; and Arakji and Lang 2007). Other authors have studied the relationships between game attributes and player usage. Kaimann, et al. (2018) studied data from individual game players and found that experience playing the game, player age, platform, and in-game variety such as character and vehicle options were all important factors in explaining the variation in duration of game play. Davis and Lang (2011) concluded that game genre can affect the relationship between self-efficacy and the purchase and usage of games.

Chung (2005) looks at monthly game revenues from 1995-2002 over seven different game consoles. He found that revenues were higher for games released during the holiday season (October – December), games with professional sports endorsements/licenses, and games with film tie-ins (e.g. *Lord of the Rings*). He also found that for a game competing with other similar games and the longer a game and console had been on the market, monthly revenues were lower. He found that whether a game was a sequel to previously released game was unrelated to revenues. He did not consider Entertainment Software Rating Board (ESRB) age ratings, likely because the ESRB was first founded in 1994 and game ratings did not become commonplace until the mid-2000s. Also, factors such as game genre, distributor, and quality were not included in this study.

Because of the lack of video game revenue literature, we used movie box office revenue literature as a reference. We believe strong parallels can be drawn between movie success and video game success. Consumer video game choices likely depend on similar qualities, such as genre, quality, sequels, age ratings, distributor, market penetration, and release date. Previous literature on movies revenues found that movie quality, genre, sequels, distributor/marketing, and the scope and timing of release were all positively related to box office revenues (Ellis & Conaway 2015; Jedidi et al. 1996; Litman 1983; Litman & Kohl 1989; Prag & Casavant 1994; Ravid 1999; Stimpert et al. 2008; Terry et al. 2004).

Findings on the impact of movie age ratings are mixed. Some authors found that the more restrictive Motion Picture Association of American (MPAA) age rating, *R*, was negatively related to revenues compared to less restrictive ratings, such as *PG* or *PG-13* (Ellis & Conaway 2015; Jedidi et al. 1996, Ravid 1999; Terry et al. 2004). Because there are similar age ratings for video games, one particularly interesting question is whether ESRB age ratings for games affect game revenues. It is not illegal in the U.S. to sell video games with *M* (Mature) or *AO* (Adults Only) ratings to minors. However, most retailers institute their own policies and refuse to rent or sell *M*-rated games to minors without permission from a parent or guardian (“ESRB, Retail Council”). Games with *AO* ratings are not carried by major retailers (Clayman 2007). Selling *AO* rated games can potentially tarnish a store’s family-friendly image and the *AO* rating suggests explicit content, which may deter some consumers from purchasing the game.

Like the MPAA ratings for movies, ESRB ratings for video games are voluntary. However, since its adoption in 1994, the ESRB ratings system has become standard practice for any major game developer wishing to release a game on a large scale. Below is a brief history and explanation of age ratings for video games.

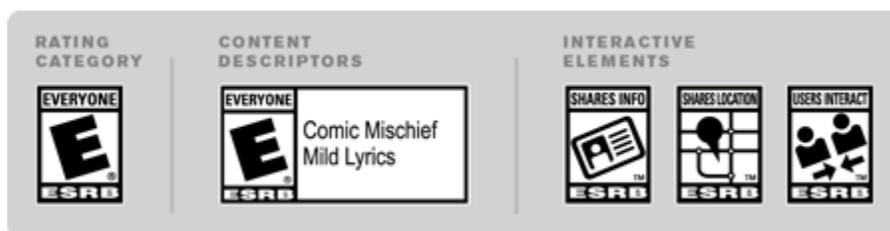
### 3. ESRB Age Ratings

The Entertainment Software Rating Board (ESRB) is a non-profit, self-regulated organization created in 1994 (“ESRB, FAQ”). The controversial release of video games such as *Mortal Kombat*, *Doom*, and *Night Trap* in the early 1990s prompted a Senate inquiry into video games and violence (Robinson, 2012). As a result of the inquiry, the video game industry was given one year to create a ratings system or face intervention by the federal government (“Sega Retro” 2014).

The rating system was formed after consulting with child development and academic experts, reviewing other rating systems, and conducting nationwide research on parental preferences. The ESRB scrutinizes video game content prior to its distribution and assigns a rating allowing parents to make more informed decisions on game purchases for their children. The ratings cover guidance regarding the age-appropriateness, content, and interactive elements of video games (“ESRB, FAQ”).

There are three parts to the ESRB ratings: rating categories, content descriptors, and interactive elements. The rating category suggests age-appropriateness of the game. The content descriptor indicates content which may have caused a particular rating and/or may be of interest or concern. The interactive element informs the consumer about interactive aspects of the game, including the users’ ability to interact with other users online, the sharing of user location with other users, or the sharing of personal information with third parties (“ESRB, Ratings”).

Figure 1 is an example of an ESRB rating that would be included on the outside of a video game case:

**Figure 1.**

Since 2005, there have been seven ratings categories (*EC*, *E*, *E10+*, *T*, *M*, *AO* and *RP*) the ESRB uses to suggest the age appropriateness of a game. The *RP* (Rating Pending) rating means a final ESRB rating has not yet been assigned (“ESRB, Ratings”). An *EC* (Early Childhood) rating indicates the content is intended for young children. An *E* (Everyone) rating suggests the content is generally suitable for all ages and may contain minimal cartoon, fantasy or mild violence, and/or infrequent use of mild language. An *E10+* (Everyone ages 10 and up) rating reflects that content is generally suitable for ages 10 and up and may contain more cartoon, fantasy or mild violence, mild language and/or minimal suggestive themes. A rating of *T* (Teen) implies the content is generally suitable for ages 13 and up and may contain violence, suggestive themes, crude humor, minimal blood, simulated gambling, and/or infrequent use of strong language. A rating of *M* (Mature) indicates the content is generally suitable for ages 17 and up and may contain intense violence, blood and gore, sexual content, and/or strong language.

An *AO* (Adults Only) rating suggests the content is suitable for adults ages 18 and up and may include prolonged scenes of intense violence, graphic sexual content and/or gambling with real currency. There are very few games rated *AO* and most of those received the rating due to pornographic content. When a game is rated *AO*, major retailers refuse to sell the games and Nintendo refuses to allow *AO* games to be released for any of its consoles. Critics have called the *AO* rating the “kiss of death” as it assures a lack of access and marketing to consumers (Clayman 2007).

While not a perfect comparison, video game age ratings can be thought of as similar to movie age ratings in the following way:

<b>ESRB Video Game Age Rating</b>	<b>MPAA Movie Age Rating</b>
<i>E</i> (everyone)	<i>G</i> (general audience)
<i>E10+</i> (everyone ages 10 and up)	<i>PG</i> (parental guidance suggested)
<i>T</i> (teen)	<i>PG-13</i> (parental guidance suggested for those under age 13)
<i>M</i> (mature)	<i>R</i> (restricted for those under 17 unless accompanied by a parent or guardian)
<i>AO</i> (adults only)	<i>NC-17</i> (no one age 17 or under admitted)

With 99% of boys and 94% of girls saying they play video games, the ESRB rating system allows parents to make more informed decisions about which video games are appropriate for their children (Lenhart et al. 2008). It is widely adopted by gaming platforms and publishers, and is supported by retailers (“ESRB, Ratings”). The ratings system is also a signal to adult players who are looking for more adult content in games. We believe these ratings signals play a potentially important role in determining consumer game choices.

#### 4. Model

The following model was estimated for video game  $i$  for console  $x$  in year  $t$ :

$$Y_{ixt} = \beta_0 + \beta X + \delta \Sigma + \varepsilon_{it}$$

Where,

$Y_{xit}$	=	revenues for video game $i$ for console $x$ in year $t$
$X$	=	a vector of dummy variables for ESRB age rating for game $i$ ( $E$ , $E10+$ , $T$ , and $M$ )
$\Sigma$	=	a vector of video game characteristics for game $i$ for console $x$ in year $t$ ( <i>console type, quality, ESA distributor, genre, sequel, movie tie-in, sports license, fall release date, weeks on market, competition</i> )
$\varepsilon_{xit}$	=	error term

See Table 1 for a complete description of variables and expected signs.

The dependent variable is a measure of the revenue earned in the U.S. market by an individual video game in a single year for a specific console (e.g. revenues earned by the XBOX360 version of *Grand Theft Auto 4* in the year 2008 in the U.S.). Since some games are only released for one console, games were distinguished by console type. For example, games created by Nintendo are only released for Nintendo consoles. Other games were released exclusively for PlayStation or XBOX consoles, while others were released for both. Some games were released for all three console types.

Vector  $X$  in the above equation includes dummy variables for the ESRB rating for the game ( $E$ ,  $E10+$ ,  $T$  and  $M$ ). None of the games in our data set were rated  $AO$  or  $EC$ . Vector  $\Sigma$  in the above equation includes various game characteristics. *Console type* is also a dummy variable indicating the type of console the game was released on – XBOX, PlayStation, or Nintendo. *Quality* is a measure of game quality.

Game distributors were placed into two categories – members of the Entertainment Software Association (ESA) and non-members. The ESA includes all of the industry leaders – Nintendo, Microsoft, Sony, and Electronic Arts. The association engages in lobbying activities and sponsors the largest annual global computer and video game trade show, the E3 (Electronic Entertainment Expo) conference. ESA members are given priority in selecting floor space, press conference times, and other preferential treatment at this conference, allowing them to better market their games to consumers.<sup>1</sup>

Non-ESA members are comprised of much smaller game distributors that have less access to capital for marketing games, paying for top game developers, and other factors that likely impact game success. Therefore, we expect games released through ESA member distributors to have higher revenues compared to games released through non-member distributors. The variable *ESA member distributor* is equal to 1 if the distributor was an ESA member and 0 otherwise.

Game genre was measured using a dummy variable for each genre. The six genre categories used were, First Person Shooter (FPS), Group Play/Music, Simulation/Platform, Sports/Fighting/Racing, Puzzle/Miscellaneous, and the omitted genre category, Action/Adventure/Role Playing (RPG)/Strategy. Dummy variables were also used to measure whether the game was a sequel to a previous game (e.g. *Grand Theft Auto 4*), whether the game was had a film tie-in (e.g. *Spider Man 3*) and whether the game was licensed by a professional sport (e.g. *Tiger Woods PGA Tour* or *NBA 2K12*).

Games were coded as being a sequel if it had the same name as a previous game (e.g. *Call of Duty: Modern Warfare* and *Call of Duty: Black Ops*) or if the game was based in large part on characters from previous games (e.g. if the game included Super Mario characters). For games with film tie-ins, the game was only coded as being tied to a film if the film came out before the game (e.g. if the game was based on characters in the film). The game was not recorded as having a film tie-in if the film came out after the game (e.g. the movie *Silent Hill* was based on the video game). The data were coded this way to capture the effect of film popularity on consumer game choices.

*Fall Release* is a dummy variable that was given a 1 if the game's release date was during the months of September, October or November. Games released during any other month were given a 0. Because playing video games usually requires being indoors, people begin to spend less time outside and on vacation during the fall compared to the summer months. Also, games released during the fall are likely to have higher holiday sales as players begin to see which games have good reviews before deciding which games to buy and play over the Thanksgiving/Christmas holidays. The E3 conference has taken place each summer since 1995, and is the largest gaming conference in North America ("A Brief History of E3" 2013). Here, new games are announced and available for play demonstrations, and awards are given to the best new upcoming games. New games are marketed starting with this conference and release dates are announced. Gamers can begin pre-ordering games that are expected to have a large demand on the release date (Pereira 2016).

The variable *Weeks on Sale* measures the number of weeks the game has been on the market at the time of the observation. Lifetime sales of the game will certainly increase the longer a game has been on the market, but the yearly sales likely fall over time. We expect that on average that the longer a game has been on the market, the lower the yearly sales will be.

*Competition* is a variable that captures some of the competition faced by games from other games released for the same console. It is the number of top 100 games that were released during the same year and for the same console as the observed game. While not perfect, this measure should control for some of the lost revenues due to competition from other games released around the same time for the same console. Table 1 includes the definitions of all variables used and their expected signs.

## 5. Data and Empirical Results

We used yearly data on the domestic sales of the top 100 games over the years 2005-2013 for a total of 900 observations. This time period includes ratings under the current ESRB ratings system. From the original 900 observations, we had to drop 28 observations for games that did not have a reported quality measure. We also dropped 9 observations for games that were made for the computer, rather than a gaming console. We also dropped 2 observations for games that were only released in a bundle with another game. Dropping these observations resulted in 861 total observations. A random sample of games would be ideal; however, unit sales data were only available for the 100 top selling games each year. The study only uses U.S. data because the ESRB ratings are not ubiquitous on an international scale; they are primarily used in the US and Canada.

Revenue data on each game were not available, so estimates of revenues by game, year, and console were derived using unit sales data published on VG Chartz ([www.vgchartz.com](http://www.vgchartz.com)) and unpublished price data provided by Price Charting (<http://videogames.pricecharting.com>). VG Chartz publishes unit retail sales estimates of each game by year and console type for both domestic and foreign markets. PriceCharting.com maintains data on game prices, including the manufacturer's suggested retail price (MSRP) for games by console. Yearly sales data were collected from VG Chartz, and the MSRP for each game by year was provided by Price Charting.

We used the unit retail sales and MSRP data to estimate revenues by game, console, and year. For example, we know 3.64 million copies of *Grand Theft Auto 4* for the XBOX 360 sold in the U.S. for the year 2008. We also know the MSRP for *Grand Theft Auto 4* for the XBOX 360 in the year 2008 was \$59.99. From these numbers we calculated an estimate of the revenues earned by *Grand Theft Auto 4* for the XBOX 360 in the year 2008 at just over \$218 million. We did the same thing for *Grand Theft Auto 4* for the PlayStation 3 in 2008, when unit sales were just over 2 million and the MSRP was \$49.99, resulting in revenues of \$100 million. We did the same for each game by console and year. All revenue estimates were adjusted for inflation to 2013 dollars. While many gamers do not pay MSRP for games, no reported revenue data by game, year, and console are available at this time.

ESRB ratings data are provided for each game at [www.esrb.com](http://www.esrb.com). The Metacritic website (<http://www.metacritic.com/game>) provides release dates and average critical review scores from professional game reviewers that receive advanced copies of games on which to base their reviews. Game quality was measured using the critic Metascore from Metacritic. These Metascores range from 0-100 and are based on at least four professional critic reviews of the game; scores are published prior to the game's release.<sup>2</sup> Metacritic also provides data on the developer of the game, whether the game is a sequel, whether the game is licensed by a major sport, and whether the game is tied in with a film. Game genre was determined by using the reported genres for each game, which can be found on the websites for Metacritic and VG Chartz. Examples of games included in each genre category are provided in Table 6. Table 2 provides summary statistics for all the data used.

## 5.1 Full sample results

Regression results are included in Table 3. Model (1) does not account for year fixed effects; for a robustness check, model (2) does include year fixed effects. Year fixed effects were considered particularly since the time period studied covers pre, during, and post-recession periods in the U.S. Compared to *M* rated games, other ratings categories tend to have lower revenues. Games rated *E* make \$13 million less, games rated *E10+* make between \$24 million and \$27 million less, and games rated *T* make between \$23 million and \$30 million less compared to games with an *M* rating.

From the results we can infer that games with an *M* rating are most successful on average, followed by games with *E* ratings, and then *E10+* and *T* rated games. None of the games in our data set were rated *Early Childhood (EC)* or *Adults Only (AO)*. Since our data set only included the top 100 selling games for each year we can make the assumption that all other ratings (*E*, *E10+*, *T* and *M*) tend to be more successful than games with *EC* or *AO* ratings.

This result is not completely surprising when the average age of gamers is considered. According to the ESA, the average age of game players is 31 and 71% of gamers are over the age of 18, the recommended age for *M* rated games. Most gamers are likely interested in games for themselves that include more adult content (e.g. violent fighting scenes). In addition, since 39% of gamers are 36 years old and over, many gamers likely have children and will purchase both *M*- rated games for themselves as well as *E*-rated games that the whole family can play (“ESA Essential Facts” 2014). There is a much smaller population of gamers that fall between 10 and 17 years old where *E10+* or *T* rated games may be most appealing. The same is true for *EC* rated games; few small children play video games as a percentage of the gamer population. Games with *AO* ratings may appeal to a smaller population of adults compared to *M* rated games, and major retailers are unwilling to carry these games.

The results for console types show that during the time period studied games released for XBOX or Nintendo consoles had higher revenues on average than games released for PlayStation consoles. Compared to PlayStation games, XBOX games made between \$13 million and \$19 million more, and Nintendo games made about \$32 million to \$34 million more. It should be noted that due to the years covered in the data (2005 – 2013) there are fewer XBOX One and PlayStation 4 (PS4) games because these consoles were both released in November 2013. Wii U games also have relatively few observations since the Wii U was released in November 2012.

The sales of the newest generation consoles (XBOX One, PS4 and Wii U) are likely to lead to different results in the future. Of the newest generation of consoles, the PS4 currently has the highest unit sales, followed by the XBOX One, then the Wii U (“Yearly Hardware Comparisons - USA” 2016). Given this change in sales rankings for consoles, PlayStation games are likely to be more successful in the future, followed by XBOX games, then Nintendo games.

Our results also show that games released through an Electronic Software Association (ESA) member distributor tend to make about \$12 million to \$15.5 million more than games released through non-ESA member distributors. This coefficient is also picking up the differences in marketing expenditures between ESA and non-ESA members. ESA members include the top distributors with access to more capital to market games to the public. Compared to the omitted

*Action/Adventure/Strategy* game genre, *Music/Group Play* games, *Sports/Fighting/Racing* games, and *First-person Shooter* games are much more successful.

When accounting for year fixed effects in model (2), the coefficient for *Weeks on Sale* shows that for each additional week the game has been on sale, the revenues earned that year are lower by \$14,000. The coefficient for *Fall Release* date was statistically insignificant in all models using the full data sample.

The results show that an extra point on the average Metascore given by professional critics translates into roughly \$1M more in revenues for a game, and sequels tend to make about \$12 million less compared to original games. This result was surprising considering the prevalence of sequels for successful games such as *Madden NFL*, *Call of Duty* and *Assassin's Creed*. There are likely economies of scale when creating sequels compared to original games, which could explain some of the high prevalence of sequels. It should also be noted that 79% of our sample were sequels (direct sequels or games using previously well-known characters from previous games). This should say something about the success of sequels overall since our sample includes only the top 100 selling games for each year. Sequels may not make as much in revenues as original games, but they also likely result in economies of scale.

The coefficient on *Film Tie-ins* was insignificant. Games that were licensed by professional sports made about \$22-24 million less than games not licensed by professional sports; however, this variable was correlated with the *Sports/Fighting/Racing* variable. The coefficient for *Competition* was significant, but the sign was inconsistent across the models with and without year fixed effects.

## 5.2 Sub-sample results

The above results imply that games rated *M* for mature tend to be more successful than games with lower age ratings; however, this may not be the case for all consoles. For example, when our sample is broken down into sub-samples by console, nearly 75% of games released for Nintendo consoles are rated *E* and less than 1% are rated *M*. For the XBOX and PlayStation, 48% and 38% were rated *M*, respectively. This implies that Nintendo may be targeting a different gaming population compared to XBOX and PlayStation. In fact, Nintendo has tried to cultivate an image as the most family-friendly console on the market (Whitehead 2013).

To account for this difference between consoles, the data were broken into sub-samples by console. The empirical results for these sub-samples are provided in Tables 4 and 5. Table 5 includes year fixed effects for a robustness check. As suspected, games released for Nintendo consoles that are rated *E* tend to be more successful than games with other ratings released for Nintendo. For XBOX, games with *E10+* and *T* ratings perform worse compared to games with *M* ratings. For PlayStation, games with *E* and *E10+* perform worse compared to games with *M* ratings. These results indicate that XBOX and PlayStation were driving the outcomes on age ratings in the full sample results, and that consumer game choices are influenced differently by age ratings depending on the console type.

In addition to differing results for ESRB ratings, there results for genre and sequels are different between the three console types. For game released on Nintendo consoles, *Music/group play*

games and *Sports/Fighting/Racing* games are most successful. For XBOX, *Puzzle* and *First-person Shooter* games are most successful, and for PlayStation, all genre categories are insignificant. Sequels tend to do worse when released for Nintendo consoles, but better when released for XBOX consoles; the coefficient on sequels is insignificant for PlayStation games. Finally, a fall release date was associated with almost \$10 million in extra revenues for XBOX games, but was insignificant for Nintendo and PlayStation games.

## 6. Conclusions

The findings in our research add to the literature on an increasingly popular form of entertainment media where little research has been done. Games rated *M* (mature) were more successful on average than games with lower ESRB age ratings when they were released for XBOX and PlayStation consoles. Games with *E* (everyone) ratings were most successful when released for Nintendo consoles. These findings differ from the literature on movie age ratings, which tends to find *R*-rated movies do worse than movies rated *PG-13*.

This paper faces several limitations. There is no way to account for all the competition faced by a particular video game and our measure is not perfect. Many games have downloadable content, many games are sold as used for much lower prices, and many games include better online play features than others. There is also an increasing level of competition from smartphone and tablet games. These are things we could not control for in our study due to a lack of data. Also, our sample is not random due to data limitations, which skews our results towards games that are already relatively successful. In addition, our measure of individual game revenue is just an estimate, and our results would be more precise if we had exact revenue data.

Future research in this area is still very much needed. Games for smartphones have become increasingly popular, making this a new area ripe for research. Also, according to the 2014 ESA report, the top selling personal computer games were mostly rated *T* rather than *M* (ESA 2014). It would be interesting to see what similarities and differences there are between traditional console games and games for personal computers. This growing industry provides an endless number of new consumer research questions that have yet to be answered.

## Endnotes

1. More about the perks for ESA members can be found here: <http://www.theesa.com/become-a-member/index.asp>.
2. More about how Metascores are calculated can be found here <http://www.metacritic.com/about-metascores>.

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## Acknowledgements

The authors gratefully acknowledge generous support from the J. Whitney Bunting College of Business and data contributions from PriceCharting.com.

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**Table 1. Variable Definitions and Expected Signs**

<b>Variable</b>	<b>Definition</b>	<b>Expected Sign</b>
Yearly revenues	Unit sales of game <i>i</i> for console <i>x</i> in year <i>t</i> multiplied by the MSRP for game <i>i</i> for console <i>x</i> in year <i>t</i> (in 2013 dollars)	<i>Dependent variable</i>
ESRB Rating	Dummy variables denoting ESRB rating of each game	
<i>E</i>	= 1 if rated E (everyone); 0 otherwise	(+/-)
<i>E10+</i>	= 1 if rated <i>E10+</i> (everyone 10 and up); 0 otherwise	(+/-)
<i>T</i>	= 1 if rated <i>T</i> (teen); 0 otherwise	(+/-)
<i>M</i>	= 1 if rated <i>M</i> (mature); 0 otherwise	(+/-)
Console Type	Dummy variables denoting the console type for which the game was released	
<i>XBOX</i>	= 1 if game was an XBOX 360 or XBOX One game; 0 otherwise	(+/-)
<i>PlayStation</i>	= 1 if game was a PlayStation game (PSP, PS2, PS3 or PS4); 0 otherwise	(+/-)
<i>Nintendo</i>	= 1 if game was a Nintendo game (DS, 3DS, Wii or Wii U); 0 otherwise	(+/-)
Critic Score	Metacritic professional critic score (ranges 0 – 100)	(+)
ESA Member Distributor	Dummy variable = 1 if the game distributor is a member of the ESA (Entertainment Software Association); 0 otherwise	(+)
Genre	Dummy variables denoting genre of each game	
<i>Action/Adv/RPG/Strategy</i>	= 1 if game is under the genre action, adventure, role playing game (RPG), or strategy; 0 otherwise	(+/-)
<i>Shooter</i>	= 1 if game is a first-person shooter (FPS) game; 0 otherwise	(+/-)
<i>Group Play/music</i>	= 1 if game is a group play game (party/music/dancing games); 0 otherwise	(+/-)
<i>Simulation/platform</i>	= 1 if game is a simulation or platform game; 0 otherwise	(+/-)
<i>Sports/Fighting/Racing</i>	= 1 if game is sports, fighting, or racing genre; 0 otherwise	(+/-)
<i>Puzzle/Misc.</i>	= 1 if game is a puzzle game or categorized as miscellaneous; 0 otherwise (omitted genre category)	(+/-)
Sequel	Dummy variable = 1 if game is a sequel to a previously released game; 0 otherwise	(+/-)
Movie tie-in	Dummy variable = 1 if game is based on a previously released movie (or, characters from a movie); 0 otherwise	(+)
Professional sports license	Dummy variable = 1 if game is licensed by a professional sport; 0 otherwise	(+)
Fall release	Dummy variable = 1 if game was released during the fall (September, October, November); 0 otherwise	(+)
Weeks on market	Number of weeks the game has been on the market	(-)
Competition	Number of top 100 games released during the same year for the same console	(-)

**Table 2. Summary Statistics**

<b>Variable (N = 861) 2005 – 2013</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
Yearly revenues in millions (2013 dollars)	48.52	60.65	1.96	583.62
E (everyone)	0.44	0.50	0	1
E 10+ (everyone 10+)	0.12	0.33	0	1
T (teen)	0.17	0.37	0	1
M (mature)	0.28	0.45	0	1
PlayStation	0.28	0.45	0	1
XBOX	0.34	0.48	0	1
Nintendo	0.38	0.48	0	1
ESA Member	0.87	0.34	0	1
Action/Adv/RPG/Strategy	0.30	0.46	0	1
First Person Shooter	0.17	0.38	0	1
Music/Group Play	0.07	0.25	0	1
Simulation/Platform	0.13	0.33	0	1
Sports/Fighting/Racing	0.30	0.46	0	1
Puzzle/Misc.	0.04	0.21	0	1
Weeks on Sale	47.69	53.41	2	372
Fall Release Date	0.56	0.50	0	1
Critic Score (Metascore)	79.83	11.17	25	98
Sequel	0.79	0.41	0	1
Film tie-in	0.08	0.27	0	1
Pro-Sports License	0.11	0.31	0	1
Competition	21.63	11.06	2	49

**Table 3. Estimation Results for Full Sample (N = 861)**

<b>Yearly Revenues in millions (2013 dollars)</b>	<b>(1)</b>	<b>(2)</b>
E (everyone)	-13.17* (6.83)	-9.02 (6.71)
E10+ (everyone 10+)	-27.32*** (6.37)	-24.30*** (6.15)
T (teen)	-30.05*** (5.24)	-22.89*** (5.01)
XBOX	18.99*** (3.74)	13.40*** (3.66)
Nintendo	31.99*** (5.89)	33.68*** (5.70)
ESA member	12.17*** (3.43)	15.49*** (3.48)
Puzzle/Misc.	-5.607 (7.669)	-4.329 (7.263)
First person shooter	16.40*** (6.303)	16.69*** (6.112)
Music/group play	39.52*** (9.099)	28.04*** (8.973)
Simulation/Platform	-2.078 (5.962)	0.258 (5.977)
Sports/Fighting/Racing	29.20*** (7.909)	28.82*** (7.542)
Weeks on sale	-0.07 (0.04)	-0.14*** (0.05)
Fall Release	4.04 (3.89)	5.45 (3.79)
Critic score	1.18*** (0.16)	0.93*** (0.15)
Sequel	-12.13* (6.36)	-11.29* (6.15)
Film tie-in	1.53 (4.80)	3.25 (4.40)
Pro-sports license	-23.89*** (5.83)	-21.60*** (5.72)
Competition	-0.31** (0.14)	0.42** (0.17)
Constant	-54.34*** (13.54)	-88.31*** (14.36)
<i>Year Fixed Effects</i>	<i>No</i>	<i>Yes</i>
<i>F-stat</i>	9.03	10.64
<i>R<sup>2</sup></i>	0.15	0.21

**Notes:** \*\*\* significant at 1%; \*\* significant at 5%; \* significant at 10%; Robust standard errors in parentheses

**Table 4. Estimation Results for Console Sub-samples (without year fixed effects)**

Yearly Revenues in millions (2013 dollars)	(3) Nintendo (N= 323)	(4) XBOX (N=296)	(5) PlayStation (N=242)	(6) XBOX + PlayStation (N=538)
E (everyone)	18.86* (9.975)	-5.594 (10.85)	-9.881* (5.720)	-5.254 (5.840)
E10+ (everyone 10+)	11.98 (9.397)	-23.44** (11.23)	-10.10* (5.641)	-15.36** (6.181)
T (teen)	-2.501 (8.909)	-29.63*** (7.352)	-6.554 (4.693)	-16.53*** (4.443)
XBOX				20.67*** (3.549)
ESA member	0.105 (7.166)	3.532 (7.210)	9.972*** (3.832)	8.200** (4.155)
Puzzle/Misc.	-8.364 (9.525)	74.43*** (18.34)	-2.025 (6.513)	36.61*** (13.83)
First person shooter	14.54 (11.99)	19.96* (10.33)	7.845 (7.070)	14.09** (6.542)
Music/group play	57.87*** (13.42)	13.42 (10.46)	-4.113 (7.397)	5.268 (6.805)
Simulation/Platform	10.94 (8.515)	4.270 (12.25)	2.906 (5.776)	4.354 (6.704)
Sports/Fighting/Racing	72.71*** (16.25)	1.542 (8.954)	0.0260 (4.241)	-3.211 (4.825)
Weeks on sale	-0.0759 (0.0563)	-0.446*** (0.0961)	-0.177*** (0.0524)	-0.304*** (0.0556)
Fall Release	-3.744 (7.799)	8.109 (5.894)	1.393 (3.360)	4.833 (3.341)
Critic score	1.381*** (0.276)	1.503*** (0.413)	0.963*** (0.213)	1.302*** (0.228)
Sequel	-33.66*** (12.91)	16.28** (6.741)	1.585 (4.122)	10.37** (4.317)
Film tie-in	-9.484 (8.927)	15.45 (10.33)	-2.150 (4.192)	2.488 (5.292)
Pro-sports license	-81.39*** (14.93)	-13.12 (8.943)	2.030 (4.274)	-5.837 (4.571)
Competition	-1.215*** (0.349)	0.910* (0.484)	-0.195** (0.0977)	0.0687 (0.127)
Constant	-35.95 (25.81)	-92.90*** (32.85)	-43.08** (16.86)	-78.05*** (20.13)
<i>Year Fixed Effects</i>	<i>No</i>	<i>No</i>	<i>No</i>	<i>No</i>
<i>F-stat</i>	<i>5.36</i>	<i>3.67</i>	<i>7.29</i>	<i>6.50</i>
<i>R<sup>2</sup></i>	<i>0.25</i>	<i>0.22</i>	<i>0.24</i>	<i>0.23</i>

**Notes:** \*\*\* significant at 1%; \*\* significant at 5%; \* significant at 10%; Robust standard errors in parentheses

**Table 5. Estimation Results for Console Sub-samples (with year fixed effects)**

Yearly Revenues in millions (2013 dollars)	(3) Nintendo (N= 323)	(4) XBOX (N=296)	(5) PlayStation (N=242)	(6) XBOX + PlayStation (N=538)
E (everyone)	30.92*** (11.61)	-4.157 (10.75)	-8.851 (6.125)	-4.214 (5.727)
E10+ (everyone 10+)	22.99** (11.36)	-16.74 (10.77)	-10.55* (6.049)	-12.71** (6.033)
T (teen)	9.050 (9.944)	-18.13** (7.010)	-5.932 (4.164)	-11.28*** (4.013)
XBOX				14.67*** (3.418)
ESA member	8.910 (7.720)	7.339 (6.589)	8.109** (4.080)	9.249** (3.896)
Puzzle/Misc.	-14.41 (10.40)	64.38*** (18.24)	7.050 (6.146)	36.39*** (10.49)
First person shooter	7.084 (12.31)	19.54* (10.01)	7.115 (6.726)	14.76** (6.358)
Music/group play	43.41*** (13.39)	-1.344 (10.33)	-6.154 (8.763)	-2.958 (7.111)
Simulation/Platform	8.418 (8.781)	1.215 (14.59)	6.707 (5.869)	4.789 (6.881)
Sports/Fighting/Racing	66.61*** (15.86)	-2.044 (8.157)	1.379 (4.371)	-2.024 (4.476)
Weeks on sale	-0.103 (0.0671)	-0.489*** (0.103)	-0.216*** (0.0592)	-0.350*** (0.0583)
Fall Release	-2.453 (7.376)	9.712* (5.837)	0.724 (3.293)	5.942* (3.189)
Critic score	1.265*** (0.261)	1.374*** (0.424)	0.642** (0.255)	0.972*** (0.233)
Sequel	-30.10** (12.28)	13.97** (6.423)	2.187 (4.251)	10.60** (4.111)
Film tie-in	-9.933 (9.339)	11.13 (9.638)	1.536 (3.865)	2.920 (4.872)
Pro-sports license	-83.40*** (15.73)	-4.800 (9.002)	2.378 (4.404)	-2.809 (4.536)
Competition	-0.908 (0.595)	0.273 (0.527)	0.462*** (0.152)	0.731*** (0.139)
Constant	-72.85** (30.74)	-118.9*** (34.20)	-57.13*** (20.49)	-100.2*** (20.37)
<i>Year Fixed Effects</i>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>	<b>Yes</b>
<i>F-stat</i>	4.29	5.39	9.86	10.14
<i>R<sup>2</sup></i>	0.30	0.27	0.30	0.29

**Notes:** \*\*\* significant at 1%; \*\* significant at 5%; \* significant at 10%; Robust standard errors in parentheses

**Table 6. Example games included in each genre category**

<b>Action/Adv/RPG /Strategy</b>	<b>First-person Shooter</b>	<b>Group play/Music</b>	<b>Simulation /Platform</b>	<b>Sports/Fighting/ Racing</b>	<b>Puzzle/ Misc.</b>
Fable	Battlefield	Guitar Hero	Nintendogs	Madden NFL	Brain Age
Final Fantasy	Call of Duty	Just Dance	Super Mario	Mario Kart	Big Brain Academy
Grand Theft Auto	Gears of War	Mario Party	Cooking Mama	FIFA Soccer	Tetris