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# Does Sex Sell? A Look at the Effects of Sex and Violence on Motion Picture Revenues

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## **Abstract**

The Motion Picture Association of America (MPAA) is responsible for assigning all movies one of five movie ratings (G, PG, PG-13, R, NC-17). Previous research has found that G and PG-rated movies perform better at the box office, yet movie studios continue to make more PG-13 and R-rated movies. Other research has used data on a film's levels of sex, violence and profanity (SVP), to explore the link between SVP, movie rating, and box office revenues. In this paper, we use a more recent data set and include additional variables to account for movie quality to further explore this relationship. We investigate the issue of how the amount of SVP has changed in the last fifteen years. We also use theater-level data for a major Midwestern theater chain to extend our analysis beyond total box office revenues, examining the effects on revenues in four ticket categories: adult, child, senior citizen, and student. Finally, we explore the difference between foreign and domestic box office responses to SVP levels and suggest that there is a justifiable reason why movie studios continue to produce far more PG-13 and R movies than G and PG movies.

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<sup>1</sup> This is a preliminary draft and the authors welcome any comments the reader may have. Authors can be reached at lang@csus.edu and dmswitzer@stcloudstate.edu.

# 1. Introduction

As economists, we assume that firms engage in behavior that is, if not profit-maximizing, at least guided by some notion of efficiency. However, sometimes the decisions made by firms appear to contradict our behavioral assumptions. Economists and other social scientists studying the motion picture industry have noted a few recent trends and have had some difficulty explaining them. For example, despite the fact that some research has shown that R-rated movies are less profitable, movie studios continue to make more of them than movies of any other rating. Ravid and Basuroy (2004) address this issue and conclude that movie studio behavior is consistent with revenue-maximization and risk aversion more than with profit-maximization. But is there another explanation for the so-called “R-rating puzzle?”

Those studying the motion picture industry have noted that in the last few decades, it appears that the level of sexual content, violence and profanity has increased. Thompson and Yokota (2004) analyze movies from 1992 to 2003 and find that the total level of sex, violence and profanity (SVP) has followed an upward trend. Assuming that motion picture studios are maximizing profits (or at least revenues), if we witness an increase in SVP levels, we might expect this phenomenon to have a positive effect on box office revenues. Ravid and Basuroy find that violence levels in movies have a significant positive effect on box office revenues. We follow up on these two papers, using a more recent data set and including additional variables for movie quality, to determine the effect of sex, violence and profanity on box office revenues. We examine the effect on movies of different MPAA ratings, since one might find higher sexual content more objectionable in a PG-rated movie than in an R-rated movie. We then use ticket sales data from a major theater chain in St. Louis, Missouri, to provide a breakdown of ticket sales by different groups of consumers (adult, child, senior citizen, student) and investigate how sex, violence and profanity affect the revenue generated from these four groups. Finally, we investigate the effect of sex, violence and profanity on foreign box office, which has recently been having an increasingly large effect on overall motion picture revenues.

To summarize some of the paper’s findings, we show that the overall level of SVP does not appear to have a significant impact on a movie’s revenues, but examining the individual levels leads to a different conclusion: violence has a positive effect on revenues, while profanity has a negative effect, especially when one considers foreign box office. When separating movies by MPAA rating, we find that a movie’s violent content has the most consistent positive impact on box office revenues. We find that sex does in fact sell, resulting in higher box office sales to adults and students. Finally, we find that movies rated R and PG-13 sell much better to international audiences, which helps explain why movie studios continue to produce much more of them than PG and G movies.

The paper is organized as follows: section 2 describes recent trends in the motion picture industry and reviews some of the existing literature relevant to our research; section 3 explains the data sources and describes the model to be estimated; section 4 describes the

results of the model estimation and discusses the implications for the motion picture industry; section 5 concludes the paper with extensions for future work.

## 2. Literature Review and Recent Trends in the Motion Picture Industry

In order to put our research in perspective, it is important to have at least a cursory knowledge of recent trends in the motion picture industry. In this section of the paper, we discuss the changing content of movies, the changing composition of movie releases, the composition of revenues (domestic vs. foreign), and the rise of DVD sales. We then discuss related research and how this paper helps explain movie studio behavior that might otherwise seem inefficient.

### 2.1. Movie Content

The Motion Picture Association of America assigns theatrical releases with one of 5 ratings: G, PG, PG-13, R, and NC-17<sup>2</sup>. The MPAA evaluates each movie and specifies a variety of rating reasons, meant to inform consumers about why a movie received the rating it did. For example, a movie may be rated PG for content such as “language,” “innuendo,” and “mild violence.” A movie may be rated R for “excessive profanity,” “drug use,” “nudity,” etc. In recent years, to combat the insufficiencies of the rating system, a variety of services have arisen to help provide more complete information. Kids-in-Mind, for example, in operation since 1992, provides ratings from 0-10 for sex, violence and profanity for all of the movies it reviews, which is the vast majority (90-95%) of movies given an MPAA rating. In this paper, we refer to the individual ratings as well as the total. Individual ratings are indicated by a simple abbreviation (Sex =  $S$ , Violence =  $V$ , Profanity =  $P$ ), while the total of all three ratings is abbreviated  $SVP$ . Kids-in-Mind also provides a detailed description of every incidence of sex, violence, profanity and other possibly objectionable material (negative religious references, drug use, etc.) in a movie, so anyone who wishes to do so can see exactly why a movie was given a particular score. Screen It! is a similar service, but it assigns descriptive ratings to movies along 15 different dimensions<sup>3</sup>. While Kids-in-Mind is a free service (kids-in-mind.com), Screen It! (screenit.com) charges \$24.95 for a one-year subscription.

Thompson and Yokota (2004) analyze a phenomenon known as “ratings creep,” a perceived decreased stringency of rating criteria by the MPAA, where the average sex,

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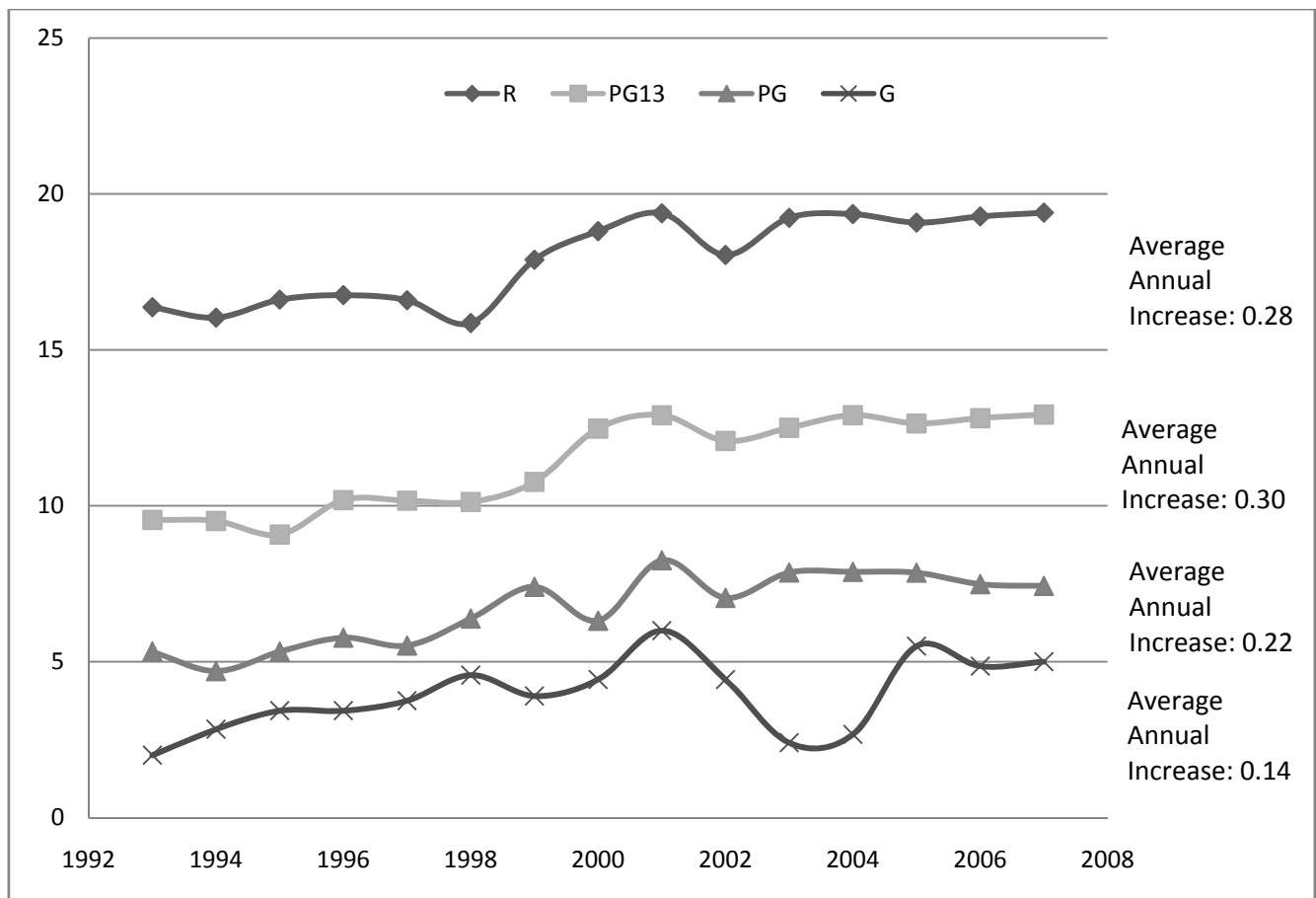
<sup>2</sup> A rating of G indicates that the movie is for general audiences. PG means that parental guidance is suggested. PG-13 means that some material may be inappropriate for children under the age of 13. R is restricted to those 17 years of age or older or those in the company of such people. NC-17 means that those 17 years of age or less are not allowed to view the material.

<sup>3</sup> Screen It! categories are: Alcohol/Drugs, Blood/Gore, Disrespectful/Bad Attitude, Frightening/Tense Scenes, Guns/Weapons, Imitative Behavior, Jump Scenes, Scary/Tense Music, Inappropriate Music, Profanity, Sex/Nudity, Smoking, Tense Family Scenes, Topics to Talk About, Violence. Ratings for these categories are: none, minor, mild, moderate, heavy, and extreme.

violence and profanity levels in movies of a given MPAA rating have increased over time. Their research takes scores assigned by Kids-in-Mind and Screen It! and tries to correlate them to the MPAA rating received by each movie and the MPAA rating reason. They find that the total *SVP* rating from Kids-in-Mind is positively correlated with time, which indicates that “ratings creep” is in fact occurring. They also find a very high degree of correlation between the ratings assigned by Screen It! and the scores assigned by Kids-in-Mind; as such, we focus solely on the Kids-in-Mind ratings since they are easier to include in regression analysis.

If one examines the average *SVP* rating for each different MPAA rating category, one finds a significant upward trend. Figure 2.1-1 below shows the average *SVP* rating for movies, by MPAA Rating, from 1993 to 2007. There appears to be a slight dip after 2001, as many movies reduced their violence levels in the wake of September 11, 2001. Since that time, those levels have returned and the upward path has continued. On average, in the last 15 years, the total *SVP* rating has increased by approximately 0.25 points per year.

Figure 2.1-1: Average *SVP* Rating by MPAA Rating, 1993-2007



It is also useful to example how sex, violence and profanity levels have each been changing over time. Figures 2.1-2 through 2.1-5 below show the average levels of *S*, *V*, and *P* for each MPAA rating category.

Figure 2.1-2: Average Sex, Violence and Profanity Ratings for R-rated Movies, 1993-2007

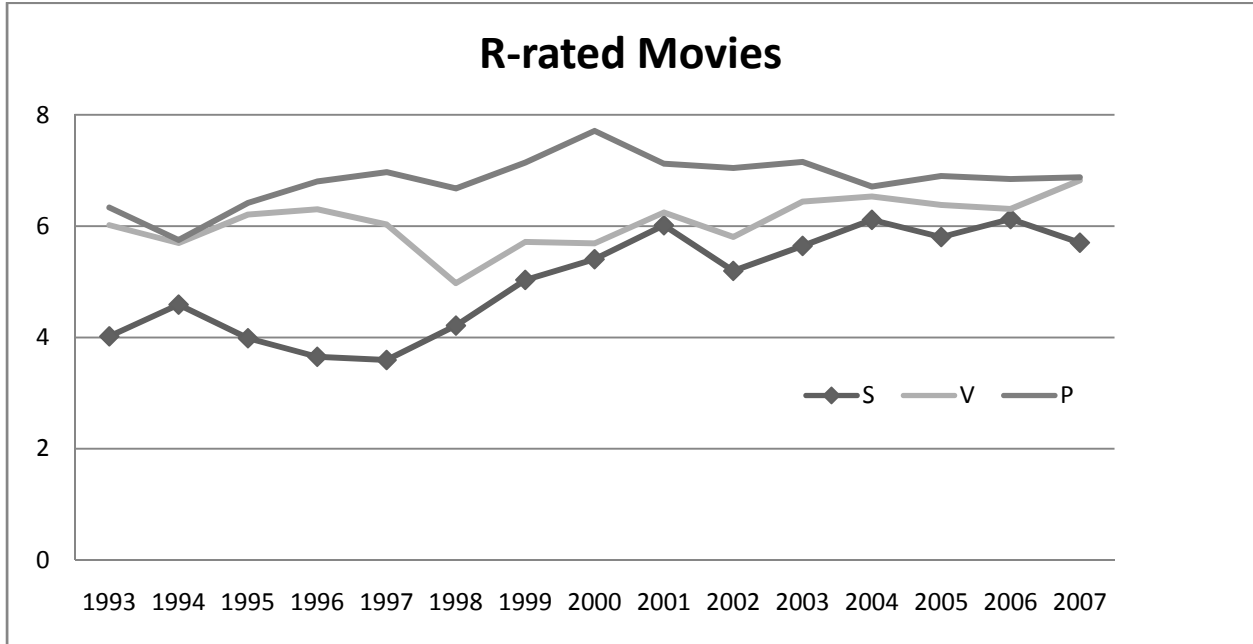


Figure 2.1-3: Average Sex, Violence and Profanity Ratings for PG-13-rated Movies, 1993-2007

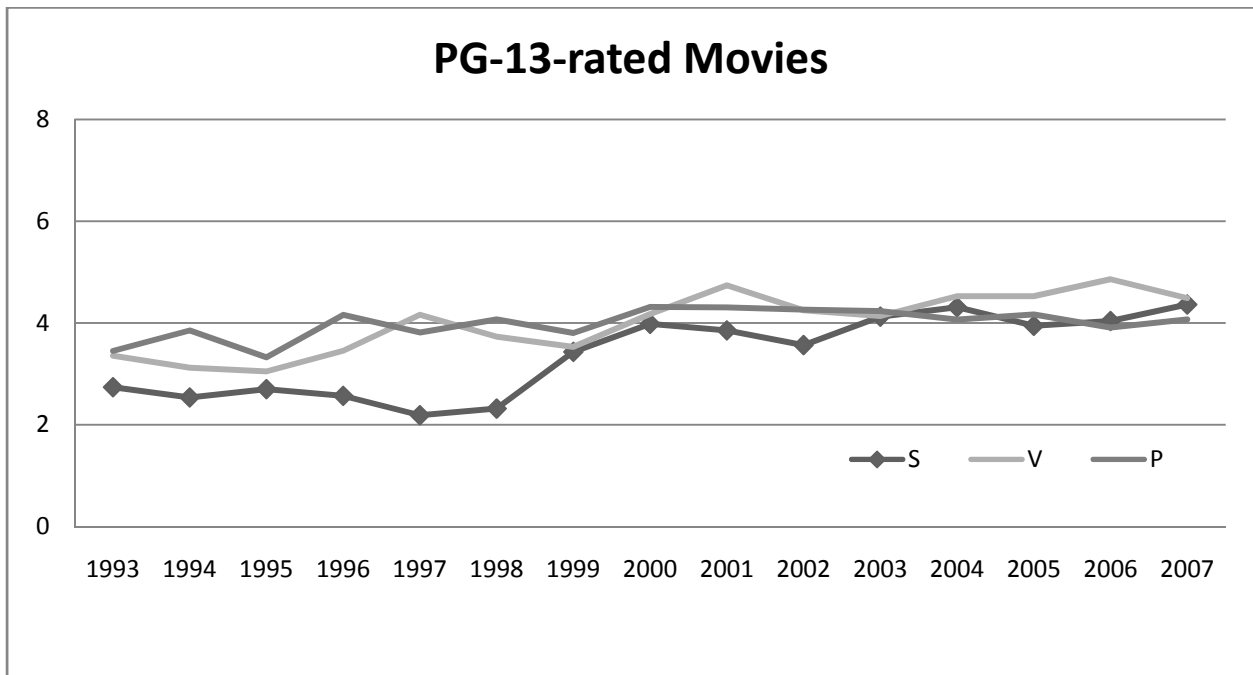


Figure 2.1-4: Average Sex, Violence and Profanity Ratings for PG-rated Movies, 1993-2007

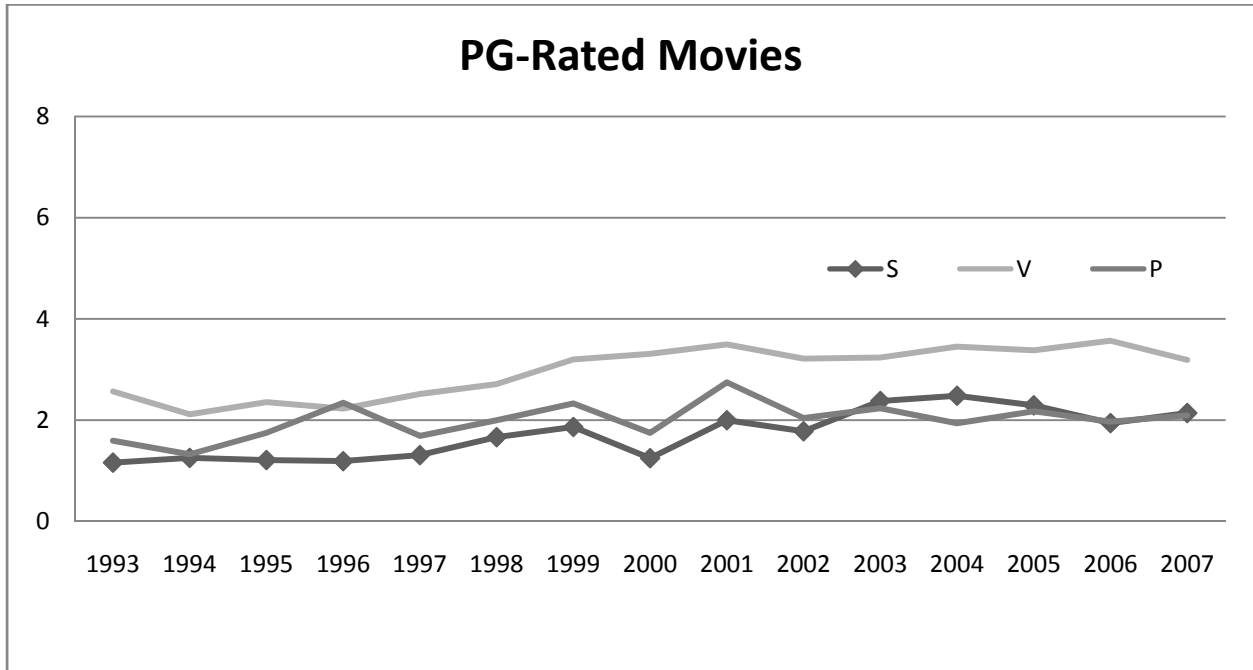
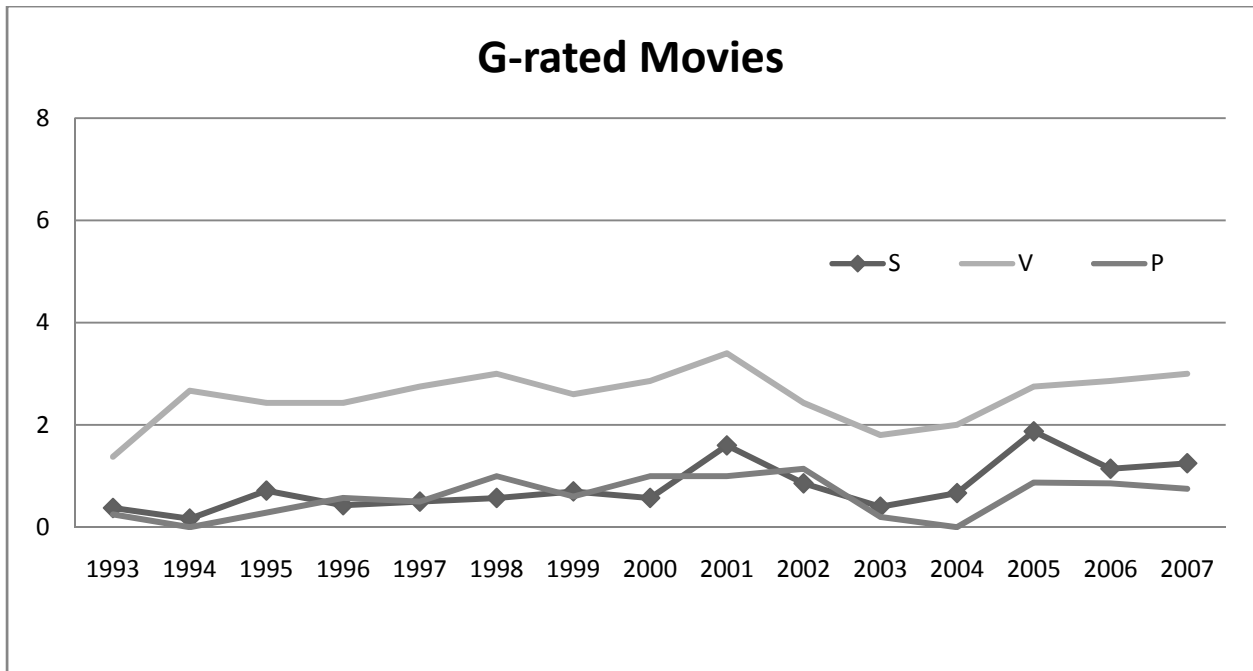


Figure 2.1-5: Average Sex, Violence and Profanity Ratings for G-rated Movies, 1993-2007



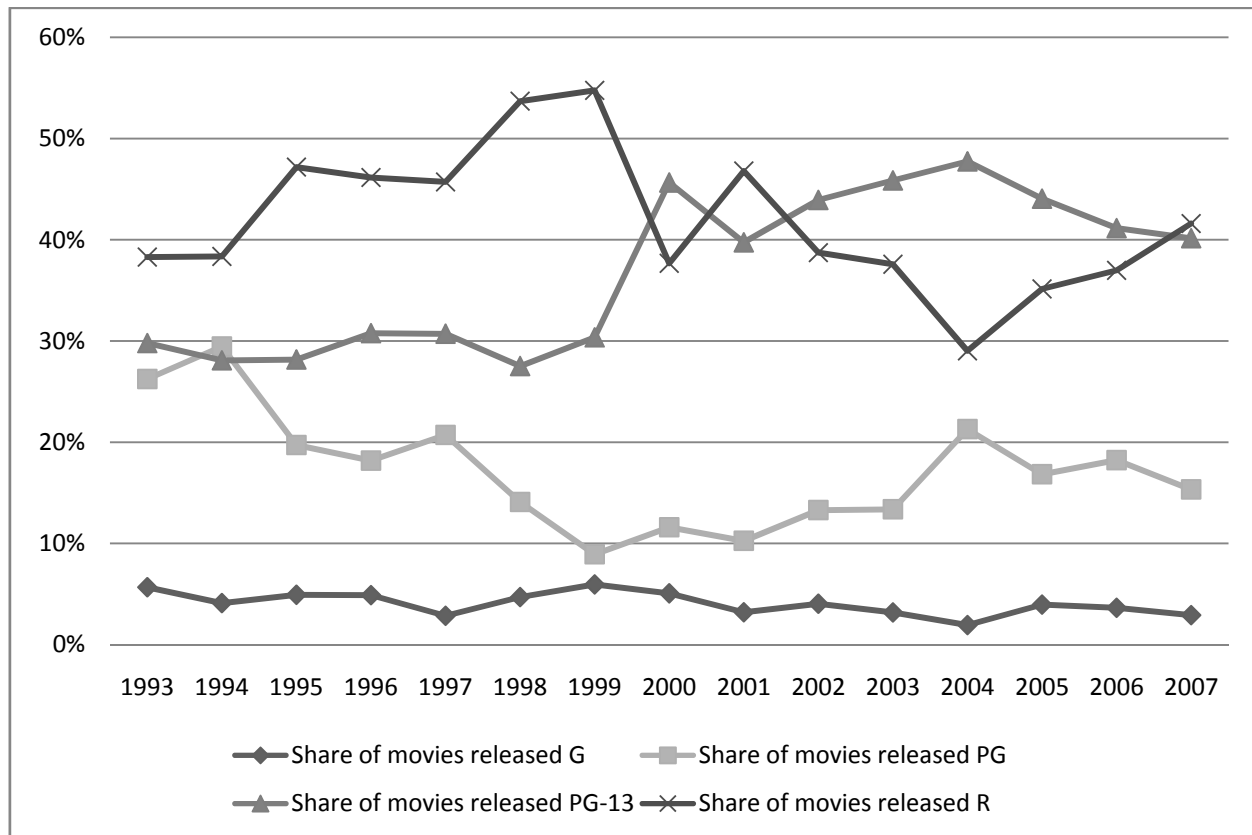
The figures above show a definitive upward trend in movie content: not one average rating is lower in 2007 than it was in 1993. The average sex rating for PG-13 movies in 2007 is equivalent to the average sex rating for R movies in 1993. Similarly, the average sex rating for PG movies in 2007 is only slightly less than the average sex rating for PG-13 movies in 1993.

The average violence rating for G movies in 2007 is equivalent to the average violence rating for PG movies in 1993. No matter how you approach the issue, the fact is that movies today involve more sex, violence and profanity than they did 15 years ago. Why this is occurring is beyond the scope of this paper and is probably best left to sociologists and psychologists. We instead focus on the impact this change may be having on the motion picture industry.

## 2.2. Composition of Movies Released

If movies as a whole are becoming more sexual, violent and profane, two effects could result. If the MPAA maintains strict guidelines, we would expect to see more R and PG-13 movies and fewer PG and G movies. If the MPAA does not maintain strict guidelines, we would expect to see the average *SVP* rating of movies within each MPAA rating increase. Figures 2.1-2 through 2.1-5 above have proven the latter, but that does not rule out the possibility that the former is also occurring. Figure 2.2 below shows how the composition of movies released has changed from 1993-2007.

Figure 2.2: Percentage of Movies Released, by MPAA Rating, 1993-2007



The graph above shows that while G-rated offerings have been relatively stable, the percentage of movies released with PG, PG-13 and R ratings have changed noticeably in the



last 15 years<sup>4</sup>. The percentage of movies rated R fluctuated substantially in the last 15 years, and composes approximately 40% of all movies released. The percentage of movies rated PG has fallen from 26% in 1993 to 15% in 2007, while the percentage of movies rated PG-13 has risen from 30% to 40% in the same period. Thus, it appears that not only is the average *SVP* rating within movie rating increasing, but the overall average *SVP* rating of all releases is increasing as PG-13 movies supplant PG movies.

A 2005 study by the Dove Foundation revealed that even though there were twelve times as many R-rated movies as G-rated movies, the G-rated movies were eleven times more profitable at the domestic box office<sup>5</sup>. Similarly, while there were more PG-13 movies than PG movies, the PG movies averaged \$33 million more profit per movie. If one compares the percentage of movies released with a particular MPAA rating to the percentage of box office revenues earned by those movies, it supports the Dove study. Looking at the total for all movies released from 1993-2003, one finds that the revenue share/movie share is greater than 1 for G, PG and PG-13 movies, but less than 1 for R movies<sup>6</sup>. Thus, it appears that R-rated movies generate less revenue.

Ravid and Basuroy (2004) attempt to explain a variety of topics, including this so-called R-rating puzzle: why do movie studios produce so many R-rated movies when they are less profitable? They find that management behavior in movie production is more consistent with revenue maximization and risk aversion than with profit maximization. And while R-rated movies may be less profitable than other movies, they are also less likely to lose money, which may be one reason why studios continue to make them. Their analysis includes movie production costs, but their end result is that costs do not appear to matter and revenues are far more important. It is for this reason that we leave budget costs out of our analysis in this paper and focus exclusively on box office revenues.

### 2.3. Domestic vs. Foreign Box Office

Another aspect of Ravid and Basuroy's work is relevant to our research and helps explain the R-rating puzzle: international box office. Figure 2.3 below shows domestic and foreign box office revenues from 2001-2007<sup>7</sup>.

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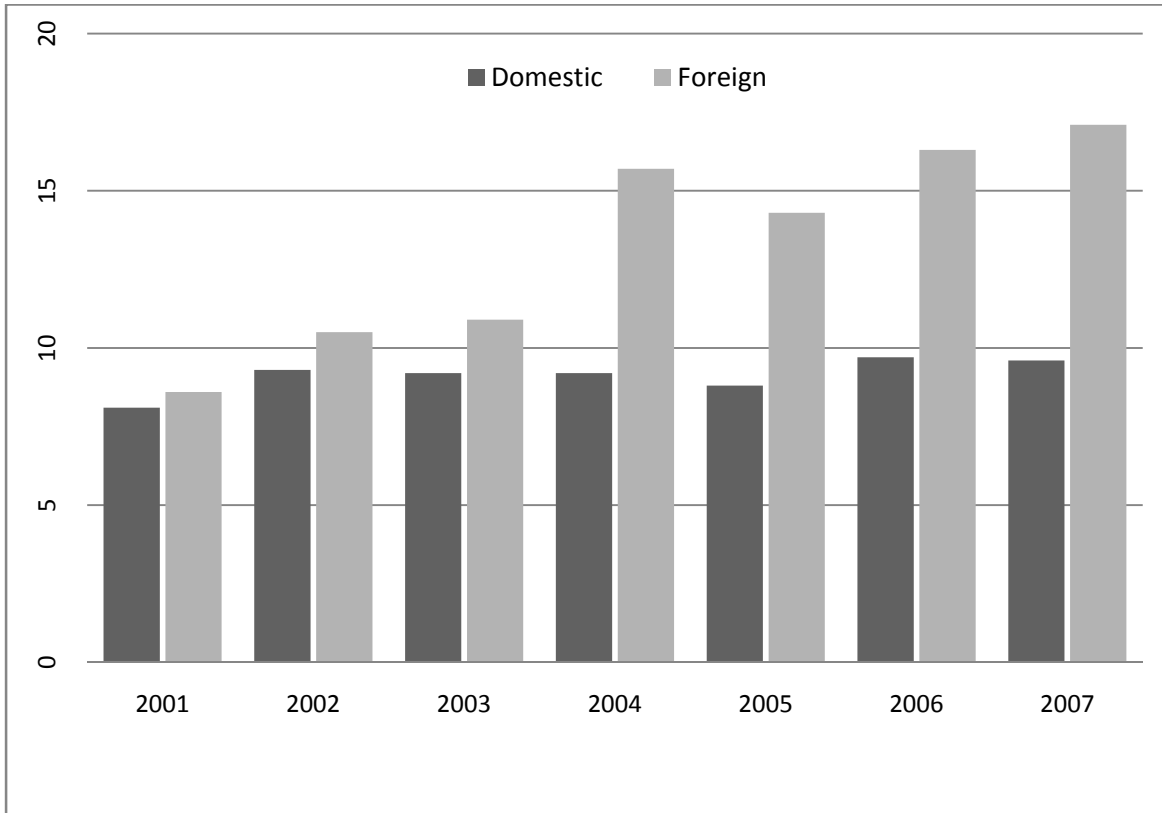
<sup>4</sup> It should also be noted that while the percentage of MPAA theatrical releases rated G has remained constant in the last decade, the number of movies produced with a G rating has increased. Many G movies now go "straight to DVD," bypassing any theatrical release. The reason for this is very simple: G movies sell very well on DVD, and if a movie is released in theaters, distributors only receive about half of the revenues (with the other half going to theater owners). Thus, it appears that movie production companies are paying attention to the ongoing research on this industry and are adjusting their practices accordingly.

<sup>5</sup> "Profitability Study of MPAA-Rated Movies," May 2005.

<sup>6</sup> The statistics are as follows, for G, PG, PG-13 and R movies, respectively: 1.33, 1.06, 1.25, and 0.75.

<sup>7</sup> Sources: Motion Picture Association of America, Nielsen E.D.I.

Figure 2.3: Box Office Revenues (in billions), Domestic vs. Foreign, 2001-2007



According to the MPAA and the National Association of Theatre Owners, the number of tickets sold in 2007 was lower than in 2001, 1.40 billion compared to 1.44 billion. But while the domestic box office has been relatively stagnant in the past five or six years, the international market for motion pictures continues to boom. In the year 2000, foreign and domestic box office revenues were roughly equivalent; in 2007, foreign box office revenues were 78% greater than domestic box office revenues. In less than a decade, the percentage of box office revenues earned abroad has gone from less than 50% to almost two-thirds. Thus, if there are differences between the kinds of movies that appeal to domestic audiences and the kinds of movies that have international appeal, this may weigh into a movie company's decision over which kinds of movies to produce. As we will see later in the paper, there appear to be significant differences between foreign and domestic consumers which may help explain the R-rating puzzle.

#### 2.4. The Rise of DVDs

One possible explanation for a stagnant U.S. box office is that movies are getting worse over time. Many a critic and moviegoer have complained that there are no new ideas in Hollywood. Whether or not this is true, if one looks at the average critic score for movies in the last five

years, one would find that it has been roughly constant, so this is not a viable explanation<sup>8</sup>. A likely explanation lies in the increase in popularity of DVDs. While domestic box office numbers have been relatively flat in the last five years, consumers have been dramatically increasing their consumption of motion pictures on DVD. From 2002 to 2006, the average price of a DVD player fell from \$136 to \$53, while the percentage of U.S. households with at least one DVD player increased from 54% to over 95%<sup>9</sup>. In this same time period, the number of DVDs purchased in the United States rose from 619 million to over 1.3 billion, more than doubling in just four years. In 2006, foreign and domestic box office combined to generate \$25.5 billion in revenues, while DVD sales exceeded this number, reaching \$29 billion. And since approximately half of box office revenues go to theater owners, a move by consumers away from theaters and towards DVDs is likely to be more profitable for movie companies<sup>10</sup>.

It is likely that some consumers view movies at the theater and movies on DVD as complementary goods – many people watch a movie in theaters and later rent or purchase it when it is available on DVD. It is also likely that other consumers view these goods as substitutes, opting to see some movies at the theater (perhaps action movies whose full impact is best felt in a theater with a large screen and good sound quality) and others in the comfort of their own homes on DVD. Any study attempting to explain box office performance should ideally also look at DVD sales. However, DVD sales figures are difficult to determine since, unlike box office revenues, they are continually increasing, even for movies that have long since been released. Currently different sources for DVD revenues report different numbers, and since we cannot be certain of their accuracy, we do not examine DVD revenues in this paper. In future work, as more DVD sales numbers are available and their accuracy can be verified, we hope to examine this aspect of the motion picture industry.

## 2.5. Current Research

This section of the paper was intended to give the reader an overall picture of what has been occurring in the motion picture industry in the last decade or so, as well as some of the research related to our work here. In this sub-section, we now return to a discussion of this research to make it clearer how this paper adds to the existing literature on firm behavior in the motion picture industry.

As a reminder, Thompson and Yakota studied the correlation between *SVP* rating and MPAA ratings, and then briefly examined the profitability of movies of different MPAA ratings. One of their findings is that among movies that received a MPAA rating reason of “violence,” PG and PG-13 movies performed better at the box office than movies that were rated R. Our research takes a different approach. Whereas Thompson and Yokota use a total *SVP* rating, we examine each of the three content ratings individually to see how they affect box office sales. Also, there is no variable to account for movie quality in their analysis, so all

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<sup>8</sup> Source: MetaCritic.com

<sup>9</sup> Sources: IDC, Adams Media Research

<sup>10</sup> See Filson, Switzer and Besocke (2005) for more information on movie contract terms.

movies are treated as equally good, varying only in their content-based ratings provided by Kids-in-Mind, Screen It!, and the MPAA. For example, consider their conclusion that, among movies judged as “violent” by the MPAA, those with a PG or PG-13 rating were more successful financially than those with a R rating. If these movies are also of higher quality or shown on many more screens across the nation, then it may be these differences rather than the rating itself that is causing this result. We include two variables designed to measure movie quality so that the effects of sex, violence and profanity can be better isolated.

Ravid and Basuroy examine violence in movies and find that violent movies tend to perform better at the box office, especially internationally. They also find that films with sexual content do not appear to do significantly better than those without. One potential drawback to their study is the limited nature and timing of their data set. It includes a random sample of 200 films from 1991 to 1993. As this section of the paper hopefully has illustrated, the motion picture industry has changed significantly in the last 15 years, and results that may have held for movies in 1991 may not still be applicable. Our research uses two data sets. One is a much broader data set, looking at a sample of 1,160 movies released from 1993-2004. The other, while slightly smaller than Ravid and Basuroy’s (139 movies), examines movies released in 2001 and 2002. Consequently, we believe that our data yields results that more accurately reflect today’s motion picture market.

### 3. Data and Model

In this section, we describe the different data sources used for our research and explain the econometric models to be estimated.

#### 3.1 Public Data

Data for this paper come from a variety of sources. Information about movies’ MPAA ratings and official box office revenues (variable name *REVENUE*) come from the Internet Movie Data Base ([www.imdb.com](http://www.imdb.com)) and The Number ([www.the-numbers.com](http://www.the-numbers.com)). Foreign box office revenues (variable name *FOREIGN*) were obtained from Box Office Mojo ([www.boxofficemojo.com](http://www.boxofficemojo.com)). Ratings for sex (*S*), violence (*V*) and profanity (*P*) are from Kids-in-Mind.

We use two different variables to measure movie quality. The maximum number of screens upon which a movie showed (variable name *SCREENS*) can be used as a proxy for mass appeal; data on screens was obtained from IMDB. To measure critical acclaim, there are a variety of possible sources for critic ratings (variable name *CRITIC*), but we used Metacritic.com. They provide a score from 0 to 100, measured by taking a weighted average of up to 30 critical reviews of the film, where more weight is given to reviews that are either more detailed or that come from a more prestigious source. If reviews are evenly divided between good and bad, the Metacritic score for that movie would be 50. *CRITIC* is intended to be a measure of movie quality, while *SCREENS* is intended to be a measure of mass appeal.

There is only a very slight negative correlation between the two ( $R^2 = .003$ ), so they appear to be capturing two different aspects of a movie's appeal.

The time period covered by the data used in the econometric model is from 1993-2004. It includes all movies that received a rating by both Kids-in-Mind and MetaCritic. For early years, this is more likely to result in less popular movies being omitted from the sample. For more recent years, the vast majority of films are rated. In the last decade, Kids-in-Mind has reviewed over 80% of the MPAA-released films and in the last few years it is closer to 95%. The set of movies reviewed by both Metacritic.com and kids-in-mind.com constitutes approximately 80% of all releases in this time period<sup>11</sup>.

Table 3.1 below shows summary statistics for these publicly available data. It should be noted that the number of observations on *FOREIGN* is smaller because we use only use this variable in a more limited regression involving private data sources.

Table 3.1: Summary Statistics of Publicly Available Data

	Mean	Max	Min	St. Dev.	N
<i>REVENUES</i>	\$53,713,635	\$600,788,188	\$2,005,840	\$63,348,190	1160
<i>S</i>	4.02	10	0	2.17	1160
<i>V</i>	4.77	10	0	2.32	1160
<i>P</i>	5.08	10	0	2.59	1160
<i>CRITIC</i>	52.29	94	1	18.62	1160
<i>SCREENS</i>	2103	4223	6	943	1160
<i>G</i>	0.03	1	0	0.18	1160
<i>PG</i>	0.12	1	0	0.33	1160
<i>PG13</i>	0.40	1	0	0.49	1160
<i>FOREIGN</i>	\$56,604,793	\$658,900,000	\$18,200	\$101,904,903	137

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<sup>11</sup> Obviously, this could result in biased results if the movies reviewed by Kids-in-Mind and MetaCritic are different from the ones they do not review. In all likelihood, the movies omitted from the sample are the least popular and therefore the least important in terms of our box office revenue analysis. In fact, these films have less than half the average box office gross. It should also be noted that from 2000-2004, only 16 movies that were released by the MPAA were not included in the sample because they lacked either a MetaCritic or Kids-in-Mind rating, which is less than 2% of films in that time period.

### 3.2. Private Data

In addition to these publicly available sources, we use additional private data to provide a more detailed picture of how movie characteristics affect different groups of consumers. Wehrenberg Theaters currently operates 13 theaters in Missouri, and has a dominant market position in St. Louis, Missouri. We use data from August, 2001 through May, 2002 for every movie showing at a Wehrenberg theater in St. Louis. For this time period, Wehrenberg's revenues constituted over two-thirds of all box office revenue in the St. Louis area and provide a very good picture of the overall market. For each of the 139 movies in this time period, we observe five different categories of daily ticket sales: adult, child, senior citizen, student, and matinee<sup>12</sup>. We use the revenues for each of these categories to calculate percentage of tickets sold to each group and then apply those percentages to the national box office for that movie, creating an estimate of the national box office that can be attributed to each group. Variables are labeled *ADULT*, *CHILD*, *SENIOR* and *STUDENT*. Summary statistics for these observations can be found in Table 3.2 below<sup>13</sup>.

Table 3.2: Summary Statistics for Private Data

	Mean	Max	Min	St. Dev.	N
<i>REVENUES</i>	\$62,976,078	\$403,706,375	\$4,365,455	\$70,908,221	139
<i>ADULT</i>	\$17,868,501	\$108,894,448	\$0	\$21,572,984	139
<i>CHILD</i>	\$7,981,008	\$89,179,281	\$0	\$17,075,266	139
<i>SENIOR</i>	\$2,550,109	\$38,293,240	\$51,510	\$4,619,247	139
<i>STUDENT</i>	\$11,072,523	\$68,937,384	\$0	\$11,651,826	139
<i>S</i>	3.98	9	0	2.05	139
<i>V</i>	5.12	10	0	1.94	139
<i>P</i>	4.93	10	0	2.26	139
<i>CRITIC</i>	48.73	94	12	18.62	139
<i>SCREENS</i>	2381	3876	220	762	139
<i>G</i>	0.04	1	0	0.20	139
<i>PG</i>	0.14	1	0	0.34	139
<i>PG13</i>	0.42	1	0	0.50	139
<i>FOREIGN</i>	\$56,604,793	\$658,900,000	\$18,200	\$101,904,903	137

<sup>12</sup> Children are defined as those age 11 or younger. Senior Citizens are those over 55 years of age. Student tickets can be purchased by anyone with a valid high school or college ID.

<sup>13</sup> We include summary statistics for the other variables for these observations so that the reader can verify that this sample is similar to the larger 1993-2004 data set.

### 3.3 The Model

The initial log-log model uses all movies rated by both Kids-in-Mind and MetaCritic that were released from 1993 to 2003. The dependent variable is the log of total box office revenue earned by the movie (*REVENUE*). Independent variables include dummy variables for MPAA rating (G, PG, and PG-13, with R being the default category), and the logs of *S*, *V*, and *P* ratings, MetaCritic score, and the maximum number of screens the movie played on in the United States<sup>14</sup>. Additional dummy variables for movie genre were included but all were insignificant, so they were removed from the estimation. Thus, the main model estimates the following:

$$\ln(\text{REVENUE}_{it}) = \beta_0 + \beta_1 G_i + \beta_2 PG_i + \beta_3 PG13_i + \beta_4 \ln(S_i) + \beta_5 \ln(V_i) + \beta_6 \ln(P_i) + \beta_7 \ln(\text{CRITIC}_i) + \beta_8 \ln(\text{SCREENS}_i) + \varepsilon_{it}$$

To illustrate the benefit of our model, as compared to Thompson and Yakota's work, we also perform the same analysis but use the total *SVP* rating instead of including each separately and compare the results<sup>15</sup>. We then estimate the model separately for movies of each MPAA rating to see how the levels of sex, violence and profanity matter different for movies of different ratings. To determine how different groups of ticket purchasers are affected by the independent variables in our model, we replace the national box office revenue with the appropriate group's revenue estimate. Finally, using this same group of movies, we use foreign box office revenue as the dependent variable to examine how the foreign box office responds.

## 4. Empirical Results

### 4.1. Main Model

The first set of regressions uses total box office revenues as the dependent variable and includes the aforementioned independent variables. The first specification uses the total *SVP* rating, while the second separates the three ratings to capture individual effects of each. Coefficient estimates and corresponding standard errors (in parentheses) are reported. For all log variables, the coefficient estimates are elasticities<sup>16</sup>.

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<sup>14</sup> For *S*, *V*, and *P* ratings, the natural log of the rating plus one was used, as the log of 0 is undefined. This simply renormalizes the ratings from 1-11 instead of 0-10 and should not affect any results or conclusions.

<sup>15</sup> For this model, the natural log of the *SVP* rating was used; since there are no movie with 0's for all three ratings, renormalization was not necessary.

<sup>16</sup> For the MPAA rating dummy variables (*G*, *PG* and *PG13*), the coefficient estimates are interpreted differently. For example, the difference between a PG-13-rated movie and an R-rated movie is equal to the exponent of the coefficient on *PG13*. Using the numbers from Table 4.1 of approximately 0.15, this implies a factor of  $e^{0.15}$ , which is 1.16. Thus, PG13 movies are expected to gross 16% more than R movies.

Table 4.1: Effect of Sex, Violence and Profanity on Total Box Office Revenues, 1993-2004

Dependent Variable: ln(REVENUE)

Constant	5.164 ** (0.365)	5.425 ** (0.344)
<i>G</i>	0.271 (0.174)	0.135 (0.161)
<i>PG</i>	0.144 (0.104)	0.082 (0.100)
<i>PG-13</i>	0.165 ** (0.059)	0.154 ** (0.058)
ln( <i>SVP</i> )	-0.022 (0.080)	
ln( <i>S</i> )		-0.077 (0.050)
ln( <i>V</i> )		0.144 ** (0.052)
ln( <i>P</i> )		-0.109 * (0.062)
ln( <i>CRITIC</i> )	1.008 ** (0.049)	0.998 ** (0.049)
ln( <i>SCREENS</i> )	1.090 ** (0.028)	1.063 ** (0.029)
Adjusted R <sup>2</sup>	0.63	0.63
Observations	1160	1160
Standard errors in parentheses		
** = significant at the 5% level		
* = significant at the 10% level		

As Table 4.1 above shows, the coefficient estimates on every other variable are consistent across specifications. Using the total *SVP* rating makes it appear that sex, violence and profanity are not an important factor in determining box office revenues. But when *S*, *V*, and *P* are included separately, the results show that violence has a positive effect on revenues, where a 10% increase in a movie's violence can be predicted to increase box office revenues by 1.44%. Profanity has a negative effect on box office revenues, while the level of sex in a movie appears to have no significant impact on revenues. Movies rated *PG-13* perform better approximately 16% better than *R*-rated movies (see footnote 16), while *G*- and *PG*-rated movies are not statistically different from *R*-rated movies. Finally, the *CRITIC* and *SCREENS* variables both



appear to be approximately unit-elastic: a 1% increase in either leads to an approximate 1% increase in revenues.

#### 4.2. Regressions by MPAA Rating

From the results in Table 4.1, it appears that a film's sex, violence and profanity levels have little if any effect on total box office revenues. However, it may be that we are adding different groups of movies together that have different, conflicting effects. It might be reasonably assumed that a higher *SVP* rating in a G movie may decrease revenues, since fewer parents might be willing to take their children to that movie, but higher levels of *SVP* may have a positive effect on R-rated movies. By including G- and R-rated movies in the same regression, these results counteract each other, making the coefficient estimates small or statistically insignificant. Thus, for the same 1993-2004 time period, we perform different regressions for each group of movies, based on MPAA rating<sup>17</sup>. The results of these four regressions are shown below in Table 4.2

Table 4.2: Effects of Sex, Violence and Profanity by Movie Rating, 1993-2004

Dependent Variable:  $\ln(REVENUE)$

	R	PG-13	PG	G
Constant	4.932 ** (0.512)	5.513 ** (0.563)	5.693 ** (1.120)	3.362 ** (1.216)
$\ln(S)$	-0.020 (0.064)	-0.209 ** (0.089)	-0.031 (0.172)	0.175 (0.220)
$\ln(V)$	0.186 ** (0.063)	0.153 * (0.095)	-0.34 (0.214)	0.408 (0.303)
$\ln(P)$	-0.170 ** (0.087)	-0.163 (0.114)	0.141 (0.170)	-0.066 (0.229)
$\ln(CRITIC)$	1.139 ** (0.074)	0.921 ** (0.076)	0.752 ** (0.154)	1.452 ** (0.179)
$\ln(SCREENS)$	1.046 ** (0.035)	1.145 ** (0.057)	1.207 ** (0.118)	1.056 ** (0.148)
Adjusted R <sup>2</sup>	0.68	0.55	0.48	0.83
Observations	507	468	140	40
Standard errors in parentheses ** = significant at the 5% level * = significant at the 10% level				

<sup>17</sup> There were only 2 movies rated NC-17 in this sample, making a regression impossible.

Table 4.2 above yields some results that are intuitive and others that are less so. Take, for example, the *CRITIC* variable. This is intended to measure the quality of the movie, and we find that it matters more for R-rated movies than for PG and PG-13 movies, which might be expected given the different audiences and types of movies that generally fall into those ratings. However, the *CRITIC* variable is most important for G-rated movies, which seems a bit counter-intuitive. The sex, violence and profanity ratings do not appear to have any impact on box office revenues for G and PG movies, perhaps indicative of the low level and variance of *SVP* ratings in these movies. These results appear to conflict with those of Thompson and Yokota, who found that among violent movies, those rated PG and PG-13 do better than those rated R. Perhaps it is not the violence in these movies that led to higher box office, but the fact that they were released on more screens, a variable not included in their research. It should also be noted that a film's sexual content has a negative impact on PG-13 movies. This may indicate that, all else equal, parents would prefer to take their children to movies with less sexual content than with less violence or profanity.

### 4.3. Revenue by Ticket Group

The regression results so far seem to indicate that sex, violence and profanity do not have a large impact on box office revenues. Even when separating movies by MPAA rating, only four of the twelve regression coefficients are statistically significant. This may be due to the fact that different consumers respond to *SVP* levels differently, so the net effect appears insignificant. The next set of regressions, the results of which are shown in Table 4.3, uses the amount of revenue due to adult, child, senior and student tickets to see how they each respond to *SVP*. We include a regression for total revenue also, which the reader can compare to the regression in section 4.1, as well as to the other regressions included in Table 4.3.

Table 4.3: Effects of Sex, Violence and Profanity by Ticket Group, 2001-2002

Dependent Variables:  $\ln(REVENUE)$ ,  $\ln(ADULT)$ ,  $\ln(CHILD)$ ,  $\ln(SENIOR)$ ,  $\ln(STUDENT)$

	Total	Adult	Child	Senior	Student
Constant	4.102 ** (1.325)	-1.78 (4.080)	-11.170 ** (2.761)	2.191 (2.208)	-1.655 (3.865)
<i>G</i>	-0.312 (0.434)	0.633 (1.336)	3.302 ** (0.904)	-1.16 (0.723)	0.731 (1.266)
<i>PG</i>	-0.038 (0.284)	-1.11 (0.875)	3.088 ** (0.592)	-0.856 * (0.437)	-0.905 (0.829)
<i>PG-13</i>	-0.011 (0.169)	0.435 (0.519)	1.21 ** (0.351)	0.133 (0.281)	0.841 * (0.491)
$\ln(S)$	0.032 (0.160)	1.055 ** (0.493)	0.031 (0.334)	-0.486 * (0.267)	1.248 ** (0.467)
$\ln(V)$	0.101 (0.197)	0.639 (0.607)	0.967 ** (0.411)	-0.515 (0.329)	0.348 (0.575)
$\ln(P)$	-0.511 ** (0.206)	0.02 (0.636)	-0.423 (0.430)	-0.346 (0.344)	0.416 (0.602)
$\ln(CRITIC)$	1.034 ** (0.139)	1.273 ** (0.428)	0.292 (0.290)	1.87 ** (0.231)	0.481 (0.405)
$\ln(SCREENS)$	1.313 ** (0.129)	1.305 ** (0.397)	2.864 ** (0.269)	0.898 ** (0.215)	1.544 ** (0.376)
Adjusted $R^2$	0.61	0.16	0.71	0.43	0.22
Observations	139	139	139	139	139

Standard errors in parentheses  
 \*\* = significant at the 5% level  
 \* = significant at the 10% level

### Total Revenues and Adult Revenues

The results of the total revenue regression are similar to those from Table 4.1, but profanity seems to matter more and violence less in this sub-sample than in the larger sample. Looking at the results for *ADULT* revenues, it appears that sexual content has a significant effect on box office revenues, with a 10% increase in *S* resulting in an approximate 10% increase in revenues. The *CRITIC* variable matters more for adults than for children or students, as one might expect. *SCREENS* matters for adults, but less so for them than for children or students. Remember, *SCREENS* is a measure of mass appeal, while *CRITIC* is a measure of critical appeal, so these results seem logical.

## Child Revenues

The dummy variables for G, PG and PG-13 movies are all significant for children, as one might expect. The coefficient estimates imply that for these three groups of movies, revenues earned from ticket sales to children are 27, 22 and 3 times greater than for R-rated movies, respectively. Children are the only group for which the violence rating of a movie has a significant effect. Children are also the most driven by the mass appeal of a movie, with the highest *SCREENS* coefficient.

## Senior Revenues

Senior citizens have the most refined tastes of all consumer groups when it comes to movies. They are much less likely to see a PG movie: based on the coefficient estimate, revenues from tickets to senior citizens are 57% lower for PG movies than for R-rated movies. They respond most strongly to the *CRITIC* rating of a movie, and the least to the *SCREENS* variable. They are also the only group for which the sexual content of a movie has a negative impact.

## Student Revenues

The student ticket category consists of high school and college students, and the results appear to bear this out. Revenues from student tickets are 2.3 times greater for PG-13 movies than for R movies. As it was with child tickets, the effect of a film's *CRITIC* rating has no impact on student revenues, while the *SCREENS* variable has a positive, significant impact: students care not about movie quality but about mass appeal. Finally, a film's sexual content has a larger positive impact on students than on any other group. Thus, it appears that students will see any movie, regardless of how bad it is, as long as there is some nudity in it.

## 4.4. Foreign Box Office

Figure 2.3 showed the dramatic growth in foreign box office revenues in the last seven years, but it would also be useful to movie companies and those studying the industry to know which kinds of movies sell better overseas. For the movies used in the regressions in section 4.3, we perform two regressions: domestic box office and foreign box office<sup>18</sup>. Results are shown in Table 4.4 below.

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<sup>18</sup> The results from the Total Revenue regression are slightly different, as there were two movies for which foreign box office data were unavailable. Thus, the number of observations drops from 139 to 137.

Table 4.4: Effect of Sex, Violence and Profanity Ratings on Domestic vs. Foreign Box Office, 2001-2002

Dependent Variables:  $\ln(REVENUE)$ ,  $\ln(FOREIGN)$

	Domestic	Foreign
Constant	4.070 ** (1.314)	-0.958 (3.194)
<i>G</i>	-0.218 (0.431)	-2.674 ** -1.049
<i>PG</i>	0.061 (0.283)	-1.656 ** -0.688
<i>PG-13</i>	0.098 (0.170)	-0.541 -0.413
$\ln(S)$	0.069 (0.159)	0.075 (0.387)
$\ln(V)$	0.162 (0.197)	0.408 (0.478)
$\ln(P)$	-0.502 ** (0.205)	-2.173 ** (0.498)
$\ln(CRITIC)$	1.080 ** (0.139)	2.363 ** (0.337)
$\ln(SCREENS)$	1.266 ** (0.130)	1.552 ** (0.315)
Adjusted R <sup>2</sup>	0.61	0.46
Observations	137	137
Standard errors in parentheses		
** = significant at the 5% level		
* = significant at the 10% level		

The results of these two regressions reveal stark differences between what matters to American moviegoers and those in other countries. *G* and *PG* movies do poorly abroad, the former yielding 93% less box office revenue than R-rated movies and the latter yielding 81% less. This provides one possible explanation for the R-rating puzzle: perhaps movie companies continue to produce R-rated movies, despite their lower domestic box office, because they are so successful abroad. One might expect the number of R-rated movies to actually increase in the future, with foreign box office becoming more important than domestic box office to overall revenue. Profanity has a very strong negative effect on foreign box office revenues, while *CRITIC* and *SCREENS* both have large, positive impacts. Thus, it appears that foreign audiences only want to see movies that either have wide mass appeal and/or great critical acclaim.

## 5. Conclusion

A variety of research on the motion picture industry has found that, according to researchers, the people in charge of movie studios and movie theaters do not appear to be maximizing profit<sup>19</sup>. In this paper, we addressed both the R-rating puzzle and the rise in levels of sex, violence and profanity. Why do movie studios continue to produce more R-rated movies when they do not perform as well at the box office? The fact is that foreign box office revenues are now much more significant than domestic box office revenues, and R-rated movies do quite well overseas. Why are movies becoming more sexual, violent and profane, and is this increasing revenues for motion picture studios? We cannot explain why movies are getting coarser, as indicated by higher SVP ratings, but we can confirm that more violent content tends to increase box office revenues, while more profanity has a detrimental impact on box office revenues both domestically and internationally. To answer the question in the title of this paper, sex does in fact sell more tickets to adults and students, but it drives senior citizens away.

There are a variety of ways we would like to improve upon this research, but as always, there are data limitations. As DVD sales data becomes more reliable and available, we will include it in our research. Clearly, consumers are moving away from viewing movies at theaters and towards viewing them on DVD (and now Blu-Ray) in their homes. DVD revenues now outpace total box office revenues, domestic and foreign combined. It is therefore instrumental that, when discussing the kinds of movies that are produced (both in terms of MPAA rating and in terms of SVP levels), we understand how DVD sales and rentals are affected by movie content.

We would like to include movie genres for the entire sample to examine how sex, violence and profanity impact movies of different genres. There is some difficulty in quantifying a movie's genre, and the process is time-consuming, but we feel it would be informative. We would also like to expand on the foreign box office analysis, using a larger time period. We used the same 2001-2002 time period so that the foreign box office results could be easily compared to other results in the paper, but a larger data set would help inform our understanding of foreign motion picture revenues.

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<sup>19</sup> See Switzer (2006) for more on the inaccurate assumption that movie theater owners are inefficient profit-maximizers.

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