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2010

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Patrick Topf
Illinois Wesleyan University, ptopf@iwu.edu

Recommended Citation

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Patrick Topf

Dr. Ilaria Ossella-Durbal

Illinois Wesleyan University

April 23, 2010

Abstract: The movie business is a multi-billion dollar industry involving production crews, marketing crews, actors, directors, distribution companies, movie theaters, and movie rental companies, but while each movie created follows the same routine, why do some perform so much better than others at the box-office? Why did <u>Juno</u> become a smash hit, while <u>Poseidon</u> is regarded as a major box-office bomb? This study investigates the impact of production cost, star power, professional reviews, release date, sequels, genre, age-rating, and distribution company on total domestic box-office revenue of the widely released films from January 2006 to December 2008.

I. Introduction

We have all heard the old adage "You've got to spend money to make money," but will spending a lot of money lead to making a lot of money? Some movie companies have created their own interpretation of the proverb and figure that if one can make money by spending it, then one must be able to make more by spending more. Spending money in the movie industry can be done fairly easily. Companies can hire well-known actors and actresses, employ a popular director, beef up the action sequences with better computer graphics, or advertise the film in mass media outlets. A more expensive film, however, does not always guarantee financial success at the box-office.

The top eight most expensive films ever produced have been made since 2006, with "Pirates of the Caribbean: At World's End" topping them all with a production budget of $300 million and an advertising budget of nearly $40 million in 2007 (showbizdata.com). While the film did generate $300 million in domestic box-office revenue, that revenue number is probably far worse than what the production company had estimated for the third installment of the popular pirate series. One could speculate that the Disney Corporation, a major conglomerate in the motion picture industry and the producer of "Pirates of the Caribbean", would not spend $300 million and plan on only getting $300 million back in revenue. Granted, it also earned internationally and in the DVD market as well. The question remains though, why would a motion picture production company spend the most amount of money ever spent on a single movie and run the risk of losing most of it? Some may believe if they spend enough on a film, people will automatically go see it. On the other hand, there exist movies like "Poseidon," which is largely considered the biggest movie flop in motion picture history.

Warner Brothers Pictures spent $160 million to produce "Poseidon", tied for the 29th

most expensive film all-time, and another $43 million in advertising, but collected only

$60 million in domestic box-office receipts in 2006 (the-numbers.com).

The belief in a large production cost generating large revenue is called

blockbuster theory. This theory states that movie production companies should spend

vast amounts of money in the creation of a particular film because it has a greater chance

of becoming a blockbuster, a film which generates a large profit, and it can cover the

costs of several failed projects by the same production company (Garvin, 1981). If the

expensive film happens to flop, however, at least the production company took an

educated risk to make a profit. The main logic behind blockbuster theory is that a more

expensive film has a greater probability of generating a large revenue than a small budget

film. The Star Wars franchise resurrected a struggling 20th Century Fox company that

went out on a limb to spend $11 million on a science fiction movie in 1977, and other

companies have been trying to replicate the success of the surprising smash hit ever since

(Garvin, 1981).

Blockbuster theory has not been discussed much in empirical research on the

motion picture industry other than including a production cost variable in the empirical

model. Production cost, however, encompasses a variety of components, such as paying

star actors, actresses, and/or directors, having spectacular special effects, and establishing

an advertising budget. In fact, the relationship between production cost and box-office

success is much more complicated than just "spend money and make money." One has

to believe that there is something more appealing to consumers in the motion picture

industry than an expensive film. Do the reviews of professional movie critics impact

consumers' thoughts? Does a certain genre put more people in the seats of theaters? Is box-office success guaranteed by using an established actor or actress in the lead, or does a particular brand or company appeal to a wider audience? Maybe people simply do not care about any other factors and see movies for seemingly no reason at all.

There are, thus, many aspects other than production cost that have a significant impact on the domestic box-office success of motion pictures. This paper investigates the impact of several variables, such as professional review scores, age-appropriate rating, genre, release date, and star power, on the domestic box-office demand for movies. Specifically it considers the 538 widely-released movies from January 2006 to December 2008, those that appeared in at least 600 different theaters during their theater lifetime. This study examines if there are factors that ultimately lead to movie success at the box-office or if there are factors that are believed to be important, but in all actuality have very little impact on revenues.

The structure of this paper is as follows. Section II provides a brief overview of the existing literature on the topic of motion picture success at the box-office. Section III describes the theory behind this study; why certain variables are used and why others are not. The empirical model and the data set used in this study are presented in Section IV. The results are discussed in Section V. Lastly, this paper closes with Section VI, which suggests ideas for future research and how this model could be extended to include different markets such as the DVD or the international market.

II. Literature Review

There are two main approaches in which the motion picture industry has been studied; a communication theory approach and an economic approach. The communication theory approach examines why people choose to go see a movie in a theater, as opposed to all of the other options of entertainment available. It also studies why people choose a particular movie over another. The data set is generally composed of surveys of individuals self-reporting their movie viewing practices. The economic approach, on the other hand, investigates which economic factors affect collective movie attendance as a whole. This approach relies on a data set that is generally composed of market information on film financing, scheduling, advertising, etc. The economic approach takes some ideas created and suggested in the communication theory approach, such as the effect of star power on movie-goers, and tests those ideas for statistical significance (Litman and Kohl, 1989).

In particular, the economic approach has examined the effects of genre, age rating, sequels, star power of actors/actresses/producers/directors, production budget, critical reviews, release dates, distribution companies, advertising, number of screens, number of awards won, etc. on the success of motion pictures at the box-office. Some studies focus on examining the impact of one particular variable on box-office success, while others take a broader approach and study the success of motion pictures in general, without focusing on the impact of a specific variable.

General Studies

The studies that explore overall what influences box-office success predict either total revenues or total profits based on several elements of motion pictures (production cost, star power, etc.). The goal of these studies is not to find if one particular variable has a significant impact on box-office success, but which variables impact the success of movies. Litman and Kohl (1989), for example, conduct a general study in which they use an empirical model to predict the rental income received by the distributor, the portion of the total domestic box-office revenue accrued to the distributor. Specifically they examine the impact on rental income from the following variables: genre (15 different categories), MPAA age rating (G, PG, etc.), sequels or based on well-known ideas (book, play, cartoon, etc), country of origin (USA or other), star power (actor from recent top-grossing film or director nominated/won Academy Award), production budget, critical reviews (averaged from two nationally recognized sources), brand (distribution company), release date (holidays, holiday season), pattern of release (number of opening screens), market forces (admission tickets and market shares). They find none of the MPAA ratings significant, and only the genres of science-fiction/fantasy and drama are significant. Moreover, the star power variable is significant and highly correlated with financial success. Litman and Kohl (1989) suggest a position of star worship of movie-goers because the audience is looking for more familiarity in their choices of entertainment.

Collins, Hand, and Snell (2002) create an empirical model similar to that of Litman and Kohl (1989), but they focus on film success in the United Kingdom. They determine if the total revenues of films released during 1998 are dependent on genre

(nine different categories), age rating in Britain (PG, 12, 15, 18), sequel, star power (based on success of last three films), re-release or professional reviews (from *Empire* magazine). The findings suggest a strong relationship between star power, as well as review score, and financial success. Only half of the genres proved to be significant, varying in negative and positive impacts.

There exist many other studies that focus on movie success as a whole, and that do not focus on one particular variable. Stimpert and Laux (2008) find genre, age rating, and star power to be insignificant, while quality, sequel, advertising, opening screens, and release date have significant positive impacts on box-office revenue. W.D. Walls (2008) finds that big budgets, wide openings, stars, and sequels are significant and profitable features of the motion picture industry. Prag and Casavant (1994) and Holbrook and Addis (2007) also use general studies to inspect the film industry and find similar results to the others. Overall, factors one would think impact box-office success generally do impact box-office success.

Variable-focused Studies

The more goal-oriented studies of the motion picture industry, on the other hand, explore the effects of star power, professional reviews, release dates, and advertising budget on box-office success. Each study also includes the variables used in the general studies, but the impact of a particular variable is the major focus.

Star Power

There are several papers that primarily investigate the effect of stars on box-office success. Moreover, these papers tend to define star power differently. For example, a

film can have star power if its lead actor is of a recently top grossing film (Litman and

Kohl, 1989) or if the actor has been in a large number of films (Wallace, Seigerman,

Holdbrook, 1993) or if that lead actor is on a critic's A-list of top stars in Hollywood

(DeVany and Walls, 2004). The significance and magnitude of the star power effect

varies based on the particular definition of a star.

Wallace, Seigerman, and Holbrook (1993) define a star as an actor or actress who

has appeared in at least seven films. Their data set consists of 111 such actors and they

represent each of these actors with a dummy variable. The other independent variables of

the study are year (of release), quality rating (by CineBooks, 1989), age-appropriateness

(CineBooks rating 1-6, early movies had no MPAA rating), country (US, other English-

speaking countries, non-English speaking countries), length (minutes), genre (25

categories), and production cost. Those independent variables are used to predict the

rental income received by the film distributor. Only 24 of the 111 actors and actresses

have a positive significant impact on a film's rental income.

DeVany and Walls (2004) try to explain "the curse of the superstar." Many times

a star actor or actress will lead to larger profits for the production and distribution

companies, however the wages needed to pay that star actor or actress tend to negate any

additional profit earned by the increased popularity of the film. A top star is considered

so if he or she appears on *Premier*'s annual listing of the hundred most powerful people

in Hollywood or on James Ulmer's list of A and A+ actors. They find that the

probability of a movie without a star earning a profit greater than $20 million is .02,

while it is .01 for a movie with a star. Movies with stars also tend to have a slightly

higher probability of earning a positive profit, and movies without stars have a higher probability of earning a negative profit.

Both studies find that a popular movie star does have an impact on the revenues of films. While it does cost the production company more money to hire the popular actor/actress, they are not necessarily taking a risk by spending more because of the higher probability of earning a positive profit.

Reviews/Judgment

The quality of a film can have a dramatic impact on box-office success. However, a film can be considered high quality if it is given a positive review by a film critic (Holbrook and Addis, 2007; Gemser, Oostrum, and Leenders, 2006) or if it is nominated for a prestigious award, such as an Oscar (Deuchert, Adjamah, and Pauly, 2005). The impacts of judgment on box-office success can also vary by choosing whether to examine expert opinions or to examine lay opinions.

Holbrook and Addis (2007) focus on studying the quality of movies and the impact on market success (MS) at the domestic box-office of expert judgment (EJ), from professional reviews, versus ordinary evaluation (OE), from people providing criticism on the International Movie Database (IMDb) website. After analyzing the role of EJ and OE on MS through OLS regressions, Holbrook and Addis find that people do see quality movies. There is a significant, but weak, relationship between expert judgment and market success.

Deuchert, Adjamah, and Pauly (2005) define a high quality film as one that is nominated for an Academy Award. They find that there is not a drastic difference in total revenues for films that win an Oscar and those that are merely nominated for the award.

Viewers take both the Oscar nominations and the award winners as a signal of high quality and attend all pictures mentioned in the award process.

Gemser, Oostrum, and Leenders (2006), instead, focus on the impact of film reviews on the box-office success of art house and mainstream motion pictures in the Netherlands. The study proposes two effects, the influence effect and the predictor effect. The influence effect is the view held for art house, or "independent," films, in which film reviews have the greatest impact on box-office success. The predictor effect is concerned with mainstream movies, in which the moviegoer is not influenced by professional reviews, but rather by other forms of information such as advertisements. Gemser, Oostrum, and Leenders (2006) find that newspaper and magazine reviews are not influencers of the mainstream-movie-going public, but rather predictors of the box-office success of the films. Films positively reviewed by newspaper and magazine critics do not influence moviegoers to see that particular film, but the positive reviews just happen coincide with box-office success.

Release Date

Seasonality and release dates of motion pictures can have nearly as much impact on box-office success as professional reviews. Nearly 40% of the total box-office revenue for any particular film is earned in the first week of its release (Einav, 2007). The release date, therefore, can classify which films will be hits and which will be busts.

Einav (2007) predicts total box-office revenues based on release date, production cost, advertising cost, distributor, genre (action, comedy, drama, children), age rating, length in time, and Academy Awards won by the picture. His primary focus, however, is on the impact of release dates on box-office revenues. The release date of a movie is

classified as one of 56 dummy variables, for the different weeks of the year. Additional weeks are added to the typical 52 week calendar in order to account for the movement of the holidays (i.e. Christmas fluctuates between weeks 51 and 52). Therefore, there is a "Christmas week" as well as weeks 51 and 52. Interestingly, the weeks of Memorial Day, Independence Day, Thanksgiving, and the weeks before and after Christmas all have a significant effect on box-office revenues.

Moul and Shrugan (2005), on the other hand, include a holiday variable in their empirical model to determine the impact of release date on box-office revenues. Instead of using a dummy variable for each week of the year, they use one variable that encompasses all films that are released during the week of New Year's Day, Memorial Day, Independence Day, Thanksgiving, or Christmas. An additional seasonal release variable is included for films debuting during the summer season (Memorial Day to Labor Day). Both variables are highly significant and have rather large magnitudes. These magnitudes, though, vary depending on which of the independent variables are included in the regression. Therefore, the exact impact of a holiday and season release cannot be quantified, but the impact itself is proven to exist.

Advertising

Advertising and marketing strategies should also have a significant impact on society. Recently, Elberse and Anand (2007) look at a simulated market of motion pictures and determine the effectiveness of pre-release advertising in the movie industry. They use a dynamic empirical model and find that when a high quality movie, based on reviews from professional film critics, is produced, increases in television advertising will generally increase box-office revenue. This is because people are being exposed to a

well-done movie and will want to go see this "good" movie. When a low quality movie is produced, revenues will fall with an increase in advertising. This is because audiences are being exposed to a poorly produced movie and will not want to go see this "bad" movie. If the "bad" movie was never advertised, potential customers will not see the previews for the "bad" film and they have a greater chance of spending money at the box-office than if they had seen the preview.

Laurichesse (2000) discusses a marketing strategy for the motion picture industry. She suggests that firms concern themselves with the quantity of advertisements, as well as the quality of the advertisement. Moreover, the preview should express the film to both a potential audience and to potential revenue sources, i.e. the movie theaters. The frequency of the previews, and thus advertising budget, is of issue as well. Properly calculating an appropriate level of saturation allows the distribution company to spend a cost-effective amount of money on advertising. A film with its own hype surrounding it does not necessarily require large amounts of capital spent informing the public of its release because information about the particular film is being spread through word-of-mouth.

The section that follows presents the demand theory for motion pictures and applies the ideas developed from previous literature to this study.

III. Theory

When looking at the demand market for motion pictures, one has to realize that it is unlike any other market. Price is fixed for each movie in a theater for those of the same age and for those wanting to see a movie during the same time of day. Therefore

changes in price do not have to be considered because there will simply not be any. The only variation is in the slope or a shift of the demand curve.

Basic demand theory states that several variables can influence the location of the demand curve, such as the price of complementary goods, the price of substitute goods, and popular attitudes or trends in society (Mankiw). Complementary goods to movies include popcorn, soda, and candy. A change in the prices of popcorn, soda, and candy, however, will not have a major impact on the demand for movies. Substitute goods to movies are the options available to consumers other than going to see a particular movie, such as other movies at the same theater, attending live theater or a musical concert, or watching a film at home. This paper does not focus on the changes in price of those other forms of entertainment either, but rather on the popular attitudes and trends of society. Movies containing star actors, storylines about terrorism, or films based on books about wizardly children all may appeal to the popular trends of the time. Moreover, popular tastes and attitudes are based on historical and psychological forces (Mankiw). One may remember, as a child, watching a movie on Saturday evenings with the family and going to the movies now as an adult can trigger those nostalgic moments from their childhood. There are thus many factors that impact the demand for movies and this paper investigates which of them can lead to box-office success.

Production Cost

This study is rooted in blockbuster theory and the idea of spending money in order to make money. It is thus necessary to consider the production cost of a movie. Low budget films will not necessarily have the excitement and aura that comes along with an expensive film. Not only are expensive films generally higher quality; due to

better special effects, better actors, etc, but people tend to create hype about a film with a large production budget. This talk and spread of information by word-of-mouth is free advertising and to the advantage of the expensive film. So the more expensive the film, the more domestic revenue one would expect that film to generate.

Star Power

Star actors, actresses, directors, and producers build hype around a particular film (DeVany and Walls, 2004). A teenage heart-throb, an action movie star, or a creative director can draw an additional audience on top of what the storyline could already attract. These factors need to be considered into what makes movies successful at the box-office. Many years ago, a new Audrey Hepburn movie would draw a wide variety of audience members. Teenage boys and girls, along with adult men and women, went to see Hepburn on the big screen. During the 1970s, Clint Eastwood attracted large audiences, but not necessarily all types of audiences. As big a star Eastwood was, and as successful his films were, his target audience was typically males. Today it seems there is a star for each audience. Jennifer Aniston's movies appeal to women, Vin Diesel's appeal more to men. Megan Fox's films draw teenage boys to the theater, while the audience at a new Brad Pitt picture seems to be composed mostly of younger females. The actors and actresses that to appeal to the most people, whether by most age groups or largest age group, will draw the most revenue for their particular film (Wallace, Seigerman, and Holbrook, 1993). One would expect a film with an established star, such as Tom Hanks, to appeal to a wide range of audiences and therefore generate the most revenue. The true stars of the motion picture industry are those that can develop hype around their film and draw in a large audience.

Reviews/Judgment

Nearly every empirical study of box-office success of motion pictures includes a quality measure for a movie. Quality, however, can be defined by different measures. A good script, good acting, good special effects, or good camera shots can all lead to a "good" movie and a higher quality film should earn more at the box-office (Stimpert and Laux, 2008). The judgment of this quality can be defined by different measures as well. Professional film critics are paid to give their "expert" opinions on newly released pictures. Lay people provide their "ordinary" opinions on movie websites and through word-of-mouth referrals to friends and family. Popular opinion and box-office revenues do not always agree with the judgments of professional critics, but the professional reviews are a standard upon which to base a measure of quality (Holbrook and Addis, 2007).

Release Date

Date and season of a release for a film can also impact success at the box-office (Einav, 2007). Since going to the movies has become commonplace in American culture and something to do when at home, children, especially teens, tend to go to more movies when not in school. This allows the summer months and the last two weeks of December to have an advantage over other months (Moul, 2005). Kids are home from school, looking for things to do and the movie theater offers entertainment, as well as an escape from the heat or cold. Moreover, releasing a movie during a particular holiday can have a natural advantage over other release dates. Couples and families enjoy spending part of their holiday at the theaters whether, it is for Valentine's Day, July 4th, or Thanksgiving.

Movie theaters, in fact, seem to be some of a handful of places open during national holidays and many families partake in a film on those days.

Sequel

Smart producers will capitalize on a hot product and figure that if a film is successful at the box-office, a sequel of the film should do well too. It seems that the sequel is never as "good" as the original, but it does have a built-in fan base that gives it an advantage over original storylines (Walls, 2008). Many films are also based on established books, songs, or action heroes, but if they were also considered sequels, it would include just about every film in the data set.

Genre

Built-in fan bases can come with genres as well. Young children want to see the newest animated film, teenage boys want to see the newest action movie, and romantic comedies are adored by females of all ages. Comedies, horror films, and superhero movies all have their own general target audience which can help or hurt them at the box-office. A genre that appeals to a larger variety of fan bases or to larger individual fan bases will likely generate more revenue due to the fact of it having a larger potential audience (Prag and Casavant, 1994).

Age-rating

Age-appropriate rating tends also to have a significant impact at the box-office. Generally, adults will not go see the latest G or PG rated films because those films are too juvenile for their entertainment. One could deduce that PG-13 and R rated films have the largest nighttime audiences, but R-rated films restrict the audience to only those over the

age of 17. Therefore PG-13 appears to have a natural advantage over other age ratings in terms of generating the most revenue, because it allows for and attracts the largest audience (Ravid and Basuroy, 2004).

Distribution Company/Brand

Distributional movie houses follow the same built-in fan base mentioned earlier. Movie conglomerates such as Disney, Lions Gate and Fox each have their own niche in the motion picture industry in which they can rely on a loyal target audience for viewing their latest picture (Litman and Kohl, 1989). Established franchises can also have connections to certain theaters or advertising companies. They may have to do less persuading towards the theater to show their newest film than an independent distribution company based on the risk factor that the picture is more likely to draw a large audience if distributed by an acclaimed company. Distribution companies such as Universal and Paramount Pictures usually distribute popular films that movie theaters enjoy showing because a larger audience leads to more revenues for the theater as well.

Established distribution franchises may also receive discounts in advertising costs for their continued business with a particular agency in which an independent distributor would not receive these benefits. A lower advertising cost could improve the advertisement itself in quality and in quantity. Since advertising informs the public about the release of a new motion picture and builds hype around the film through TV commercials, billboards, and magazine ads; the more advertisements and the higher quality of the advertisements lead to a better chance of the viewing public attending the movie (Laurichesse, 2000).

The theories developed in this section are applied to an empirical model in the next section. The variables are formally defined, and descriptive statistics concerning the revenues and the costs of the movies are also provided.

IV. Empirical Model and Data Set

This study examines the domestic box-office success of widely-released motion pictures over the three-year period from 2006 to 2008. Specifically, it investigates the impact of genre, age-rating, star power, production cost, release date, and distribution company on the box-office revenues for those particular films. It is an empirical study that relies on Ordinary Least Squares (OLS) regression analysis to validate the significance and quantify the magnitude of the impact on revenue of the afore-mentioned variables. The regression model consists of one dependent variable, total domestic box-office revenue (TR), and nine independent variables: production costs (PC), star power (SP), cumulative professional review scores (PR), season of release (SW), holiday release (H), sequel (S), genre (G), age-appropriate rating (R), and major distributor release (D). The regression equation is as follows:

$$TR = \alpha_1 + \beta_2(PC) + \beta_3(SP) + \beta_4(PR) + \beta_5(SW) + \beta_6(H) + \beta_7(S) + \beta_8(G) + \beta_9(AR) + \beta_{10}(D) + \mu$$

Dependent Variable (Total Revenue)

There are several ways to determine "box-office success" of motion pictures. One can examine the quantity of total ticket sales of particular movies, domestic or worldwide. Alternatively, one could focus on the profitability of films, using either worldwide or domestic figures. Total revenues, however, are the most accessible statistic available on motion pictures. Furthermore, international tastes may vary too significantly

from domestic tastes to include both in one model. For these reasons, success at the box-office is quantified by total domestic box-office revenue.

Since the span of the data is over three years and subject to inflation, the revenues are adjusted to December 1997 dollars based on the CPI index for admission to movies, theaters, and concerts. This is the latest date referenced by the United States Bureau of Labor Statistics for this specific measure of inflation. A more recent reference date could have been used, but it would not be as accurate to the prices of admissions.

The statistics and information of the movies come from four websites: the-numbers.com, boxofficemojo.com, metacritic.com and imdb.com. The sites the-numbers.com and boxofficemojo.com are reliable sources for motion picture information such as revenues, genre, cost, age rating, and release date. The professional review scores are obtained from metacritic.com, which aggregates reviews from acclaimed film critics across the country. The International Movie Database (imdb.com), instead, is utilized to obtain information on the stars of motion pictures. A variety of websites are used in order to ensure accuracy of information and in order to gather information on the greatest number of films.

Independent Variables

Production Cost

Total production costs, also adjusted to December 1997 dollars, measures the amount of money spent on a particular film. The production budget includes costs for camera equipment, set design, location fees, directors, actors, producers, stage crew, make-up artists, special effects designers, costumes, etc. It does not include advertising costs. However, the advertising budget tends to be in direct correlation to the production

budget. If a production company spends $5 million to produce a movie, it will probably not spend $40 million advertising the film. If a production company spends $100 million to produce a movie, it is probably more willing to spend a large amount advertising the expensive film than the production company that produced the comparatively inexpensive film. Advertising revenues are rather difficult to obtain, however, and this study does not look directly into the effect of advertising on box-office revenues.

Star Power

As discussed previously, the definition of a star is subjective. One can consider the number of popular films a particular actor has been a part of, the number of Academy Awards that actor has been nominated for or won, or even if their name makes a list of stars in a film critic's magazine. Since this paper examines the impact of a star on total revenues at the box-office, it considers a star to be someone who would generate the most revenue at the box-office. A movie having star power is therefore defined as follows: if the film's leading actor/actress was a leading actor/actress of a film that grossed a top-ten revenue for at least one of the three years prior to the film's release. A film containing a star, per this definition, receives a value of 1. A film not containing a star is the omitted case.

Reviews/Judgment

The quality of films is determined by a cumulative professional review score. A large number of experts' opinions would be the most accurate measure of quality, and in order to achieve this broad range of reviews and differences in opinion, one must compile those reviews into one score. Metacritic.com aggregates all scores from acclaimed film critics across the United States into an easy 0-100 rating scale (100 being the best). This

measurement not only accounts for differences in opinions from different regions of the nation, but it also translates the differences in quality ratings by the critics (two thumbs up, 4/5 stars, etc) into a specific numerical value.

Release Date

The importance of release date is captured by the holiday and seasonal release dummy variables. Seasonal release accounts for children, a large group of potential movie-goers, being home during the summer and winter seasons. The films released between June 1 and August 31, or December 14 and December 31, are considered seasonal releases and receive a value of 1 for the season dummy variable. Films with all other release dates fall in the omitted case. Furthermore, a film is considered to be released on a holiday if it debuts during the week of Valentine's Day, Memorial Day, Independence Day, Halloween, Thanksgiving, or Christmas. These are the major holidays family members celebrate in the United States and sometimes those gatherings lead to going to the movies. Films released during a holiday week receive a value of 1 for the holiday dummy variable. Movies with all other release dates fall in the omitted case.

Sequel

Sequels of films must be part of a series, such as Pirates of the Caribbean or Shrek. Re-makes and movies based on songs, books, television shows, etc, are not considered sequels. A sequel is given a value of 1 if the film is an additional part of a series. All other movie types fall in the omitted case.

Genre

Distinctions in genre could be classified in as many as 25 different categories or as few as two. This study considers the set of four genres, action/adventure, comedy, animation, and drama, because they can accurately explain every film in the data set and are distinct enough from each other that one film only fits into one category. The genre variable used is actually a set of three dummy variables. Each genre of action/adventure, animation, and comedy is its own dummy variable, for which the film receives a value of 1 if it fits the particular genre, and 0 if otherwise. Drama is the omitted genre.

Age-rating

Age-appropriate rating follows the same concept as genre, in terms of being a set of three distinct dummy variables. Each rating of G, PG, and PG-13 is its own dummy variable, for which the film receives a value of 1 if it has the particular age rating, and 0 if otherwise. R is the omitted rating. The ratings are assigned by the Motion Picture Association of America (MPAA), based on content of sexuality and violence.

Distribution Company/Brand

Motion picture distributors are generally categorized as majors, mid-majors, and independents, based on market share of the individual company. The major and mid-major distribution companies tend to be the most recognized and should impact revenues more than independents. In fact, Sony Pictures, Buena Vista Pictures (Disney's licensed distributor), Twentieth Century Fox, Warner Brothers, Paramount, Universal, and Lions Gate are consistently among the top distributors in terms of market share for each year of the study. A film distributed by one of the seven previously mentioned companies,

therefore, receives a value of 1 for the distribution variable. A film distributed by any

other company falls in the omitted category.

A summary table of variable definitions is provided in Table 1.

Table 1: Definitions of Variables and Expected Signs

Variable	Definition	Expected Sign
Total Revenue (TR)	Dependent Variable TR=Price*Q Tickets Sold	N/A
Production Costs (PC)	Production costs	(+)
Star Power (SP)	Dummy variable; 1 if leading actor and/or actress is star, 0 otherwise	(+)
Professional Review Score (PR)	Aggregate reviews from various professional movie critics	(+)
Release Date		
Summer/Winter Release (SW)	Dummy variable; 1 if released during summer or winter, 0 if not	(+)
Holiday Release (H)	Dummy variable; 1 if film is released on listed holiday, 0 if not	(+)
Sequel (S)	Dummy variable; 1 if sequel, 0 if not	(+)
Genre (G)		
Action	Movie is action/adventure	(+)
Animation	Movie is animated	(+)
Comedy	Movie is a comedy	(+)
Drama	Omitted category	
Age-Rating (AR)		
G	Movie is rated G	(+)
PG	Movie is rated PG	(+)
PG-13	Movie is rated PG-13	(+)
R	Omitted category	
Distributor (D)	Dummy variable; 1 if distributed by major motion picture distributor, 0 if not	(+)

As stated previously, this study examines the movies released from January 2006

to December 2008 that appeared in at least 600 different theaters during their theater

lifetime. They include popular films such as "The Dark Knight," "Mission: Impossible

III." and "Transformers," as well as the less popular "Catch a Fire" and "Run Fatboy

Run." Descriptive statistics of the data are provided in Table 2. These statistics indicate

the average revenues and costs for different age ratings, genres, holiday release films (Hol), and seasonal release films (Sea), as well as the percent of the films fitting the criteria. Interestingly, the average earnings for films with an R age rating are significantly lower than the others. Furthermore, animated films on average, earn much more than drama films.

Table 2: Descriptive Statistics

	All	G	PG	PG 13	R	Act	Dra	Com	Anim	Hol	Non-Hol	Sea	Non-Sea
Average Revenue ($ mil)	35	47	44	41	22	57	21	33	65	36	35	41	32
Average Cost ($ mil)	32	39	44	37	20	50	22	24	59	38	31	41	28
% of Films	100	4	21	37	37	20	42	31	7	15	85	31	69

V. Results

After running the OLS regression, it is interesting to note that many of the variables are significant and that all have positive signs. The results are presented in Table 3. The most significant variables are production cost, sequel, and review score. The coefficient measuring production cost, interestingly, is less than one. That figure means that an additional million dollars spent on the production of a film results in a box-office return of only $849,000, on average. While this may appear to be counterintuitive to a profitable business such as the motion picture industry, it is consistent with the findings of previous studies. Moreover, the additional capital spent on the production of a film is very much controlled for in this model. The coefficient of the production cost variable captures the impact of extra money spent to produce a movie that is not spent on

quality or actors. This leaves little else to spend on, possibly the reason for such a small coefficient. Furthermore, most films do not earn a positive profit. Only 20% of the films earn 80% of the revenues (Moul and Shugan, 2005). Therefore, on average, if one spends more money on a film, one will make more, but not enough to cover one's costs.

Table 3: Results with Production Cost

Variable	Coefficient	Significance
Cost	.849	.000***
Star	5.02	.243
Review	.507	.000***
Season	7.46	.024*
Holiday	6.27	.110
Sequel	17.2	.000***
Action	6.66	.114
Animation	9.86	.176
Comedy	9.98	.006**
G	5.22	.562
PG	3.92	.390
PG-13	9.39	.009**
Distributor	7.99	.025*
Adjusted R^2 = .593		

Full regression results can be found in the Appendix
* $p<.05$ ** $p<.01$ *** $p<.001$

Blockbuster theory, therefore, is much more complicated than having a large production budget. Spending money on a film is such a broad and general term. A production company could include more explosions in the action sequences, hire a well-known actor or actress to play the lead role, or fine tune the computer graphics to make them more realistic. Hence, there probably exists multicollinearity between production cost and the other independent variables in this model. In order to investigate this further, an OLS regression is run with production cost as the dependent variable, and all

other variables from the model as the independent variables. This regression results in an

adjusted R^2 value of .459, indicating that the independent variables explain 45.9% of the

variation in production cost. The full regression results can be found in the Appendix.

The production cost term is, thus, tied to many other aspects of movie production.

This correlation and multicollinearity between production cost and most of the other

variables included in the first regression leads this study in a new direction. The

production cost variable will now be removed so that the revenue data can be better

explained by each aspect of the costs. The results from running the new regression are

presented in Table 4.

Table 4: Results without Production Cost

Variable	Coefficient	Significance
Star	25.6	.000***
Review	.704	.000***
Season	11.5	.000***
Holiday	6.22	.125
Sequel	30.4	.000***
Action	26.7	.000***
Animation	31.9	.000***
Comedy	10.4	.003**
G	5.25	.525
PG	15.6	.000***
PG-13	20.4	.000***
Distributor	14.7	.000***
Adjusted R^2 = .421		

Full regression results can be found in the Appendix.
* p<.05   ** p<.01   *** p<.001

With this new regression, every variable coefficient remains positive, implying

that each variable results in added revenue to a motion picture, all other things equal.

The most impressive improvement from the original empirical model to this model

without production cost is the effect of star power. In the original regression results, star power is not significant, due to multicorrelation with production cost. Established stars demand a higher salary than novice actors and paying those stars results in a rise in production cost. Removing production cost from the regression allows for the star power variable to become significant because it is no longer correlated with costs. This significance is unlike the study of Stimpert and Laux (2008), who find star power insignificant using a 100-point scale to rate each movie's leading actor or actress. The results of this paper indicate an average increase of $25.6 million in revenue for a film with a star leading actor.

Professional reviews, however, generally have the same magnitude and significance in both models. The interpretation of the coefficient is somewhat complex, though. Each score is generated by aggregating reviews given by many professional film critics across the country. In order to change the overall score of a film, either many critics have to be persuaded to change the review or a few must change their review by a substantial amount. Either way, it is possible for professional reviews to impact total box-office revenues of movies, much in the way Holbrook and Addis (2007) find a significant impact of expert judgments on market success. Given the second regression, an increase of one full point on the 0-100 Metacritic scale, ceteris paribus, results in a total box-office revenue increase of $704,000.

Seasonal release also has a significant impact on box-office revenues, confirming the hypothesis that the people tend to see more films during the summer months and weeks surrounding Christmas. Nearly $11.5 million more in total revenue can be expected for a film released during this particular time period, compared to other release

dates. This magnitude does vary, though, depending on which other independent

variables are included, as seen when comparing the Season coefficient in Tables 3 and 4.

This fluctuation in magnitude is also found in the study by Moul and Shrugan (2005).

The holiday variable is not significant in this study. If one considers a one-tail

test, which assumes the holiday variable will always have a positive effect on total

revenue, the impact of a holiday release becomes more significant, to the .0625 level.

Einav (2007) finds only four holidays (Memorial Day, July 4th, Thanksgiving, Christmas)

significant in his examination of release date. Moul and Shrugan (2005) use a holiday

variable comprised of a different set of holidays than this study uses, but the variable is

significant. Hence, which holidays are to be included in the holiday variable needs to be

explored further, i.e. Valentine's Day could be removed, or Labor Day added.

Sequels have built-in fan bases to which hoards of viewers flock to see the newest

installment of the series. The sequel effect is evident with a $30.4 million increase in

revenue, on average, for sequel films over those of an original storyline. The sequel

variable is highly significant in both empirical models, indicating a lack of correlation

with production cost.

The genres of action and animation become significant with the exclusion of

production cost. This could possibly be due to the fact that action and animation films

tend to be the more expensive films to produce when compared to comedies and dramas.

Animation films tend to generate the most additional revenue, $31.9 million more than

dramas. Action films generate the next highest additional revenue over dramas, $26.7

million, compared to the $10.4 million generated by comedies. This study does include

fewer genre categories than Litman and Kohl (1989, 15 categories, two of which are

significant) and Collins, Hand, and Snell (2002, nine categories, four of which are significant), which could be driving the fact that all the genres considered in this study are significant.

Movies of an R age-rating generally appeal to only adults, a small potential audience, while the other categories can be enjoyed by a larger variety of audiences. Movies rated PG-13 have the largest potential audience and, therefore, should generate the most revenue. This hypothesis is affirmed in this study. Films rated PG-13, on average, earn $20.4 million more than an R-rated film. Similarly, PG films also hold a significant advantage over R-rated films by generating $15.6 million more at the box-office. Litman and Kohl (1989), Prag and Casavant (1994), and Stimpert and Laux (2008) find age-rating insignificant. The studies use relatively older data sets, before 2004, in which the significance of a particular age-rating on box-office revenues is not quite apparent.

Lastly, having a major distributor for the film can add $14.7 million to total box-office revenue, on average. Litman and Kohl (1989) find similar results in that a major distributor can add a significant amount of revenue towards total revenue for a particular film.

As one can see, there are many factors that influence box-office revenue other than production cost. Star power, professional reviews, release date, sequels, age-rating, genre, and distribution company all have a significant impact on the success of motion pictures. While blockbuster theory credits production cost as the major influence to the success of movies, this study reveals that it is much more complex than that. Production

cost is significant and has a dramatic impact on box-office success, but the elements listed above have a dramatic impact on success as well.

VI. Conclusion

This study investigates what elements of a movie lead to domestic box-office success. The results show that certain aspects of a film draw larger audiences. Animated films tend to generate the most revenue and PG-13 rated films tend to appeal to the widest range of moviegoers. This may be part of the reason why "Avatar" was such a success. It is both animated and rated PG-13. This study, however, does not examine the additional impact on revenue of a film of a particular genre and age rating. The genre and age rating categories are observed individually.

Many of the general study research papers found some of their independent variables (mostly sequel, cost, star power, and release date) to be significant, but none of the studies found all of the included variables to be significant. Granted, holiday and the age rating of G are insignificant in this study. The results found here, nevertheless, are a good showing that there are indeed certain aspects of films that appeal to audiences more than others.

The "curse of the superstar" stated by DeVany and Walls (2004) is evidenced in this paper by the drastic change in significance level of the star power variable when production cost is not included in the regression. While star actors and actresses may draw larger audiences, the cost of hiring those stars tends to negate any additional profit potentially earned. Based on the findings of this study, a production company can pay a star actor up to $25 million for the star role and still have a positive profit in the end. DeVany and Walls (2004) test the "curse of the superstar" by predicting total profits

instead of total revenue. In fact, if the dependent variable in this study were changed from total revenue to total profit, the difference in the coefficients of the star variables for these two models would capture how much surplus value stars are able to extract from producers. Doing this would be an interesting extension to this paper as it would investigate if the "curse of the superstar" is still apparent in today's motion picture industry, or if its impact has even increased.

While the variables of this study are highly significant, there are definite avenues in which to extend this research. Advertising is a major component of the motion picture industry because it informs the public of the newest release and provides a preview of the quality of the film. Advertising costs, thus, can be included as an independent variable. Similarly, the number of screens on which a movie is shown during the first week of release can help explain the success of films at the box-office.

On another note, the value of the individual distribution companies can be investigated by including a separate dummy variable for each of the major motion picture distributors in the industry. This would examine the impact that companies such as Universal or Fox would have on box-office success over other distributors, such as Paramount or Lions Gate.

In addition, this model could be applied to the DVD or worldwide markets. People are probably more willing to rent a lesser quality movie to watch at home, because it is cheaper than going to the movie theater. Popular tastes may also vary significantly internationally and produce different results than found in this study. Nonetheless, the motion picture industry is a fascinating market in which popular trends can be empirically tested and theories of success at the box-office can be thoroughly examined.

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Appendix A.1: Regression Results with Production Cost Variable

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.778[a]	.605	.593	29.68558

a. Predictors: (Constant), Distributor, G, Holiday, Comedy, Sequel, PG, Star, Review, Season, Action, PG13, Animation, Cost

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	554890.099	13	42683.854	48.436	.000[a]
	Residual	362187.031	411	881.234		
	Total	917077.130	424			

a. Predictors: (Constant), Distributor, G, Holiday, Comedy, Sequel, PG, Star, Review, Season, Action, PG13, Animation, Cost

b. Dependent Variable: Revenue

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-35.648	5.937		-6.004	.000
	Cost	.849	.063	.572	13.380	.000
	Star	5.015	4.290	.040	1.169	.243
	Review	.507	.087	.192	5.796	.000
	Season	7.461	3.294	.075	2.265	.024
	Holiday	6.271	3.910	.051	1.604	.110
	Sequel	17.173	4.279	.133	4.013	.000
	Action	6.658	4.202	.061	1.584	.114
	Animation	9.857	7.276	.054	1.355	.176
	Comedy	9.980	3.605	.099	2.768	.006
	G	5.220	8.999	.021	.580	.562
	PG	3.924	4.563	.034	.860	.390
	PG13	9.387	3.565	.098	2.633	.009
	Distributor	7.987	3.551	.073	2.250	.025

a. Dependent Variable: Revenue

Appendix A.2: Regression Results without Production Cost Variable

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.659[a]	.434	.421	32.97101

a. Predictors: (Constant), Distributor, Season, Comedy, G, Sequel, Star, Holiday, PG13, Review, Action, PG, Animation

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	434944.197	12	36245.350	33.342	.000[a]
	Residual	566372.657	521	1087.088		
	Total	1001316.854	533			

a. Predictors: (Constant), Distributor, Season, Comedy, G, Sequel, Star, Holiday, PG13, Review, Action, PG, Animation

b. Dependent Variable: Revenue

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-45.457	5.701		-7.973	.000
	Star	25.555	4.161	.207	6.141	.000
	Review	.704	.086	.283	8.165	.000
	Season	11.454	3.224	.122	3.553	.000
	Holiday	6.223	4.055	.052	1.535	.125
	Sequel	30.361	4.356	.238	6.970	.000
	Action	26.710	4.053	.246	6.590	.000
	Animation	31.857	6.889	.187	4.624	.000
	Comedy	10.373	3.515	.111	2.951	.003
	G	5.254	8.268	.025	.635	.525
	PG	15.623	4.246	.148	3.679	.000
	PG13	20.358	3.400	.227	5.987	.000
	Distributor	14.704	3.332	.150	4.414	.000

a. Dependent Variable: Revenue

Appendix A.3: Regression Results with Production Cost as Dependent Variable

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.689[a]	.474	.459	23.04828

a. Predictors: (Constant), Distributor, G, Holiday, Comedy, Sequel, PG, Star, Review, Season, Action, PG13, Animation

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	197318.314	12	16443.193	30.953	.000[a]
	Residual	218863.881	412	531.223		
	Total	416182.194	424			

a. Predictors: (Constant), Distributor, G, Holiday, Comedy, Sequel, PG, Star, Review, Season, Action, PG13, Animation

b. Dependent Variable: Cost

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-14.615	4.553		-3.210	.001
	Star	24.672	3.101	.292	7.956	.000
	Review	.260	.067	.146	3.893	.000
	Season	7.757	2.528	.116	3.068	.002
	Holiday	-.956	3.036	-.012	-.315	.753
	Sequel	16.867	3.217	.194	5.243	.000
	Action	23.381	3.053	.316	7.659	.000
	Animation	28.744	5.469	.235	5.256	.000
	Comedy	-.274	2.799	-.004	-.098	.922
	G	3.800	6.985	.023	.544	.587
	PG	14.935	3.465	.191	4.310	.000
	PG13	15.748	2.657	.244	5.928	.000
	Distributor	9.004	2.721	.122	3.309	.001

a. Dependent Variable: Cost