Undergraduate Economic Review

Volume 9 | Issue 1 Article 10

2013

Turning Followers into Dollars: The Impact of Social Media on a Movie's Financial Performance

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Recommended Citation
Kaplan, Joshua J. (2012) "Turning Followers into Dollars: The Impact of Social Media on a Movie's Financial Performance," *Undergraduate Economic Review*: Vol. 9: Iss. 1, Article 10.
Available at: http://digitalcommons.iwu.edu/uer/vol9/iss1/10

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Introduction

Films, particularly in the US, are constantly evolving products which attempt to satisfy the demands of a voracious consumer ever seeking of new thrills both in movie content and its presentation. Beyond the difficulties of pleasing the movie going crowd, the industry faces increased pressure from new mediums that allow easier access of movies from the comfort of one's home. Websites such as Hulu, Netflix, and Redbox, to name a few, are chipping away at studio's market share and have tightened profit margins. Films represent a significant investment on the behalf of studios where in the current environment films average upwards of $70 million to produce according to Eliashberg et al. (2010). This figure represents just the production budget of the film, and doesn't include advertising and promotional costs which vary from film to film. As movies only run on average for 4 weeks in the theatre, studios face a significant time constraint in which to recoup their initial outlay.

In previous studies, research has focused on two models: an ex post regression analysis which uses information available after a film's release and an ex ante analysis which uses only information available prior to release. It seems that in today's competitive environment analysis of the ex post type wouldn't lend studios an advantage in the context of making business decisions; a script is chosen years before the eventual release and finances are committed well in advance of opening night. Studios need some way of measuring whether their investment will pay off months prior to release and therefore, analysis should focus on predicative factors that are available prior to release. Although not a perfect method to assess a film's box office performance, ex ante analysis can produce reasonable estimates that allow studios to decide whether to commit additional financing and make appropriate adjustments to marketing promotions to try and induce greater gross upon release.

When examining past studies that had been done on the subject, we began by examining recent research in this field. Many of these papers are based on prior studies and include new formulations of past variables; a majority of the substantial work in this field has been done in the 1980's and 1990's. Recently, with a focus on ex ante analysis, Eliashberg, Hui and Zhang (2010) study the decision to 'green-light' a film, or go ahead with production on the film; variables studied include the content of the script and the genre of the film. The study, which focuses on the time frame well before a film's eventual release, was an inspiration and helped shape this current study.

When examining how to increase the relevancy of our models we turned to the use of social media. The growing prevalence of individuals who are connected through social media either through Facebook, Twitter, Google or YouTube has given studios a new medium in which to access prospective movie-goers. These sites are incredible storehouses of information and can be tapped to

gain insight into a film's popularity well in advance of release. One of the most accessible types of information is the popularity of those individuals who work on the film, namely the director and the actors/actresses. Twitter, allows its users to follow individuals that they are interested in and provides a clear observation of popularity through the count of followers a particular individual has. Instead of using polls in magazines or websites to assess popularity we decided to utilize the data of the number of followers those involved in making the film had on Twitter. This direct relationship between followers or popularity and box office gross we believe to be a significant and interesting method for assessing star power both in this study and in research going forward.

Literature Review

Several studies from the 1980's and 1990's have laid the foundation for future research on the film industry. These studies help establish and refine the traditional variables used when engaging in a study on this subject material. Recently, as the ease of access to film information has increased, there are several enhancements that can be made to research in this field.

The 1983 study by B.R. Litman, "Predicting Success of Theatrical Movies: An Empirical Study," is known as one of the cornerstone papers in this field. According to Litman (1983) the role of the director is stressed over that of the film's actors and actresses as the director is the one that weaves the story together; in addition, signing the right director can secure additional financing for the film. Stars can complement a good film but it is Litman's belief that they no longer salvage a poorly made film. In recent research, the value of the stars in a film is a variable that has received much attention. Studies following Litman's such as Ravid (1999) supported his conclusion that the presence of the stars in the film is irrelevant where as more recent literature by Karniouchina (2011) and Brewer et. al (2009) have found it to be a significant predictor of film revenues; for the purposes of this paper I will examine whether it is the stars of a film who truly contribute to its box-office revenues or whether another variable such as production budget will be more all-encompassing.

Production budget is another strong determinant of film quality; a larger budget, Litman (1983) hypothesizes, reflects greater production value being built into the film, this in turn leads to greater popularity and quality of the finished product. Litman cautions overemphasizing the importance of a film's budget as there have been both large and small budget box office successes. In addition, budgets can be inflated with over-the-hill actors or stunts that don't provide a return on their cost.

The MPAA rating assigned to the film appears to be an oft used metric for research in this field but its predictive capabilities have varied as we will discuss

in regards to Leenders and Eliashberg (2006). In his own thesis, Litman (1983) identifies PG as the most desirable rating for a film as it can reach a wider range of people; this is consistent with later studies, though the desirable range has expanded to include PG-13 due to changing standards.

According to Litman (1983), when choosing between releasing a movie under an independent or a major label, the latter has greater power in striking deals with film distributors; the independent labels have less power and thus greater difficulty when looking for distributors for their films. Indeed, "the one thing worse than being involved with a major was not being involved" according to two producers cited in Litman's study. In regards to the release of the film, many films tend to cluster around the major holidays due to greater audience accessibility. Holidays are cited as the best times to release a film but are also a time of heavy competition. De Vany and Walls (1996) examine a film's performance at release as a rank order survival tournament in which films go head to head and the impact of competition on revenue is looked at.

Also of importance, the film's award circuit performance and the critical praise of the film. Litman (1983) argues that critical acclaim lends momentum to a film's theatrical success whereas unfavorable critical press can have a decelerating impact on a film's theatrical success. Litman (1983) saw the awards as a way to accelerate box-office gross for a short time period. According to a Variety article Litman cited, the 'Oscar' luster could boost domestic box-office by $10 million in 1983 dollars (approximately $22.4 million 2011 dollars), not including the impact on foreign box office. This post-Oscar/Academy Award bump is most likely larger in today's dollars and environment. Post-Litman almost every study has used a variable or proxy of this variable to measure awards. In particular, Smith and Smith (1986) and Zhuang (2011) examine specific awards that are the best indicators of a film's revenue. Award nominations are released post-release; therefore, to approximate pre-release impact, we could take a count of the number of awards the cast and crew of the film have been nominated for and/or won in past films.

In his study Litman (1983) discovered that the MPAA rating was not significant, and the genre of Science Fiction/Horror was the only significant genre variable. He concludes that the quality of a film can outweigh both MPAA rating and genre constraints. Actors and Actresses were not seen as significant predictors of film revenues holding with his hypothesis that the age of star-idolization is passing. Also, the release of a film during peak release times was mitigated for the Easter, and Memorial Day to Labor Day release periods by increased competition.

For the purposes of his study, Litman used 1983 as the base year for all dollar amounts. Adjusted production costs were a significant indicator of film revenue; Litman (1983) found that each additional million dollars spent on

advertising generated $390,000 (approximately $873,000 in 2011 dollars) in additional revenue. Each additional star rating increased ticket gross by $3.376 million (approximately $7.56 million 2011 dollars). The genre of Science Fiction or Horror in the period from 1972 to 1978 added $5.9 million (approximately $13.2 million 2011 dollars) to films revenues. Films distributed by major studio labels earned $7.21 million (approximately $16.1 million 2011 dollars) higher than their independent counterparts. The Christmas-New Year's peak release time was significant and it appeared as if the larger foot traffic outweighed the increased competition faced by such films. Lastly, being nominated for a major award (Best Picture/Best Actor or Actress) added $7.34 million (approximately $16.4 million 2011 dollars) to the box office while actually winning a nomination added $16.3 million (approximately $36.5 million 2011 dollars)[1]. Litman's study established precedents that can be seen in almost every study thereafter; his study in particular denoted the importance of a films budget, its award circuit performance, and its release date.

Sochay (1994) sought to expand the tools used to study box office performance. He determined that a November-December or June-August release date, an Oscar win or nomination, the variable for bankable stars, the MPAA rating, Comedy genre, and the number of screens released on, were all positively correlated with box-office revenues. Litman (1983) had found both the Science-Fiction variable to be significant along with the Horror variable. Perhaps Science-Fiction was highly significant in earlier studies due to the impact of mega-blockbusters such as the "Star Wars" series.

In terms of the Christmas and summer film seasons, Sochay (1994) found that a higher level of competition led to a ripple effect for other films; as posited by Litman (1983), having bigger box-office hits in the theatre created a positive externality for other films showing at the time. If the bigger box-office films are sold out when a consumer goes to buy their ticket, the individual has the potential to attend another film or if consumers were so satisfied with the blockbuster they had just viewed, they will wish to consume more and attend other movies. For Easter, the opposite held true; blockbusters had a 'black hole effect' and created a market for only one or two films. In relation to MPAA rating, the only significant variable was the R rating of a film which negatively impacted box-office gross as Sochay hypothesized prior to the study.

De Vany and Walls (1996) is cited by many as another cornerstone of film research and departs from previous studies by examining the impact of competition on film revenue; specifically, they examine survival and death rates of films or what factors make films extend their theatrical run longer than others.

[1] Conversions to 2011 dollars are based on the CPI for all urban consumers, December 1983 CPI = 101.4, December 2011 CPI = 227.0. CPI data from http://research.stlouisfed.org/fred2/series/CPIAUCSL?cid=9.

De Vany and Walls (1996) provide an interesting summary on the ways distributors choose which theatres to release their product to. Since major producers, by anti-trust ruling, no longer own large chains of theatres, films are auctioned to theatres. There are two types of releases as discussed by earlier studies: a wide release which opens on many screens to achieve the broadest audience reach possible and also a tailored release in which the studio lets the film out on a few screens to test demand. If sufficient demand exists, the studio then expands the release to more screens.

With the supply of seats fixed, films maximize revenue by optimizing the duration of a film's run in theatres. By lengthening the run time, the studio stands a better chance of garnering a larger audience and achieving higher revenues. This is especially true as the fixed overhead of the film, the prints, are not dependent on how long the film runs. The expansion of run time is specified in the contract; if box-office revenues for that week exceed a pre-agreed upon amount the film is allowed to continue its run. Terms of contract stipulate a weekly rental rate the theatre must pay to show the film; typically the terms are 70:30 in favor of the studio, however, as the weeks go by, the ratio turns in favor of the theatre to encourage them to continue showing the film. Further, after the contractual obligation is up, it falls on the theatre to decide whether to continue showing the film or not.

Keeping the above information in mind, it is clear that a film must take in a certain level of box-office receipts each week in order for it to survive in the theatre. If the film fails to meet the cutoff, or the required level of intake, it is dropped and replaced by another film. In their study De Vany and Walls (1996) cap their rank system at the fifty top box-office grossing films per week. Those films that achieved less than the fifty top grossing films for that week are dropped in favor of the higher grossing films. In the sample of films studied, the mean run time was 5.71 weeks. Those that ran longer than the mean had been ranked in the top ten at some point. Further, those that ranked number one at some point had a mean run length of 17.67 weeks and held the coveted number one spot for 2.86 weeks on average. Data was compiled from Variety's domestic box office weekly report which examines major and medium metropolitan market areas; the information gathered included the box office revenue, the number of theatres and screens showing the film, the rank, the number of weeks currently in the top fifty and the number of weeks it had had been in the top fifty in other runs.

Films with length of runs between 5 and 11 weeks generated 50% of the total revenue in the sample. A film on average has a 25% chance of lasting 7 weeks or more and a 15% chance of lasting 10 weeks or more. An interesting conclusion is that releasing a film on a large number of screens does not guarantee its survival; for example, if a film is widely released and the demand is not there

to support it, the low per theatre revenues will cause the theatres to replace the film with another more profitable product.

In conclusion, some of the longest running films in the sample earned small box office receipts and some of the top grossing films had relatively short lives. This supports the author's theory that widely released films will saturate demand too quickly and die off whereas specialty films or small release films coax out demand slowly and thus bolster their run potential over time. Whether limited release strategy or a wide-release strategy is more significant is left to future studies.

Ravid (1999) focuses his research on the film star variable and is recognized in the field for his work**.** Ravid (1999) hypothesizes that stars in a film capture their economic rent and therefore do not contribute to films profitability; this hypothesis would be supported by a finding of no correlation between star participation and higher film revenue. On the other hand, Ravid (1999) hypothesizes that getting a well-known star to participate in a film may provide a signal of the film's quality; stars and directors are concerned about both their reputation and the back end profits of the film for compensation reasons. Therefore, they will only sign onto a product if they have superior information that the film is a quality product.

In the results, Ravid (1999) focuses on the Star variable and finds that films employing well-known stars are only slightly more profitable than their counterparts. In terms of revenue over return on investment, star studded casts do produce higher revenues; however, as previously mentioned they also have higher costs which crowds out profit. Due to the weak nature of the results, Ravid (1999) was unable to reject his hypothesis that stars capture all their economic rent. In terms of critical reviews, films employing high star quality received more review attention, but, in terms of the review rating they had virtually no difference in ratings from their lesser known counterparts.

In relation to the other generic variables in the study, Ravid (1999) found that films rated by the MPAA as G and PG to be the highest performers. The variable for budget as opposed to the star power in the film seemed to be the better signal of higher revenues; further, the more reviews a film receives as well as the quality of the reviews received will lead to higher revenues. Ravid's conclusion lends support to the notion that 'star power' is becoming a less significant variable in analysis of this type and it is something to take into consideration when finalizing an empirical model.

The following studies examine unique variables or different formulations on existing variables that improve the accuracy of cornerstone research.

The research conducted by Spann and Skiera (2003) investigates a new medium through which to predict box-office success. Virtual Stock Markets, or VSMs for short, are used to predict short/medium term market developments.

The VSM brings interested parties together to trade shares of virtual stock and bet on the future outcome of the stock; the payout is determined by whether the future outcome being bet on by the party is realized in actuality. Through trading of these 'stocks', a VSM engine can elicit feedback on how the populace believes the product will perform upon release.

In relation to the movie industry, participants in the VSM system have access to all information released prior to a film's actual release: the film's website, the preview (movie trailer), public opinion, and movie critiques. The VSM for movies is known as the Hollywood Stock Exchange (HSX), and it utilizes the data collected from the sale and purchase of stock as a market research method. The stock exchange makes the stock in a movie available in an IPO or initial public offering, usually a year in advance to the actual release. Four weeks post release of the film the stock is cashed out and removed from the exchange. Note, there is no true monetary gain here besides a ranking system in which those who pick the best stocks (movies) are ranked at the top. Predictive capacity of this tool is found in the level of the stock price leading up to and at the eve of release.

In their research, Spann and Skiera (2003) found that the HSX had a bias towards underestimating the opening weekend box-office gross for movies with large opening weekend totals; it also overestimated revenues for movies with small opening weekend totals. In essence it had an averaging effect, predicting lower grosses for 'large' films and higher grosses for 'small' films. In an article from 2010, Jolie O'Dell details that Twitter trumped the HSX in predicting real world outcomes; the accuracy of predicting film performance was increased by 1-2 percent through using Twitter over the HSX. If the data is readily available perhaps twitter 'buzz' could be used in determining box-office revenues.

Leenders and Eliashberg (2006) examined the Motion Picture Association of America or the MPAA which assigns content ratings to movies (G, PG, PG-13, R, NC-17, etc.) Most literature uses the MPAA rating as a predictive variable; however, Leenders and Eliashberg (2006) propose an alternative hypothesis as to the impact of a films rating. In part of their study, Leenders and Eliashberg examine MPAA rating in relation to product performance, and suggest restrictive ratings can have both positive consequences and negative consequences for a film.

The key is for filmmaker to tell their story in a manner which captures the essence of the film while adhering to the guidelines of the MPAA to obtain a profit favorable rating; typically ratings of G, PG or PG-13 are the most profitable ratings. Leenders and Eliashberg (2006) cite the movie "Hannibal", comparing its performance in France where 12+ could attend the theatre and in Australia where 18+ were allowed to view the film. As we would expect the film's profitability was less in Australia as compared to France.

In examining the stigma associated with movies that receive explicit content ratings such as R and NC-17 or NR, Leenders and Eliashberg (2006) discuss the 'tainted fruit' effect. In essence, warning labels should decrease the attractiveness of a product as the product might harm the consumer. The product/movie will only be consumed by those who consider it appropriate. A contrasting theory, the 'reactance theory', suggests that limiting or threatening a person's freedom of consumption will induce that person to react in a manner opposite of the desired result of the limitation; this plays on the 'forbidden fruit' desire of the customer. In studies examining this theory, it was found that as the MPAA rating became more restrictive for a given movie, the desire of the adolescent age category to see that movie increased.

In the results it appears as if the rating category impacts box-office performance in a significant, albeit negative manner. Further, Leenders and Eliashberg (2006) detail that after accounting for the other variables and random effects there is a general 'tainted fruit' theory across all countries. For more masculine countries, the 'forbidden fruit' effect is amplified as compared to the more feminine countries. Thus the ratings are less of an impact in masculine environments. Violence was seen as the mechanism which led to the most restrictive rating and thus limited the audience and the films commercial success.

Sood and Dreze (2002) studied the performance of movie sequels at the box office, citing that sequels are becoming a safe and productive play at the box office. Indeed, according to Sood and Dreze (2002), sequels annual box-office revenue has more than doubled to $1.9 billion in the 2000's from $718 million in the 90's. In relation to the sequel and its predecessor, Sood and Dreze (2002) hypothesize that genre similarity is important to consumers. Interestingly, they also hypothesize that consumers will prefer dissimilar sequels in terms of their storyline so they do not pay to see the same movie again.

In their analysis, Sood and Dreze (2002) cite two types of association with the original product; physical similarity and shared association. Both types increase extension evaluations or the likelihood that the sequel of the first product will be consumed. Between the two, the former is the physical resemblance to the first line of the product (i.e. a kitchen timer is more similar to a Rolex than a pair of cuff links). However, if the cuff links are made by Rolex, the shared association attraction of the brand is greater than that of the physical attraction. In relation to the topic at hand, movies, the researchers believe that this type of product will diverge from previously predicted behavior for other products like kitchen timers and cuff links; as these goods are experiential and intangible, consumers will prefer dissimilar sequels to similar ones. The dissimilar experience helps them maintain an optimal level of stimulation.

To test this preference for dissimilarity, Sood and Dreze (2002) use the genre of the sequel in comparison to the original's genre. Further, they examine

similar extensions which are composed of the same genre but with a new storyline and dissimilar extensions which are composed of different genre and have a different storyline. Lastly, Sood and Dreze (2002) also pay attention to the title of the sequel: is it a numbered sequel such as "Shrek 2" or a named sequel such as "Wall Street 2: Money Never Sleeps".

Sood and Dreze (2002) conclude that having a named title leads to a more favorable rating and higher desire to see the film. "Wall Street 2: Money Never Sleeps" was therefore aptly named, instead of calling it simply Wall Street 2. The three words after the initial name suggest a different take on the original. Further, it lends information to individuals who were not familiar with the first movie in the series. In terms of success of the sequel, Sood and Dreze (2002) evaluate its success through the probability that the studio will release a follow-up film to the sequel. Using this method of evaluation, Sood and Dreze (2002) found that named sequels dissimilar in genre from the first movie were the highest rated and most likely to then produce a follow-up to the sequel. The researchers make note that the sequels examined in the study were only moderately different from their predecessors; if the sequels were highly disparate, the results could have been much different.

In the modern Hollywood, studios are relying more and more on sequels to bring in revenue for their studios; case and point is "Toy Story 3" which was the highest grossing film in 2010 at $415,004,990 (Box Office Mojo, 2010).

More recent studies done have provided a mixed levels of information, several have been updated studies of those done by Litman in the 1980's. However, some examine more recent issues such as the impact of social media in creating buzz for a film or the use of regression analysis at the 'green-lighting' phase as shown in the study by Eliashberg et al. (2010).

Brewer et. Al (2009), conducted a study of the top 100 grossing films/year from 1997 – 2001 and examined the various factors that went into predicting box office success. Brewer et al. (2009) decided to split their analysis into two regressions. The first, ex ante, predicts a film's success based on information available prior to the film's release and the second or ex post uses information available post release of a film. In the study, "Titanic" and the "Blair Witch Project" were omitted from the study, "Titanic" for its unusually high gross, "Blair Witch Project" for its extremely low budget in comparison with gross or, its high Return on Investment.

Unique to their study was the method of measuring Star Power. In the study, Brewer et al. (2009) used the Harris Poll to measure the top ten movie stars, and then combined this with the People's Choice Awards for Best Motion Picture Actor/Actress, Male/Female TV Performer and another poll used to measure star popularity. The stars that were present on all three polls for the years studied were then included in the final list of sixty-six. Brewer et al. (2009)

used a count function in which each film would receive a total for the number of individuals from the list who appeared in that particular film. Lastly, word of mouth was measured by a source called CinemaScene; this organization conducts exit polls on site at movie theatres and gets the viewer's rating of a movie post-screening.

Brewer et al. (2009) found results that matched expectations. The ex ante regression found production budget, gross of prequel, personal income, favorable critical reviews and a release in the summer or holiday season (Thanksgiving – Christmas) to be positively associated with gross box office receipts which matches with results from prior studies. As for the ex post regression, peak number of screens, the stardom factor, film award nominations and word of mouth were shown to have a positive impact on the gross box office receipts. Genre received mixed reviews, the five highest grossest movies of the 1997 – 2001 period included two dramas, two comedies and one action/adventure and thus it was determined inconclusive which genre was dominant[2]. In conclusion the study determined that the most potent variables were personal income, and the MPAA rating of PG-13 prior to a movie release and award nominations and word of mouth after a movie is released.

Simonton (2009) provides an evaluation for the impact of major awards on a films financial success. He makes note of the fact that not all awards bear the same weight in determining a films financial success, accordingly he divides various Oscar Awards into four different categories. The first, the dramatic cluster, includes awards in directing, writing, acting and film editing. The visual cluster is composed of cinematography, art direction, costume design, and makeup. Technical, encompasses special effects, sound editing and sound mixing and there is also a musical cluster. Of these clusters it is interesting that critical acclaim is heaped on the dramatic elements of a film, while a higher percent of the budget is often focused on the technical component. Thus, while critical acclaim is associated with more award nominations, more money is focused on areas such as the technical for the 'wow' factors that bring in the audience. Simonton (2009) details that for each additional dollar spent on technical 'wow' factors the returns are $.47 for every $1.00; a decision of 'Film as Art' versus 'Film as Business' tradeoff. Simonton (2009) concludes that critical acclaim for a film is not always as highly associated with more box-office gross as previously thought. Further, he details that a nomination for an award has been seen to return more for the film than an actual award win in many cases.

The paper concludes by examining the typical independent variables for a regression concerning gross box office receipts. In regards to star power, Simonton (2009) argues that the variable is an unreliable predictor of film revenue

[2] (Titanic (drama), Men in Black (comedy), Jurassic Park II: The Lost World (action-adventure), Liar, Liar (comedy) and Air Force One (drama)

which matches the expectations of Ravid (1999). Perhaps you need a more accurate assessment of Star Power as Brewer et al. (2009) calculated, or a fresh take as in looking at social media's impact on popularity. As for the season of release, summer is seen as the cash cow for the movie season, followed by the Holiday season and Easter; this is an update on earlier studies which showed the December release as the optimal window. Most flops occur in the first few months of the New Year as studios put out movies then that they feel would otherwise be unable to compete with summer blockbusters. Interestingly, the study finds that the later in the year (closer to December 31st) a film is released the higher the chance of critical praise for the movie.

One of the most recent studies, Karniouchina (2011), has helped shape the focus for the social media buzz aspect of a movie in this study. Karniouchina (2011) concerns herself with the concept of word of mouth marketing, in particular the popular attention given to a star of the movie, in a word their "buzz". Indeed, 53% of moviegoers base their movie choices on information received from others, or the word of mouth effect. This variable is becoming an increasingly important aspect of determining box-office revenue due to the impact of websites such as Twitter and Facebook.

The movie buzz effect has been seen to generate large returns for movies. The "Blair Witch Project" which used pre-release hype on the internet to bring in huge crowds despite having a minimal production budget is a prime example. More recently "Paranormal Activity" which had a budget of $11,000 and generated well over $100 million in gross box office receipts parallels the "Blair Witch Project" effect. The success of such movies is due in part to 'buzz' marketing on the behalf of executives through creative online gimmicks like advertising and secrecy surrounding the movie's content that captures a film goer's attention.

Also of consequence is the 'star' buzz or the ways in which studios use their stars to generate interest in their movies; techniques include various public relations stunts and/or interviews as well as social media promotion. Karniouchina (2011) cautions the use of the star buzz factor in that some stars have a detrimental effect on movie revenues due to unfavorable potential audience perception. Karniouchina (2011) concludes that there are three main factors that determine whether a star can generate the needed buzz for the film: bankability, sex appeal and award nominations. The first is measured by examining the stars ability to consistently generate both critical and moviegoer interest in their various films as measured by previous films financial performance, sex appeal is not detailed and award nominations examines the individuals past history for award nominations and wins.

Karniouchina (2011) states that both star buzz and movie buzz are positively associated with box office receipts. In particular, star buzz and movie

buzz have been shown to dramatically increase opening week gross at the box office. Karniouchina (2011) found one irregularity in that star buzz has been shown to have a negative impact after opening week; however the net between the opening week and subsequent weeks remained positive. She concludes by saying if there is a significant demand for a movie as measured by its buzz, a decrease in the opening number of screen can cause demand to be spread out over a longer horizon and generate more long term revenues. This hypothesis parallels that of Litman (1983) and De Vany and Walls (1996).

In summation, it is clear that there is a wide array of research that has been done in this field and it appears that a variety of data is available. From Litman (1983) to Karniouchina (2011) there have been a multitude of variables tried and tested. This study will focus on pre-release information and will filter out those variables that are only available post-release. Based on previous research, the budget of a film, its MPAA rating, the genre, the release date and the number of screens are integral to the analysis. The use of a star variable is debatable given the wide spread rejection by Litman (1983), Ravid (1999), and Simonton (2009) of the variables impact. As an alternative, the 'buzz' generated by the movie either through the Hollywood Stock Exchange or, for the purposes of this study, Twitter, may be valuable. In terms of award nominations and wins, a count function that examines how many past nominations/wins the cast and production team has between them would be insightful. Ex ante analysis does not allow for the use of information on wins and nominations for the current film but a relationship should exist between past wins/nominations and current.

Data

This study examines 207 films covering the period from 2009 – 2011.[3] Films had to gross at least $15 million in total domestic gross to be included in the sample. Rereleases such as the "Lion King 3D" were excluded from the sample as were documentaries to focus purely on feature films. Lastly, those movies missing production budget data or cases in which a reasonable estimate for the production budget was not available are excluded as well.

Theoretical Model and Hypothesis

For the purposes of this study we utilize two different dependent variables. Total domestic gross and domestic gross/theatre, both measured in millions of US dollars, the former shall be known as equation 1 and the later as equation 2. The auxiliary equation of domestic gross/theatre is used to decrease the disparity between large release blockbusters and limited release films. The latter, while

[3] The list of films used in the analysis is available from the author upon request.

financially successful in their smaller theatrical circuit, never reach as broad an audience as their wide release counterparts. Revenue grossed outside of the domestic box office in international markets is ignored for the purposes of this study. The two OLS regressions used in this study are both ex ante in nature.

Table 1: Dependent Variable: Total Domestic Gross

Independent Variable	Expected Relationship
Release Date	Positive
Studio	Positive
Genre	Ambiguous
Sequel/Remake	Positive
MPAA Rating	Ambiguous
Runtime	Positive
Academy Awards	Positive
Production Budget	Positive
Twitter Followers	Positive

Table 2: Dependent Variable: Domestic Gross/Theatre

Independent Variable	Expected Relationship
Release Date	Positive
Studio	Ambiguous
Genre	Ambiguous
Sequel/Remake	Positive
MPAA Rating	Ambiguous
Runtime	Positive
Academy Awards	Positive
Production Budget	Positive
Twitter Followers	Positive

Based on the work of Sochay (1994) and Simonton (2009) we decided to include a dummy variable, SUMMER, to measure whether the film was released in the summer months or otherwise. Brewer et. al (2009) had previously defined the summer months as the period of May, June and July. Their non-inclusion of August was based on the belief that individuals are returning to work, public school or to college and therefore have less time to spend at the cinema. We only include a variable for the summer period as Simonton (2009) found that using a variable for the holiday season, November – December, to be insignificant. We believe our SUMMER variable will have a positive relationship.

Litman (1983) found that higher revenues were correlated with films associated with a major label; as such this study includes a dummy variable STUDIO which we expect to have a positive relationship with the dependent variable in equation 1 and an ambiguous relationship with the dependent variable in equation 2.

Sood and Dreze (2002) examined the correlation between a film being a sequel or of a known brand and its performance at the box office. This study expands this definition to include remakes. We believe the correlation between a movie being a remake/sequel and higher revenues to be positive and this belief is captured by the variable SEQUEL/REMAKE.

The genre categories are loosely based on a study by Brewer et. al (2009), there are seven genres identified in this study, the seventh is Romance and is our reference dummy. The relationships between these variables and the dependent variables are ambiguous with the exception of the animation/family category which we believe will have a positive relationship.

The MPAA rating has been used since Litman (1983); however, Leenders and Eliashberg (2006) found its predictive capacities to be poor. We included G, PG, and PG-13 as dummy variables while R is the reference dummy. The more restrictive the rating, the more constrained will be box office revenues. Thus, the MPAA rating of G should be positive in nature and from there the expected result is ambiguous.

Researching past studies, we found no research on the impact of a film's length or runtime in minutes. As such, the variable RUN was included with the expectation of a positive relationship.

Litman (1983) found production budget to be a significant variable in his study. We have also included the variable BUDGET in our study with the expectation that as a films production budget increases, the opportunity for enhancements in quality or the 'wow' effect on the technical side are increased leading to higher box office revenues.

Simonton (2009) focused a majority of his research on the impact of awards on box office revenue. This study focuses purely on the ex ante side and therefore could not use those awards involved with the film being studied. As a proxy of a film's quality, the dummy variable AA is used; if the director or any of the three main actors/actresses have had a past win or nomination the variable takes the value of 1, otherwise 0. Our expectation is that this measure of quality would exhibit a positive relationship with both dependent variables.

The last variable is perhaps the most unique aspect of this study. When examining how best to assess the popularity of the actors/actresses and director of the film we turned to the use of social media. Karniouchina (2011) researched the social buzz surrounding a movie and was the inspiration, along with Jolie O'Dell's article in 2010, for our use of social media to approximate star

popularity. Using the sum total of the director and the three main actors/actresses twitter followers we compiled the variable TWITTER. Originally we only included Twitter accounts that had been approved by twitter as legitimate; these are noted on the site by the account having been marked by a blue checkmark. Upon collecting this data it became apparent that many accounts not verified as 'official' by Twitter appeared legitimate and could represent real celebrity accounts yet to be verified by the site. We therefore expanded our selection to include all accounts above 50,000 followers with or without a blue checkmark and appearing as legitimate. As a note of caution, this variable took the sum of followers as of March 2012 and could be slightly biased as it could represent followers who became followers post movie release. Future research should use data prior to a movie's release. We believe that this variable will display a positive relationship with domestic gross/theatre and total domestic gross.

Data Description

Table 3: Descriptive Statistics

Variable	Mean	Standard Deviation	Maximum	Minimum
Total Domestic Gross	78,010,526	73,069,065	415,004,880	15,013,650
Domestic Gross/Theatre	23,814	17,578	103,030	5,312
SUMMER	0.26	0.44	1	0
STUDIO	0.78	0.42	1	0
SEQUEL/REMAKE	0.22	0.42	1	0
ACT/ADV	0.22	0.41	1	0
ANIM/FAM	0.11	0.31	1	0
COMEDY	0.26	0.44	1	0
DRAMA	0.11	0.31	1	0
HORROR	0.14	0.35	1	0
SCI-FI/FANTASY	0.10	0.30	1	0
G	0.03	0.17	1	0
PG	0.20	0.40	1	0
PG-13	0.46	0.50	1	0
RUN	106.21	14.70	154	63
BUDGET	60,332,126	52,188,702	260,000,000	1,500,000
AA	0.50	0.50	1	0
TWITTER	1,267,092	2,440,822	15,732,427	0

Table 3 provides a summary of descriptive statistics for the sample used in this study. Data was compiled from the websites Internet Movie Database, Twitter, BoxOfficeMojo, and theNumbers for 2010 and 2011. The mean for total

domestic gross and domestic gross/theatre were $78,010,526 and $23,814 respectively, with a standard deviation of $73,069,065 and $17,578 respectively.

The top 5 grossing movies for total domestic box office in this study were Toy Story 3: $415,004,880, Harry Potter and the Deathly Hallows Part 2: $381,011,219, Transformers: Dark of the Moon: $352,390,543, Alice in Wonderland (2010): $334,191,110 and Iron Man 2: $312,433,331. The bottom 5 were Judy Bloom and the NOT Bummer Summer: $15,013,650, Youth in Revolt: $15,281,286, The Ghost Writer: $15,541,549, The Thing (2011): $16,928,670 and Splice: $17,010,170.

In looking at equation 2 which studies domestic box office/theatre the top 5 grossing movies were Toy Story 3: $103,030.01, Alice in Wonderland (2010): $89,379.81, Harry Potter and the Deathly Hallows Part 2: $87,088.28, Transformers: Dark of the Moon: $86,201.21, and Inception $77,156.17. The bottom 5 changed quite a bit from total domestic box office with Apollo 18: $5,311.62 having the lowest total followed by The Thing (2011): $5650.42, Furry Vengeance $5,872.91, Going the Distance: $5,876.01 and Fright Night (2011): $5,877.52.

In relation to the other variables, 26% of the movies were summer releases, 22% were remakes or sequels of other movies[4] and 77.6% were released under the label of a major studio. For our study we consider the following and their subsidiaries to be major studios: 20th Century Fox, Sony/Columbia Pictures, Warner Bros. Pictures, Walt Disney Pictures, Paramount Pictures and Universal Pictures. In terms of genre, Action/Adventure composed 22% of the sample, Animation 11%, Comedy 26%, Drama/Musical 11%, Horror/Thriller 14%, Sci-Fi Fantasy 10% and Romance 7%. Last from the qualitative variables, 50% of the movies included a nominated or academy award winning director and/or actor/actress.

If we examine the quantitative variables in the equation; the sample had a mean runtime of 106 minutes, with the maximum and minimum at 154 minutes

[4] The Thing (2011), Fright Night (2011), The Three Musketeers (2011), Conan the Barbarian (2011), Arthur (2011), Nanny McPhee Returns, Scream 4, Spy Kids: All the Time in the World, Cats & Dogs: The Revenge of Kitty Galore, A Very Harold & Kumar 3D Christmas, Big Mommas: Like Father, Like Son, Final Destination 5, Wall Street: Money Never Sleeps, Saw 3D, Diary of a Wimpy Kid: Rodrick Rules, Death at a Funeral (2010), Step Up 3-D, Resident Evil: Afterlife, A Nightmare on Elm Street (2010), Predators, Tyler Perry's Madea's Big Happy Family,Paranormal Activity 2, Sex and the City 2, Tyler Perry's Why Did I Get Married Too?, The Chronicles of Narnia: The Voyage of the Dawn Treader, Robin Hood, Jackass 3-D, X-Men: First Class, Little Fockers, Kung Fu Panda 2, Clash of the Titans (2010),Cars 2, The Karate Kid, Rise of the Planet of the Apes, True Grit, Tron Legacy, Shrek Forever After, Fast Five, Pirates of the Caribbean: On Stranger Tides, The Twilight Saga: Eclipse, The Hangover Part II, Iron Man 2, Harry Potter and the Deathly Hallows Part 1, Transformers: Dark of the Moon, Harry Potter and the Deathly Hallows Part 2, Alice in Wonderland (2010), Toy Story 3

and 63 minutes respectively. The production budgets of the movies in the sample averaged $60,332,125.60 with a maximum budget of $260,000,000 and a minimum of just $1,500,000. The Twitter total for the movies director and the top three actors/actresses averaged 1,267,091.72 followers. The maximum was held by Katy Perry for her role in "The Smurfs" with 15,732,427 followers and the minimum number of followers was 0. Out of the directors in the time period studied, 12% had a twitter account with over 50,000 followers and 41% of the actors/actresses in the sample achieved the same threshold.

Final Model

Each equation is estimated using OLS with Newey-West Standard Errors to address potential heteroskedasticity.

Both of the equations in this study use variables of the ex ante type. The final estimated equations can be seen below. Based on the F-statistic for each equation of 17.17 and 13.71 for equation 1 and equation 2 respectively, we conclude that both models are jointly significant at the 1% level.

Equation 1:

$$\text{Total Domestic Gross}_{\text{Dollars}} = \beta_0 + \beta_1\,(\text{SUMMER}) + \beta_2\,(\text{STUDIO}) + \beta_3\,(\text{SEQUEL/REMAKE}) + \beta_4\,(\text{ACT/ADV}) + \beta_5\,(\text{ANIM/FAM}) + \beta_6\,(\text{COMEDY}) + \beta_7\,(\text{DRAMA}) + \beta_8\,(\text{HORROR}) + \beta_9\,(\text{SCI-FI/FANTASY}) + \beta_{10}\,(\text{G}) + \beta_{11}\,(\text{PG}) + \beta_{12}\,(\text{PG13}) + \beta_{13}\,(\text{RUN}) + \beta_{14}\,(\text{BUDGET}) + \beta_{15}\,(\text{AA}) + \beta_{16}\,(\text{TWITTER}) + e$$

Equation 2:

$$\text{Domestic Gross/Theatre}_{\text{Dollars}} = \beta_0 + \beta_1\,(\text{SUMMER}) + \beta_2\,(\text{STUDIO}) + \beta_3\,(\text{SEQUEL/REMAKE}) + \beta_4\,(\text{ACT/ADV}) + \beta_5\,(\text{ANIM/FAM}) + \beta_6\,(\text{COMEDY}) + \beta_7\,(\text{DRAMA}) + \beta_8\,(\text{HORROR}) + \beta_9\,(\text{SCI-FI/FANTASY}) + \beta_{10}\,(\text{G}) + \beta_{11}\,(\text{PG}) + \beta_{12}\,(\text{PG13}) + \beta_{13}\,(\text{RUN}) + \beta_{14}\,(\text{BUDGET}) + \beta_{15}\,(\text{AA}) + \beta_{16}\,(\text{TWITTER}) + e$$

Estimation Results

Table 4: Ex Ante: Domestic Gross/Theatre

Variable	Coefficient	SE	T-Value
Constant	-68,220,559	34626723	-1.97
SUMMER	20,823,093	10949054	1.90[b]
STUDIO	-1,354,003	8023259	-.168
SEQUEL/REMAKE	43,970,868	10533377	4.17[a]
ACT/ADV	-34,671,855	15523292	-2.23[b]
ANIM/FAM	20,828,259	19176046	1.086
COMEDY	-22,063,775	14804330	-1.49[c]
DRAMA	-13,579,434	17078506	-0.795
HORROR	-35,496,055	14816379	-2.396[a]
SCI-FI/FANTASY	3,026,895	20593553	0.146
G	15,162,890	35599023	0.425
PG	-25,226,158	11108004	-2.27[b]
PG-13	1,839,179	8228936	0.22
RUN	367,532	160667.5	2.287[b]
BUDGET	0.670743	0.104051	6.446[a]
AA	5,408,349	7561376	0.715
TWITTER	2.66	1.167785	2.28[b]

* N = 207, Adj. R^2 = 55.5, R^2 = 58.8, F-stat = 17.17, Durbin Watson Stat = 1.777
a: Significant at 1% level, b: Significant at 5% level, c: Significant at 10% level

Table 4 presents the results obtained in running equation 1; the final sample was composed of 207 movies from 2009-2011. The R^2 and Adjusted R^2 are 58.8 and 55.5 respectively. SUMMER, as hypothesized, has a significant positive relationship. If a movie is released in the months of May, June or July it will add $20,823,093 to its total domestic gross than if it is released in another period. This matches the results of Brewer et. al (2009) who also found a positive relationship between a summer release and higher domestic box office gross.

STUDIO was found to be insignificant, and had a negative relationship which is opposite of what was hypothesized; if a film was associated with one of

the six major studios it took away $-1,354,003 from its total domestic gross than if associated with a minor label. This runs contrary to Litman (1983) who found this variable to be significant. Perhaps this is due to the emergence of more minor labels in the 29 years since Litman conducted his study. Further, it could indicate that consumers care more about the stars and quality of the film than the organization that backs it.

The dummy variable SEQUEL/REMAKE was significant as hypothesized. It matched the research and pattern hypothesized by Sood and Dreze (2002) that film sequels were becoming an increasing share of yearly box office. In the case of our study, if a film was identified as belonging to this category it added $43,970,868 to the films total domestic gross than if otherwise.

In terms of the genre variables used in this study, three out of six were identified as significant. The Action/Adventure genre was significant and decreased a films total domestic gross by $34,671,855. Comedy and Horror films were also found to be significant with Horror taking away $35,496,055 from the total domestic gross and Comedy taking away $22,063,775 from the total domestic gross. Drama and Sci-Fi/Fantasy films were both insignificant with Sci-Fi/Fantasy having a positive association with total domestic gross and Drama a negative association. Surprisingly, the Animation/Family genre was positive as hypothesized, though insignificant in our study. Horror movies had also been previously found by Litman (1983) to be significant and positively associated with total domestic gross. Sochay (1994) also found Comedy to be a significant variable. Tastes and preferences change over time and as such the genre variable has been known to change in its significance over time. While three of our genre variables in this study were significant for our purposes, it should be noted that their future significance cannot be guaranteed.

Two out of the three MPAA variables were found to have positive associations with total domestic gross, but were found to be insignificant. The PG rating was the sole exception and was found to be negatively associated with box office gross. Our results match Leenders and Eliashberg (2006) in relation to the G and PG-13 variables which in their study were found to be the most profitable ratings assigned to a film. However it contradicts both their study and Litman (1983) in the fact that PG rated films took away $25,226,158 from a film's box office gross; interestingly enough, Litman (1983) had previously found PG to be the most desirable rating.

The variable RUN was significant as hypothesized. The more content a movie offers a viewer, the more it should hold attraction to the consumer. For the purposes of our study each minute of runtime added $367,532 to a movies total domestic gross.

In terms of BUDGET or a movies production budget, for each dollar spent on a movie, it returned $0.67. Although this reflects decreasing returns to scale, it

opens the door for other revenue streams by increasing, among other factors, the number of screens a movie can open on according to De Vany (2004) and Brewer et. al (2009). Litman (1983) also found this variable to be significant but cautions over-emphasizing its importance as both small budget and large budget films have blockbuster potential.

In an effort to find a proxy for director and actor/actress quality, past nominations and/or wins for Academy Awards was used. The variable was found to have a positive but insignificant impact on a films domestic box office performance. When attempting to differentiate between a director's quality and the actors/actresses quality by separating the variable into two separate dummy variables. One for director Academy Award wins and one for actor/actress Academy Award wins, this reduced goodness of fit for the equation and both variables were still insignificant. Perhaps as Simonton (2009) hypothesized, different awards have different impacts on a films box office performance. Or as Litman (1983) found it is awards received specific to the film being examined that impact box office in a positive significant manner.

Our final variable, TWITTER, as hypothesized was found to be significant and had a positive relationship with total domestic box office. For every follower, a film added $2.66 to its total domestic box office. This may seem a small impact, however, for stars such as Katy Perry that have 15,627,593 followers having a well-known actress in this case added $41,569,397 to "The Smurfs" total domestic box office gross. Our use of this variable showed perhaps best of all the rising importance that social media has on the industry by allowing stars to further connect with their fans. It also demonstrates the impact movie stars and their 'star buzz' can have on a movie's performance by staying connected with their fans and promoting their movies through social media. These results match Karniouchina (2011) expectations of 'star buzz' and is in contrast to Ravid (1999) who found that well-known stars were found to add only slightly more to a films financial performance than lesser known ones.

Table 5: Ex Ante: Domestic Gross/Theatre

Variable	Coefficient	SE	T-Value
Constant	-14,919	8875	-1.68
SUMMER	5,005.171	2772.63	1.81[b]
STUDIO	-315.59	1987.07	-0.159
SEQUEL/REMAKE	9,498.93	2689.34	3.532[a]
ACT/ADV	-7,201.55	3614.15	-1.993[b]
ANIM/FAM	7,111.80	4825.31	1.474[c]
COMEDY	-2,814.46	3450.15	-0.816
DRAMA	675.15	4366.35	0.155
HORROR	-7,348.13	3418.52	-2.153[b]
SCI-FI/FANTASY	2,747.54	4782.97	0.574
G	1,897.00	9364.41	0.203
PG	-7,304.21	2816.67	-2.59[a]
PG-13	-417.74	2364.95	-0.177
RUN	129.67	38.4125	3.376[a]
BUDGET	0.000145	2.64E-05	5.499[a]
AA	2,221.610	1885.85	1.178
TWITTER	0.00077	0.000303	2.541[a]

* N = 207, Adj R^2 = 49.7, R^2 = 53.3, F-stat = 13.71, Durbin Watson Stat = 1.69
a: Significant at 1% level, b: Significant at 5% level, c: Significant at 10% level

Our second model focuses on per theatre gross to moderate between blockbusters that use their wide-opening potential to gross huge revenues in comparison to films which opened on far less screens but still performed well. Per theatre gross is based on the maximum number of screens it was ever showing on. In our sample the film "127 Hours" was only shown on 916 screens and grossed $18,335,230, "Toy Story 3" was shown on 4,028 screens and grossed $415,004,880. In this instance "127 Hours" represents just 4.4% of "Toy Story 3's" total domestic gross. If we look at per theatre figures "127 Hours" had a gross of $20,017 in comparison to $103,030.01 by "Toy Story 3". Although there

is still a large difference, because of its smaller release "127 Hours" narrows the gap under this method and represents 19% of "Toy Story 3's" gross/theatre. The adjusted R^2 and R^2 for equation 2 were 49.7 and 53.6 respectively. Besides the change in the dependent variable, the independent variables used were the same as in equation 1. No change occurred in the sign of the coefficients for the variables SUMMER, STUDIO, SEQUEL/REMAKE, ACT/ADV, SCI-FI/FANTASY, G, BUDGET, and AA.

The genre variable ANIM/FAM retained its positive association but was now significant at the 10% level and added $7,111.80 to a films domestic gross/theatre. COMEDY, previously significant in equation 1 at the 10% level was not significant in equation 2. DRAMA, remained insignificant but was now positively associated with domestic gross/theater and HORROR remained negatively associated with domestic gross/theatre but was significant at the 5% level as opposed to the 1%. Once again, 3 out of 6 genre variables were identified as significant in equation 2.

The MPAA rating of PG was also found to be significant at the 1% level where previously it had been significant at the 5%; it remained negatively associated with domestic/gross per theatre. Further, PG-13, though still insignificant, was found to be negatively associated with domestic gross/theatre whereas in equation 1 it was found to have a positive association. This matches previous expectations that a more restrictive rating takes away from potential gross.

RUN, was found to be statistically significant at the 1% level whereas in equation 1 it had been statistically significant at the 5% level. TWITTER was found to be significant at the 1% level instead of at the 5% level in equation 1, for every follower, a film added $0.00077 to its gross/theatre. In terms of Production Budget, each dollar spent on budget returned $0.000145. The variable AA was still positively insignificant and added $2222.00 to the movies per theatre total.

The major differences between these two equations lie with the changes in the significance and signs of the genre variables, and the change in the sign of the PG-13 variable. In terms of quality, equation 1 appears to be a better predictor of film revenue with an adjusted R^2 of 55.5 versus 49.7. Brewer et. al (2009) puts the range of studies of this type at between .09 and .70 for the value of the adjusted R^2. Both our equations represent equations with quality towards the upper end, especially equation 1 at 55.5.

Conclusion

Modeling our research to include only variables available prior to a film's release or ex ante we believe has a greater value to studios in today's competitive atmosphere. We believe our equations will help more accurately forecast how a film will perform thereby allowing studios to make pre-release adjustments if revenue forecasts are not in line with expectations.

Our research shows the significance of runtime, production budget and social media promotions via Twitter. On the qualitative side, a film's release period, its genre, rating received, and whether or not it is based on previous material also proved to be significant factors in determining a films domestic gross. In particular the significance of Twitter and therefore social media in predicting a films box office performance opens up avenues for further research into this area. Twitters significance also demonstrates a new source for data gathering and its predictive capacity gives studios a powerful tool to use when evaluating film performance.

In terms of future research on this topic several improvements could be made to the equation. The variable RUN could be adjusted to find the average runtime of the movies being studied; then the variable could examine how much was added or taken away from a films gross by exceeding this averaged threshold. By this process one could calculate an optimum movie length. Also, in terms of the academy award variable, perhaps by focusing on wins/nominations in a more current window like the last five years it would increase the significance of this variable as opposed to looking at all previous wins/nominations. If using the number of Twitter followers, picking an ex ante point say six-months prior to the release of the film would isolate the predicative power of this variable specific to the film being studied. Our model could include followers who were added after a film's release. Lastly, one area in which we found prospective data to be inaccessible was Google search volume of film titles; if accessibility of this metric was more readily available it could prove to be a significant and important method for accessing pre-release popularity of a film.

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