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# A Study on the Sensitivity of Film Demand to External Events

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# A Study on the Sensitivity of Film Demand to External Events

## **Abstract**

The purpose of this research project was to investigate the relationship between unique external events, such as news stories and the Superbowl, and the sensitivity of film demand. The initial hypothesis was that unique external events would reduce consumers' leisure time which reduces their demand for movies. Understanding this relationship would provide movie studio managers with better information when making decisions. The desired end result was to improve the decision making process. Closely related to unique external events are seasonal events so their effects were also tested for. These events typically increase leisure time so we expected seasonality to increase movie demand.

The first step towards reaching a conclusion involved the accumulation of the appropriate data. Our sample consists of the top 60 films and their specific characteristics from April 2000 until November 2003, a 189 weekend time period. This information was complemented by historical film performance data which would serve as a benchmark in our analysis. Lastly, a list of events whose effects were to be measured was compiled. To test our hypothesis several forms of analysis were performed. A parsimonious regression analyzed the effect unique external events had on overall weekend results. An average based model regression examined the average performance differences for a weekend while controlling for certain film specific variables. A movie specific regression examined how events affect film demand on a movie by movie basis.

The results of our analysis suggest that unique external events do negatively affect film demand. For large national events, for instance going to war, this effect was proven to be statistically significant, and it was estimated to decrease revenues by \$21 million over an entire weekend. However, events not classified as "national" that were included in the other categories of news, sports, weather, and other holidays did not prove as conclusive. They may have affected film demand, but this effect was not large enough to be considered statistically significant. Seasonality, meanwhile, always demonstrated an observable increase in film demand at a statistically significant level. Our lack in ability to make more detailed conclusions is a shortcoming of this analysis and indicates the need for further research. Properly addressing these shortcomings should provide the quality of results needed to make good decisions. One difficulty we encountered was how to select and group the unique external events that were to be tested. There was no hard and fast rule as to which events should be included within the analysis. Grouping the unique external events into subgroups allowed us to better understand the difference between events and their effects. Our analysis highlights the importance of how each type of event differed. Proper analysis would include a larger amount of data so the specific effects of each type of event can be quantified. This level of information detail is needed before decisions can be significantly improved. As it stands now there is only incomplete information from which decisions can be made, yet this is still better than no information at all.

In conclusion, this research project can be considered a success due to the results it was able to achieve and the improvements its shortcomings will have on future research. Managers will be better prepared to make decisions that react to unique external events. By understanding how the events affect film demand, managers will seek to minimize any decrease it causes. The film decision making process will be improved as a result of this information.



**A Study on the Sensitivity of Film  
Demand to External Events**

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Wharton Undergraduate Research Scholars WH-299-301
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## Abstract

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The first step towards reaching a conclusion involved the accumulation of the appropriate data. Our sample consists of the top 60 films and their specific characteristics from April 2000 until November 2003, a 189 weekend time period. This information was complemented by historical film performance data which would serve as a benchmark in our analysis. Lastly, a list of events whose effects were to be measured was compiled. To test our hypothesis several forms of analysis were performed. A parsimonious regression analyzed the effect unique external events had on overall weekend results. An average based model regression examined the average performance differences for a weekend while controlling for certain film specific variables. A movie specific regression examined how events affect film demand on a movie by movie basis.

The results of our analysis suggest that unique external events do negatively affect film demand. For large national events, for instance going to war, this effect was proven to be statistically significant, and it was estimated to decrease revenues by \$21 million over an entire weekend. However, events not classified as “national” that were included in the other categories of news, sports, weather, and other holidays did not prove as conclusive. They may have affected film demand, but this effect was not large enough to be considered statistically significant. Seasonality, meanwhile, always demonstrated an observable increase in film demand at a statistically significant level. Our lack in ability to make more detailed conclusions is a shortcoming of this analysis and indicates the need for further research. Properly addressing these shortcomings should provide the quality of results needed to make good decisions.

One difficulty we encountered was how to select and group the unique external events that were to be tested. There was no hard and fast rule as to which events should be included within the analysis. Grouping the unique external events into subgroups allowed us to better understand the difference between events and their effects. Our analysis highlights the importance of how each type of event differed. Proper analysis would include a larger amount of data so the specific effects of each type of event can be quantified. This level of information detail is needed before decisions can be significantly improved. As it stands now there is only incomplete information from which decisions can be made, yet this is still better than no information at all.

In conclusion, this research project can be considered a success due to the results it was able to achieve and the improvements its shortcomings will have on future research. Managers will be better prepared to make decisions that react to unique

external events. By understanding how the events affect film demand managers will seek to minimize any decrease it causes. The film decision making process will be improved as a result of this information.

## Introduction

The film industry has successfully developed into a significant part of the economy, but like the economy it has struggled as of late. In 2003, box office revenues remained nearly constant to 2002 even though [boxofficemojo.com](http://boxofficemojo.com) notes that the number of films released, average budget, and average ticket price all increased. When a typical industry falls into recession it is often change that helps to bring it back to prosperity. This current recession should be a clear signal that operational change is needed.

As an industry it operates very differently from other similarly sized industries. While other parts of the economy frequently base decisions on models and quantitative facts, the film industry has maintained its heuristic approach to decision making. With regard to movie production, the influence of social connections often plays a critical role in the decision process. Marketing research usually gives way to a standard approach when deciding on a marketing mix. Standard industry practices and contract limitations restrict distribution flexibility of any given film. Decisions are more frequently taken based upon a “gut feeling” as compared to other industries. For example, it has long been common practice for movie studios to release high-potential films during holiday periods. This practice is based on the notion that individuals “consume” more or increase their demand for movies when they have an increased amount of leisure time. The downside is that the competition during holiday periods is more intensive. The problem with such an approach is that, although logical, it lacks the proper investigation to determine

whether in fact such reasoning is accurate. An important implication of such an investigation is the possibility that good movies can attract large audiences during off-seasons, when the competition is less intensive. For example, if a good film can maintain the same demand over both good and bad weekends then studios can change its distribution by releasing it at a different time without any loss in performance.

### Research Goal and Overview

The purpose of our research is to analyze the sensitivity of film demand in relation to unique external events independent of a film's quality. Analysis of demand's sensitivity will determine how significant an effect unique external events, such as major sports events (e.g., Superbowl), national news, severe weather conditions, wars, and political events, which presumably should keep the audience at home, have on movies' attendance. The research will also encompass seasonality effects on film demand. Seasonality events are those that occur year after year on a repeated basis, most notably major holidays. This will provide some insights into the question — will good movies attract large audiences even when they are released during non-holiday periods when moviegoers have less leisure time available? Better information in regards to these topics may help determine whether the current film release strategies are indeed correct, and if not, what can be changed in order to achieve optimal results.

### Relevant Literature

From an academic and economic standpoint there has been an increased interest in finding ways to improve decisions within the film industry. Empirical studies have been conducted that encompass the different areas of decisions in relation to producing



and distributing a motion picture. The areas of decision making that the research focuses on can be separated into three distinct subcategories; revenue projection, marketing decisions, and distribution decisions. Professor Eliashberg has conducted research in a variety of these areas. Our research project, dealing with demand and external events, seeks to improve the understanding of how a film's time of release in relation to external events, a distribution decision, affects its performance. External events are just one factor to consider when deciding upon the time of release for a film. Furthermore, a film's time of release is just one aspect of the distribution decision process. In addition to distribution decisions, marketing and production decisions are the other main decision components of a film. In order for a film to be successful it is important that the decisions made in each of these three main categories be done so carefully. To properly address each decision one must understand that different decisions, even from different categories, may be related. Therefore, it is important to not only understand the specifics that relate to a given decision, but how all other decisions will relate to the one being addressed.

#### Revenue Projection:

Due to the large investment required by movies for their production movie studios are very interested in analyzing the profit potential for that given film. Through this analysis they can determine whether the potential reward and accompanying risk justify making the required investment. Accurate costs and projected revenues are, therefore, highly valuable to the movie studios. Much research has been conducted in this area attempting to accurately forecast revenues and determine how individual factors may affect the performance of a film.

A well known study by Anast (1967) is one example that seeks to identify the effects of individual characteristics on a film's performance. The effect of each movie characteristic is measured as it co varies with attendance. In his study Anast found that violence co varied positively with attendance while adventure did so negatively. Another study by Litman (1983) uses multiple regression of a film's characteristics to determine what part they each play in the overall performance of the film. The study used adjusted film rentals over a six year period and found that the use of major distributors, Christmas release, and critics' ratings are the most important characteristics for predicting a film's income. In a different approach to forecasting film revenue Eliashberg and Sawhney (1996) use a film's initial results in order to project the remaining revenues. This parsimonious forecast model, called BOXMOD, is based on two variables, a consumer's time to decide and their time to react. The study attempts to determine how long the film can generate acceptable revenues and in actuality does so with reasonable accuracy. This information is helpful to exhibitors in their decision to determine how long to screen a certain film versus screening a new film.

Studies have also been conducted regarding how external opinions may affect a film's performance. Dodds and Holbrook (1988) targeted how Academy Awards affect a film's revenues. They found that if a film was awarded one of the top awards, best picture, best actor, or best actress, that each had a significant effect on increasing box offices revenues for that film. Several studies have focused on what effect critics and their reviews may have on a film as well. Eliashberg and Shugan (1997) researched what relationship critics' reviews have with the market performance of a film. The initial hypothesis was any effect of critics' reviews would be strongest during a film's initial

release and become less significant as word of mouth about the movie spread. Rather than analyze specific critics, reviews for a film were as an aggregate considered being positive, mixed, or negative. The analysis yielded surprising results. The study found that reviews played a smaller roll during a film's release and influence grew afterwards. This suggests that consumers eager to see a film initially ignore critics' reviews, but those who decide to see a movie after release are more affected by the critics. From these results it is clear that studios and exhibitors must pay attention to external factors such as critics and awards when making decisions.

#### Marketing Decisions:

A growing trend within the film industry is the increased expenditures being made on marketing films. Studios have become so caught up in marketing their films that the marketing costs of a film can come to exceed the film's production cost. With the amount of money being spent on marketing campaigns it is essential that the money be used efficiently. Having better information and understanding the effects of marketing a film therefore, becomes essential in making the proper marketing decisions. This need has resulted in research that focuses on marketing decision improvement. Professor Eliashberg's *MOVIEMOD* (2000), which uses behavioral studies to determine the effects of different marketing plans, is an example of research dedicated to improving marketing related decisions. *MOVIEMOD* is a prerelease marketing evaluation model that uses a Markov chain model to forecast demand. Consumers are asked to fill out information about themselves, and they are then exposed to marketing stimuli and the film. Under this behavioral model consumers are classified into categories based upon their behavioral state which is influenced by the film. The categories they can be classified

into are undecided, considerer, rejecter, positive spreader, negative spreader, and inactive. This information, along with questions they answer before and after the film, produces forecasts of how the movie will be adopted and its market penetration based on a given marketing plan. It has been found that MOVIEMOD does in fact produce accurate forecasts of a film's box office performance. This tool allows studios and distributors to test different marketing plans relatively cheaply and quickly in order to find the mix that yields the best result for a given film. Research tools of this kind have come a long way in aiding to improve the marketing decision process.

#### Distribution Decisions:

Our study of film demand's sensitivity to unique external events is directly related to the distribution decision process. A better understanding of how film demand reacts to unique external events will affect how films are distributed and the decisions that are made in the process. More specifically, knowing whether an event increases or decreases demand will influence the number of films released on a given weekend. Other research has also been performed relating to the decisions made in distributing a film that is highly related to our study.

At the studio level of distribution decisions a study by Elberse and Eliashberg (2003) has targeted the relationship of sequentially releasing films in international markets. This study sets to find out how the performance of a movie in its domestic market is related to the performance of the same film released at a later time in a foreign market. In addition, the study also looks to quantify the effects of how the time in

between the release periods influences performance. The initial hypothesis was that the relationship between performance in each market would be highly correlated.

Performance in the foreign market would be affected by information coming from the domestic market. Additionally, a success-breeds-success model was also expected where successful movies in the domestic market would contribute to the film doing well in other markets. This idea is closely related to the buzz effect where a film released in a foreign market looks to build upon buzz generated in the domestic market. The strength of this effect is expected to be stronger as the time between releases is shortened.

The study's results provide information that is highly insightful in the distribution decision making process. The study found that the number of screens, a direct driver of revenues, allocated to a film is highly related between markets. Another finding was that advertising is a better predictor of opening week performance while word-of-mouth is a better predictor of movie performance over subsequent weeks. It was also proven that as time lag between release dates increases the performance relationship and buzz effects between markets weakens. In terms of distribution then, if a studio wishes to push a film into the market it is highly beneficial to coordinate release dates as soon as possible to capture the benefits of a buzz effect and advertising. Likewise, if a film receives poor reviews then it may be more beneficial to increase the time between releases as to dilute the effect of the poor reviews.

Another study that provided equally important insights into the film distribution decision making process was SilverScreener (2001), a marketing management support system for movie exhibitors. This study focused on distribution decisions that are made at the exhibitor level, such as what films should a movie theater show and for how long.

SilverScreener aims to help theater managers select and schedule which films show over a fixed time horizon. Based on consumer demand data, the mathematical programming system calculates the optimal usage of theater space for the following week. The model was tested on a limited basis with promising results. The theater that used SilverScreener showed higher revenues than the two other comparable theaters used in the study. This study makes evident the abundance of opportunities that exist where the performance of films can be improved. Important decisions in distribution are found at multiple levels of the distribution process, each having a significant effect on a film's success. It is therefore important to understand how these decisions are related and how each can be made more effectively.

#### Research Issues

From our analysis we plan on observing how a film's release date and environmental conditions affect its performance, independent of the film's quality. If we can determine that unique external events do, in fact, affect film demand then it will be beneficial to understand which events cause attendance to increase or decrease. Our initial hypothesis is that unique external events, such as the world series or space shuttle Columbia disaster, which reduce an individual's leisure time, will have a negative effect on film demand, and seasonal events, which increase leisure time, will have a positive effect on film demand. By capitalizing on events that increase attendance, namely holidays producing a long weekend like Memorial Day, and avoiding events that reduce demand studios will be better able to capitalize on a film's profit potential by fully capturing demand for a given film. In the process we may also uncover potential changes in release date strategies that will improve attendance based on a film's demand. Our

results may shed some light that allow the film industry to make better decisions backed by research as opposed to relying on the former commonsense approaches.

The key research question is — can a good movie perform commercially well even in a time when moviegoers do not have a large amount of leisure time? This question seeks to maximize attendance given a film's demand independent of its quality or marketing campaign. The goal is for the film industry to eventually improve information and establish methods of decision-making based upon analyzed evidence rather than common intuition.

The need for decision-making methods extends beyond dealing with external events and attendance. This concept can be adapted to deal with many aspects relative to movies. Improved decision models would benefit the film creation process, distribution strategies, marketing strategies, and all other decisions involved when producing and distributing a film. By improving each of these decision processes the film industry may be able to improve its efficiency and profitability.

Due to the lack of research in this particular area of the film decision making process we felt there was a clear opportunity to discover potential improvements. However, one must first recognize that going about this research is not an easy process. Movies and their demand are reliant on a plethora of variables, and an attempt to isolate a single one of those is a difficult process. Movie attendance will be used as an approximation of film demand. However, there are many variables that affect movie attendance. These variables include, but are not limited too, release date, movie budget, number of screens, days in release, genre, actors, other films being released, marketing, reviews, and distribution strategy. Variables and conditions will not always be able to be

held constant and therefore approximations and compromises have to be made. Rather than seeking precise numerical results we will be seeking a general approximation of a film's elasticity curve. It is also possible that different types of films will have different demand sensitivities relative to external events. As a result, any conclusions reached will not be hard and fast numerical laws, but rather general approximations that can present an improved understanding. Even though the decision process will not evolve immediately into a quantitative formula, previously used qualitative methods will now have additional quantitative support.

### Research Approach

In searching for the answers to our research questions we felt the most appropriate path of action was to gather a significant amount of quantitative data and analyze it statistically. This approach would yield conclusions that can be relied upon with a certain degree of confidence. Our dataset includes data for over 1000 movies released from April 7, 2000 until November 16, 2003. The collected data can be grouped into three distinct categories; movie performance, general performance, and movie characteristics. Movie performance data outlines how a film performed at the box office. General performance seeks to establish general box office trends and results for each week of the year. Movie characteristic data serves to better classify a movie for accurate comparisons.

The first challenge was to determine what measures to use that would capture demand for a film. Movie attendance appeared to be the most appropriate proxy for film demand and was used as the primary variable in performing our analysis. Our research utilizes weekly box office results within the US market as a measure of attendance. The



next step in our research was gathering all of the relevant box office data. Data collected includes weekend gross revenues, per screen average revenues, cumulative gross revenues, number of screens films were released on, and the number of days they had been released. One challenge was finding reliable sources for the information we needed. Many websites only carry a limited amount of information so several sources were required in order to obtain all of the necessary data (see exhibit 6). This data was separated on a week by week basis composed of the top sixty performing films for each week in our dataset.

Movie characteristics and performance data for each film are included along with film titles. The main element of background data is a film's reviews and ratings. A large difficulty we ran into was how to determine the quality of a film. Because there is no definitive answer to this question we chose to use reviews as a proxy for quality. However, reviews are very subjective. In order to minimize this effect we gathered both reviews from critics and the general public. Additionally, we were able to locate information that is an average review number based on a vast number of inputs. This gives us a more accurate reflection of a film's perceived quality based upon a large number of viewers. This problem of subjectivity was not a problem in the gathering of our performance data. Performance data is to consist of the film's rank the previous week, current rank, weekend gross revenue, percent change in revenue vs. the prior week, per screen average revenue, number of screens, cumulative gross revenue, and the number of days released. Our variety of data will provide for more possibilities of comparisons between similar types of films and their corresponding performance in order to determine the effect of unique external events. One example could compare how two

similar quality movies opened and their final gross revenues differed when opening during different seasons. It was also important to have all of this relevant data when conducting our regression analysis. The regression is able to control for differences in these variables in order to target more accurately the specific effect of unique external events. This provides us with a clear answer to our research question.

In addition to the film database, a list of proposed significant events was compiled, which served as a guideline in making the proper comparisons. This list of significant events, see exhibit 1, was gathered from a variety of news and internet sources reflecting their top headlines. For a given event compared individual and cumulative weekend box office results vs. a non-event period in order observe the effect of that external event if any such effect exists. Beyond simple comparisons of how revenues, per screen attendance, or number of screens differed, the need for regression analysis is necessary in order to analyze the changes in multiple variables at a given time. This may provide for a better understanding of how film attendance reacts to external events.

General performance data gathered is a reflection of the entire movie industry rather than a specific film. By aggregating how all the individual films for a given week performed we are able to view the performance of the industry as a whole. Industry data is also significant when determining the effects of external events. It follows that a significant external event should affect all films at a given time, and using industry analysis captures this. In addition to our 180 week period data we gathered weekend data going ten years into the past. The purpose of this data was to establish performance norms for given times of the year. By establishing these norms we now have a base

performance expectation with which to compare the weekends from our more in depth sample set.

Obtaining the appropriate data is essential in our ability to conduct our analysis properly. In order to answer our research question pertaining to the effect of external events it was necessary to collect data relative to a film's performance, its quality, and the general performance of the industry. These then are the tools we will be using to determine what effect external events have on film demand.

#### Database

Acting as a backbone to the entire research project the database serves as the foundation to our analysis. Each category of information is organized into different worksheets within the database. General performance data is found under the weekend average information. The movie ratings page houses the movie descriptive data. The largest category of data, movie performance, has so much information that it has a dedicated worksheet for each individual week. Some of the data, most notably weekend averages, required certain calculations and adjustments. Putting this data into its own worksheet makes these calculations easier and for this reason the data has been split into so many worksheets. However, for the purpose of statistical analysis much of this data will have to be reorganized into a single worksheet. The reorganization of data will also facilitate comparisons as large differences in the data become more readily apparent. These characteristics indicate how important the organization of a database is relative to its effectiveness.

#### Weekly Results:

The 189 weekend dataset from April 7, 2000 until November 14, 2003 contains all of our weekly results data. Each weekend has its own spreadsheet that contains the top 60 films ranked by weekend gross revenue. In addition it contains the films' rank the previous week, title, distributor, percent change from the previous week, per screen average, number of total screens, cumulative gross, total days released, average critics' review, and average publics' review. The data from the top 60 films is a very close approximation for the results of all films released in a given week. For this reason we have also aggregated the results of the top sixty films for each categories described above. This information will become useful later when making weekend comparisons. The vast amount of information available for each individual film allows us the opportunity to compare films on a one-on-one basis. These sets of data are also necessary for performing a proper regression analysis where differences in these variables is controlled for and the effect of external events becomes measurable. Before we are able to perform the regression analysis, however, all of this data must be combined into a single spreadsheet and combined with the movie descriptive and event list data.

#### Weekend Averages:

The weekend average data is to serve as a measure of historical results for a given weekend in the year. Uncovering large discrepancies between the historical and actual

results from within our dataset period may help explain the role of unique external events. Our forecasts are based on historical data. We collected the actual weekend results for the previous 10 years and adjusted the data due to changes in variables to calculate an expected result for each weekend (see exhibit 2). Data was collected from every weekend beginning in 1994 through 2003. Earlier years were not used because going to far back in the data does not accurately account for changes in box office attendance. Even within our sample period there had been significant changes that need to be accounted for. For example, the weekend results from 1994 are much lower than today because tickets were cheaper and less screens existed.

Increases in the price of tickets and changes in the number of screens available are the two main variables that our data had to be adjusted for. Average data for each of these variables was collected on a yearly basis for our test period. The actual results for each weekend were then adjusted accordingly to reflect the changes in these two variables. Therefore, if prices and the number of screens had doubled from 1994 to 2003, then the weekend results of 1993 would be adjusted by a factor of four to make the data comparable to current market conditions. Of course, these are not the only variables that affected box office results within the ten year period. Although we feel that other changes are not very significant, their lack of accountability is one shortcoming that must be taken into consideration when making conclusions based upon these numbers. Our adjustment factors also do not provide the exact amount an older movie or weekend would have produced in present revenues. It is simply an approximation that includes some degree of error. Adjusting for both variables on a yearly basis helped to minimize

this error. If data had been available on a week by week basis then this would have allowed for an even more accurate adjustment.

One other problem did arise in calculating weekend averages. The weekend number of a given year does not always fall on the same date as the prior year. Additionally, holidays often change days which creates long weekends. In order to account for these changes we developed two sets of weekend averages. The first set is an average for a specific weekend number of a given year independent of date, say weekend 23. The other set of forecasts establishes a holiday as a base weekend and counts upwards so that, for example, forecasts for Memorial Day weekend is the average of Memorial Day weekends over the past 10 years. The problem with this method is that the period in between long weekends, depending when the holidays fell, did not always include the same number of weekends. Therefore, under this method of forecasting several weekends have not been accounted for. In the end, although imperfect, these two forecasts methods produce a rough range of possibilities of how a certain weekend should perform. Any weekend that does not fall within this range raises sufficient reason to be investigated more closely.

#### Film Ratings:

The question of how to accurately determine a film's quality raised significant challenges in our research. In an attempt to allocate a quantitative measure to a film's quality we decided to use reviews as a proxy for quality. One problem with movie reviews is that they are very subjective. Luckily, we were able to gather data that was an average review from a wide variety of sources. This data was split into two categories, critics' reviews and the public's review. One set of data takes a weighted average from a

wide variety of critics across the country. The reviews were based on a 0-100 scale. Our public's review is based on internet users who, after a viewing a film, submit their review. These reviews range from 0-10 with the overall review reflecting an average of the reviews submitted to the first decimal. This score was then adjusted by a factor of ten so that now both systems of review are comparable on the 0-100 scale. The large number of reviews that make up these averages give us a fairly accurate description of a film's perceived quality. Both of these ratings were gathered for nearly every film that was shown during our 189 week sample period, approximately 1150 films. In some cases reviews were not available because the film was released on such a limited basis that not enough reviews were available for a useful average to be calculated.

#### Events List:

In determining whether external events affect film demand we need to determine what events we consider significant enough to test. These events were then listed in chronological order within our sample period. Significant events we are looking for fall into four general categories; news, weather, other holidays, and sports related. In relation to our study we will consider repeated events such as holidays as seasonal events. Major news and weather events, on the other hand, shall be considered unique events. We hope to determine what affect, if any, both unique and seasonal events have on demand. Our list is composed of approximately 75 events, 40 of which can be classified as unique and the remaining seasonal. The development of this list is a very subjective process. To be considered significant we can only hypothesize that the event affects film demand in some way, however, we can not know this for sure until we conduct our analysis.

Therefore, it may be necessary to perform analysis several times over, using different sets

of events, in order to determine which events exactly or what kind have an affect on film demand.

## Analysis

The analysis portion of our research project is composed of several t-tests and three regressions. We felt that regression analysis was most appropriate given our type of data. The purpose of the t-tests is to provide a descriptive analysis of our data. From this information we hoped to structure the regressions to provide a more relevant analysis.

The regression will help control for several variables, the characteristics of each film and weekend, and thereby isolating the effects of seasonality and unique events. All of the regressions include variables for seasonality and unique events. The seasonality and unique events are coded so that if an event occurred it was marked with a one and if no event occurred it is coded with a zero. This allows the regression to control for our variables and isolate the effects of seasonality and unique events. One foreseeable difficulty in using regression analysis is precisely quantifying the effects of seasonality and unique external events. This is due to the determination of which events should be tested (see exhibit 1). For seasonality events we decided to test commonly observed federal holidays and Easter. Commonly observed federal holidays include; New Years Day, Martin Luther King Day, Presidents Day, Memorial Day, Independence Day, Labor Day, Thanksgiving, and Christmas Day. These events were chosen due to the fact that they result in a long weekend, thereby providing people with more leisure time to go to the movies. Other holidays were not completely ignored; they were included under a subgroup of unique events. Deciding upon which unique events to test for significance was a more difficult decision. Our base list of events included both national and regional



events. This list, composed of forty events, was used as our base for unique events. Prior to analysis we felt that some events on the list would not have a significant effect and dilute the effect of the more important unique events. To solve this problem this base was then broken down into subgroups. The subgroups were national events, news events, weather related events, sporting events, and other holidays. Each regression was then run a total of six times, once for the base events and each of its subgroups. The detailed results of this analysis allow us to better understand the effects of each type of event.

The first regression is a parsimonious analysis which includes two independent variables. The weekend results of gross revenue are compared to our base amount for each weekend within our 189 week sample with an expected difference of zero. The actual differences are then regressed on our seasonal and unique event variables. The second regression is an average based model that analyzes differences in per screen average revenue for each weekend. This regression expands upon the information in the first regression by controlling for certain film characteristics. Averages of days released, critics' reviews, and the publics' reviews are controlled for in order to isolate the effects of seasonality and unique events. The last regression is movie specific and includes each movie within our sample for every weekend it was screened at the box office. This regression allows us to control for each specific film characteristic such as days released, number of screens, cumulative gross, and reviews. This regression provides our analysis with the effects of seasonality and unique events on an individual film level rather than an entire weekend. From this variety of analysis we hope to obtain a thorough understanding of the effects of seasonality and unique events.

T-Tests:

The purpose of our t-test analysis was to provide information for a qualitative description of our results. The data was first sorted by weekend number and focused upon only those weekend numbers for which an important event occurred. Since each weekend number has three or four occurrences in our data sample it was possible to find a weekend with the same weekend number, and therefore approximately the same date but a different year, with similar characteristics in terms of number of screens, critics' and publics' reviews, cumulative revenues, and days released. The principal difference would be that no unique event occurred on this similar weekend. By controlling for all of these weekend characteristic variables a t-test on the mean revenues per film could then examine the difference in box office revenues for those weekends. If this difference was statistically significant then some other variable must be causing this difference. We would attribute it to a unique external event, the only other known difference between the weekends. It is possible however, that some other variable could cause the difference in revenues, one that was not considered in our analysis.

A weekend analysis was performed for ten events using a total of twenty different weekends. The events chosen fell under our national category of unique events, which we believe to have the greatest possibility of affecting film demand. For each comparison it was necessary to run a t-test for each weekend characteristic to ensure that differences in these characteristics were not statistically significant. Therefore, for each weekend comparison a total of six tests were run, five ensuring similarity and the last testing for significant differences in average revenues. When running the t-test it was assumed that both sets of sample data had equal variances. Once verified that we could

assume each weekend had similar characteristics the differences in mean revenues were analyzed.

Results Table

Test #	1	2	3	4	5	6	7	8	9	10
T-Stat	1.45	-.208	.838	-.057	-.303	-.591	.802	-.044	.154	.526
P Value	.075	.418	.202	.477	.381	.278	.212	.482	.439	.30

The results of the t-test analysis differed from our expectations. Of the ten tests not one was able to show that the difference in average gross revenue for the compared weekends was statistically significant. This implies that each weekend had the same mean revenue with the difference attributed to normal variance. These results suggest that unique external events do not have a significant impact on film revenues. One possible explanation of these results is due to the number of films used per weekend. The data for each weekend consisted of approximately 50 films, yet the majority of film revenues for a given weekend are generated by only the top 10 films. Therefore, the mean revenue per film is not an accurate indicator of how much revenue any given film will generate on that weekend. Including many films with small revenues may have diluted the effect of large changes in revenues to the top 10 movies. These changes, isolated from the rest of the data, may have been statistically significant, but our analysis was unable to target these specific changes.

At a more qualitative level the results were equally inconclusive. While hypothesized that a unique external event would reduce box office revenue because individuals would be affected by the event in a way that reduced their leisure time, and therefore time to see a movie, the tests showed that in five of the ten cases the average revenue of a film for a weekend when a unique event occurred actually increased. Therefore, no general conclusion can be made based on this data whether unique events reduce or increase box office revenue.

#### Parsimonious Regression:

The simplest of our three regressions is a parsimonious regression that analyzes seasonality and unique event variables in relation to a dependent variable.

$$Y = B_0 + B_1 X_1 + B_2 X_2 + \epsilon$$

In this case the dependent variable,  $Y$ , is the difference between a weekend's box office revenue and the historical revenue average for that same weekend of the year.

Seasonality is the independent variable  $B_1$  and unique external events are independent variable  $B_2$ . The historical results are an average of a ten year range from 1994 until 2004. However, only the results of the top 12 films were available for this extended time period. As a result, the comparison is based on the box office performance of the top 12 films for each weekend even though our weekend data had information on the top 60 films. Due to changes in screens and ticket prices this data had to be adjusted to the current environment. Data regarding average ticket prices and number of screens for a given year was obtained from NATO, the National Association of Theater Owners. In order for our comparison to be accurate our sample data, which dates back to 2000, had to be adjusted to current standards as well. Gross revenues for each weekend were

adjusted for ticket price based on the NATO data and adjusted for number of screens using NATO's 2003 average as a base. Post-adjustment left both sets of data standardized to the 2003 film environment and ready for comparison. It should be noted that this regression does not consider film specific variables which are an important part to our hypothesis to the effects of external events.

Results Table

$$Y = -2,958,449 + 13,450,000 X_1 + B_2 X_2 + \epsilon$$

Variable Name	Variable	Coefficient	T-Stat	P-Value
Seasonality	B1	≈13,450,000	≈3.35	< .01
Unique External Events	B2	568,358	0.15	0.88
Other Holidays	B2	1,549,589	0.24	0.81
National	B2	2,164,791	0.35	0.72
News	B2	4,562,758	0.66	0.51
Weather	B2	1,491,688	0.14	0.89
Sports Related	B2	-3,781,286	-0.64	0.53
Regression Statistics	$R^2 = .047$		F-Significance <.01	

Note: regression and seasonality variables are an average of all models run

The regression statistics suggests that this was not a very strong model. Approximately only 4.7 percent of the variance in Y, difference in revenues, is explained by the independent variables, the majority of which is explained by seasonality. The lack of this model's strength must be considered when considering its other results. As mentioned in the analysis outline, each regression was run several times in order to test the different unique event sub-groups. In this case the regressions were very conclusive

with respects to seasonality, each indicating the same results. In each parsimonious regression seasonality was found to have a statistically significant effect at a five percent level on a weekend's gross revenues. The p-statistic was below .001 for each regression. The coefficient of seasonality was also very consistent over all of the regressions, varying within the \$13 million dollar range. These results would indicate that when a weekend falls on an observed federal holiday or Easter total box office revenues, on average, will increase by \$13 million dollars.

The results for unique events were also consistent, but unlike the conclusions for seasonality which followed our hypothesis, the results for unique events provided contradictory evidence to our hypothesis. In none of the six different regressions were the effects of unique events found statistically significant. In fact, the p-values fell within the .5 to .9 range, far from the .05 required to show significance. While initially thought that unique events would drive down film demand it seems from this test that the opposite is the case. For five out of the six regressions showed unique events to have a positive coefficient in relation to box office revenues. The sole exception to this was sporting events, as film revenues declined when a major sporting event was taking place. Again, none of this data is statistically significant and these results could have occurred simply by chance. The end result of this regression shows no data that can support our expectations. It is important to consider, however, that this analysis did not allow for other film specific variables to be controlled for, most notably film quality, which is a fundamental assumption in our hypothesis. The other two regressions do incorporate film specific variables.

Average Based Model Regression:

Our average based model regression is a more in depth analysis of the data analyzed by the parsimonious regression. Rather than looking at just weekend gross revenues this analysis takes into consideration many other characteristics of the films screened during a weekend.

$$Y = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + \varepsilon$$

For this regression the dependent variable is the average revenue per screen generated by films on a given weekend. The independent variables include the average number of days the films have been released, the average of critics' reviews for film that weekend, the average of the publics' reviews, and the seasonality and unique event codes.

Including these independent variables allows us to control for how long the movies have already been released and the quality of the movies. Our initial hypothesis that unique events would reduce film demand for a given film quality makes it very important that we control for these variables.

One problem that occurred when preparing this analysis is that it was not possible to find both critics' and the public's average reviews for every movie screened on a given weekend. As a result, it was necessary to eliminate those data-points that did not include review scores. This resulted in the sample size for films on a given weekend being reduced from 60 to just above 50, varying by a few films from week to week. This should not be considered a significant loss in data because the majority of films that did not have the necessary reviews were very small, cumulative revenues usually under one million dollars from a very small number of screens, and would have an insignificant effect on weekend averages. The sum of weekend gross revenues for each film with the

necessary reviews were divided by the number of screens those films were shown on to determine average revenue per screen.

Results Table

$$Y = -6,574 + 11.8X_1 + 84.2X_2 + 58.8X_3 + 730X_4 + B_5X_5 + \varepsilon$$

Variable Name	Variable	Coefficient	T-Stat	P-Value
Per Screen Revenue	B0	-6,574		
Number of days released	B1	11.82	2.68	<.01
Average critics' review	B2	84.18	2.44	.016
Average public's review	B3	58.75	1.05	.29
Seasonality	B4	≈730	≈4.56	<.01
Unique External Events	B5	-337	-2.26	.02
Other Holidays	B5	-102	-0.41	.68
National	B5	-574	-2.38	.02
News	B5	-538	-1.99	.048
Weather	B5	-242	-0.55	.58
Sports Related	B5	-266	-1.33	.26
Regression Statistics	$R^2 \approx .28$		F-Significance <.01	

Note: regression and seasonality variables are an average of all models run

Controlling for more variables helped improve the strength of the regression. The independent variables explain 28 percent of the variance in Y. Due to this improvement the result from this regression should be considered more significant than the results from the parsimonious regression. The results for seasonality from these regressions were very



similar to the results from the parsimonious regressions and confirmed the hypothesis that seasonality increases film demand. For each of the regressions the effect of seasonality was statistically significant at the 5% level. The p-value was below .0001 for each type of event. The coefficient for seasonality was approximately \$730 for each regression. This suggests that during a holiday weekend it can be expected that the average revenue per screen increases by \$730 dollars. If we assume that on a holiday weekend 38,000 screens are available this would correspond to an increase of \$28 million in total revenues for that weekend. The average based model regression suggests that the effect of seasonality on revenues is even greater than what was proposed by the parsimonious model.

Unlike the parsimonious analysis these regressions following an average based model did show unique events to have a statistically significant effect on average revenues per screen. The effect of both base events and national events produced a p-value of  $p = .02$  which is less than the 5% needed to show significance. Interestingly, news events were the only other subgroup to cause a significant effect with a p-value of  $p = .048$ . Another important result of the test was that these results supported our initial hypothesis that unique events would negatively affect film demand. Our base group had a coefficient of -\$337 which corresponds to a decrease in weekend revenues of almost \$13 million assuming 38,000 screens are in use. For national and news events this coefficient was closer to approximately -\$550 corresponding to a \$21 million decrease in revenues. Sports, weather, and other holidays also had negative coefficients, but all of these were small in magnitude ranging from -\$102 for other holidays to -\$266 for sporting events. Although this falls in line with our hypothesis the data is not conclusive

at a statistical level due to their p-values above 5%. Still, the results of this analysis are very supportive of our hypothesis.

#### Movie Specific Regression:

The movie specific regression seeks to analyze differences in revenues at the individual film level while controlling for their other characteristics.

$$Y = B_0 + B_1X_1 + B_2X_2 + B_3X_3 + B_4X_4 + B_5X_5 + B_6X_6 + B_7X_7 + \epsilon$$

The process of performing this regression was very similar to that of the average based model regression except for changes in data. In this case the characteristics we controlled for were the number of days released, the number of screens the film was shown on, cumulative gross revenues, average critic rating, and average public rating. Coded seasonality and unique event variables would then indicate what affect, if any, they had on revenues. Like the other regressions different unique event codes were tested in order to better understand the effects of each type of event.

One significant problem was run into when trying to perform the movie specific regression. Within our data sample the films are observed multiple times, once for each weekend they are screened. Changes in a film's characteristics are recorded from week to week. It had been desired to include an interaction variable between movie name and days released so that we could also observe the decay factor of each film. This would allow us better understand how events and seasonality may have influenced the rate at which film revenue declines. However, in working with the different statistical packages available we were unable to run the regression while including this interaction. This is one shortcoming that presents the opportunity for future research to improve upon.

#### Results Table

$$Y = -5,024,624 + 1,577X_1 + 4,663X_2 - 9,523X_3 + 9,377X_4 + 5,482X_5 + 572,000X_6 + B_7X_7 + \epsilon$$

Variable Name	Variable	Coefficient	T-Stat	P-Value
Weekend Revenue	B0	-5,024,624		
Number of days released	B1	1577	2.95	<.01
Number of screens	B2	4663	87.7	<.01
Cumulative gross revenues	B3	-9523	-12.8	<.01
Average critics' review	B4	9377	2.15	0.03
Average public's review	B5	5482	7.26	<.01
Seasonality	B6	≈572,000	≈4.71	<.01
Unique External Events	B7	-180,472	-1.56	0.12
Other Holidays	B7	-57,154	-0.29	0.77
National	B7	-426,898	-2.3	0.02
News	B7	-265,015	-1.28	0.2
Weather	B7	293,882	0.9	0.37
Sports Related	B7	-291,296	-1.58	0.11
Regression Statistics	R <sup>2</sup> ≈ .48		F-Significance <.01	

Note: regression and seasonality variables are an average of all models run

This regression model was the strongest of the three we ran with independent variables explaining 48 percent of the variance in Y. As such, the results of this regression should be weighed most heavily when making conclusions in comparison to the other models. Once again the result for seasonality proved very conclusive and

supported our other analysis. For each set of unique event codes run seasonality showed a statistically significant effect on film revenues. Its coefficient was positive, above 500,000 for each test. This indicates that during a holiday weekend each film is expected to generate more than \$500,000 in revenues. In reality the effects of holidays are probably different. Rather than increase the revenues of each film by the same amount holidays are more likely to increase the revenues of the top films by a large amount, approximately \$25 million in total. When this increase is averaged over 50 films the average increase becomes half a million as indicated by our coefficient statistic.

Our test on base unique external events contradicted important findings from the average base model analysis. With a t-stat =  $-.156$  and a p-value =  $.12$  it did not show them to have a significant effect on film revenues. As expected the coefficient was negative, indicating film performance during external events suffered. The average reduction in revenues was approximately \$180,000 per film, or \$9 million per weekend. Within the subgroups, only national events, with a p-value =  $.02$ , proved to have a significant event on revenues. Its coefficient indicates that an event typically causes film revenues to decrease by an average of \$426,000 or \$21 million in total. The effects of this decrease in performance is not spread equally over films, but rather targets the largest movies following the pattern similar to how seasonality increases film revenue. The fact that national events did have a significant effect suggests that perhaps our base sample of events includes too many insignificant events which dilute the effects of the larger ones. To investigate this conclusion one could increase the sample timeframe, thereby including more unique events of similar significance, and retest for their effects. The results for news events, not having a significant effect on revenues, do not support the

results from the average base model. The other sub-groups, except for weather events, produced negative coefficients which does support the results from the average base model regression. The negative coefficient for weather events may be due to its small sample size of 4 events. It is also possible that during times of bad weather film demand increases since, as an indoor activity, it provides an alternative in avoiding the poor weather.

#### Conclusions:

Our different tests and regressions provided us with a variety of results. This variety can be very conclusive when the data supports itself. The results seemed very conclusive with regards to the effect of seasonality. Each test found seasonality to have a significant positive effect on film demand. The magnitude of this effect ranged from \$13 to \$28 million on a weekend's revenue. Another common conclusion from our results is that weather events and other holidays do not have a significant effect on film revenues.

Having a variety of results can also yield differences that make conclusions more difficult. This was the case for the remainder of our analysis. However, do to the detail and data quality involved in the average base model and movie specific regressions their results are more trustworthy. From these we can conclude that our tested external events did have some effect on movie gross revenues. This effect is clearly a reduction in

revenues, but an exact amount is difficult to quantify. The major national events showed in both tests to reduce weekend results at a statistically significant level by approximately \$21 million dollars. The results on news and sporting events were rather inconclusive. Although our results suggest that they did not have a statistically significant effect on film demand, a sample of different events within those categories may prove otherwise.

#### Managerial Implications:

The important implication that our results suggest is that unique events do significantly affect film demand, but what does this mean for managers making decisions? Depending whether the event was expected or unexpected will have an influence on the managers decisions. Actions related to predictable events are mostly distribution related decisions. If a predicted event increases demand, such as seasonality, then managers should look to release more films during that weekend. This conclusion supports actions currently in place. If the event is predictable but has a negative effect on film demand, much like sports related events, then managers should look to release fewer films during these time periods. In order to react to unpredictable events marketing decisions are most affected. Unpredictable events that reduce film demand like news events can be reacted to or ignored. The effects on older films will most likely be ignored because any reaction to the event will not yield a sufficient increase in revenues. New films hurt by the event should receive additional marketing support for the following weekend. The decision for increased support will help counteract the lost revenues of the unique external event and promote the lifecycle of the film. An improved lifecycle will help generate higher revenues for all of the films following weekends.

These actions can help maximize film revenues given the presence of unique external events.

#### Future Research Implications

This study serves as a valuable reference on how future research should be approached in order to obtain more accurate and useful results. Using our research process as a reference, several recommendations can be made to improve upon our results. The definitive results for seasonality should provide the standard in testing unique events. Testing seasonality events produced consistently accurate results. This is likely do to the close similarity between each seasonal holiday. The goal for unique events is to achieve the same level of information so that it too can be incorporated into the decision process. First of all, it would be useful to have a dataset with a longer time frame. This will allow for more events and holidays to be tested. It is important to increase the number of events tested because they should be grouped into smaller, more identical groups. Therefore, the Superbowl or terrorist acts, should be classified as their own groups. This will allow researchers to better understand the effects of a specific type of event. Having this information will allow studio managers to properly understand and prepare to react to unique events. The same can be done for seasonality. Holidays should be grouped individually to isolate the effects of each one. For example, all Memorial Day weekends should be tested as a single group to understand precisely what effect Memorial Day has on film demand. This type of information will prove more valuable to movie studio managers making distribution decisions.

#### Concluding Thoughts

The goal of this research project was to develop an understanding of how external events affected film demand so that the film decision process could be improved. The results of this research project were successful in providing an idea as to how unique events and film demand are related. The ability to reasonably compute the effect of a major national event went beyond expectations. Although limited to these basic results and conclusions, it has now become more obvious the actions that need to be taken in order to achieve the final goal of improving decision-making within the film industry. Due to these positive results this research project can be classified as successful in meeting the goals it had set out to achieve.

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Seasonality – Federally recognized holidays including Easter

Week Number of the Year

New Years Day  
Martin Luther King Day  
Presidents Day  
Easter

Memorial Day  
Independence Day  
Labor Day  
Veterans' Day  
Thanksgiving  
Christmas Day

Unique External Events

Compiled with assistance from [www.mapreport.com](http://www.mapreport.com) and [www.infoplease.com/year](http://www.infoplease.com/year)

Note: some events may repeat such as sports or other holidays

National (NA) News (NE) Sports Related (SR) Weather (W) Other Holidays (OH)

Elian Gonzalez reunited with father (NA) (NE)  
Mother's Day (OH)  
NBA Finals (SR)  
Olympics (NA) (SR)  
Rosh Hashanah (OH)  
World Series (SR)  
Presidential Election Day (NA) (NE)  
Blizzard of 12/31/00 (W)  
Superbowl (NA) (SR)  
St. Patrick's Day (OH)  
Tiger Woods completes grand slam (SR)  
Father's Day (OH)  
World Trade Center Bombings (NA) (NE)  
Attacks begin on Afghanistan (NA) (NE)  
Anthrax cases scare (NA) (NE)  
Release of Bin Laden video (NE)  
Winter Olympics opens (NA) (SR)  
Sniper on the loose (NE)  
Major snowstorm 12/25/02 (W)  
Major snowstorm 1/3/03 (W)  
Space shuttle Columbia crash (NA) (NE)  
War with Iraq begins (NA) (NE)  
War with Iraq ends (NA) (NE)  
Countrywide power outage (NA) (W)

Exhibit 2 – Historical Weekend Averages and Adjustment Calculations

Week	Average
53	159,485,354
52	182,428,488
51	136,954,521
50	98,407,221
49	88,272,002
48	147,223,009
47	156,307,628
46	144,156,082
45	120,886,212
44	94,475,498
43	89,625,326
42	92,850,386
41	93,701,765
40	94,258,706
39	82,623,542
38	76,683,059
37	65,474,599
36	77,842,703
35	104,250,303
34	101,990,446
33	124,986,921
32	144,378,445
31	154,258,138
30	154,442,989
29	147,109,085
28	154,641,340
27	163,865,097
26	154,078,764
25	149,403,048
24	132,185,554
23	119,137,008
22	136,036,979
21	181,867,866
20	108,749,681
19	92,645,486
18	93,897,383
17	73,062,137
16	84,897,639
15	89,315,158
14	94,953,704
13	93,956,321
12	93,483,185
11	92,967,109
10	89,855,119
9	87,571,592
8	98,662,199
7	132,897,607
6	96,508,102
5	90,171,426
4	87,026,981
3	118,693,626
2	119,515,159
1	120,167,726

### Weekend Averages Calculations

Source: NATO (National Association of Theater Owners)

<http://www.natoonline.org/statisticstickets.htm>

#### Adjustment

#### Factors:

Year	Average US Ticket Prices	Total Screens	Multiple: Ticket Price x Screens	Adjustment Factor
<b>2003</b>	5.91	38459	227,293	<b>1.00</b>
<b>2002</b>	5.8	35804	207,663	<b>1.09</b>
<b>2001</b>	5.65	35143	198,558	<b>1.14</b>
<b>2000</b>	5.39	36264	195,463	<b>1.16</b>
<b>1999</b>	5.06	37185	188,156	<b>1.21</b>
<b>1998</b>	4.69	34168	160,248	<b>1.42</b>
<b>1997</b>	4.59	31865	146,260	<b>1.55</b>
<b>1996</b>	4.42	29731	131,411	<b>1.73</b>
<b>1995</b>	4.35	27843	121,117	<b>1.88</b>
<b>1994</b>	4.08	26689	108,891	<b>2.09</b>

## Parsimonious Regression Base

### Events

SUMMARY

OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.239280286
R Square	0.057255055
Adjusted R Square	0.047118013
Standard Error	21244787.25
Observations	189

### ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	2	5.09844E+15	2.54922E+15	5.648102545	0.004155868
Residual	186	8.39494E+16	4.51341E+14		
Total	188	8.90479E+16			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>
Intercept	2958052.467	1929547.674	1.533028961	0.126967853	6764661.418
Seasonality Code	13425448.67	4004152.397	3.352881545	0.000968925	5526062.432
Unique Event Code	568358.833	3807867.7	0.149259081	0.881510914	6943797.235

Exhibit 4 – Average Base Model Regression – Unique External Events

**Average Base Model Regression - Regional - Base**  
SUMMARY  
OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.549510511
R Square	0.301961802
Adjusted R Square	0.28288972
Standard Error	825.7510985
Observations	189

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	5	53978676.16	10795735.23	15.83266069	6.00314E-13
Residual	183	124781272.4	681864.8766		
Total	188	178759948.6			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>
Intercept	6573.754374	2460.322719	2.671907357	0.008222747	11428.00144
# Days Released	11.82201065	4.417335126	2.676276604	0.008120363	3.106553975
Average Critic Review	84.18005328	34.49712037	2.440205222	0.015631767	16.11680939
Publics' Review	58.75292375	55.77285152	1.053432309	0.293531814	51.28760005
Seasonality Code	715.0605169	156.738138	4.562134819	9.25696E-06	405.8142378
Unique Event Code	336.7922688	148.7386119	-2.26432306	0.0247273	630.2553841

Exhibit 5 – Movie Specific Regression – Unique External Events

SUMMARY  
OUTPUT

<i>Regression Statistics</i>	
Multiple R	0.693032558
R Square	0.480294126
Adjusted R Square	0.479903202
Standard Error	4.544842677
Observations	9314

ANOVA

	<i>df</i>	<i>SS</i>	<i>MS</i>	<i>F</i>	<i>Significance F</i>
Regression	7	177643.9441	25377.7063	1228.611732	0
Residual	9306	192220.9667	20.65559496		
Total	9313	369864.9108			

	<i>Coefficients</i>	<i>Standard Error</i>	<i>t Stat</i>	<i>P-value</i>	<i>Lower 95%</i>
Intercept	5.024624072	0.322475693	15.58140405	4.67794E-54	5.656747469
# Days Released	0.001576794	0.000533741	2.954227901	0.003142371	0.000530543
# Screens	0.004663126	5.31466E-05	87.74087717	0	0.004558947
Cum. Gross - not including this weekend	0.009522884	0.000744635	12.78866915	3.8931E-37	0.010982532
Average Critic Review	0.009377255	0.00436648	2.147554693	0.031774893	0.000817992
Publics' Review	0.054815961	0.0075494	7.260969306	4.15168E-13	0.040017474
Seasonality Code	0.572080126	0.121500916	4.708442917	2.53225E-06	0.333911566
Unique Event Code	0.180472125	0.115730008	1.559423769	0.118930119	0.407328435

Adjustments for ticket prices and number of screens:  
Source: NATO (National Association of Theater Owners)  
[www.natoonline.org/statisticstickets.htm](http://www.natoonline.org/statisticstickets.htm)

List of Significant Events:  
[www.mapreport.com](http://www.mapreport.com)  
[www.infoplease.com/year](http://www.infoplease.com/year)

Movie Specific Characteristics:  
[www.the-movie-times.com](http://www.the-movie-times.com)

Public's Reviews:  
[www.imdb.com](http://www.imdb.com)

Critics' Reviews:  
[www.metacritic.com](http://www.metacritic.com)

Historical Performance Data:  
[www.boxofficemojo.com](http://www.boxofficemojo.com)