

The Economics of Film Distribution

by

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Abstract

The film industry, namely Hollywood, is characterized by a pattern of large budget releases during what may be termed peak seasons. The peak seasons are centered on holidays, when demand is high, which in turn leads to greater box office revenue. This environment creates competition for release during these days and as such, distributors must compete in releases. This dissertation analyzes this behavior by incorporating game theoretic models to determine optimal release patterns. An economic history of the film industry and film distributors provides the foundation to current film practices. The economic history entails distributor practices through the various eras of Hollywood. A brief analysis of the major film distributors is also given. Chapter three introduces two-player noncooperative games. The first group of games centers on two players engaging in simultaneous play. From these games, a coordination failure arises and the second group games are specified under a correlated equilibrium. With correlated equilibria, it is possible to increase expected payoffs to distributors and increase social welfare. The game theory models are then tested with a series of regressions with data from 1998 – 2008. Two measures of competition are proposed and found to decrease box office revenue. Policy regarding release schedules is presented in the conclusion.

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List of Abbreviations

DOJ	Department of Justice
FCC	Federal Communications Commission
JVC	Japan Victor Company
LTE	Loews Theatrical Enterprises
MPAA	Motion Picture Association of America
MPPC	Motion Picture Patents Company
RKO	Radio Keith Orpheum
SIMPP	Society of Independent Motion Picture Producers
SPE	Sony Pictures Entertainment
UA	United Artists
WB	Warner Bros.

Chapter 1

Introduction

The motion picture industry has a history consisting of six essential eras while existing for narrowly more than a century. These eras were defined by the respective periods, the technology available, and served to entertain the wants of consumers. Moreover, consumer demand for films during these eras was often subject to innovations by film distributors and the availability of substitute entertainment. From the introduction of celluloid, that first allowed moving pictures to exist, to the advances in high definition and surround sound that characterize modern film, such traits have left consumers long enticed by the motion picture industry. Today, consumers are still attracted by the motion picture industry, though to a lesser degree, but film distribution has deviated from the direction it once took.

Early and persistent adaptations by film distributors helped to fuel demand through film entertainment's inception to the *Paramount* decree. These adaptations included increasing film length so that films ran as full-length features as opposed to sideshows of vaudeville acts, hiring and maintaining stables of stars, and introducing first sound on film and then color. Each progressive adaptation increased demand. Demand for filmed entertainment was especially high during the film industry's inception and throughout the Feature Film and Sound eras. Weekly attendance peaked at an estimated 110 million during the film industry's golden years. This occurred during a time when

the US population was approximately 123 million.¹ This outcome can likely be attributed to the lack of close substitutes to filmed entertainment. While studios of the Feature Film and later eras enjoyed the attention and profits, the pioneering film distributors gave rise to such enrichments.

Celluloid, created by George Eastman in 1884 in the necessary form needed, was the medium that gave rise to the introduction of cinema. Soon after, competing companies sought to capitalize on this new product and moving pictures would soon follow suit. From the first moving pictures, lasting mere minutes – if even that – to full length features, film distributors quickly capitalized on the market for motion pictures. Thomas Edison was one of the first entrepreneurs to do so. His company, the Edison Manufacturing Co., was among the first to explore the uses of celluloid and the first to bring movies to life. Along with Edison, several others, Biograph and Vitagraph to name a few, joined the motion picture business to provide moving pictures to ever-increasing audiences. Together these pioneers initiated the film industry with first run pictures that traveled to vaudevilles, penny arcades, and nickelodeons.

To promote stability and prevent entry of budding competition, the earlier film distributors, led by Edison, cartelized the industry forming the Motion Picture Patents Company (MPPC). The cartel deemed illegal by the United States under the Sherman Antitrust Act in 1915, faced dissolution in 1917. Soon after, the above-mentioned budding competitors were quick to launch their products into the market and serve the growing demand for moving pictures.

A breakaway from traditional practices began as the new distributors, freed from monopolistic practices of the MPPC, produced films of increasing length. As it was,

¹ This is roughly four times the number of moviegoers in 2006.

these films were now features, and were no longer subject to the constraints they once faced as sideshow entertainment to vaudeville acts or the one to three reel shorts at nickelodeons. Pioneering this breakaway, Carl Laemmle, the Warner Brothers, and Thomas Fox among others, moved much of their production to California to establish what is known today as Hollywood. While a vast majority of production took place in Hollywood at the studios' lots, financing and many other corporate practices took place in New York. It was the separation of production and corporate offices that allowed Columbia Pictures to remain unrelenting in their distribution of films (Dick 1991)

The glory days of the Feature Film and Sound Eras, characterized by distributors such as Warner Bros, Paramount, Radio Keith Orpheum (RKO), Metro-Goldwyn-Mayer (MGM), and Twentieth Century Fox, would inevitably fade, as a new form of entertainment would make its way into American homes. With the introduction of television, Hollywood studios saw profit margins shrink as attendance declined at theaters. Reluctantly, studios began to embrace television and even began to create movies and infuse their film libraries to television programming to combat waning profits and declining attendance. In addition, film distributors began to create and merge with television studios. These practices characterized Hollywood throughout the mid to late 20th century.

Major distributors along with a few “minimajors”² and a vast number of independent distributors comprise the film industry today. The major film distributors have broken away from past systems, such as the system prevalent in the Studio Era where each company produced and distributed feature films on a weekly basis, and now

² The term “minimajors” is used to characterize film distributors that do not have as much success as the major distributors. For more information see (Vogel 2004, p. 49)

opt for the production and distribution of more blockbuster films amid their growing libraries.

Production and distribution of a blockbuster today necessitates investment of enormous amounts of money, as an example the 2007 film *Pirates of the Caribbean: Dead Man's Chest* possesses \$225 million in negative costs alone. However, the return can be quite lucrative if the proposed blockbuster favors well with audiences. *Pirates* generated \$423 million in domestic box office receipts and \$1.06 billion internationally, not including ancillary market, cable, merchandising, and pay-per-view sales.³

Today's feature film market is characterized by competition among big budget productions. With new releases, being nearly a third⁴ of that found during the Golden Age of Hollywood, film distributors rely on their big budget films to provide returns to ensure profits. However, as a distributor releases a big budget film, they must also concern themselves with other distributors doing the same. In essence, distributors vie against one another on a weekly or seasonal basis to promote their products to ensure the greatest returns. Yet, this competition is somewhat subdued during most of the year. Distributors, however, do increase competition during key times of the year through the release of big budget films. These key times are characterized by high demand that allow distributors to extract greater box office returns. While these *ex ante* blockbusters often possess enormous negative costs, they often provide their distributors with exceedingly high returns. While the adage "Nobody knows anything," may hold true for the films, distributors most likely conjecture that a big budget film released around a key date will,

³ The global and ancillary markets often allow a full recuperation of negative costs and profit for big budget films.

⁴ This is a rough calculation based on each major distributor and mini-major releasing about 15-25 films a year, whereas, in the Studio Era, each Major distributors were releasing nearly one film per week.

with a greater probability, provide a greater return than if the film had a different release date.

The purpose of this dissertation is to examine the film industry with respect to film distributor behavior. More specifically, the focal point of the analysis hinges on the type of profit maximizing behavior in which film distributors engage related to timing of releases. To assess such behavior theoretical and empirical models are constructed utilizing game theory and econometrics. The core of this dissertation provides an overview of the film industry from its past to present, a game theoretic approach to product timing and release, and empirical estimation of the competitive models set forth in the theoretical analysis. The last chapter concludes the dissertation with discussion of its main findings and provides recommendations for the optimal timing of, primarily, big budget releases.

The focus of the second chapter of this dissertation is of the film industry from its inception to present day. Throughout this chapter, much of the attention focuses on the larger firms of the past and present, with minor deviations. Presented is a synopsis of the rise, faltering of some, and persistence of distributors through the various film eras. The synopsis includes a brief overview of the coming of age of cinema, early film distributors, the “Majors” of the studio system, and the evolving firms and industry today. Much of the analysis focuses on the economic practices and antitrust issues surrounding distributors, highlighting key elements in brief descriptions of the “Majors.” This chapter also provides a prelude to the current film environment. As the industry evolved into the Blockbuster Era, the compulsion of film distributors to release big budget films and films around certain dates had advanced.

The third chapter examines the industry as a competitive environment where firms seek to capture as much box office revenue as possible during key times of the year. Certain dates, Memorial Day and July 4th *e.g.*, have higher box office attendance and therefore receipts. As a result, distributors frequently target these dates as a time to release their blockbusters. However, it is assumed that each distributor also considers the specific release date of their competitors and if the competitors' releases can have a significant impact on box office revenue. In doing so, each film distributor is concerned about their product timing and hence gaining as much market share or revenue as possible. Game theory has strong applicability to help analyze such a situation. By examining two competing firms across different time sets, a series of games are created to resolve the issue of product timing in the new release market. In the first set of games, distributors are assumed to have complete information and each chooses their release time simultaneously. These sets of games are noncooperative, *i.e.*, each player in the game acts independently of the other. Such a game is resolved via the concept of Nash Equilibrium. Assumptions categorizing players, strategies and payoffs are presented. Under these assumptions, conditions for Nash equilibria are specified. In addition, box office revenues for the years 1998-2008 are characterized to provide foundation for further analysis. As these data is from a time span that account for the most recent years, it captures conditions prevalent during the Blockbuster Era of film. Along with specifying distributional assumptions of weekend revenues, tables providing breakdowns of revenue classes and goodness-of-fit tests are presented. To illustrate each distributional assumption, graphs are provided. The analysis then shifts towards another class of games that best capture the essence of release. These sets of games employ

correlated equilibria as the solution concept. When a game is specified such that multiple equilibria exist, choosing which equilibrium is Pareto superior becomes mired in ambiguity. With correlated equilibria, the goal is to enhance expected payoffs to the players, and therefore move towards a Pareto superior outcome with the intervention of a mediator.

Implementation, by use of empirical estimation, of the theory set out in the third chapter is presented in the fourth chapter. This chapter promotes general models built from theory and empirical findings in the movie economics literature to examine the direct effects of competition. These models begin with a parsimonious regression that incorporates variables often found in the literature and others not found in the literature. Utilizing a multiplicative heteroskedastic regression, each model is estimated and their variance functions are reported. After the parsimonious regression is analyzed, the model(s) undergo various statistical tests to determine the “best fit” model. This model affords stability to undergo the main thesis of the chapter, that of competition. The goal of the chapter is to empirically demonstrate that competition among big budget films can negatively affect box office returns. To determine levels of competition, two measures are created and tested. Each measure is then tested in the best-fit model to determine the level of competition among distributors. In addition, various seasonal effects with competition are tested.

Chapter five concludes the dissertation with comments and suggestions for further research. Moreover, from the theory developed in chapter three and the estimation in chapter four, a policy recommendation is provided to distributors.

The goal of this dissertation is to expound upon the competitive behavior of major firms within the film industry. By analyzing competition among the most lucrative films, i.e. typically films that have big budgets, a recommendation of movie placement can be made, in order for film distributors to maximize revenue at the box office. Moreover, if there exists an optimal timing of release for films, then it is possible to enhance social welfare as clustering is less likely to take place Einav(2007). The results and conclusions drawn have applicability to a number of other industries where product timing and release is essential for profit maximization.

Chapter 2

A Brief History of Film Distributors, Eras, and Practices

1. Introduction

The goal of this chapter is to provide an overview and brief history of the film industry with respect to its leading distributors and their economic practices. The film industry has seen the advancement of many eras, as such different business, and economic practices during those eras. As (Mast 1981) remarks there are six eras of the film industry with each era characterized by the inventions and innovations of their respective times. Of the many practices, vertical integration saw extensive use and was the cause of one of two major reorganizations, due to antitrust legislation – the *Paramount* decree⁵, in the industry. Monopolization of the movie market was the other cause for reorganization, which stemmed from the creation of the Motion Picture Patents Co. and the accompanying antitrust case, the *US v. Motion Picture Patents Co*. Each case broke up the monopolistic practices of film distributors, and at the same time ushered in a new era of cinema. Each new era of cinema, allowed many distributors to thrive, yet limited others. Limitations arose out of competition amongst distributors and new forms of media such as the television and home video.

The organization of this chapter proceeds as follows. First, a brief overview of the motion picture industry through its various eras is presented. Following is an

⁵ *United States v. Paramount Pictures, Inc.*, 334 US 131

overview of the rise of cinema and the earliest film distributors. This entails the first era of movies, the Nickelodeon Era, through the first major antitrust case against film distributors. Next, the Golden Age of Hollywood or Feature Film Era is presented along with a brief background of the major studios of the time. This extends the discussion to the *Paramount* decree, the second and most famous antitrust case in the film industry. Finally, an analysis of the last era of film, the Blockbuster Era, and the new majors of today bring about a preamble of the main thesis of this dissertation.

2. Film through the Ages

2.1 Overview

From the earliest American film distributors, Edison, Biograph, Vitagraph among others and two early influential French film distributors Méliès and Pathé to today's distribution giants, film distributors have, with various formulas, seen enormous success and disastrous failure. From the advent of the motion picture, the rise of the star, the introduction of sound then color, experiments with 3-D, and large production blockbusters, each innovation has proven successful, but at the same time, each has had its failures. Because of failures and changing tastes, film distributors adjusted their operations in order to ensure they remained profitable, and in many cases operational. The adjustments made were, largely to gain market share among competitors and remain profitable against substitutes, through the introduction of a new format or technology to adapt to changing demand.

Throughout the 20th century, changing tastes and technology led to adjusted operations and practices as producers moved consumers first away from movie sideshows

of vaudeville and penny arcades to nickelodeons, next to film palaces, drive-ins, and the multiplex, and finally to the living room with the introduction of the television and home video. The initial move from vaudeville parlors to nickelodeons proved successful for those distributors that embraced the move, but unfortunate for those who did not.

Following, the next move to film palaces also proved fortunate. As demand for films increased, limitations in size and scope of vaudeville parlors and penny arcades proved too small as only a limited amount of consumers could view a movie at a given time.

The distributors of the second era, the Feature Film Era, of movies sought to change the previous practice by first exhibiting films in nickelodeons then movie palaces that could house more than one thousand viewers and in many cases had an orchestra to accompany the film for sound. The move to movie palaces also provided a better experience for viewing movies, as movie palaces were more grandiose than nickelodeons. In addition, the feature film could last up to two hours, as opposed to the one-hour shorts shown in nickelodeons, thereby necessitating a more comfortable environment. A key component of this era was vertical integration. Prior to the Feature Film Era, the MPPC had monopolized the industry by hoarding film production and distribution. With control over output and inputs, from Eastman Kodak's involvement in the trust, only theater owners who dealt with the MPPC film exchanges received the best movies. However, this led several theater owners to begin their own production and distribution, thus controlling every aspect, except raw film, of movie making.

With the Feature Film Era under way, distributors entered into the Golden Age of Hollywood, a time when eight particular studios prospered. The advance of sound initiated Hollywood's third era, the Sound Era. Talkies, films with sound, as they were

known became a staple in the industry after the introduction of Vitaphone, and the success of *The Jazz Singer* (1927). Distributors, initially slow to adopt, began to equip their theaters with sound systems. However, the Great Depression loomed around the Sound Era, and box office revenues fell. As the United States recovered from the Great Depression, Hollywood did as well. Industry revenues increased yearly until their peak in 1946. Two year later, Hollywood's big eight would suffer another blow with the *Paramount* decree.

As Hollywood distributors progressed from the second, Feature Film Era, and the third, Sound Era, eras into the Transitional and New Hollywood Eras they were faced with two challenges. The first challenge was the immediate damage the *Paramount* decree had done to their established system. The major distributors could no longer participate in the vertically integrated practices that had once allowed them to be profitable. Distributors were also subject to the Motion Pictures Association of America (MPAA) regulations. Regulations surrounding movies had existed since the Production Code, but the Hay's Code (1934) began to enforce the Production Code more stringently. The goal of Hay's Code was to use the Production Code as a counter to censorship of film by finding alternate ways to display risqué topics (Grainge et al. 2007). After the *Paramount* Decree, censorship of movies became increasingly difficult as independent directors, distributors, and producers resisted the MPAA's seal of approval (Grainge et al. 2007). With barriers to exhibition broken down by the *Paramount* decree, independents found it increasingly easier to show their films in theaters. A key result from this was the New Hollywood Era, which sought to explore more culturally charged topics. One genre

that arose out of this was sexploitation. By 1968, the MPAA introduced a rating system, a precursor to the one today, and discontinued the Production Code (Grainge et al. 2007).

The second challenge Hollywood distributors faced were falling attendances and the rise of the television. The movie palace was in wide use, but drive-ins and multiplexes were becoming increasingly popular. Each allowed expansion of the consumer base. The drive-in provided a convenient medium where consumers could cheaply attend movies. The multiplex and later megaplex facilitated access of suburban America to the movies lowering the opportunity cost of going to the movies as many were located in shopping malls. First, it provided a more convenient location than conventional urban theaters and second one could shop and watch a movie in a day at the mall, thereby reducing time spent on the two previously separate activities. Yet, the invention of the television proved to be another challenge for distributors to overcome.

As the Feature Film Era persisted, vertical integration of production, distribution, and exhibition became the standard for the major distributors, and to a lesser extent Poverty Row distributors. This ensured oligopoly power in the film market, yet film distributors faced a new substitute for their previously unique product. Television had been commercially available since the late 1930's. By 1951, approximately five million televisions were in American homes, providing perhaps the first close substitute to movies (Dick 1991). The advent of the television would not deter the major film distributors; they instead saw the television as a way to gain profit albeit many were reluctant to join the market at first (Eames 1979). Three reasons for their reluctance were contractual obligations, first run profits, and the cost of films (Balio 1990). Contractual obligations from unions prohibited distributors from collecting revenue from other

licensing venues, due to the lack of stipulating royalties to members of the production team. The threat of strike from unions would follow if movies were licensed to television and members were not paid. To a lesser extent, first run profits caused hesitation towards television. Distributors have historically viewed theatrical release as the main avenue for profits with other media providing residual revenue. As television became a staple of the American consumer, licensing films to television became a logical choice for distributors to pursue as they could extend the life of their films and therefore revenue returned. Finally, as television was in its infancy, renting or purchasing a film outright was not economically viable, as distributors priced their products for more than what television stations could afford.

With initial reluctance, major distributors ultimately licensed movies to television without giving exclusive rights (Grainge et al. 2007). Licensing films provided one means to ward off falling attendances. Another source of revenue, during a time of falling attendances, was “B” films directly allotted to television. B films had already existed to fill a bill, usually as a double feature, or allotted to second-run theaters. Television also provided a new outlet of distribution for the B film. With time, major film distributors joined television production by licensing films, making films for TV and becoming a part of television stations. Columbia joined the fray first as Screen Gems became the progenitor of film distributor outlets to television (Dick 1991). Other distributors soon followed and today distributors are much a part of television production.

With the growth of television, and distributors joining the television market, other exhibition markets were on the rise. The multiplex brought movies to American suburbs in 1963 (Acland 2003). Home video was introduced in the 1970’s. Television channels

dedicated to movies were introduced in the 1970s and 80s. Today, movies are streamed over the internet. Each innovation has brought a new way to profit from a single product and has given consumers multiple ways to enjoy the same product.

Film distributors today are much the same as they were during their birth. They each seek to make profitable ventures. However, the major and minimajor film distributors of today vary slightly as compared to those at the inception of the film industry. This variation lies within the eras of the film industry. From the earliest Nickelodeon Era to what (Mast 1981) proposes as the Blockbuster Era, the first major film distributors have changed as a new wave of distributors has come forth in the market. Among these eras, two advanced because of the monopolizing enterprises of prior eras, beginning with the earliest cartel of movie distributors, the Motion Picture Patents Company.

2.2 Enter Film, the Nickelodeon Era, and Prevalent Businesses

The film industry has its beginnings in the late 19th century with entrepreneurs seeking profits with this new novelty item. The 20th century began with the Nickelodeon Era, which saw the growth of film as consumers both from the United States and internationally flocked to local sites to view picture shows that satisfied a growing appetite in this new form of entertainment. While films from the late 19th century and Nickelodeon Era were essentially the same, *i.e.* films from both eras possessed no sound; the Nickelodeon Era provided mass exposure to consumers. Early distributors, led by pioneering giants such as Thomas Edison, sought to capitalize on this sensation and eventually would monopolize the market for motion pictures.

Movies began with the creation of celluloid and Thomas Edison's ingenuity. Edison viewed George Eastman's creation, celluloid, at first as a novelty act. Edison devoted his company's resources sparsely towards motion pictures (Mast 1981). However, as the first films proved profitable, Edison devoted more resources towards the production and distribution of motion pictures. The first motion pictures were no longer than a minute in length and cost a penny to view. The invention of the Kinetoscope, a viewing device, and the Kinetograph, a camera to record the movie, facilitated the first films in vaudeville parlors and penny arcades (Mast 1981). Others also ventured into the film industry around the same time as motion pictures provided a profitable venue. Domestic companies such as Biograph and Vitagraph as well as international companies such as Pathé and Méliès began producing and distributing films mainly as intermission entertainment to upper class citizens that frequented vaudeville parlors. However, as movies became more popular the consumer base expanded to include middle class citizens. The growth of the movie-viewing base ushered in exhibition outlets that specifically catered to film.

As motion pictures proved nothing more than a novelty act to early consumers, (O'Leary 1965), exhibition for movies evolved into a new form. Originating in 1905, this new form of exhibition moved away from arcades, parlors, and fairgrounds and into theaters called nickelodeons. Nickelodeons, aptly named as consumers were charged a nickel per viewing, introduced mass audiences to motion pictures. A large influx of consumers, as nickelodeons provided venues that could accommodate hundreds, enabled growth in the film industry, which led to increased distribution and exhibition.

The nature of the nickelodeon film was short, lasting anywhere from 10 – 60 minutes, making turnover critical to gain repeat customers. Exhibitors, therefore, changed their programs several times per week, if not daily. This shift in business practice led to increased attendance during the Nickelodeon Era, as customers began to incorporate movie viewing into their everyday lives. A simple model economically, transactions costs were low as admission fees were flat, and audiences could amass in theaters. Moreover, film producers/distributors stuck to a cheap formula. Since films were relatively short, production and distribution costs were low enabling producers and distributors to make cheap films ensuring a larger return.

The nickelodeon also brought out a pivotal change in movie viewing. Prior to the nickelodeon theater, films were most readily viewed in vaudeville parlors, fairgrounds, and penny arcades, which acted as fleeting entertainment secondary to other forms of entertainment available. With the introduction of the nickelodeon, movies had a distinctive home and became the primary form of entertainment leading to the growth of the movie industry. Growth in demand led to a growth in supply. Nickelodeons quickly grew to over 5,000 in number after the initial inception in 1905 (Mast 1981).

2.3 Early Dissension and the Motion Picture Patents Company

As nickelodeons began to flourish, the amount of theater owners did as well. Theater owners such as Carl Laemmle, Marcus Loew, Adolph Zucker, the Warner Bros, Louis Mayer, and William Fox were at the forefront of movie exhibition. These men began amassing theater chains and a few even formed their own studios. Concurrently, the Motion Picture Patents Company formed in 1908, as the leading distributors of the

time sought to monopolize the motion picture industry by pooling all relevant patents of movie technology. The MPPC consisted of the film companies Edison, Biograph, Vitagraph, Essanay, Selig, Lubin, Kalem, American Star, American Pathé and Eastman Kodak, the largest supplier of raw film (Mast 1981).

As the MPPC burgeoned, annoyance of the theater owners flourished as well. The MPPC had near complete control of films in the American movie market. Moreover, the MPPC owned patents to movie viewing technology. By colluding, the MPPC was assured to have only their films shown in theaters. This act was enforced through punishment towards exhibitors who rented films from distributors not associated with the MPPC.⁶ The significance of this lies with the quality of product. MPPC products were among the best in terms of quality. Moreover, with Eastman Kodak solely supplying the MPPC, it became increasingly difficult for developing distributors to stay in business due to lack of raw film. However, the MPPC proved to be its own demise. Not only was the trust illegal by the Sherman Antitrust Act, but the restriction to films that popularized the Nickelodeon Era and increasing rental rates led to the breakaway from the rising independents.

Feature film was ready to assume its role as the next innovation of film. Growing audiences at nickelodeons meant a change in the composition of the audience. The previous films, while not lacking in story, provided little in diversification. Two-hour feature films provided a story, yet the investment towards them was more than the MPPC was willing to accept. This catalyst sparked independent distributors to flee to California, establish Hollywood, and escape the MPPC. As independent distributors began

⁶ William Fox was one exhibitor that refused to honor contracts from the MPPC. He remained independent of the MPPC's exchanges and as such was not able to receive the top billing films. This defiant act eventually led Fox to move to Hollywood and begin his own studio (Solomon 1988)

producing and distributing feature films, the MPPC was relenting. Failing to adapt to latest innovation, and coupled with an antitrust lawsuit⁷, the MPPC ceased to exist in 1917 and the Studio System was born. Concurrently, the feature film also brought on the demise of the nickelodeon (Anderson1985).

2.4 The Hollywood Majors from the Nickelodeon Era to the Sound Era

Prior to and during the dissolution of the MPPC, distributors such as Paramount, MGM, Fox, and Warner Bros, among others began moving their studios to the western United States, what is present day Hollywood. These companies erected massive sound stages to produce films and to escape pressure exerted by the MPPC. These distributors also altered their business practices. Many of the founding distributors of this era owned nickelodeons and theater chains. Hence, in this era movie production, distribution, and exhibition were tied together, thus creating vertical integration for many distributors in the movie industry. Two major innovations during the transition of the Nickelodeon and Sound Era led the previous exhibitors turned distributors into the Hollywood majors and minimajors. The first innovation stemmed from the direct control of the MPPC on film production and distribution and led the then exhibitors to introduce the feature film, as a way to diversify film to satisfy growing audiences. This innovation ushered in the Feature Film Era. The second innovation brought sound to previous silence and created film's third era, the Sound Era. The major distributors, and to some extent the minimajors, of these two eras were pivotal for the evolving film industry. Below, a brief history an economic analysis is presented for each.

⁷ *U.S. v. Motion Picture Patents Co.*, 225 F. 800

2.4.1 Paramount

The analysis of economic performance during the Studio System era begins with Paramount. Paramount, as its name implies, is a good example of the movie studio model during the Golden Age of Hollywood. Paramount Pictures Corporation began distribution in 1914 under W.W. Hodkinson. Initially, Paramount was not a producer of films; instead, the company relied on others to produce films for which it distributed (Balio 1985). Adolph Zucker, who formed the Famous Players Film Company in 1912, was one such producer who allowed Paramount Pictures Corporation to distribute his products. Famous Players was another producer for Paramount. Famous Players merged with Jesse L. Lasky Feature Play Company in 1916 to become the Famous Players-Lasky Corporation, with Paramount included, as Hodkinson was deposed (Balio 1985). By 1927, a number of other smaller mergers had occurred among Famous Players-Lasky and Paramount, and eventually one company was formed. The company later reorganized after bankruptcy and renamed Paramount Pictures in 1935.

Paramount, similar to the other major distributors of the Feature Film Era, was a vertically integrated firm combining elements of production, distribution, and exhibition. Unfortunately for Paramount, their vertical integration would lead them to become the namesake defendant in the *US v. Paramount* antitrust case.^{8,9} After the consent decree, Paramount split into two companies, Paramount Pictures Corporation (for production and distribution) and United Paramount Theaters (for exhibition). Gulf and Western acquired Paramount in 1966 for \$83 a share making Paramount the first major distributor to be

⁸ *United States v. Paramount Pictures, Inc.*, 334 US 131

⁹ Although Paramount is the namesake for lawsuit, each of the major distributors of Hollywood shared equal roles in the case.

owned by a conglomerate¹⁰ (Eames 2002). During this time, Paramount enjoyed success with movies *The Godfather II* (1974), *Beverly Hills Cop* (1984), *Star Trek: The Motion Picture* (1979), and the *Indiana Jones* series to name a few. Paramount continued its success under Gulf and Western into the 1980s with the *Star Trek* series, *Crocodile Dundee* (1986), *Top Gun* (1986), and *Beverly Hills Cop II* (1987) among some of the top grossing films. Moreover, Paramount's television division produced hit shows in *Cheers* (1982) and *Family Ties* (1982) to further the horizontal integration that was fully gripping Hollywood's major studios.

Viacom made a push to acquire Paramount edging out QVC with a bid price of \$9.5 billion in 1994 Wiseman (1994). Recently, much of Paramount's success has been attributed to its contract with DreamWorks, which has produced such hits as *Transformers* (2007) and *Shrek the Third* (2007). This venture came out of a \$1.6 billion deal, in which Paramount would distribute films for DreamWorks in order to fill in the gaps of their own production. However, this venture formally ended in 2008 Cieply (2008).

2.4.2 Twentieth Century Fox

Twentieth Century Fox, formerly Fox before the acquisition of Twentieth Century in 1935, has its foundations in distribution, exhibition, and production beginning in the year 1915. Prior to the all-encompassing studio, William Fox had beginnings as an arcade and nickelodeon owner (Solomon 1988), of which he grew out of to form the Fox Film Corporation after several acquisitions. Like many of the studios of the Studio Era,

¹⁰ Universal, acquired by MCA in 1962, was the first distributor to be a part of a conglomerate, however, Universal's status was subordinate to the major distributors.

Fox moved to Hollywood in 1917. Chase Bank purchased a majority stake in Fox from the Wesco Corporation in 1934 and later acquired Twentieth Century Pictures in 1935, and thus the studio Twentieth Century Fox was born Churchill (1935). Prior to this acquisition, Fox Films had purchased a controlling interest in MGM, however, financial troubles and antitrust issues led the courts to a decision of dissolution between the two (Solomon 1988).

After the Paramount Decree, distributors began looking for ways to combat falling attendances, largely due to the advent of television. In 1952, Fox introduced cinemascope (Solomon 1988). Cinemascope allowed films to be displayed in widescreen, and was another innovation to attract audiences to theaters and show that movies were superior to television. Throughout the New Hollywood Era, Fox distributed hits such as *Cleopatra* (1963), *The Sound of Music* (1965), *Fantastic Voyage* (1966), and *Planet of the Apes* (1968). Moreover, in 1977, *Star Wars* had become the most profitable film, up to that time, released in theaters. Around this time, Twentieth Century Fox would soon become the desire for an oil tycoon in Marvin Davis. Davis was the first private individual to own a studio since Howard Hughes and RKO (Solomon 1988). By 1985, however, Twentieth Century Fox would have its last buyout. Rupert Murdoch bought Davis' 50% stake for \$325 million Lindsey (1985). Although typically remaining in the lower half of the top six distributors, in terms of market share, Twentieth Century Fox remains a competitive force in the movie industry, with box office hits in the *Star Wars* trilogy, *Star Wars* pre-trilogy, the *X-men* trilogy, the *Ice Age* trilogy, *Independence Day* (1996), *Avatar* (2009) and the joint venture with Paramount, *Titanic* (1997).

2.4.3 Warner Bros.

Warner Bros began like most major distributors of the Feature Film Era, as a theater. The four Warner brothers: Harry, Albert, Sam, and Jack, opened their first theater in 1903 (Hirschhorn 1979). After a modest amount of success, the Warner Bros relocated to California in 1912 where they entered agreements with Carl Laemmle to distribute their products, in order to escape the MPPC's reach. 1923 was the year the Warner Bros become fully incorporated, Warner Brothers West Coast Studio, and introduced Rin-Tin-Tin, which would become their most profitable venture (Hirschhorn 1979).

Warner Bros was the first to incorporate and capitalize on sound into movies. With the purchase of the Vitaphone from Western Electric in 1926 (Higham 1975), Warner Bros released *The Jazz Singer* in 1927 and introduced the sound evolution in film.¹¹ Introducing sound into film proved a gamble, however by the late 1930's Warner Bros. were ahead of other film distributors in terms of sound on film. Warner Bros. hired two famed composers, Max Steiner and Erich Wolfgang Korngold, to solidify their status as distributors with quality sound films (Higham 1975). During the 1930's Warner Bros also released 'Looney Tunes' and 'Merrie Melodies' from which characters Bugs Bunny and Porky the Pig are famous.

After the success of *The Jazz Singer*, Warner Bros began expansion, first by borrowing \$100 million from Goldman, Sachs and Hayden, and Stone and Co. Part of this loan went to equip theaters for sound. Warner Bros also made two key acquisitions. First, they purchased a 70% stake in First National Pictures. Second, they purchased the

¹¹ Technically, *Don Juan* (1926) had incorporated sound as well into the film, yet there was no sound for the dialogue, thereby, making *The Jazz Singer* the first movie to have sound in the form of dialogue and music.

Stanley Corporation of America, which enhanced Warner Bros. exhibition by 250 theaters nationally (Warner Bros. Buy Stanley Theaters 1928).

Time Inc. purchased Warner Bros. in 1989, followed by the mergers of Turner Broadcasting System in 1996 and AOL in 2000. Independent distributors were rising in the 1960's. New Line was one such distributor. In 1994, Turner acquired New Line/Fine Line Cinema for \$600 million Sharpe (1994). New Line was a rising independent that had success with the *Nightmare on Elm Street* series and at the time had the most successful film by an independent, *Teenage Mutant Ninja Turtles* (1990). New Line has been able to remain some autonomy and has had recent success with the *Lord of the Rings* trilogy, the *Austin Powers* trilogy, and *Wedding Crashers* (2005). Warner Bros., now a part of the company Time Warner, has had recent success with the *Harry Potter* franchise and the *Matrix* trilogy,

2.4.4 Metro-Goldwyn-Mayer

Metro-Goldwyn-Mayer is probably most famous for its iconic symbol, Leo the lion, and stars Clark Gable and Jean Harlow. However, MGM, as it is commonly known, did not arise until 1924. Marcus Loew, of Loews Theatrical Enterprises (LTE), established the foundations of MGM in 1910 (Eames 1979). With the establishment of the MPPC in 1908, and the subsequent exertion of pressure on exhibitors, it was no coincidence that Marcus Lowe formed MGM two years later. By 1920, LTE began its expansion with the acquisition of Metro Picture Corporation and four years later the Goldwyn Company. Around the same time, the final piece to MGM was the acquisition

of Mayer Pictures. After the mergers were complete, the newly formed company was renamed to Metro-Goldwyn-Mayer.

MGM began to fade into the background of the major distributors, and was the last of the defendants in the Paramount case to cooperate with ruling, and by 1973, ceased the distribution of its films (Eames 1979), which it licensed to United Artist (UA). By 1981, however, MGM purchased UA, which immediately became a subsidiary. Two years later the subsidiary UA was consolidated into MGM and MGM/UA was formed. Throughout the remainder of the 20th century, numerous acquisitions and mergers surrounded MGM/UA.

Despite successes such as *Armageddon* (1998) and *Tomorrow Never Dies* (1997), MGM/UA still found it difficult to return a profit. In a move to gain profits, MGM/UA began to release films away from key times to avoid direct competition with the major distributors. Moreover, this strategy focused on a small amount of films, around ten, and smaller budgeted films (< \$20 million) to provide profitable returns.¹² This strategy worked well with small budgets films such as *Legally Blonde* (2001) which grossed over \$96 million and cost less than \$20 million *Graser* (2003). Sony Pictures, in its attempts to continue to expand into the movie market, began negotiations with MGM/UA in 2004. In September 2004, Sony, in a joint venture, purchased MGM/UA for approximately \$5 billion, while only paying in \$300 million of its own *Goldsmith* (2004). MGM/UA, however, remained a private company. Today, MGM/UA is no longer the major distributor as it once was. In 2007, there were 29 total new releases from MGM/UA, yet; only \$366 million was generated from these films.

¹² MGM's larger budget films during this time were flopping at the theaters, thus pushing the strategy to go with smaller budget films.

2.4.5 Radio Keith Orpheum

The conclusion of past major distributors lies with a brief analysis of the smallest of them all, Radio Keith Orpheum (RKO). RKO has a quite different history from the other majors of the Studio era. While RKO is still a film distributor today, the company is not the film giant it once was. Today it produces and distributes relatively few films. *Shade* (2004), its latest distributed film only grossed \$25,000. RKO arrived during the Sound Era of film. With Warner Bros. breakthrough of sound on film, RCA sought to move into the film market, as RCA had previously been exploring sound technologies with film. RKO became a Hollywood distributor in 1928, when RCA purchased controlling interest in Joseph Kennedy's Film Booking Offices of America (FBO), alongside with Keith-Albee-Orpheum (K-A-O). This deal was fortunate for RCA in two ways. First, RCA now had holdings in the movie industry. Secondly, perhaps more importantly, with the merger, RCA had several hundred theaters (Lasky 1984) to display its films.¹³ RKO proved prosperous, and in 1936 signed a contract with Disney to distribute his films (Thomas 1998). As World War II ended, so did RCA's interest in RKO, selling their remaining stock for \$7 million Lasky (1984). Howard Hughes would later purchase RKO for \$8.8 million, becoming one of the first private individuals to purchase a movie distributor (Lasky 1984). However, this deal proved to be the final blow to the fledgling company. Hughes had lost much of his interest in the company often-selling films from RKO's library. Eventually, Hughes sold his controlling interest in the company and in 1957, the company ceased production. In 1989, RKO began production with the acquisition by Ted Hartley and Dina Merrill (Company:Legacy).

¹³ A common practice during the Golden Age of Hollywood was for major distributors to show their films in their theaters.

The company has produced a modest amount of films with *Are We Done Yet?* (2007) being the latest RKO film produced but distributed by Sony.

2.4.6 Poverty Row and the Minimajors

Poverty Row is a term given to a section of Sunset Boulevard and aptly named because it housed the studios and distributors that produced and distributed films that were shown in side street America or on the lower half of double bills (Dick 1991) and many were considered independents. The independents did not have major stars on contract, nor did they own theaters, or produce and distribute as many films as the majors of the day. However, among those on Poverty Row, one in particular, Columbia¹⁴, proved to be more than just an independent.

Columbia was perhaps the most prominent distributor of Poverty Row. Columbia origins began in 1919 with Harry and Jack Cohn with the founding of the Hall Room Boys Photoplays, Inc. Soon after the Cohn brothers, along with Joe Brandt, formed the CBC Film Sales Co. (Dick 1991). The CBC operated as a small film company that produced films for other studios to distribute. By 1924, CBC would change its name and business practices to become Columbia Pictures and distribute its own films. Columbia, however, neglected to follow the major studios of the time with its own exhibition; instead, Columbia allowed others to exhibit their films. This action proved fortuitous for Columbia, as the Consent Decree handed down in 1949, forced major studios to abandon many of their exhibition practices. Columbia was also the first to join the television market with the launch of Screen Gems, Inc., formerly Screen Gems a subsidiary of Columbia, in 1948.

¹⁴ Columbia was actually considered a minimajor by the standards of the time.

By the time the Blockbuster Era of film had arrived, the Coca Cola Corporation had purchased Columbia in 1982. This acquisition, however, did not last. By 1989, Columbia was sold to the Sony Corporation, as Sony sought to enter the film industry Buchan (1989). Along with TriStar, Columbia was under the control of Sony. Today, Columbia still releases several films a year, but they now do it as a subsidiary of Sony.

Universal and United Artists are two other distributors of note during the Golden Age of Hollywood. Carl Laemmle founded Universal Pictures in 1912 when he was seeking to escape the monopolistic pressures of the MPPC. Universal's operations were moved to California by 1915. After the Paramount decree, Decca Records purchased - in 1952 - the controlling interest in Universal. MCA would later consolidate with Decca leaving Universal a subsidiary. In 1993, Matsushita Electrical Industrial Company purchased MCA for \$6.6 billion, followed by Seagram Co. purchase of MCA in 1995. Universal's future was still in the air by 2000. Vivendi purchased Seagram, which later purchased USA Networks to make Vivendi Universal Entertainment. Finally, in 2004, Universal saw its last move when General Electric purchased Vivendi's entertainment unit.

Out of the original dominant Hollywood eight, United Artists (UA) had the most uncommon methods to approaching films. Production and distribution, for the most part, were conducted at each distributor's studio. With the exception of Columbia, exhibition was also an integral part of the movie. However, UA, founded in 1919 by D.W. Griffith, Charles Chaplin, Mary Pickford, and Douglas Fairbanks, divorced itself completely from production studios. Instead, the four founders sought to distribute films that were the products of independent producers (Balio 1987). This strategy worked well; however,

UA remained limited in the total number of films they released each year, often with the lowest output of the eight distributors. UA remained a private company until 1957, being the last of the original eight to do so. Around this time, UA had expanded into the television market; again one of the last of the original eight to do so. UA entered the sixties by releasing big budget films. *The Greatest Story Ever Told* (1965) was one such film that was met diametric opposition from the critics (Balio 1987). However, UA also released the first in a series of successful movies *Dr. No* (1962), which had a modest amount of success. Following *Dr. No*, UA moved ahead with *From Russia With Love* (1963) with a production budget of \$2 million and domestic grosses in excess of \$24 million. UA found a successful formula and the James Bond series moved forward. After an acquisition by TransAmerican Corporation in 1966, from which UA maintained autonomy, UA became MGM's distributor in 1973. However, MGM purchased UA in 1981 and the company became MGM/UA Delugach and Pollock (1981)

2.5 The Paramount Decree

As the major studios power solidified so did many of their practices. Among these were block booking and blind buying.¹⁵ Each practice ensured that the major distributors would continue to reap large profits and highlight many products not deemed worthy by exhibitors. Along with these practices, many of the major distributors operated their own theater chains ensuring that many of the products could only be viewed at one of their theaters and lower rental rates were given to theater owners. The

¹⁵ Block booking is the practice of selling one or more films along with a feature film to an individual exhibitor to ensure that some of the distributors "canned" films are picked up. Blind buying is the practice of selling films to exhibitors without allowing the exhibitors a chance to view the film. This practice ensures, much like block booking, that some of the sub-par films are sold, whereas they otherwise would not be.

U.S. Department of Justice (DOJ) filed its case against the major distributors in 1938 for violations of the Sherman Antitrust Act. Vertical integration was the determining factor for the DOJ to pursue the Hollywood distributors. A brief reprieve would be awarded to the Hollywood distributors if they abided by three rules: 1) one-shot block booking could no longer take place 2) trade showing would exhibit new products every few weeks so blind buying would no longer be a practice and 3) an arbitration board to enforce the policies would be put in place and paid for by the distributors. The five major studios of the time signed this consent decree on September 1, 1941. The other three distributors, Columbia, United Artist, and Universal, refused to sign, as they did not own any theaters. However, the Supreme Court had a stipulation that allowed the lawsuit to be reinstated within three years if the distributors failed to follow the decree.¹⁶

Along with the DOJ, a group of independent producers, the Society of Independent Motion Picture Producers (SIMPP) filed a lawsuit against the major distributors in 1942 as the previous practices promoted unfair competition (Aberdeen 2000). This lawsuit by SIMPP and the failure of distributors to abide by the rules led to the reinstatement of the lawsuit in 1943.

The US Supreme Court handed down its verdict 1948¹⁷ and Hollywood distributors were forced to give up the vertically integrated practices. The main intention for the case was to promote fair trade and exhibition practices for exhibitors and independent distributors. However, the result was higher rental rates to exhibitors and a lower output of films. The lower output of films actually resulted in higher quality thereby hurting independent distributors, De Vany and McMillan (2004). Moreover,

¹⁶ This is an overview of the original case in 1938. Time magazine presented this article in 1940.

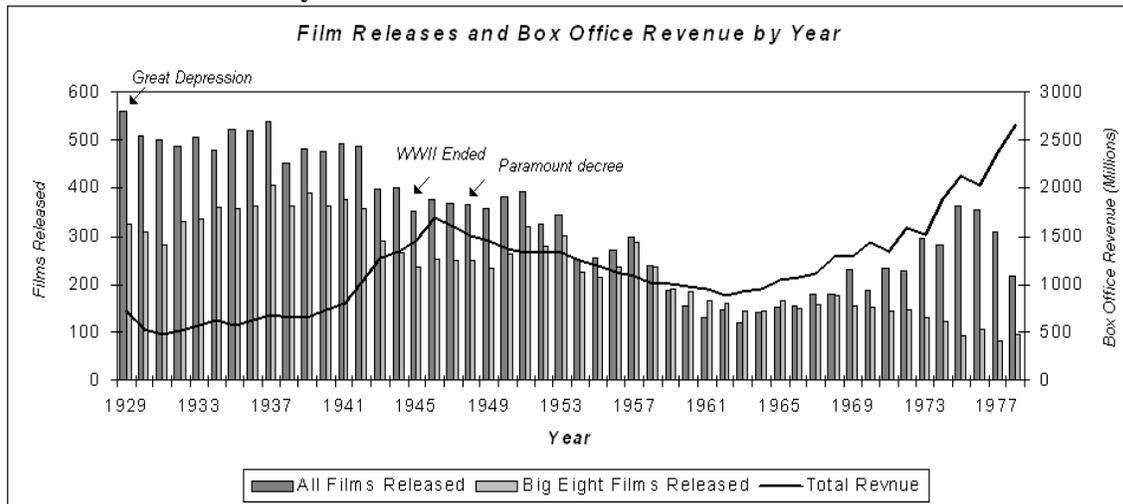
¹⁷ United States v. Paramount Pictures, Inc., 334 US 131

Crandall (1975) concludes that from 1948-1966 the independents were not able to compete with the major distributors, due to a lack of total industry output and an increase in quality output from the majors.

2.6 Television and the Coming of the Blockbuster

After the Paramount Decree, the majors abandoned previous practices such as block booking and blind buying.¹⁸ This period for the major distributors saw the faltering of one, RKO, falling attendances, growth in the movie landscape, and the rise of television.¹⁹ Film studios sought to combat their lost practices, falling attendances, and the rise of the new technology in television. Moreover, production and revenues had fallen after World War II. Revenues did not trend upwards until 1963, but the eight majors, sans RKO, were distributing less with independents distributing more, Figure 2.1.

Figure 2.1 Total New Releases, New Releases by the ‘Hollywood Eight’ and Total Box Office Revenue by Year.



Data source: (Steinberg 1980)

¹⁸ The last studio to fully adhere to the Paramount Decree was MGM in 1959.

¹⁹ Television did contribute partly to the fall of attendances; however, the variety of product available may have been a cause as well. The barriers to entry were high for incoming distributors seeking to release a product to a mass audience as the major distributors did.

Early innovations such as color films, previously seen in the 1940's, was one innovation that became more common as television was slower to adopt the technology needed to produce color images. Drive-ins and multiplexes were another factor in an attempt to curb falling attendances. However, lower opportunity costs for television consumers facilitated the television as a rising form of entertainment. Going to the movies required taking time out of one's day and spending money, therefore, making a night of television viewing relatively less costly. As this practice became more common, studios saw waning profits and sought to adapt to the crisis. As a result, film studios began the move towards television.

Hollywood studios attempted to enter the television market in the 1930's. Paramount epitomized this move after conducting research between the link of Hollywood and Television. Purchasing the Allen B. DuMont Laboratories in 1938, Paramount was underway to gain a base in the television market (Kramer 1996). Paramount moved forward with television by launching an experimental television station; soon after, Warner, Fox and MGM filed petitions with the FCC to join the market with their own stations (Segrave 1999). By this time, the US was fully involved in World War II, and television production had diminished as box office revenues increased.

Attempts to resume television expansion were stalled by the Paramount Decree. Previously, the radio stations NBC and CBS attempted to move into the television market, but were halted by the FCC primarily because of potential monopolization in the market.²⁰ The FCC issued licenses to the radio stations to broadcast television signals in 1941. With the FCC's watch off the NBC and CBS, it turned its attention fully towards

²⁰ NBC had to divest its company, in 1941, into two entities NBC Blue and NBC Red because of the potential to monopolize the broadcast market. NBC Blue later became ABC and NBC Red became NBC.

the Hollywood studios. Aside from prohibiting practices by the major distributors, the Paramount Decree also prohibited them from fully integrating into the television market. While not a clause in the consent, the Communications Act of 1934 allowed the FCC to refuse licenses to companies that had been accused of monopolizing practices (Kramer 1996) thereby limiting entry of distributors, and leading to the withdrawal of applications for station licenses.

Columbia was among the majors to make the first serious move towards television with Screen Gems Inc., a television distribution arm. Making commercials initially for television, Screen Gems later made full length television shows. Columbia would have also been the first to allow television access to a film library, yet Howard Hughes released 740 features of RKO (Dick 1991) Columbia followed with 104 and Warner Bros with 850 (Segrave 1999). United Artists Television received the Warner Bros deal, which included all films up to 1949 for \$21 million (Higham 1975). The FCC may have derailed Hollywood's initial move into television, but the growth of television dictated programming and the feature film libraries of Hollywood was the answer. Mergers and acquisitions of companies, *e.g.* Turner Broadcasting Services with Warner Bros and Viacom with Paramount led to the union between Hollywood and television.

One other practice to combat the decline in attendance was the move to focus on producing bigger budget films and less on producing a higher quantity of films (Grainge et al 2007). This change marks the beginnings of the Blockbuster Era. Film production dropped and the output of larger budget films increased to subsidize the losses smaller budget films incurred.

The blockbuster also provides lucrative returns with television licensing. *Harry Potter and the Sorcerer's Stone* have a reported \$70 million asking price and NBC paid \$30 million for the rights to air *Titanic* McDowell and Tyranigel (2001).

2.7 Home Video

Movie attendance finally saw stabilization, in terms of attendance, during the Blockbuster Era. Distributors were producing and distributing blockbuster films to combat waning profits from other film ventures. Yet, the rise of home video and pay television proved to be another obstacle for movie distributors. Ampex produced the first videotape recorder in 1956, but the videocassette recorder (VCR) would not be commercially viable until the 1970's (Wasser 2001). With the introduction of Sony's Betamax, 1975, and Japan Victor Company's (JVC) Video Home System (VHS), 1976, home video, in the form of video tapes, arrived in the market and offered consumers a way to record television programming to watch later. Initially, distributors viewed this technology negatively. Three concerns emanate this aversion. First, distributors believed that leverage and power came from leasing a film not selling it. Distributors also worried about video piracy. Finally, distributors feared rerecording cassettes would eschew consumers from theaters (Wasser 2001). However, by the mid-80's home video was accounting for 50% of feature film production (Grainge et al 2007). Leading to this was the tit-for-tat game that Disney and Paramount, and to a lesser extend Warner Bros., played. Videos were originally priced at \$79.95, but Paramount released *Star Trek II: The Wrath of Khan* at a price of \$39.95, which sold over 200,000 units. Few distributors followed this lead. Disney, on the other hand, released seven non-feature animation films

priced at \$29.95. Paramount countered with a \$24.95 price on recent big budget films and thus ushered a sticky price for VHS tapes (Wasser 2001).

2.8 New Majors

The composition of the majors in Hollywood has changed over the years. Fox, now Twentieth Century Fox, Paramount, Universal, and Warner Bros are surviving members of the Golden Era. MGM and RKO now have diminished roles; the former distributes a modest amount of films per year²¹, while the latter produces a few films and distributes even less. Today, however, the number of major distributors numbers six, but includes one old distributor, Disney, and one new distributor, Sony.

2.8.1 Disney/Buena Vista

Walt Disney, and its distribution arm Buena Vista, is no stranger to the movie market. In the late 1920's and early 1930's Walt Disney optioned many of his cartoons to distributors to be played at movies.²² Among his most famous cartoons was Steamboat Willie, which introduced Mickey Mouse (Grover 1991). However, as an independent distributor, Disney had relatively little power in the market. Walt Disney along with many other distributors formed the Society of Independent Motion Picture Producers (SIMPP) to combat the practices of the major studios (Aberdeen 2000).

Even as a member of SIMPP, Disney had relatively little distributing power, yet this problem resolved itself with RKO's financial troubles in 1953. Disney had no formal distribution arm prior to Buena Vista. Disney contracted Columbia, United Artists, and

²¹MGM distributed 20 films in 2007, the most within the past nine years.

²² Columbia was the first distributor to release Disney's films. Later, Disney would opt for his films to be distributed by United Artists, then RKO.

RKO to distribute its films. Disney's last distributor was RKO, but in 1953, Disney severed ties with RKO, likely over the film *The Living Desert*, and introduced Buena Vista (Thomas 1988). Using a family oriented formula for its movies Buena Vista had success throughout much of the second half of the twentieth century. As Disney and Buena Vista's sales grew so did their production and distribution.

As Disney was more attuned towards family oriented films, Touchstone, a subsidiary of Disney, was founded in 1984 to provide the market with adult oriented films. Disney also acquired the successful independent distributor, Miramax, for \$60 million in 1993 Eller and Froom (1993). More recently, Disney acquired the Pixar animation studio, which has had enormous success providing animated movies such as *Finding Nemo* and *The Incredibles*, as well as the critically acclaimed *Ratatouille*. Disney's latest venture was a \$4.3 billion deal with Marvel Entertainment Co. This deal, finalized on Dec. 31, 2009, may prove a valuable deal given Marvel's recent success with comic book adaptations Littleton (2010). Disney is one of the more curious distributors, as there have been no acquisitions of Disney. It has been the other way around. The empire that is Disney has been through its acquisitions of other companies.

2.8.2 Sony

Sony Corporation has a relatively short history in the film market having been a Japanese electronics giant and not a film distributor or producer. The entrance into the film market may be attributed to Akio Morita, Sony's chairman, foresight that software sales would outgrow hardware sales Wagstyl and Buchan (1989). Sony entered the movie market with the acquisition of Columbia/Tristar in September 1989. The deal

came at a cost of \$3.4 billion, purchasing Coca-Cola's 49% stock in Columbia, but most importantly gave Sony studios, theaters and a film library Sanger (1989). Throughout the 1990's Sony restructured many of its movie operations. Columbia Pictures now operated under the renamed Sony Pictures Entertainment (SPE) and Tristar merged with Columbia in 1998 Carver and Cox (1998). Sony, however, was not finished with past Hollywood giants. On September 23, 2004, a deal was struck between Sony and MGM. The deal was reported to be near \$5 billion Sorkin (2004), yet Sony walked out of the deal paying only \$300 million of its own cash Goldsmith (2004). Presently, SPE is one of the leading Hollywood distributors consistently earning 10% or greater of the market share with hits such as *Men in Black* (1997) *Men In Black II* (2002), *Hancock* (2008), the *Spider-Man* trilogy, and *Casino Royale* (2006), the first James Bond film not distributed by MGM or one of MGM's distribution partners, *i.e.* United Artists.

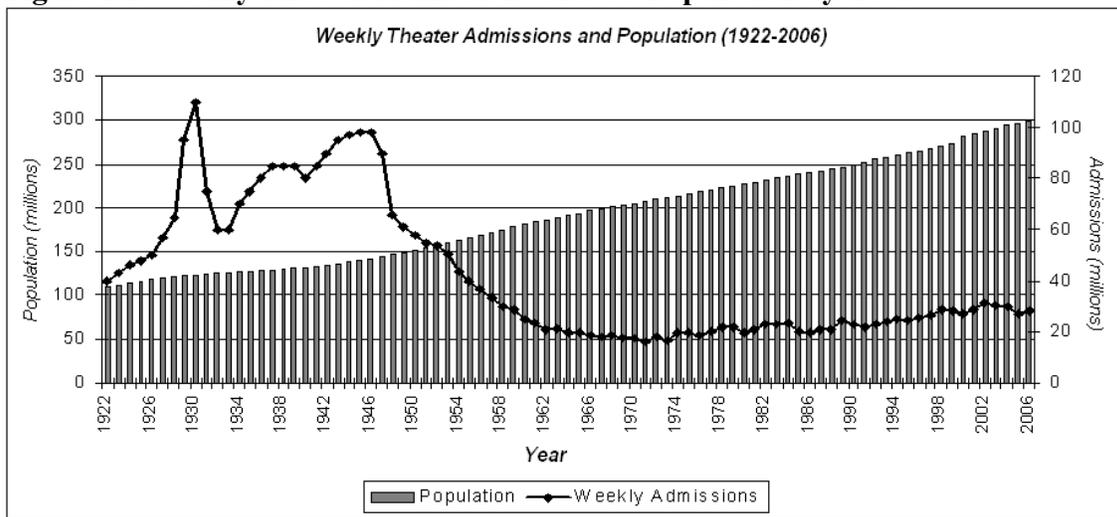
3. Looking Forward

3.1. Prelude to Competition

This Blockbuster Era provides us the sufficient conditions to move forward with an analysis of film distributors. In prior eras, vertical integration was crucial to distributor success, as distributors could release their films in their theaters, guaranteeing no direct competition at a particular theater. Moreover, attendance during these eras was high, with no close substitutes to film. Therefore, the major distributors could concern themselves less with competition and more about the amount of product they put into the market. As the major studios moved away from previous models of film distribution and began to focus more on a few releases per year, the need for a more successful film arose,

i.e. one that recoups negative losses in a shorter amount of time for the distributor. Film history has seen a myriad of films that have been successful at the box office and provided enormous profits for film distributors. However, in an era of falling attendances, Figure 2.2, the need to pursue a medium that could captivate audiences, which in turn leads to higher box office returns has arisen.

Figure 2.2 Weekly Theater Admissions and US Population by Year



Data Sources: US Census Bureau; International Motion Picture Almanac 1947, 2008, (Steinberg 1980)

The blockbuster was, and is, the preferred medium for major film distributors. During peak times of the year, film distributors focus on releasing a handful of blockbusters as these films typically enjoy the most success at theaters and provide the studios with an overall higher market share. Yet, blockbusters are not without their problems.

3.2 Competition between Films

Two problems arise when releasing a blockbuster. The first problem is associated with the enormous negative costs (production budget) that go into producing a

blockbuster. Production budgets of blockbusters are typically greater than \$100 million, making it a necessity for the film to have a strong run at the box office. Moreover, the first problem is positively associated with the second problem. The second problem that arises is the release timing of a new movie in conjunction with another film of similar traits. A distributor would certainly not want to have a movie with an enormous negative cost compete with another movie of similar factors. In doing so, the distributor almost ensures that the returns to his release will be smaller than had he released away from his competition. This presents an optimal timing problem for distributors.

Major distributors²³ are among the key players in releasing big budget films²⁴, consequently leaving them among those who compete for market share in opening and subsequent weekends.²⁵ From 1998-2008, 1,707 movies were released. Table 2.1 details the number of big budget films released by major distributors during this time. Of the 1,707 movies released, 1,161 are included in the sample.²⁶ Major distributors possess the overwhelming majority of big budget

Table 2.1 Big Budget Films by Type of Distributor

Distributor	Big Budget Films
Majors	150
Non-Majors	23

Note: For an explanation of how big budget films were determined see chapter 4, section 2.

²³ Buena Vista, Fox, Paramount, Sony, Universal, and Warner Bros, see (Vogel 2002)

²⁴ While the major distributors have more regularity in releasing big budget films, big budget films are not restricted to major distributors. During the course of a year, smaller distributors have an occasional big budget film, and in many instances have sleepers that generated enormous amounts of revenue.

²⁵ Opening weekend revenue is pivotal for distributors as contracts may stipulate 90% of the gross be returned to the distributor with the return percentage declining as the movie continues its run in theaters. A “floor” may also be imposed in addition to the sliding contract so the distributor recoups a minimum amount of the receipts. Effectually, whichever contract returns the largest amount of revenue the distributor takes (Daniels et al. 1998).

²⁶ This omits re-issues, IMAX releases, as well as movies for which data were incomplete.

films, but are not the sole possessors of big budget films. This will lead to a general analysis of big budget films as opposed to a specific one in distributors.

Seasonality is also a pivotal element in the determination of opening weekend revenues and competition among movies. Big budget films are typically released, approximately 62%, during the holidays and summer months, Table 2.2.

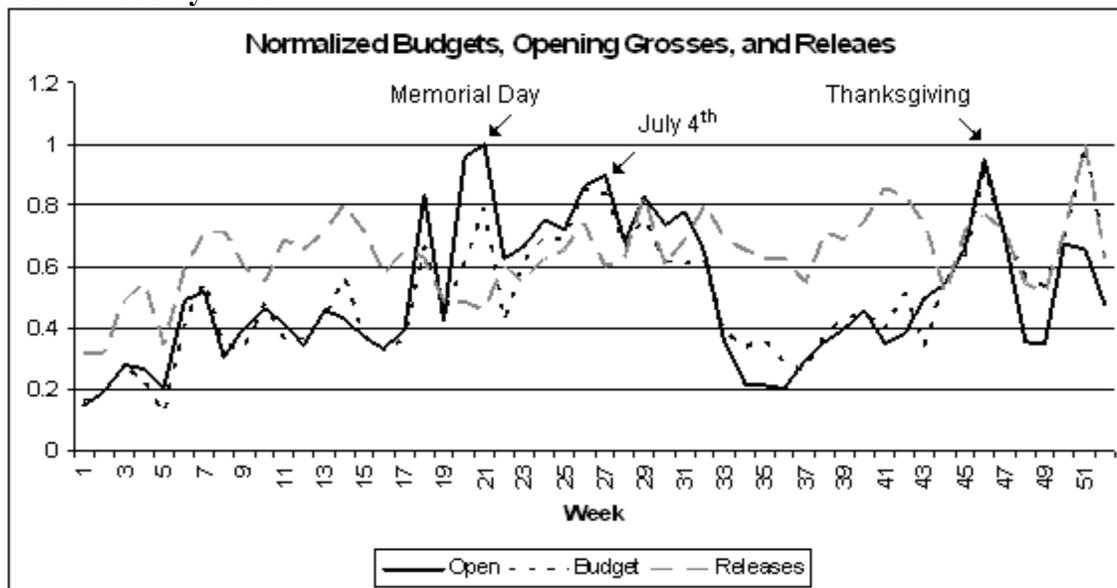
Table 2.2 Big Budget Films by Season

Season	Big Budget Films	% Total
Memorial Day	29	16.8
July 4 th	33	19.1
Thanksgiving	28	16.2
Christmas	17	9.8
All Other Times	66	38.2

Note: Data is the same as in Table 2.1.

Holidays and summer months exhibit greater attendance leading to greater returns. Moreover, as big budget films are released during these times there are a lower number of total movies released. Figure 2.2 normalizes opening weekend grosses, budgets, and the total number of new releases. The figure shows three peak times: Memorial Day, July 4th, and Thanksgiving, around weeks 21, 27, and 46 respectively. Interestingly, the number of new releases during these times declines as opening weekend revenue increases, as opposed to the first sixteen weeks and weeks 33-44.

Figure 2.2 Normalized Budgets, Opening Grosses, and Releases for the period 1998 – 2008 by Week



Note: Data is the same as in Table 2.1

With big budget films being released more frequently during the peak seasons, and with the number of movies released declining during the peak season, it is clear that big budget films are competing against one another with limited competition from other films. The question that remains is thus: How much competition is occurring and to what extent does competition hurt opening weekend revenue?

Chapter 3

Optimal Release Timing of New Films

1. Introduction

Firms engage in competition for the marginal consumer by physically locating near their competitor Hotelling (1929). For particular products, however, it is important to locate with distance temporally as opposed to physically. The entertainment industry encounters this situation with a variety of products (CDs, DVDs, and video games).²⁷ While store shelves or movie theaters contain a variety of choices, newly released products often maintain an initial high demand. Due to the eroding nature of their sales, these products in particular should incorporate release strategies as to avoid any loss in profit from competition. In the present analysis, movie release timing is considered.

The film industry has evolved, with fewer products being produced by each distributor over time. As such, the need for a film(s) to generate a substantial profit²⁸ has arisen. One way to amass profits in the film industry is to release a blockbuster. Prior to the Blockbuster era, distributors released movies almost on a weekly basis, with the occasional “mega hit” or “blockbuster.” The transition into the Blockbuster era by Hollywood distributors did not bring about the blockbuster, but altered the business practices of the studios. Today’s film environment, however, has limited the number of

²⁷ Products may also include television programming Gabszewicz et al. (2007).

²⁸ Film distributors focus on revenues for each film individually, and calculate profits at the year’s end. This can attributed to the focus on weekend, weekly or total box office gross.

releases for distributors as each competes in blockbusters.²⁹ This alteration in release patterns have brought about a small number of big budget films by the six major distributors with the release of marginal films to fill the slate throughout the year. Minimajors and independent distributors also compete against the Majors' big budget films, yet they do so with less frequency.³⁰ Moreover, the blockbuster is partially subjected to seasonality Einav (2007), as significant portions of blockbusters are released during peak seasons to ensure greater returns. Yet, as distributors have focused more on big budget films, they have also increased competitive losses by clustering big budget films together. When distributors compete head-to-head, each loses revenue they otherwise would have gained. The organization of this chapter proceeds as follows: first, the motion picture release background is presented which includes graphical representations of release patterns during the year. Next, the initial framework is presented bringing forth the need for strategic behavior to be incorporated. Following, are a series of noncooperative games using simultaneous moves. The theoretical distribution of opening weekend revenues is presented along with graphical representations. Concluding the chapter is the solution concept of correlated equilibria incorporated into the noncooperative games.

2. Background

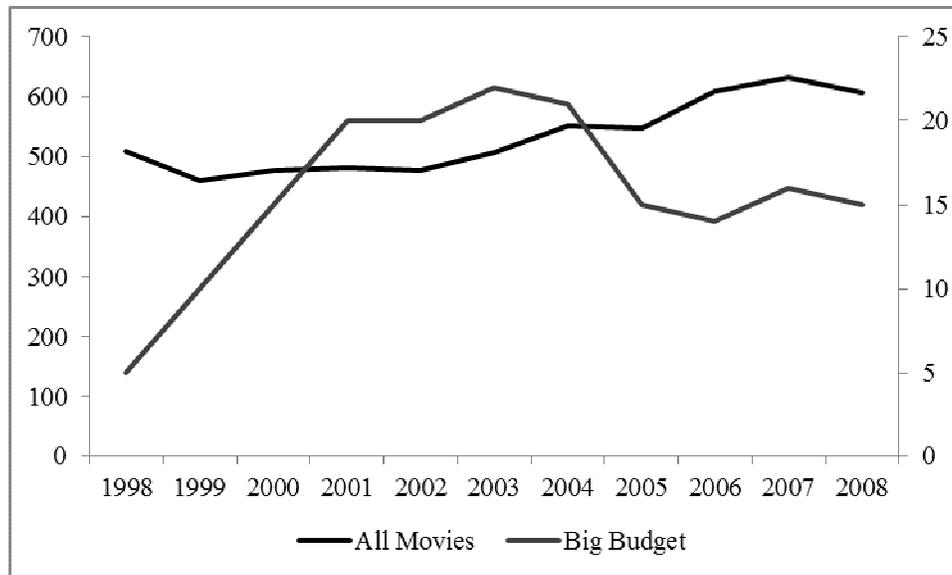
The film industry is a multi-billion dollar industry grossing approximately \$10.8 billion in 2009 (boxofficemojo.com). Each year film distributors release hundreds of

²⁹ Qualification: each distributor releases numerous films a year, yet profit gains are largely determined by blockbusters.

³⁰ This is largely due to the lack of ability to raise the money necessary to produce a big budget film.

movies to satisfy consumer wants for entertainment. More importantly, however, are the number of films that achieve big budget status, as it remains relatively low, Figure 3.1.

Figure 3.1 Big Budget Films v. All Films, 1998 – 2008



Data Source: boxofficemojo.com

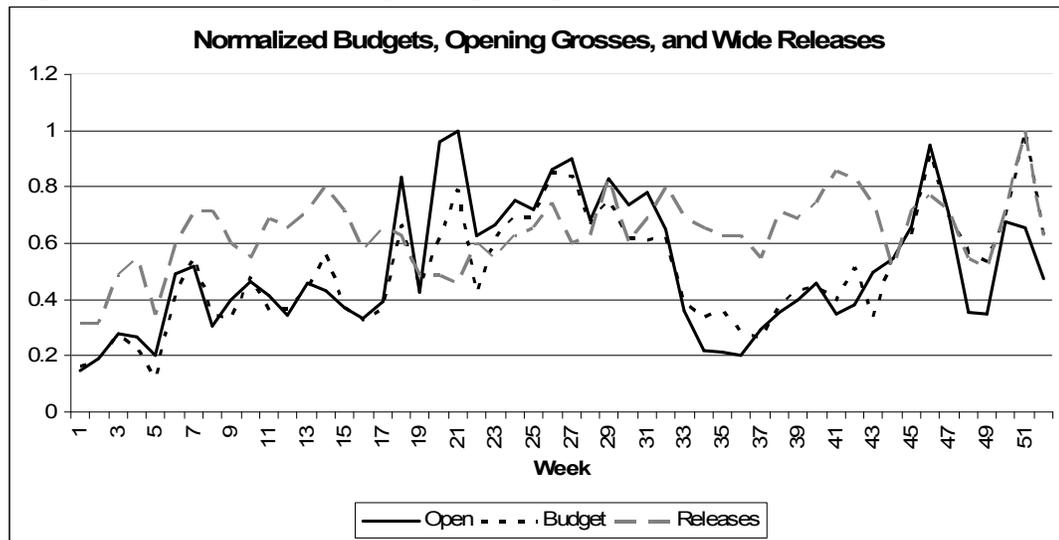
With only a handful of big budget films released per year, they are expected to become blockbusters for distributors, for which they can earn substantial revenue and in return increase profits for the year. As such, distributors seek to release these films at times when demand is high and competition in general is low. This is most readily seen during the summer and Christmas holidays, with higher demand and lower competition in the summer and high demand during Christmas. Memorial Day weekend marks the start of summer for many and is a key date for big budget films. July 4th is the other holiday during the summer that is also significant for distributors and big budget films.

Thanksgiving and Christmas mark the other two times of the year that are high demand

dates for movies. Hence, many distributors schedule big budget films to be released on or near these dates. As Figure 3.2 shows, opening revenues, budgets, and wide releases are normalized by the greatest week for each week during the years 1998-2008.

Throughout the year, releases tend to remain relatively high when compared to opening

Figure 3.2 Normalized Budgets, Openings Grosses, and Wide Releases



Data source: boxofficemojo.com

weekend revenues. However, as opening weekend revenues begin to rise, the number of wide release films begins to decline. Coincidentally, the budget line also follows opening weekend revenues with a correlation of 0.87. The first significant spike occurs around week 18, which typically marks the beginning of May, then falls precipitously until week 20. This is significant, as distributors have recently released their big budget films with this weekend, often jumping the gun of the summer season, and directly avoiding competition. Memorial Day lies primarily on week 21 and opening weekend revenues decline and plateau for the remainder of the summer, until the first week of August.

Wide releases and opening weekend revenues continue their contrariety until

Thanksgiving weekend (week 46) and resume until Christmas weekend (week 51) a time when a profusion of films are released.

The patterns implied by Figure 3.2 are representative of the typical movie year. With four key weekends of release, distributors have to position their films with caution as they consider competition into their release formula. Each peak weekend bolsters box office revenue, yet there are more than four big budget films per year. Moreover, as each distributor competes they do so subject to conditions determined by the market and the inherent qualities of their respective film(s).

3. Framework

Assessing release patterns invokes several important questions, namely: Do film distributors seek to capture as much of the market as possible, or do distributors seek to capture as much of the market from their competitors as possible? The former question invokes capturing a lone distributor's performance against all films in the market at a given time. The latter question, however, seeks to understand a more competitive behavior among film distributors, i.e., among film distributors with an expected high grossing film, each vies to compete in the peak seasons, but at the same time avoid direct competition with others of similar standing.

Distributors seeking to avoid competition do so against like films, i.e., big budget versus big budget.³¹ Each big budget film's demand is relatively high with a natural assumption that the greater the budget the larger the demand. Moreover, peak days and seasons have an inherit demand built in due to greater accessibility of moviegoers.

³¹ A small budget film generally poses no threat to a big budget film in terms of box office competition. In fact, it may be wise for a small budget film to open alongside a big budget film on a peak day due to the inherit demand created by the peak day.

Demand for big budget films paired with the inherent demand from peak days and seasons translates into greater weekend revenues for the film industry. As distributors set to release their big budget films, they must also consider the release patterns of other distributors. Each distributor then needs to assess the optimal time in order to extract as much opening weekend revenue to enhance the overall profitability of the film.

There is an inherent strategic timing problem involved with the distribution of blockbusters. If two distributors release their respective blockbusters on the same date, then they split the revenues³², holding other factors such as genre, star power, critic reviews, etc. constant. One assumption is that a distributor does not want to share revenue with another distributor since as much as (25-30%)³³ percent of a film's total box office receipts are gathered during the opening week³⁴ with subsequent weeks generating substantially less revenue. However, it is also possible that distributors will decide to take a competitive loss if the demand for their film is high enough.

An important determinant in strategic timing of films relates to the positioning of a film near a "megadate."³⁵ By this, it is meant whether or not a film distributor will think that positioning the film too close or too far away from the megadate or peak weekend and a competitor is an ideal situation. Further, will this positioning allow for an optimal extraction of revenue? A distributor must choose to release in time P_{t-n} , P_t , or time P_{t+n} where P is the peak day, and the firm releases either before, on, or after the peak day. In addition, firm i must also consider firm j 's positioning to the peak day, as

³² This is not an exact 50/50 split as one movie may attract a larger audience. In addition, other distributors may release films on a key date.

³³ This is for films in wide release by a major distributor from the 1998-2008.

³⁴ The distributor/exhibitor contracts are set on average so that the distributor receives 90% of opening weekend grosses (Daniels et al. 1998).

³⁵ A megadate is a date of high attendance. In Figure 1, the biggest megadate is July 4th. Other megadates also exist at Christmas, Memorial Day, and New Year's Day.

competing head-to-head decreases revenue for each firm. This presents a basic setup for a two-player game of strategic timing.

When distributors release their big budget films, they take into account their competition. Each big budget film may be placed in time with respect to other big budget films to enhance profitability of the respective distributor. Placement in time is a location choice and hence simultaneous and dynamic games can be used to analyze the optimal choices of each distributor.

To set the stage only two distributors are considered. Each distributor makes the decision to produce a film with a big, moderate, or small budget, as defined by the previous year's market conditions, or not produce. Once each distributor decides to make a big budget film, then the distributor has the option to screen the movie to gauge the film's potential market. A film distributor can use the movie screening as information to determine opening weekend revenues and determine the timing of release. If the film creates a positive signal then it will not necessarily need the opening bump³⁶ that a peak date provides. However, if the movie creates a negative signal then the movie may need the opening bump from a peak date, as the movie would not generate enough revenue outside of the high demand time.³⁷ In the following sections, simultaneous and dynamic games are analyzed.

3.1 Noncooperative Simultaneous Play

To begin, a two-stage game of complete information is considered. While simultaneous play and complete information may not necessarily hold, it does provide a

³⁶ Peak weekends generate an opening bump. Essentially, an opening bump serves to increase revenues to higher levels than they would be on an off peak weekend.

³⁷ This does not imply a film cannot generate its own demand; rather the peak times bolster demand.

good starting point in analyzing distributor behavior. In this model, distributors know each other's budgets and are aware of a competitive loss that arises when they both release on the same day. Distributors do not hold pre-screening to determine if their respective movie needs the opening bump that a peak day provides, and therefore can avoid early announcements.

3.2 Setup

Two film distributors, i and j , seek to release their respective films during a month with a holiday (peak) weekend. If one distributor decides against releasing a film, the game ends with the other distributor releasing on the peak weekend. Weekend revenues are considered over total revenues as distributor-exhibitor contracts are typically sliding scale agreements, with distributors collecting the largest percent of revenue (around 90%) during the opening week.³⁸ Distributors i and j are faced with three possible release options: release prior to the peak week, release on the peak week, or release after the peak week. Releasing after the peak week, however, provides little incentive to the distributors. Consider that peak weekends generate the greatest demand and hence revenue. Further, releasing a film prior to the peak week creates availability for the peak weekend. While the early release does not return peak week revenues it does allow some extraction of peak week revenues.³⁹ Releasing a film after the peak week, however, does not create availability for the peak week nor does it return peak week revenues. In addition, each distributor bases their decision on past information regarding the movie's

³⁸ There is also a strong positive correlation (0.89) between opening weekend revenues and total revenues, likely due to opening weekend revenues accounting for more than 25% of total revenues.

³⁹ This extraction may be negligible if the film released on the peak weekend extracts a significant portion of peak weekend revenues.

traits (genre, stars, directors, etc.) and selects their release date. Given this, the strategy space for distributors i and j are $S_{i,j} = \{Early, Peak\}$ where Early denotes an early release and Peak denotes a peak weekend release.

As there are two distributors, it is possible that both may release on the same weekend, thus each will suffer a competitive loss. The competitive loss is a head-to-head competition where each film loses revenues as moviegoers go see one of the films but not both. Had the films released on separate weekends there would be no direct competitive loss.⁴⁰ With this, the payoff to distributor i is defined as:

$$\pi_i = \begin{cases} R^e & \text{if } s_i \neq s_j \text{ for } i > j \\ R^e - C(B_i, B_j) & \text{if } s_i = s_j \text{ for } i < j \\ R^p & \text{if } s_i \neq s_j \text{ for } i < j \\ R^p - C(B_i, B_j) & \text{if } s_i = s_j \text{ for } i > j \end{cases} \quad (\text{eq. 3.1})$$

With R^e and R^p being the early and peak weekend revenues respectively. Payoffs to distributor j are symmetric to i . There are no direct costs to the distributor for distribution of the film as budgets are assumed a fixed/sunk cost. The marginal cost of distributing is also assumed zero. The competitive loss $C(B_i, B_j)$ enters into the payoff as a function of budgets. This assumption is made because budget size has a direct relationship with movie revenues, and a competitor with a substantial budget is more likely to reduce revenues. As the size of the budget increases, movie revenues grow by a proportionate

⁴⁰ The possibility of an indirect competitive loss exists, which is simply one film creating holdover to the peak weekend. In the present analysis, holdover will not be considered.

amount, likewise for a decrease in the size of a budget. Therefore, the competitive loss increases as each budget increases in size and decreases as the budget size gets smaller.

3.3 Simultaneous Play

From the preceding, a simple 2x2 game (Table 3.1) can be constructed. This game is in normal form, so that each player moves simultaneously. While not wholly realistic, this provides a starting point for a richer analysis. In this game, each distributor knows the payoffs but is unsure as to what the other distributor will do. To proceed, each distributor must predict what early and peak weekend revenues would be to determine the location of their respective film. Some assumptions about revenues and competitive losses are known to both namely $R^p > R^e$ and $C^p(B_i, B_j) \geq C^e(B_i, B_j)$.

Table 3.1 2x2 Normal Form Game 1

		<i>j</i>	
		Early	Peak
<i>i</i>	Early	$R^e - C^e(B_i, B_j), R^e - C^e(B_i, B_j)$	R^e, R^p
	Peak	R^p, R^e	$R^p - C^p(B_i, B_j), R^p - C^p(B_i, B_j)$

This game is symmetric in that the payoffs for {Early, Peak} and {Peak, Early} are reversed. Under the assumption that $B_i \approx B_j$, or that they are both big budget films, the conditions to achieve Nash equilibrium are as follows:

- 1) if $R^p - C^p(B_i, B_j) \geq R^e$ then the Nash equilibrium is {Peak, Peak}

2) if $R^p - C^p(B_i, B_j) \leq R^e$ then there are two Nash equilibria {Early, Peak} and {Peak,

Early}, with a mixed strategy of
$$\left\{ \begin{array}{l} \frac{[R^p - C^p(B_i, B_j)] - R^e}{[R^e - C^e(B_i, B_j)] - R^e - R^p + [R^p - C^p(B_i, B_j)]} \\ \frac{[R^e - C^e(B_i, B_j)] - R^p}{[R^e - C^e(B_i, B_j)] - R^e - R^p + [R^p - C^p(B_i, B_j)]} \end{array} \right\}.$$

The competitive loss in condition 1 is small enough to allow each distributor to pursue the peak date as their release time. This must be the case if under a probability distribution F , where R^e is achieved with probability p and R^p is achieved with $(1 - p)$ and $p > (1 - p)$ that adding a competitive loss, C , does not lower/raise the probability of achieving R^e/R^p , such that $p > (1 - p) + C$. The converse is true for condition 2, where introducing C increases the probability that $p < (1 - p) + C$. Hence, there will be two pure Nash equilibria and a mixed strategy.

Under condition 2, the two Nash equilibria create a coordination problem for each distributor. Namely, each distributor has the option of releasing early or on the peak date, and certainly, they would both prefer to release on the peak date as it ensures higher returns. Coordination failure is a likely to arise is such a case. By ceding the peak date, the distributor lowers their probability of higher profits for the year. A potential solution is to allow a focal point to arise such that if $B_i > B_j$ then distributor j cedes the peak weekend. Under complete information, both distributors would know the other's budget and could act accordingly. This solution minimizes the competitive loss for the smaller budget film and may enhance social welfare. Such a case may be likely in many long awaited projects that have created enough hype, e.g., a sequel to a previous blockbuster, which often posses larger budgets.

Another way to solve the multiple equilibria is to consider peak date availability. Consider distributor j who wants to release his film on the peak date, but is aware, or perhaps unaware, that distributor i is releasing his film on the peak date. With this information, distributor j knows that a competitive loss will erode peak date revenues if they both release on the same date. However, distributor j wants to pursue an availability option, i.e., distributor j releases his film prior to the peak date, and thus his movie is available for the peak date, without having suffered the opening weekend competitive loss. Such an action may be viable when $B_i > B_j$, as distributor i 's film is likely to gross more than distributor j 's film. However, the distributor j would need *ex ante* information about the film. Without prior information, distributor j is essentially taking a shot in the dark and does not know how well the movie will carry over to the peak weekend—the holdover assumption.

One caveat of the previous analysis is that, due to the symmetry, the game could easily substitute the big budget films for small budget films and the payoffs and structure of the game remain unchanged. Hence, if there exists a time during the year where big budget films are absent from peak and early releases, then distributors of small budget films still know the equilibrium outcomes.

3.4 Big Budget v. Small Budget

The next type of game is one of asymmetry. The main assumption here is that budget size between two competing films is vastly different, i.e., a big budget film versus a small budget film. Under this assumption, the competitive loss is expected to shrink as big budget films dominate small budget films. Consider the following,

Table 3.2 2x2 Normal Form Game 2

		<i>j</i>	
		Early	Peak
<i>i</i>	Early	$R_b^e - C_b^e(B_i, B_j) , R_s^e - C_s^e(B_i, B_j)$	R^e , R_s^p
	Peak	R^p , R^e	$R^p - C_b^p(B_i, B_j) , R_s^{p'} - C_s^p(B_i, B_j)$

Distributor *i* releases the big budget film and *j* releases the small budget film. In this scenario, revenues for the small budget film will be different when compared to the early game. First, the competitive loss will be significantly smaller as a big budget film has more built in demand than a small budget film, ensuring that more moviegoers see the big budget film as opposed to the small budget film. This shrinks the competitive loss and alters the revenue distribution. Second, peak weekends have a greater inherent demand, but adding big budget films to them increases the demand. However, if the big budget film were to cede a peak week leaving only the small budget film available for the release, then the revenues generated are smaller than they otherwise would be.

Solving the game assumes the following conditions:

1. $R_b^p - C_b^p(B_i, B_j) \geq R^e$ and $R_s^{p'} - C_s^p(B_i, B_j) \geq R_s^p$ the Nash equilibrium is {Peak, Peak}
2. $R_b^p - C_b^p(B_i, B_j) \geq R^e$ and $R_s^{p'} - C_s^p(B_i, B_j) \leq R_s^p$ the Nash equilibrium is {Peak, Peak}
3. $R_b^p - C_b^p(B_i, B_j) \geq R^e$ and $R_s^{p'} - C_s^p(B_i, B_j) \leq R^e$ the Nash equilibrium is {Peak, Early}

The first inequality in each condition specifies that peak date revenue with a competitive loss for distributor i will always be greater than or equal to revenues on earlier dates. This is a natural assumption since small competitors generally do not significantly lower revenues of their big budget counterparts. When considering the probabilities of each event, obtaining total peak date revenues incurs a probability a , such that $0 \leq a < 1$. For a distributor to maximize his probability there must be no other film released on the same day. However, as $B_i \rightarrow \infty$, the probability of obtaining $R^p = 1$, i.e., the big budget film crowds out the small budget film, the competitive effect diminishes. If the two films are released on the peak date then obtaining a is not possible. However, the Nash equilibrium from conditions 1 and 2 are still valid as the competitive loss is minimal to distributor i :

$$0 \leq a < R^p - C_b^p(B_i, B_j) \leq R^e < 1$$

Condition 3 specifies the only deviation from the {Peak, Peak} equilibrium. It must be the case there exists a week such that revenues from that week are large enough to forgo entry in the peak week for the small film. Such weeks may occur in the summer months, particularly before the July 4th holiday.

4. Theoretical Distribution of Weekend Revenues

4.1 All Films

The following provides some grounding for decision making from the previous games. What follows are the distributions of weekend revenues utilizing a three-parameter lognormal distribution (Cohen (1951); (Cohen 1988)) that takes the following form:

$$f(x; \theta, \zeta, \sigma) = \frac{1}{\sigma \sqrt{2\pi} (x - \theta)} \exp\left(-\frac{[\log(x - \theta) - \zeta]^2}{2\sigma^2}\right) \quad (\text{eq. 3.2})$$

where θ is a threshold parameter, ζ is the scale parameter and σ is the shape parameter. Movie revenues do not follow the normal distribution, as a few movies tend to dominate the box office at any point in time De Vany and Walls (1999). The three-parameter log normal distribution, however, serves as an excellent distributional assumption due to more importance given at the lower tail than the upper tail.

Using the SAS proc univariate procedure, maximum likelihood estimates were obtained on weekend revenues for all movies from the years 1998-2008. These data come from boxofficemojo.com. There are a total of 575 weeks included in this data. Table 3.3 provides the maximum likelihood estimates for θ , ζ , and σ . Table 3.4 provides goodness-of-fit tests for Table 3.3, p -values for each test are given in parentheses.

Table 3.3 is divided into three groups: pooled weekend revenues, early weekend revenues and peak weekend revenues. Early weekends and peak weekends follow the same categorization from the previous chapter. From Table 3.3 it is clear that peak weekend revenues are, on average, higher than early weekend revenues. The distribution is given by Figure 3.3.

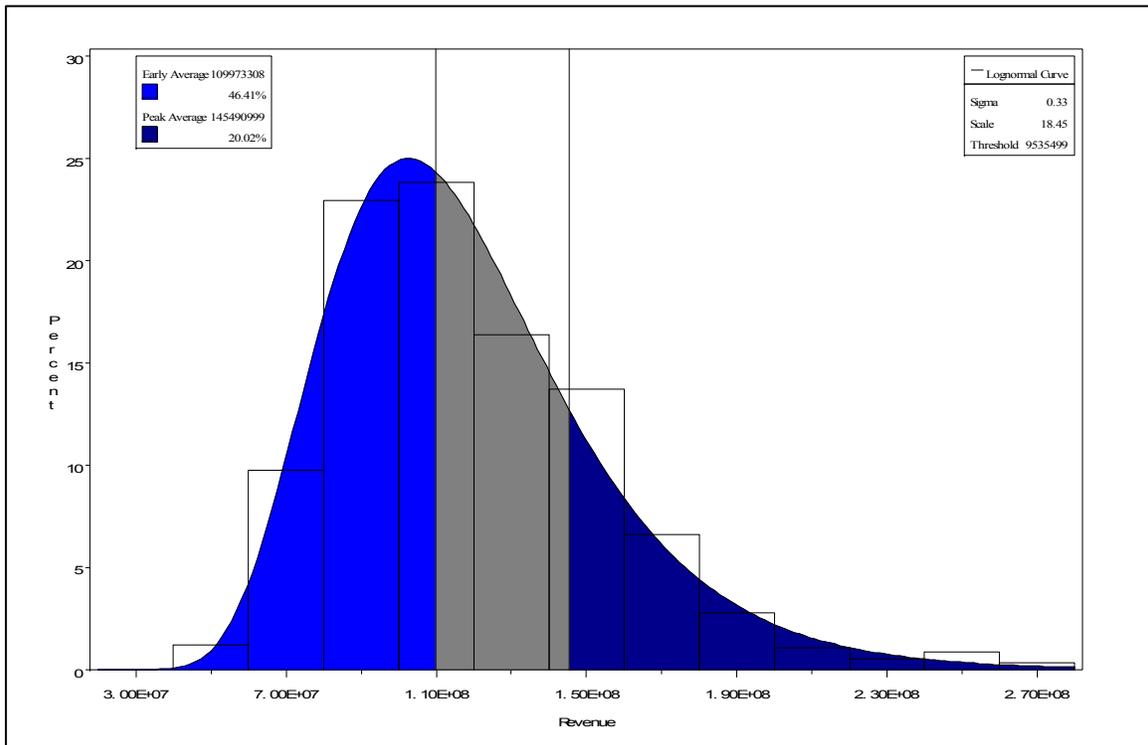
Table 3.3 Parameter estimates for Weekend Revenues

Pooled Weekend Revenues		Early Weekend Revenues		Peak Weekend Revenues	
Parameter	Value	Parameter	Value	Parameter	Value
θ	9535499	θ	-8883070	θ	0.0000003793
ζ	18.45435	ζ	18.56401	ζ	19.00056
σ	0.325251	σ	0.243128	σ	0.232824
Mean	118559323	Mean	109973308	Mean	145490999
St. Dev.	36297407.61	St. Dev.	29203511.80	St. Dev.	42757983.68

Table 3.4 Goodness-of-Fit Tests for Weekend Revenues

Weekend Revenues Three Parameter Lognormal Distribution Goodness-of-Fit				
Group	Kolmogorov-Smirnov	Cramer-von Mises	Anderson-Darling	Chi-Square
Pooled	0.02584 >(0.2500)	0.06109 >(0.2500)	0.4376 (0.1780)	11.8179 (0.2240)
Peak	0.04109 >(0.5000)	0.04770 >(0.2500)	0.3187 >(0.2500)	4.3114 (0.5060)
Early	0.03034 >(0.2500)	0.05606 >(0.2500)	0.4536 (0.1550)	24.1583 (0.0040)

Figure 3.3 Three Parameter Lognormal Distribution of Weekend Revenues



The distribution graph aids the analysis a bit further. There are two cut off lines at the mean early and peak week revenues. Early weekend revenues comprise about 46.4% of the distribution and peak weekend revenues about 20%. On average, distributors can expect to release their films in peak weeks and obtain peak weekend revenues about once out of every five movies. However, this ignores the competitive effect and budget size.

4.2 Small Budget Films

To account for budget size and the competitive effect the sample data used in chapter 3 is used here to calculate distributional parameters. The first table (Table 3.5) presented is the small budget subset data from 1998-2008. This data, like Table 3.3, is

Table 3.5 Parameter Estimates for Small Budget Films

Pooled Weekend Revenues		Early Weekend Revenues		Peak Weekend Revenues	
Parameter	Value	Parameter	Value	Parameter	Value
θ	-970296	θ	-2734169	θ	-1094937
ζ	16.28418	ζ	17.18743	ζ	16.40137
σ	0.701727	σ	0.697083	σ	0.680134
Mean	14065217.13	Mean	13558425.70	Mean	15593831.94
St. Dev.	11413200.47	St. Dev.	11054174.62	St. Dev.	12331480.86
N	988	N	742	N	246

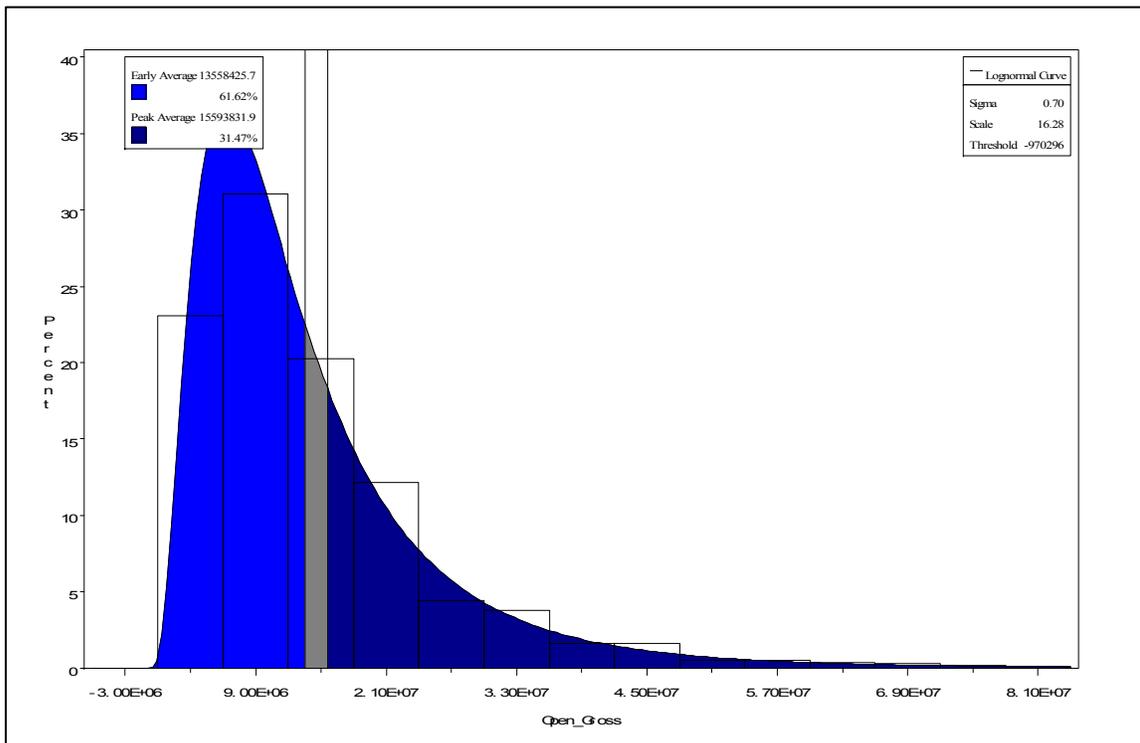
divided into three groups: pooled, early weekend and peak weekend. Table 3.6 provides the goodness-of-fit test with p-values in parentheses. Table 3.5 indicates that only 246 (about 25%) small budget films were released on peak weekends. However, the mean revenue increased by approximately \$2.03 million, or 15%. For small budget distributors it may make economic sense to release on the peak date, as long as the competitive loss does not erode profits to the

Table 3.6 Goodness-of-Fit Tests for Weekend Revenues

Weekend Revenues Three Parameter Lognormal Distribution Goodness-of-Fit				
Group	Kolmogorov-Smirnov	Cramer-von Mises	Anderson-Darling	Chi-Square
Pooled	0.02237 (0.193)	0.04630 >(0.2500)	0.2760 >(0.5000)	11.1884 (0.428)
Peak	0.03853 >(0.2500)	0.04280 >(0.5000)	0.2557 >(0.5000)	6.1584 (0.406)
Early	0.02270 >(0.2500)	0.04933 >(0.2500)	0.3258 (0.2500)	10.2412 (0.509)

point where early weekend revenues equal peak weekend revenues, at such a point the distributor is indifferent towards release dates. If, on average, the competitive loss were less than 15% then releasing on a peak weekend would increase opening weekend revenues for the film. Figure 3.4 shows the three parameter lognormal distribution for small budget films.

Figure 3.4 Three Parameter Lognormal Distribution of Small Budget Films



In the figure above, very little films lie between the early weekend average and peak weekend average, giving small budget films little room to work with when making release date decisions.

4.3 Big Budget Films

To conclude the simultaneous game analysis, big budget films are examined. First, the parameter estimates and mean weekend revenues are given in Table 3.7 for big budget films and goodness-of-fit test in Table 3.8. Comparing the average early weekend and peak weekend revenues reveals a \$12.5 million difference. This is six times the amount seen among small budget films. For a distributor releasing a big budget film, there is a greater reason to position himself on the peak weekend. Moreover, in the sample there are 107 films released on peak weekends compared to 66 released on early weekends.

Table 3.7 Parameter Estimates for Big Budget Films

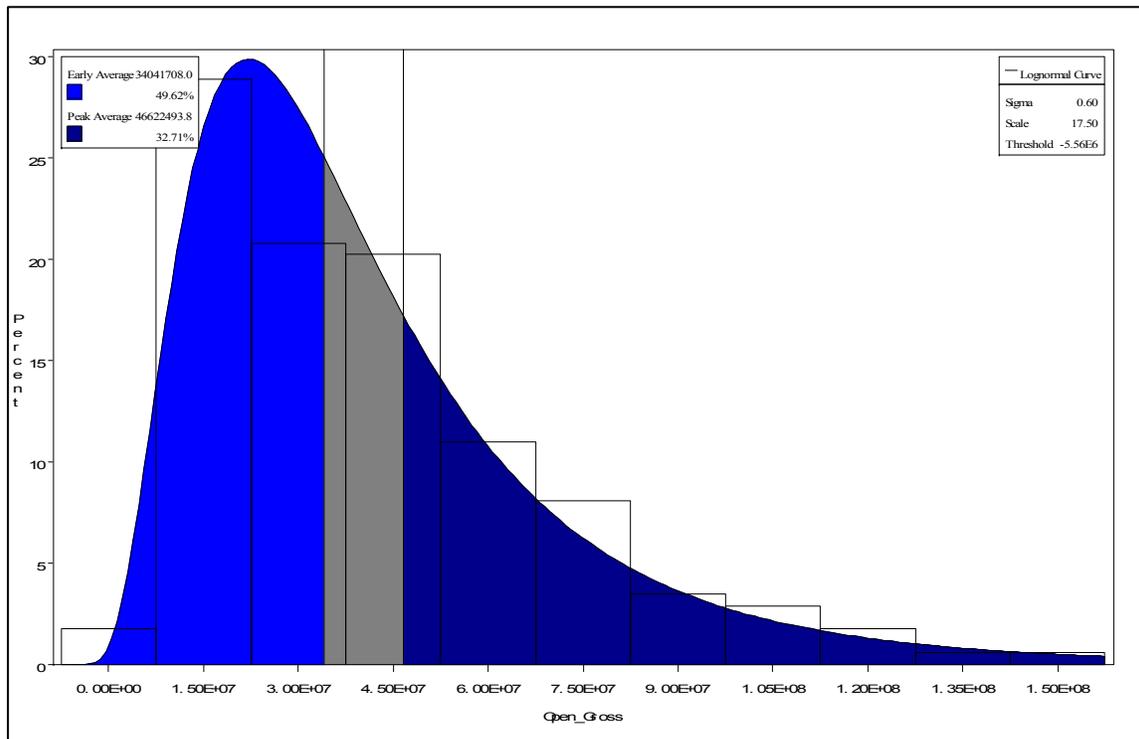
Pooled Budget Revenues		Early Budget Revenues		Peak Budget Revenues	
Parameter	Value	Parameter	Value	Parameter	Value
θ	-5563476	θ	-2734169	θ	-5743129
ζ	17.50026	ζ	17.18743	ζ	17.628
σ	0.602805	σ	0.697083	σ	0.554857
Mean	41822887.64	Mean	34041708.00	Mean	46622493.77
St. Dev.	28366206.95	St. Dev.	26932045.00	St. Dev.	28282708.96
N	173	N	66	N	107

Table 3.8 Goodness-of-Fit Tests for Weekend Revenues

Weekend Revenues Three Parameter Lognormal Distribution Goodness-of-Fit				
Group	Kolmogorov-Smirnov	Cramer-von Mises	Anderson-Darling	Chi-Square
Pooled	0.05906 (0.0880)	0.08502 (0.1020)	0.48018 (0.136)	6.90411 (0.547)
Peak	0.05088 >(0.5000)	0.03278 >(0.5000)	0.2761 >(0.5000)	2.80949 (0.590)
Early	0.07875 >(0.2500)	0.07110 >(0.173)	0.414496 (0.208)	6.60675 (0.252)

This means that even with a greater frequency of movies being released on peak weekends, there is still a substantial difference in revenue.

Figure 3.5 Three Parameter Lognormal Distribution of Big Budget Films



5. Correlated Equilibria

5.1 Introduction

The next objective is to expand upon the previous games and include a richer analysis. This game involves adding nonbinding announcements as an action in the game prior to distributors releasing their films. Binding announcements, while a much easier method for creating optimal outcomes, would be illegal in the United States under antitrust laws. Instead, the analysis hinges on the solution concept of correlated equilibria first proposed by Aumann (1974). In these games, each player is provided a private signal by a mediator. For example, in the previous games where the only options to distributors were to release their film prior to the peak weekend {early} or on the peak weekend {peak}, the mediator would inform each distributor independently as to what action to pursue.

5.2 Game Solution

In table 3.1, the first assumption made was budget size was approximately equal, i.e., either films possessed big budgets or both possessed small budgets. One conclusion drawn was the possibility of a mixed strategy. However, the mixed strategy, while a Nash equilibrium, does not provide any guidance to either distributor as to an appropriate strategy. Instead, it gives each distributor some probability with which to play each strategy. One downfall is each distributor has to randomize their strategies and there is potential for them to play the same strategy. If, for example, the strategy {Early, Early} is chosen then they both receive a payoff of $R^e - C^e(B_i, B_j)$, which is substantially lower than other possible payoffs. Moreover, this coordination failure results in a lower

expected payoff for each distributor. Thus, under the following definition, a correlated equilibrium can provide an alternative and eliminate or at best reduce coordination failure:

Def. The correlated strategy $p(s)$ is a correlated equilibrium of the mediated game if for every i and for all s_i^* such that $p(s_i^*) > 0$,

$$\sum_{s_{-i}^* \in S_{-i}} u_i(s_{-i}^*, s_i^*) p(s_{-i}^* | s_i^*) \geq \sum_{s_{-i}^* \in S_{-i}} u_i(s_{-i}^*, s_i) p(s_{-i}^* | s_i^*) \text{ for all } s_i \in S_i$$

Thus, when all players play to their recommendation by the mediator, then no player can benefit by deviating. Reconsider Table 3.1,

Table 3.1 2x2 Normal Form Game 1

		<i>j</i>	
		Early	Peak
<i>i</i>	Early	$R^e - C^e(B_i, B_j), R^e - C^e(B_i, B_j)$	R^e, R^p
	Peak	R^p, R^e	$R^p - C^p(B_i, B_j), R^p - C^p(B_i, B_j)$

and the mixed strategy defined earlier,

$$\left\{ \begin{array}{l} \frac{[R^p - C^p(B_i, B_j)] - R^e}{[R^e - C^e(B_i, B_j)] - R^e - R^p + [R^p - C^p(B_i, B_j)]} \\ \frac{[R^e - C^e(B_i, B_j)] - R^p}{[R^e - C^e(B_i, B_j)] - R^e - R^p + [R^p - C^p(B_i, B_j)]} \end{array} \right\}$$

Let,

$$\left\{ \frac{[R^p - C^p(B_i, B_j)] - R^e}{[R^e - C^e(B_i, B_j)] - R^e - R^p + [R^p - C^p(B_i, B_j)]} \right\} = \theta$$

and

$$\left\{ \frac{[R^e - C^e(B_i, B_j)] - R^p}{[R^e - C^e(B_i, B_j)] - R^e - R^p + [R^p - C^p(B_i, B_j)]} \right\} = (1 - \theta).$$

Given the payoffs and mixed strategy the resulting expected payoffs to i and j are:

$$E(\pi_i) = (1 - \theta)[R^e - C^e(B_i, B_j)] + (\theta)(R^e) \quad (eq. 3.3)$$

$$E(\pi_j) = (1 - \theta)(R^e) + (\theta)[R^e - C^e(B_i, B_j)] \quad (eq. 3.4)$$

where $E(\pi_{i,j}) \leq R^e$. Using the mixed strategy is suboptimal. Clearly, both distributors can do better. One potential candidate to consider is a fair coin that gives the probability of $\{1/2, 1/2\}$. However, this results to back ally play, which again may be illegal. A more appropriate method is to consider a mediator.⁴¹ The mediator will choose $x \in \{1, 2, 3\}$ with probability α , β , and $(1 - \alpha - \beta)$. The mediator will send the following messages:

- If $x = 1$ tell i to play early and j to play peak.
- If $x = 2$ tell i to play peak and j to play early.
- If $x = 3$ tell i to play peak and j to play peak.

The mediator will never tell both distributors to release early, as he understands doing so would be a Pareto inferior outcome. When the mediator sends signals to each distributor, the expected payoffs become:

$$E(\pi_i^*) = \alpha R^e + \beta R^p + (1 - \alpha - \beta)[R^p - C^p(B_i, B_j)] \quad (eq. 3.5)$$

$$E(\pi_j^*) = \alpha R^p + \beta R^e + (1 - \alpha - \beta)[R^p - C^p(B_i, B_j)] \quad (eq. 3.6)$$

where $(1 - \alpha - \beta) < \alpha$ and $(1 - \alpha - \beta) < \beta$. Following the mediator's advice, the expected payoffs to both distributors i and j increased, resulting in a Pareto improvement. A further implication of following the mediator's advice is the enhancement of social

⁴¹ In Hollywood, the mediator may be a prescreening audience that views both films and makes suggestions as to release dates to both distributors.

welfare among the distributors. Suppose, for example, that the mediator sends the message $x = 1$. Distributor i not seeking to deviate will release his film on the early weekend and distributor j knows with probability $2/3$ to release on the peak weekend. Distributor j will in fact release on the peak weekend. Since the condition $R^p - C^p(B_i, B_j) \leq R^e$ gives rise to a correlated equilibria, distributor j receives the peak weekend revenue, and distributor i receives revenues at least as great compared to a heads up competition in the peak week. In this sense, producer surplus has increased. Consumers also benefit since the marginal consumer no longer has to decide to see only one new movie when two new movies are present. The marginal consumer may now elect to see both at different times, thereby enhancing consumer surplus.

6. Concluding Remarks

It has been shown that distributors face strategic timing decisions when considering the release of their films. Each distributor must account for other distributor(s) when setting a release date. With specific assumptions, Nash equilibria exist for each game. However, assumption 2 from game 1 provides a mixed strategy that is improved upon by the correlated equilibria concept. The expected payoffs to each distributor using a mixed strategy are less than that of the correlated equilibria outcome. Using a mediator to provide a signal, distributors can increase their expected payoff and enhance welfare. This supports the conclusion drawn by Einav (2010). When distributors can reduce clustering on peak dates then they increase welfare. A three parameter lognormal distribution was also specified as a potential theoretical distribution for box office revenues.

Chapter 4

Competition and Movies: An Empirical Approach

1. Introduction

Analyses surrounding movies, and hence movie revenues, have primarily been concerned with examining seasonality (Einav 2007; Radas and Shugan 1999), stars (De Vany and Walls 1999, 2002, 2004; Albert 1998; Rosen 1981; and Ravid 1999), or other movie characteristics that positively or negatively affect revenue. While these are important factors in determining a movies' total revenue they often ignore the direct effect of competition among films (Jedidi *et al.* 1998; Krider and Weinberg 1998; and Ainslie *et al* 2003). The importance of competition lies primarily with big budget films.⁴² A distributor confronts relatively little difficulty releasing their big budget film against one or several small competitors, as big budget films have historically gathered the majority of the box office revenue when competing against smaller budgeted films. However, when two big budget films compete head-to-head, it is expected that each film will, with a higher probability, receive less revenue than when being released separately. This head-to-head competition lowers potential box office returns and each movie may fail to cover any associated costs in the primary market.⁴³

⁴² In the following analyses, big budget films are defined as those that have one standard deviation above the mean budget for the year the film was released.

⁴³ Primary markets are defined as a film's first run. Ancillary markets are those for which the film has been licensed to, pay-per-view or cable, or put on DVD.

The competitive nature of the movie industry is most readily identifiable during the peak seasons, namely Memorial Day, July 4th, Thanksgiving and Christmas. During these times, it is common to witness a distributor avoiding direct placement of their big budget film(s) with other distributors' big budget films. Moreover, distributors seem to have adopted a one release per week formula. This method designates distributor A releasing their big budget film on a given week and distributor B releasing their big budget film the week prior to or after distributor A's release. The advantage of this method is that a big budget release from one distributor can earn more opening weekend revenue as opposed to going head to head with another big budget film.⁴⁴ However, this method is still subject to multiple major releases on any given week, as there are six major distributors with mini-majors and independents having the occasional big budget film and only so many weekends in the peak seasons. A distributor then needs to know how to maximize the opening weekend revenues for his film while releasing amongst other big budget films.

The question assessed in this chapter is thus: How much does competition hurt opening weekend revenues? To answer this question, the first step is to identify a regression that captures the determinants of demand for a movie. This is accomplished through a parsimonious regression that incorporates variables that are often found in the movie box office literature. The parsimonious regression is used to determine a base model for the inclusion of the main variable of interest, competition among films. With

⁴⁴ This may not be the case every time. It may be that two big releases have two different target audiences, and therefore draw in the box office they were supposing to. As an example, consider the summer of 2008. One week prior to July 4th *Wall-E* and *Wanted* were both released, with budgets of \$180 million and \$75 million respectively. Each film had different appeals, one being animated – *Wall-E*, and the other an action film – *Wanted*. *Wall-E* drew in \$63 million and was the number one movie. *Wanted* made \$50 million and was the number two.

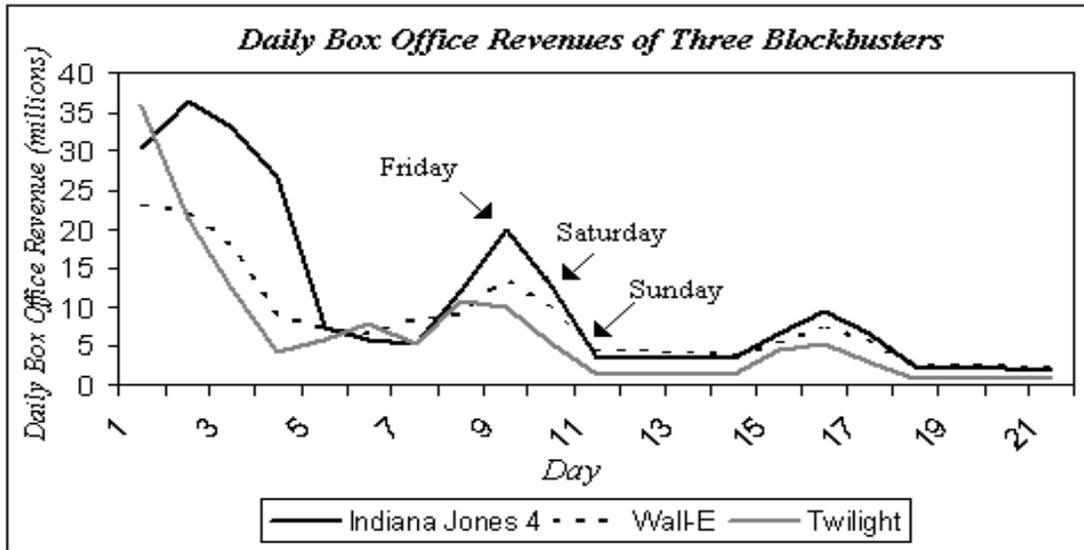
the inclusion of the competition variable, a model(s) can expound directly how opening weekend revenues are affected. Opening weekend revenues are also of primary interest because this is the weekend with the highest percentage return to distributors. Moreover, as the film continues its run in theaters, weekly revenue, and percentage returns decline for the distributor, therefore, leaving the opening weekend for a big budget film the most important.

2. Analytical Framework

The movie literature, when considering box office revenue, has focused primarily on total box office revenue as the regressand (Ravid 1998; Sochay 1994; Litman 1983; Litman and Kohl 1989). The determinants behind total box office revenue have been well established; however, in order to examine the competitive nature of films, opening weekend box office revenue has to be considered, as opposed to opening week revenues, which are low during the week and begin to rise during the weekend, Figure 4.1. In addition, the vast majority of revenue in the opening week is accumulated during the weekend⁴⁵, thereby considering advertising and release timing on weekends as opposed to weeks. Three blockbusters in 2008 were chosen as a representation of seasonal releases. Each film is a typical release of Memorial Day – *Indiana Jones 4*, July 4th – *Wall-E*, and Thanksgiving – *Twilight*, and each still exhibits weekly revenue characteristics of all films.

⁴⁵ The weekends of each of the blockbusters in Figure 1, accounted for more than 60% of opening week revenues. The opening weekend shares were 68%, 67% and 75% for *Indiana Jones 4*, *Wall-E*, and *Twilight*, respectively.

Figure 4.1 Typical Decay Patterns of Blockbusters

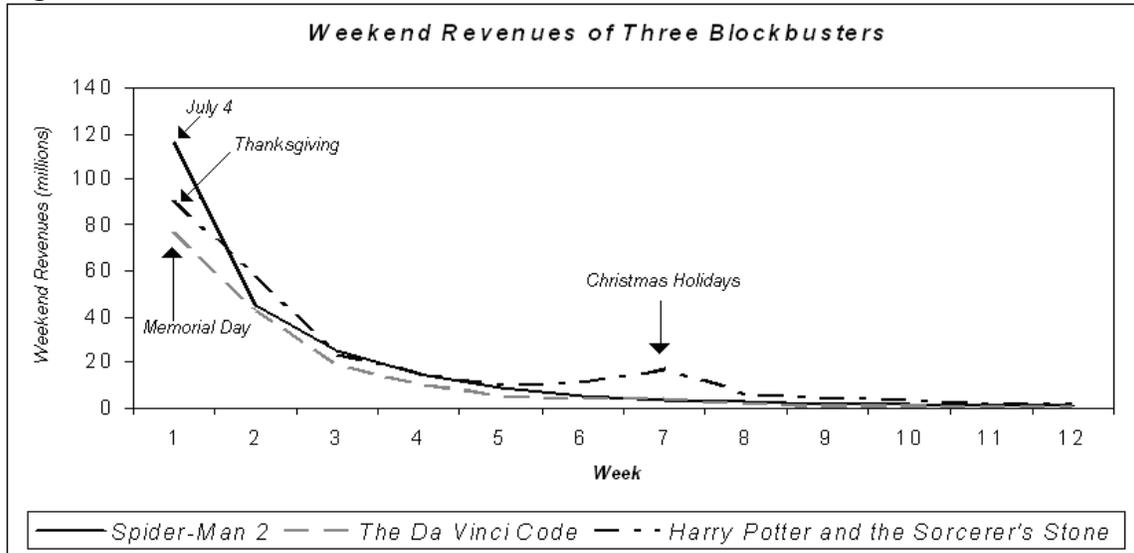


Data Source: boxofficemojo.com

During the time of the data, most films had revenue that declined as the length of time in theaters progressed, Figure 4.2. Moreover, film distributors are not likely to keep a particular film in theaters for a long period, as contractual obligations and moving products into and out of the market prohibit long runs⁴⁶ (Daniels et al. 1998).

⁴⁶ Contractual obligations usually have a film staying in a particular theater for 5-10 weeks.

Figure 4.2 Weekend Revenues over 12 weeks

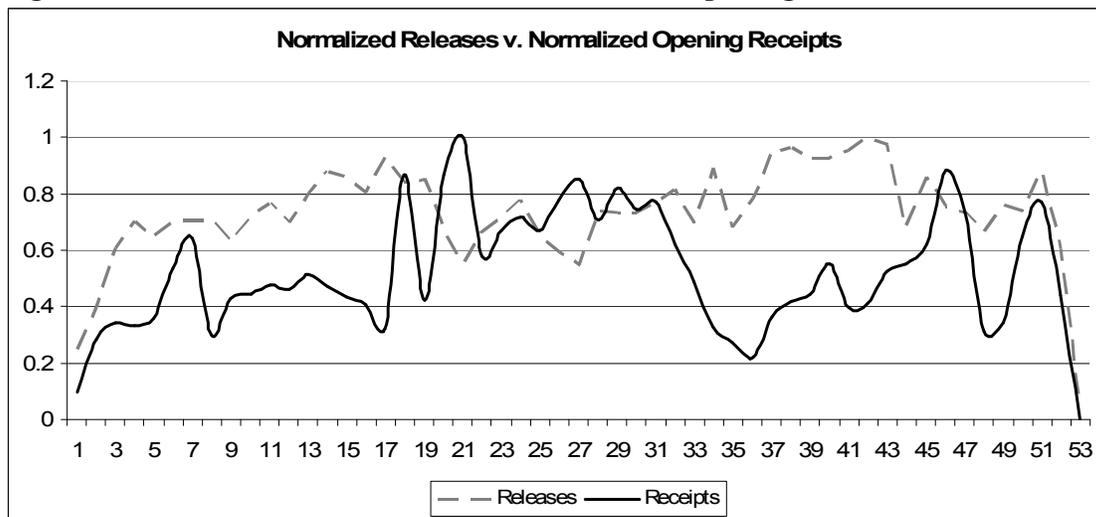


Data Source: boxofficemojo.com

As an example of a film's run and return, consider Figure 4.2. The figure shows the life of three big budget movies over 12 weeks. Each film was released on a separate holiday, yet still exhibits declining revenues, with only *Harry Potter and the Sorcerer's Stone* having an increase in revenue due to the Christmas Holidays.

Opening weekend revenues are pivotal for distributors. Most contractual agreements are arranged so the distributor receives around 90% of the box office during the first week (Daniels et al 1998). The percentage on returns declines as time progresses (known as a sliding scale agreement) making it in the best interest for the distributor to maximize opening weekend revenues, as exhibitors receive a larger portion of the box office as weeks progress, making the opportunity cost of holding a film in theaters longer greater for distributors. In addition, distributors concern themselves with competition; hence, they may be more likely to release their big budget film(s) when they can expect film distribution to be low. As Figure 4.3 shows, the number of new releases declines as opening revenue increases.

Figure 4.3 Normalized New Film Performance on Opening Weekend



Data Source: boxofficemojo.com

Figure 4.3 represents all movies released from 1998-2008.⁴⁷ It is clear that there are certain times during the year that box office receipts are higher. In addition, the number of new releases declines as well during these times. These times occur around the holidays: Memorial Day, July 4th, Thanksgiving, and Christmas. Beginning around the Memorial Day holiday season, opening weekend receipts are high and new releases begin to fall. There is a slight rise in releases as there is a reprieve of one to two weeks between the Memorial Day and July 4th holidays. However, towards the end of the July 4th holiday (around week 31) receipts fall precipitously and new releases increase.⁴⁸ This same pattern is also seen during the Thanksgiving and Christmas Holidays. The reason for the decline of releases around these times may be due to the number of big budget films, Table 4.1.

⁴⁷ Films that are limited releases, re-issues or IMAX releases are omitted from the sample.

⁴⁸ Aside from the beginning and ending of the graph where releases are at a low due to the inclusion of a 53rd week, the two times with the lowest amount of new releases is around week 21 (Memorial Day) and week 27 (July 4th).

Table 4.1 Breakdown of Big Budget Movies

Season	Big Budget Movies	% of Total
Memorial Day	29	16.8
July 4 th	33	19.1
Thanksgiving	28	16.2
Christmas	17	9.8
All Other Times	66	38.2

Data Source: boxofficemojo.com

Roughly 62% of big budget films have been released during the holiday seasons. Over a span of eleven years, this amounts to 107 films. By comparison, there have been 1,707 wide release films released during the same span with an average of 155 movies released per year. The 107 big budget films have a combined opening gross of \$5 billion, or an average of \$46 million, whereas the non-big budget films have a combined opening gross of \$14 billion, or an average of \$14 million.⁴⁹ If big budget films, on average, obtain higher opening weekend grosses than other films, then competition is likely a consideration of movie distributors, as a big budget film has potential to elicit revenue from other films.

3. Model Specification

3.1 Parsimonious Regression

Before turning to the main thesis of optimal timing, an analysis of competition in a broader sense is presented. What follows is a series of models that lends support to the notion that competition among films erodes opening weekend revenue. Specifically, releasing one film against another big budget film(s) can decrease opening revenue.

⁴⁹ There are a total of 988 non-big budget films included in the sample.

To test the theory set forth by the previous chapter, a set of revenue regressions is presented. These regressions lend evidence to support the theory that competition among big budget films can lead to decreased revenue. The importance of the regressions lies in the magnitudes and signs that they provide. For example, it is expected that an increase in the number of big budget films released during a particular weekend would lead to decreased revenues, thus for a given revenue function R , $\delta R/\delta\omega < 0$, where ω is a measure of competition.

To begin the analysis, a general revenue regression is specified,

$$R=f(C, T, U) \quad (\text{eq. 4.1})$$

Equation 4.1 represents a film distributor's opening weekend revenue regression where R is opening weekend revenue and is a function of costs, C , movie traits, T , and unobservable demand, U . Ticket prices remain relatively stable across regions with slight increases in prices over time.⁵⁰ Therefore, prices are not included.

C and T represent two different approaches to film revenue. C is a factor that is directly influenced by moviemakers.⁵¹ In the era of blockbusters, it has become commonplace to assume that pouring more money into a project will yield higher returns. This is identifiable in the number of films that have large production budgets that may enhance an action sequence or generate complex computer generated images (CGI). This sometimes-superfluous outpour of money may or may not increase revenues, evident in flops such as *Stealth* (2005). The other main determinable factor by the moviemaker is

⁵⁰ Ticket prices in 1996 were \$4.42 on average. By 2006, ticket prices had increased to \$6.55 on average (source: MPAA report p. 7).

⁵¹ While a moviemaker determines many factors in T , consumers reveal their preference towards them by seeing a movie and are hence uncertain parts in a movie's makeup.

the timing of release. T is a vector of factors that are movie decision variables, *i.e.*, these factors are determinants for consumers.

The costs, found in C , associated with making a film are called negative costs, or simply the production budget. The production budget includes wages of the acting ensemble, director, technicians, set pieces, and equipment, among other things. However, the production budget does not include the prints and advertising costs. These costs fall on the distributor, are rarely reported in trade journals, and are difficult to obtain. However, the MPAA notes that its members spent, on average, \$35.9 million per film in advertising in 2007 thereby increasing the cost associated with a film and making opening weekend revenue more important to recoup costs (www.mpa.org).

Other factors that influence a movie's revenue are those that allure a consumer to see a film. These factors include, but are not limited to, stars in a movie, a movie's genre, ratings, critic reviews, and whether or not the movie is based upon a book. Consumers of films watch previews, visit websites, read newspapers or magazines and gauge the movie on a variety of criteria to determine if they wish to view the movie. To create a successful formula, a moviemaker should enlist as many determinants that can create as positive an outcome as possible. The above factors could therefore provide a significant opening or make the movie just another face in the crowd. These factors have been analyzed extensively in the literature.

Finally, unobservable demand is considered in the revenue function. This type of demand is residual and often difficult to quantify, as it most likely lies in word-of-mouth or preference towards particular film genres. Because of the difficulties in obtaining such

data, unobservable demand is not a specific variable; rather it is residual and treated with unobserved heterogeneity in a composite error term.

Equation (4.1) is expanded to an unobserved effects model for opening weekend box office revenues. The log-log specification proposed by De Vany and Walls (1999) is used. Equation (4.2) leads to a parsimonious model derived from estimated regressions found in the movie box office returns literature. Ravid (1999), Sochay (1994), and Litman (1983) examine box office revenue in a similar fashion as (4.3.2).

$$\ln Open = \alpha + \beta c + \delta t + v_{it} \quad (\text{eq. 4.2})$$

The assumption of (4.2) is that $v_{it} = a_i + \mu_{it}$ where a_i represents the unobserved heterogeneity and μ_{it} is the idiosyncratic error term. v_{it} then is the composite error, and is assumed to be uncorrelated with c and t . Heterogeneity bias should not arise, as the fixed effects remain constant and independent of c and t over time. Factors that may be included in a_i are locations of theaters, theater quality, even demographic characteristics across the nation.

Competition is not included in (4.2). The objective is first to acquire a regression built from empirical evidence and theory that obtains the best fit.⁵² From these series of models, a base model will be selected and then competition will be included in the base model. Specific variables for (4.2) are discussed in the data section.

It is assumed that equation (4.2) is heteroskedastic. Upon examination, it is found that the heteroskedasticity is multiplicative.⁵³ Harvey (1975) provides a method to handle this particular form of heteroskedasticity. This method is known as feasible

⁵² Fit in this sense means model fit. Diagnostic tools such as Aikike Information Criteria (AIC), Chi-square values, Ramsey RESET, and variable significance will determine the appropriate model.

⁵³ The chi-square statistic from the Breusch-Pagan test is 44.62, resulting in a sound rejection of the null hypothesis of homoskedasticity. The variance of (4.2) is a function of the explanatory variables, $\ln bud$, $\ln PDI$, and $time$.

generalized least squares (FGLS) or estimated generalized least squares (EGLS).⁵⁴ With the exact form of heteroskedasticity not known, a flexible way to handle it is to use the variance function in equation (4.3).

$$\text{Var}(u|\mathbf{x}) = \sigma^2 \exp(\delta\mathbf{x}) \quad (\text{eq. 4.3})$$

In (4.3) \mathbf{x} is a vector of independent variables and δ are the unknown parameters. The exponential function is used, as a linear one does not necessarily ensure the predicted values will be positive when weighted least squares (WLS) is performed, which is problematic when the estimated variances must be positive to perform WLS. Equation (4.3) is now extended to equation (4.4),

$$u^2 = \sigma^2 \exp(\delta\mathbf{x})v \quad (\text{eq. 4.4})$$

where v has a mean equal to one, conditional on \mathbf{x} . If v is independent of \mathbf{x} then the log-linear variance function may be written as,

$$\log(u^2) = \alpha_0 + \delta\mathbf{x} + e \quad (\text{eq. 4.5})$$

where e has a zero mean and is independent of \mathbf{x} . Using the above variance function, the fitted values are obtained by running the independent variables of interest, *i.e.* those believed to be causing heteroskedasticity. The fitted values are then used as weights to estimate (4.2). Since the weights are estimated, the EGLS estimator is biased. However, the EGLS estimator is consistent and asymptotically more efficient than OLS.

Using the variance function found in (4.5), equation (4.2) is a multiplicative heteroskedastic regression. The variance function includes variables that significantly cause the variance to increase or decrease. Once the regression models and variance

⁵⁴ It is known as estimated generalized least squares because to correct for heteroskedasticity, OLS is reiterated using WLS until the heteroskedasticity is corrected, hence, the parameters are found through estimation.

function are correctly specified, the base regression is obtained and the measure for competition is included.

3.2 Categorical Competition

Two competition variables are proposed. The first is competition measured categorically. This measure is the summation of all big budget films released in a given week except for the big budget film in question. For example, if there are three big budget films released in one week, then each film obtains a value of two due to the competition. Film A is competing with films B and C, but not with itself, likewise for B and C. This measure is somewhat limited as it is rare to find a multitude of big budget films released during a given week.

To determine whether a movie was a big budget film or not the movie had to have one standard deviation above the mean budget from the previous year.⁵⁵ For example, consider determination for the year 2008. The production budgets of 2007 have an average of approximately \$59 million with a standard deviation of \$49.9 million. Therefore, a big budget film in 2008 needed a budget of approximately \$109 million, so that it lays one standard deviation above the mean.

⁵⁵ One standard deviation above the mean ensures, assuming a normal probability, that only those films with the largest budgets are included. This method effectively breaks the sample up in to three segments: small budgets (one standard deviation below the mean), big budgets (one standard deviation above the mean), and all other budgets that lie between the small and big budgets. In addition, the previous year is used to determine the size of production budgets. This method is taken due to the limited availability of budget information throughout the year. Simply, a distributor does not know what will constitute a big budget throughout the year, as there may be smaller budgets than larger budgets throughout the year, effectively lowering the average budget for the year. Therefore, the previous year serves as a proxy for the current year.

3.3 Continuous Competition

The second measure of competition is a continuous variable measured as the summation of the actual budgets in a given week. Similar to the first measure, this measure does not include the budget of the film being estimated, but it may provide a more precise measure of competitiveness in terms of budgets. Each week with two or more new films, and corresponding budgets, the amount of competition is measured by the size of the budget. If there is a large budget(s) in the week of measure, then there is assumed more competition for revenues that week. To illustrate, first, assume that demand for movies is higher for big budget films⁵⁶ and there are only two times of release. Next consider, in time one, there are three or more competing films, but each has a small budget that is equal to x . In time two, there are only two competing films with nearly identical budgets, and film two's budget is equal to y . Now assume that $y > x$, then the two competing films in the second period have a greater degree of competition due to the inherent demand for big budget films and the single budget in time two being greater than the combined budgets in time one. Moreover, if the two periods do not have a big budget film among them, then one can still assume that the period with the greater measure of budgets has a greater inherent demand and therefore a greater degree of competition.

4. Data and Variables

The data set used is unique in that it accounts for the most recent years (1998-2008), and hence, some of the biggest grossing movies, in nominal terms, of all time.

⁵⁶ Demand for big budget films is typically greater than that for smaller budget films. This is seen in total and opening box office grosses of big budget films when compared to small budget films.

The primary source of the data comes from boxofficemojo.com. Of the 1,707 possible wide screen releases, 1,161 observations were used due to missing data from various fields. In addition, IMAX and re-issues were omitted from the sample. Data obtained here were opening revenues, production budgets, genre, ratings, theater counts, release dates, and distributor of the film. Opening weekend revenues and production budgets are measured in millions of dollars. Production budgets are often included in the literature (Litman 1983; Litman and Kohl 1989; Sochay 1994; De Vany and Walls 1998; Ravid 1999; and Zufryden 2000) and have been shown to be positively related to box office revenues.

Next, a movie's genre is considered. Genres range from action and adventure to horror, drama, or comedy. For purposes here, only action and comedy are considered, as these two genres make up the majority of releases during the peak seasons, so as to capture any effects within the seasons. In addition to genres, a movie's source is considered. The main variables of interest here are *Book*, *Comic*, and *Sequel*, where Book and Sequel have been shown to increase returns (Ravid 1999; Basuroy *et al.* 2006).

Ratings, established by the MPAA, have been examined in the literature and shown to have positive and moderate effects. Movie ratings are defined as follows: R, PG13, PG, G, and unrated. In the sample used, there are no unrated movies; therefore, the PG13 rating is used as the base as it has a higher frequency in the data at 532 and the G rating the lowest frequency at 46. Ravid (1999), Simonoff and Sparrow (2000) and Fee (2002) find evidence that G rated films are more profitable than other ratings. Ravid and Basuroy (2004) support Ravid (1999) Simonoff and Sparrow (2000) and Fee (2002) showing that G and PG films provide higher revenues than R rated films, however, they

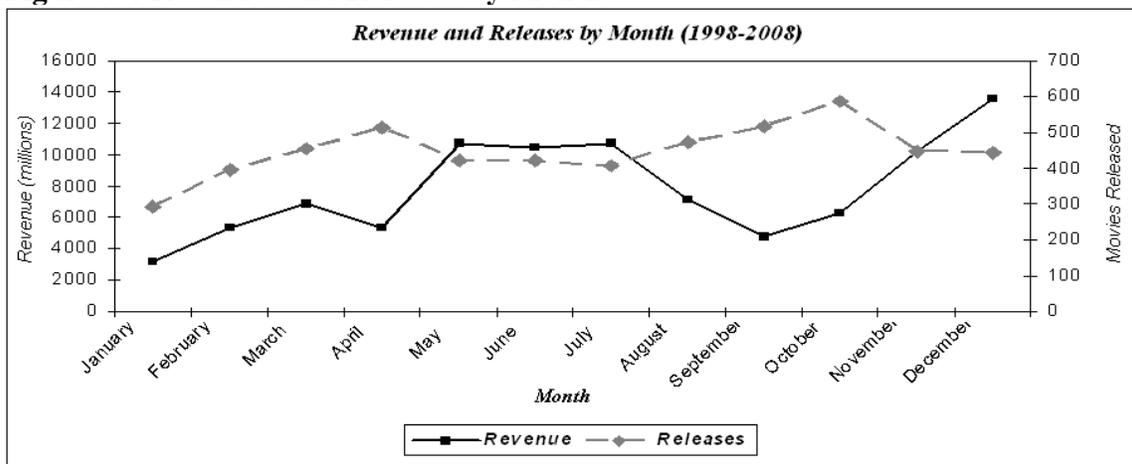
also find R rated films do increase revenues. With the current data, however, it is expected that PG13 would perform best, as a larger share of big budget films are rated PG13.

The six major distributors: Buena Vista (Disney), Paramount, Sony, Twentieth Century Fox, Universal and Warner Bros., have potential to increase box office receipts due to market power and financial backing. It is assumed, due to market power and financial backing, each of the 'Six' has the ability to promote their films more aggressively than smaller film distributors. Aggressive advertising could lead to higher opening weekend revenues, as consumer become more aware of the film. Litman (1983) and Litman and Kohl (1989) find evidence to support a major distributors ability to increase revenue, with Litman and Kohl (1989) providing evidence of the effect being moderated and minimajors and larger independents having gained ground. However, Sochay (1994) finds that distributors have no significant effect on revenues when controlling for other factors. Rising distributors such as Lionsgate and DreamWorks, however, may produce results such as that found in Litman and Kohl (1989). For construction of the distributor variables autonomy was given to companies like Miramax and New Line who are subsidiaries of Disney and Warner Bros. This representation puts the 'Six' as distributor variables and all other distributors as the reference group.

The issue of seasonality is well documented and its effects on movies are strong (Radas and Shugan 1999; Einav 2007; Litman and Kohl 1989). To get a flavor of the changing dynamics in seasonality and box office success (Steinberg 1980) notes that Saturday, Friday, and Sunday, in that order, are the best days for theater business. Monday thru Thursday are near equal (refer back to Figure 4.1). Very little has changed

in successful days and theater business – Friday has probably surpassed Saturday as the most lucrative business day. However as (Steinberg 1980) notes the best month, in terms of box office revenues, is July followed by August then January. May, according to industry estimates, is the worst month of the year. The dynamics of the industry have changed since. In Figure 4.4, it is clear that during the span of 1998-2008, revenues in December, May, and July, in that order, were the highest, whereas January, September, and April, in that order, possessed the lowest revenues. Unsurprisingly, the months with the highest total revenues coincides with three of the biggest release dates and releases, as a percentage of revenues are the lowest.

Figure 4.4 Revenues and Releases by Month

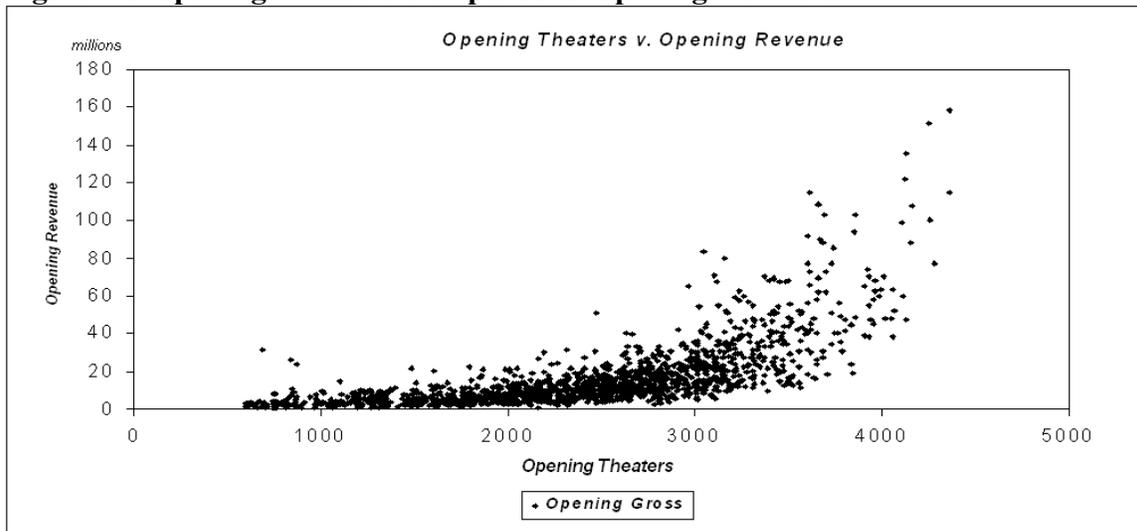


Data source: boxofficemojo.com. Also, note that this figure includes all movies: limited and wide release, re-issues, and IMAX releases.

Theater counts are the number of theaters that showed the movie on its opening weekend. For purposes of this study, only movies that are considered wide release (> 600 theaters) are included. This approach is taken because limited release movies rarely have large production budgets, often do not have production budget data available, and have historically had low box office numbers, therefore, providing little if any

competition to a big budget film. Theater counts are assumed quadratic in nature, Figure 4.5. Theater counts increase with larger budgets. This may be reflected in exhibitors choices to screen the large budget movie, as these films typically draw larger crowds and hence create more revenue for the exhibitor.⁵⁷

Figure 4.5 Opening Theaters Compared to Opening Revenues



Data source: boxofficemojo.com

The principal players in a movie: actors, director, and executive producer(s) are obtained from the Internet Movie Database, imdb.com.⁵⁸ For each movie, the four leading roles (actors and actresses) are considered. De Vany and Walls (2004), Albert (1998) and Rosen (1981) examine stars as a potential to enhance box office receipts. However, Litman and Kohl (1989), Ravid (1999), De Vany and Walls (1999, 2002) find stars play no role in financial success of a movie. The construction of a star variable is done with two alternative measures. First, Quigley Publishing (QP) produces an annual

⁵⁷ A potential problem with theater counts is endogeneity. As stated in the text, theater counts are typically larger for big budget films as attendance for these films are greater than their smaller budget counterparts.

⁵⁸ It should be noted that the Internet Movie Database acquired Boxofficemojo.com in July 2008 (<http://www.boxofficemojo.com/about/boxofficemojo.com>).

“Top Ten Poll of Money-Making Stars,” hereafter referred as the List, which surveys circuit exhibitors and independent theater owners.⁵⁹ This list includes both actors and actresses. To assign a star variable, a dummy variable is adopted. The dummy variable is retroactive in that if an actor or actress made the List within the past five years, then the current movie receives a one for having a star, zero otherwise. The second measure is to consider actors and actresses who have won or been nominated for the best actor or actress Academy Award. For this measure, Oscar awards and nominations are taken from 1977 to 2007. Including thirty years of nominations could increase the number of star actors in the sample, yet there is a large number of repeat nominations leading to an reasonable number of actors. Litman (1983) finds evidence that Academy Award nominations and winnings are significantly related to revenue.

The measures of actors are imitated for the director of the film. However, there is not a poll that surveys top directors, therefore, to gauge top directors, the top ten directors, based on total movie grosses, are collected for each year. Then, as the first measure for actors, each film is assigned a one if the current director had a top ten grossing film in the previous five years. The second measure for directors is the same as the second measure for actors, in that Academy Award nominations and awards are considered. In the literature, directors have shown positive statistical significance towards revenue (Litman and Kohl 1989; Litman and Ahn 1998; Wallace *et al* 1993)

The last principal player considered is the executive producer. The executive producer has the financial responsibility⁶⁰ as well as some influence in the movie’s

⁵⁹ Sochay (1994) and Jedidi *et al* (1998) also use this method to determine stars.

⁶⁰ It is because of the financial responsibilities that an executive producer has as to why just the producer is not used. While it is true when no executive producer is present in a film that the producer assumes financial responsibility, it is often the case that executive producers are tied to big budget films.

overall direction. Moreover, along with actors and directors, executive producers are often featured in movie trailers as a signal for a quality film. Again, imitating the first measure for actors and directors, films that have an executive producer with a top ten grossing film within the previous five years is assigned a value of one zero otherwise.

One other signal of a quality film that interests many consumers and often seen as a variable of interest in the literature (King 2007; Boatwright *et al* 2007; Eliashberg and Shugan 1997; Reinstein and Snyder 2005; Litman and Kohl 1989) is a critic's rating. Many critic reviews are published a few days prior, just before, or the day of opening for a film. There are many expert reviewers and far more amateurs; therefore, to obtain a reliable measure, the ratings provided by metacritic.com are used. Metacritic.com provides a composite critic score that ranges from 0-100, with the best movies receiving a 100 and the worst a 0.⁶¹ Eliashberg and Shugan (1997) determine that critics are a good predictor of box office success. However, the absence of a screen variable leads Ainslie *et al* (2003) to conclude that critics favor art films as opposed to blockbusters.

Two other variables, *lnPDI* and *Time*, are also included to control for national and time trending effects. *lnPDI* is the natural logarithm of personal disposable income measured in billions of dollars. Movies may be counter-cyclical to the business cycle meaning that as personal disposable income decreases movie revenues increase. This may be explained by the low cost of attending a movie relative to other entertainment.

As the data covers eleven years, variables are deflated using the CPI. Variable definitions and summary statistics are found in Tables (4.2) and (4.3) respectively.

⁶¹ For a thorough analysis of metacritic.com, see King (2007)

Table 4.2 Variable Definitions

Variable	Definition
In Open	Natural log of the opening weekend revenue of a film
In Budget	Natural log of the budget of a film
In Theaters	Natural log of the opening theaters of a film
In Theaters2	Natural log of the opening theaters squared of a film
Memorial Day	Dummy = 1 if the film was released around the Memorial Day Holidays
July 4 th	Dummy = 1 if the film was released around the July 4 th Holidays
Thanksgiving	Dummy = 1 if the film was released around the Thanksgiving Holidays
Christmas	Dummy = 1 if the film was released around the Christmas Holidays
Director	Dummy = 1 if the director of the film was a top director in the previous five years
Director Oscar	Dummy = 1 if the director of the film had previously won an Oscar
Exec. Producer	Dummy = 1 if the executive producer of the film was a top executive producer in the previous five years
Star	Dummy = 1 if the one of the principal cast of the film was a top actor/actress in the previous five years
Actor Nomination	Dummy = 1 if one of the principal cast of the film had previously won an Oscar
Metacritic	Composite critic score for a film from metacritic.com
Buena Vista	Dummy = 1 if the film was distributed by Buena Vista
Fox	Dummy = 1 if the film was distributed by Fox
Paramount	Dummy = 1 if the film was distributed by Paramount
Sony	Dummy = 1 if the film was distributed by Sony
Universal	Dummy = 1 if the film was distributed by Universal
Action	Dummy = 1 if the film was an action film
Comedy	Dummy = 1 if the film was a comedy
Book	Dummy = 1 if the film was based on a book
Sequel	Dummy = 1 if the film was a sequel
Comic	Dummy = 1 if the film was based on a comic or graphic novel
R	Dummy = 1 if the film was rated R
PG13	Dummy = 1 if the film was rated PG13
PG	Dummy = 1 if the film was rated PG
G	Dummy = 1 if the film was rated G
In PDI	Natural log of personal disposable income for a given quarter
Time	Denotes the week of release for a film
Competition 1	The number of big budget films released in a given week
Competition 2	The sum of budgets for films released in a given week

Table 4.3 Descriptive Statistics

Variable	Mean	St. Dev	Max	Min
In Open	15.7187	0.8739	18.1044	12.3790
In Bud	16.3156	1.6787	18.7901	9.7655
In Theaters	7.7814	0.3532	8.3816	6.3986
In Theaters2	60.6753	5.3416	70.2513	40.9420
Memorial Day	0.0577	0.2333	1.0000	0.0000
July 4th	0.0827	0.2755	1.0000	0.0000
Thanksgiving	0.0844	0.2781	1.0000	0.0000
Christmas	0.0792	0.2702	1.0000	0.0000
Director	0.1094	0.3123	1.0000	0.0000
Director Oscar	0.0413	0.1992	1.0000	0.0000
Exec. Producer	0.2016	0.4013	1.0000	0.0000
Star	0.1904	0.3927	1.0000	0.0000
Oscar Nom.	0.3282	0.4697	1.0000	0.0000
Metacritic	48.1774	16.9690	96.0000	6.0000
Buena Vista	0.1025	0.3034	1.0000	0.0000
Fox	0.1171	0.3217	1.0000	0.0000
Paramount	0.1120	0.3155	1.0000	0.0000
Sony	0.1016	0.3023	1.0000	0.0000
Universal	0.1128	0.3165	1.0000	0.0000
Warner Bros.	0.1352	0.3421	1.0000	0.0000
Action	0.0784	0.2689	1.0000	0.0000
Comedy	0.3480	0.4765	1.0000	0.0000
Book	0.1783	0.3829	1.0000	0.0000
Sequel	0.1214	0.3268	1.0000	0.0000
Comic	0.0233	0.1508	1.0000	0.0000
R	0.3514	0.4776	1.0000	0.0000
PG13	0.4582	0.4985	1.0000	0.0000
PG	0.1507	0.3579	1.0000	0.0000
G	0.0396	0.1952	1.0000	0.0000
In PDI	9.0404	0.1503	9.3026	8.7573
Time	293.2679	157.9285	584.0000	3.0000
Competition 1	0.1998	0.4271	2.0000	0.0000
Competition 2	15.1828	6.8150	19.0254	0.0000

5. Empirical Results

5.1 Parsimonious Regression

The results from (4.3.2) are presented in Table (4.4). The analysis begins by first turning to the parsimonious regression and model 1. Model 1 includes a full set of revenue affecting variables found in the movie box office literature. The inclusion of *Exec_Producer*, *lntheater*, and *lntheater*² are variables that do not have much exposure in the literature. *lnPDI*, and *Time* are new additions to the revenue regression. *lnPDI* serves as a control for changes in the economy and also determines if the movie industry is countercyclical. Due to the time series nature of the data, *Time* is included to serve as a detrending variable. *Exec_Producer*, *lntheater*, *lntheater*² are hypothesized to have a positive effect on opening weekend revenue. Model 1 provides high levels of significance for many variables. Model 2 is the same as model 1; however, the variance function omits the distributor variables. Model 2 has marginal changes in the coefficients and significance levels.

Model 3 replaces *Director* and *Star* with *Director_Oscar* and *Oscar_Nom* to allow for any potential effects that an Oscar nomination may have on opening box office revenue. The two replacement variables are not significant suggesting that a director or actor who has won or been nominated for an Academy Award has no effect on opening weekend revenues. Models 4, 5, and 6, remove variables that provide little or no significance. Model 6 provides the base regression for which other analyses will be conducted.

In all models except model 2, *ln_budget* is significant, which corresponds well to the literature. Total opening theaters provides a high level of significance throughout each model. Seasonality in the model is captured by the dummy variables:

Table 4.4 Parameter Estimates for Parsimonious Regression

Variable	Model 1	Model 2	Model 3
Constant	31.2364 (12.1597)**	33.1059 (12.2352)***	34.0776 (12.2760)***
ln Budget	0.01709 (0.0103)*	0.0163 (0.0104)	0.0181 (0.0104)*
ln Theaters	-15.4821 (1.2998)***	-15.5881 (1.3072)***	-15.9783 (1.3013)***
ln Theaters ²	1.1379 (0.0866)***	1.1447 (0.0871)***	1.1722 (0.0866)***
Memorial Day	0.3155 (0.0592)***	0.3182 (0.0598)***	0.3310 (0.0599)***
July 4 th	0.1643 (0.0506)***	0.1670 (0.0512)***	0.1777 (0.0515)***
Thanksgiving	0.1305 (0.0507)**	0.1304 (0.0509)**	0.1434 (0.0509)***
Christmas	-0.0085 (0.0532)	-0.0135 (0.0538)	0.0081 (0.0534)
Director	0.0592 (0.0457)	0.0632 (0.0463)	- -
Director Oscar	- -	- -	0.0214 (0.0698)
Exec. Producer	0.1093 (0.0371)***	0.1062 (0.0369)**	0.1159 (0.0366)***
Metacritic	0.0116 (0.0009)***	0.0116 (0.0009)***	0.0117 (0.0009)***
Star	0.0736 (0.0362)**	0.0769 (0.0366)**	- -
Oscar Nom.	- -	- -	0.0091 (0.0314)
Buena Vista	0.0902 (0.0544)*	0.0891 (0.0518)*	0.0872 (0.0518)*
Fox	0.0051 (0.0504)	0.0032 (0.4966)	0.0046 (0.0497)
Paramount	0.0473 (0.0485)	0.0476 (0.0493)	0.0503 (0.0494)

Table 4.4 Continued

Sony	0.0058 (0.0491)	0.0047 (0.0513)	0.0153 (0.0512)
Universal	0.2009 (0.0457)***	0.1994 (0.0489)***	0.2068 (0.0488)***
Warner Bros.	-0.1145 (0.0474)**	-0.1144 (0.0459)**	-0.1107 (0.0461)**
Action	0.0341 (0.0537)	0.0335 (0.0540)	0.0241 (0.0541)
Comedy	-0.0270 (0.0311)	-0.0291 (0.0313)	-0.0239 (0.0315)
Book	-0.0044 (0.0375)	-0.0043 (0.0378)	0.0032 (0.0380)
Sequel	0.1652 (0.0461)***	0.1684 (0.0465)***	0.1662 (0.0464)***
Comic	0.1508 (0.0461)*	0.1569 (0.0923)*	0.1473 (0.1473)**
R	0.0074 (0.0322)	0.0065 (0.0324)	0.0111 (0.0325)
PG13	- -	- -	- -
PG	-0.2160 (0.0409)***	-0.2041 (0.0411)***	-0.2123 (0.0403)***
G	-0.1111 (0.0748)	-0.1128 (0.0735)	-0.1175 (0.0739)
ln PDI	3.9462 (1.2166)***	3.7851 (1.2233)**	3.8271 (1.2273)***
Time	-0.0029 (0.0006)***	-0.0029 (0.0007)***	-0.0029 (0.0007)***
n	1161	1161	1161
Log Likelihood	-767.11	-770.57	-773.59
Chi Square	44.50	37.58	37.06

Table 4.4 Continued

Variable	Model 4	Model 5	Model 6
Constant	33.3355 (12.3721)***	33.2207 (12.3769)***	33.2202 (12.4885)***
ln Budget	0.0171 (0.0105)	0.0175 (0.0104)*	0.0180 (0.0105)*
ln Theaters	-15.1749 (1.3232)***	-15.2297 (1.3194)***	-14.6009 (1.3175)***
ln Theaters2	1.1161 (0.0881)***	1.1199 (0.0878)***	1.0760 (0.0876)***
Memorial Day	0.3316 (0.0602)***	0.3325 (0.0602)***	0.3198 (0.0604)***
July 4th	0.1652 (0.0514)***	0.1638 (0.0514)***	0.1609 (0.0517)***
Thanksgiving	0.1214 (0.0514)**	0.1243 (0.0513)**	0.1115 (0.0517)**
Christmas	-0.0078 (0.0544)	-0.0078 (0.0545)	-0.0303 (0.0546)
Director	0.0805 (0.0466)*	0.0809 (0.0466)*	0.0942 (0.0470)**
Director Oscar	- -	- -	- -
Exec. Producer	0.0972 (0.0364)***	0.0977 (0.0364)***	0.1012 (0.0368)***
Metacritic	0.0123 (0.0009)***	0.0124 (0.0009)***	0.0121 (0.0009)***
Star	0.0701 (0.0369)*	0.0666 (0.0366)*	0.0853 (0.0367)**
Actor Nomination	- -	- -	- -
Buena Vista	- -	- -	- -
Fox	- -	- -	- -
Paramount	- -	- -	- -
Sony	-	-	-

Table 4.4 Continued

Variable	Model 4	Model 5	Model 6 ⁶²
Universal	-	-	-
	-	-	-
Warner Bros.	-	-	-
	-	-	-
Action	0.0151 (0.0546)	-	-
Comedy	-0.0210 (0.0318)	-	-
Book	-0.0038 (0.0383)	0.6824E-05 (0.0376)	-
Sequel	0.1723 (0.0470)***	0.1738 (0.0469)***	0.1841 (0.0467)***
Comic	0.1650 (0.0932)*	0.1752 (0.0915)*	0.1947 (0.00924)**
R	-0.0106 (0.0327)	-0.0068 (0.0322)	-
PG13	-	-	-
	-	-	-
PG	-0.2002 (0.0417)***	-0.2017 (0.0414)***	-
G	-0.1189 (0.0731)	-0.1180 (0.0728)	-
ln PDI	3.5915 (1.2365)***	3.6240 (1.2371)***	3.4823 (1.2466)***
Time	-0.0028 (0.0007)***	-0.0028 (0.007)***	-0.0027 (0.0007)***
n	1161	1161	1161
Log Likelihood	-788.40	-788.70	-801.59
Chi Square	34.87	34.72	35.63

⁶² To test for endogeneity of the variables lnbudget and lntheaters a modified Hausman test was performed. The resulting F-statistic is 0.22. While simultaneity may be in the model, it does not bias the estimates.

Mem_day, *July_4*, *Thanksgiving*, and *Christmas* with all other times being the base group. In each model, *Mem_day*, *July_4* and *Thanksgiving* are positive and significant as expected; however, *Christmas* is negative, in most models, and insignificant. *Exec Producer*, and *Metacritic* provide significance at the 5% and 1% levels in each model. *Director Oscar* replaces *Director* to test effects of an Academy Award win over director performance, but is insignificant. *Star* provides marginal significance at the 10% and 5% levels. Much like the director effect, *Actor Nomination* tests the effect of Academy Award nominations on revenue, but the result is insignificant. There is little distributor effect in the results with *Buena Vista* and *Universal* showing positive results against the base group of all distributors other than the majors, and Warner Bros. providing negative results. *Sequel* and *Comic* have positive effects on opening week revenue. This is expected as sequels are usually based off a successful prequel, and have been shown to be positive and significant in the literature. *Comic*, on the other hand, introduces the ‘comic book age’ of movies. Over the span of the data, numerous films adapted from comic books and graphic novels have been produced. Success from this formula can readily be seen in Marvel’s adaptations. Finally, the film’s rating is considered. The R-rating puzzle (De Vany and Walls 2002; Ravid and Basuroy 2004) and the G film Basuroy et al (2003) are prior inquiries. However, in the present context, both show marginal, if any, significance against the base group, PG13. Moreover, only PG shows strong results, that of negative returns against the base group. The most likely reason for this result is that PG13 movies, while maintaining the highest frequency of all ratings, have the highest frequency of all big budget films.

Table 4.5 Variance Function Estimates

Variable	Model 1	Model 2	Model 3
ln Budget	-0.1188 (0.0269)***	-0.1239 (0.0263)***	-0.1224 (0.0263)***
ln PDI	-10.9810 (3.5271)***	-10.4854 (3.5190)***	-11.0177 (3.5190)***
Time	0.0067 (0.0018)***	0.0064 (0.0018)***	0.0067 (0.0018)***
Buena Vista	0.0607 (0.1507)	-	-
Fox	-0.0426 (0.1427)	-	-
Paramount	-0.1341 (0.1452)	-	-
Sony	-0.2172 (0.1505)	-	-
Universal	-0.2978 (0.1451)**	-	-
Warner Bros	0.0105 (0.1368)	-	-

Table 4.5 Continued

Variable	Model 4	Model 5	Model 6
ln Budget	-0.1205 (0.0263)***	-0.1191 (0.0263)***	-0.1179 (0.0263)***
ln PDI	-9.9351 (3.5190)***	-10.0513 (3.5190)***	-9.2427 (3.5190)***
Time	0.0061 (0.0018)***	0.0062 (0.0018)***	0.0059 (0.0018)***
Buena Vista	-	-	-
Fox	-	-	-
Paramount	-	-	-
Sony	-	-	-
Universal	-	-	-
Warner Bros	-	-	-

The variance function, estimates found in Table 4.5, found in model 1 is altered by removing the major distributors in model 2. Major distributors have the potential to release higher grossing films, Table 4.6, because of their ability to bring in higher profile producers and having increased financial resources.⁶³ However, as Table 4.5 shows, only one of the major distributors has an effect on the variance; therefore each is dropped in subsequent models. Models 2 through 6 use the same variance function.

⁶³ By removing distributors, a potential problem with endogeneity is also removed.

Table 4.6 Big Budget Releases of Major Distributors

Major Distributor	Number of Big Budget Releases	% Total of Big Budget Releases
Buena Vista	31	17.9%
Fox	20	11.6%
Paramount	19	11%
Sony	25	14.4%
Universal	20	11.6%
Warner Bros	35	20.2%

5.2 Results from Competition Measures

From the parsimonious regression, model 6 serves as the base regression for further analysis. The data were broken up into three parts: pooled, big budget, and small budget. The pooled section combines all data both big budget and small budget. The big budget section is just big budget films and likewise for the small budget section. This is done to see to what magnitude the big budget films affect each other and their smaller budget counterparts.

Table 4.7 presents the results of the model 6 from the parsimonious regression and the inclusion of the first measure for competition. For all data sets, the estimates suggest that competition does have a negative effect on opening weekend revenues. The magnitude from the big budget data set presents the largest magnitude. It may be argued that big budget films are a homogenous product leading to a “bigger is better” effect, whereas the small budget films are heterogeneous and compete in aspects other than budget. The estimate in the big budget sample suggests that adding an additional big budget film in a given week decreases opening weekend revenues by 7.5%. This is a

large drop when considering the necessity for big budget films to make a large amount of money in

Table 4.7 Competition Regression: Categorical Measure

Variable	Pooled	Big Budget	Small Budget
Constant	33.3288 (12.3974)***	138.6838 (33.9482)***	23.7735 (13.4805)*
lnbud	0.0161 (0.0104)	0.0012 (0.0278)	0.0109 (0.0112)
lntheat	-13.9997 (1.3195)***	-28.6096 (6.2550)***	-11.9624 (1.4441)***
lntheat ²	1.0340 (0.0878)***	1.9586 (0.4005)***	0.8961 (0.0965)***
Competition	-0.0683 (0.0160)***	-0.0751 (0.0370)**	-0.0593 (0.0173)***
Memorial Day	0.3068 (0.0600)***	0.4251 (0.0861)***	0.1561 (0.0789)**
July 4 th	0.1644 (0.0513)***	0.0537 (0.0825)	0.1852 (0.0626)***
Thanksgiving	0.1142 (0.0514)**	0.2130 (0.0847)**	0.0774 (0.0619)
Christmas	0.0217 (0.0561)	0.0997 (0.1120)	0.0400 (0.0625)
Metacritic	0.0124 (0.0009)***	0.0094 (0.0020)***	0.0126 (0.0010)***
Director	0.0895 (0.0466)**	0.1038 (0.0662)	0.0069 (0.0602)
Executive Producer	0.1063 (0.0365)***	0.0933 (0.0599)	0.0578 (0.0428)
Star	0.0777 (0.0364)**	0.0700 (0.0627)	0.1007 (0.0426)**
Sequel	0.1835 (0.0464)***	0.2377 (0.0716)***	0.1683 (0.0554)***
Comic	0.2038 (0.0916)**	0.5582 (0.1433)***	0.0835 (0.1100)
lnPDI	3.1839 (1.2373)**	-2.1444 (2.3481)	3.3668 (1.3583)**
Time	-0.0020 (0.0007)***	-0.00007 (0.0012)	-0.0026 (0.0007)***
n	1161	173	988
LL	-794.26	-71.23	-690.27
χ^2	37.67	6.93	34.26

the opening weekend. The necessity arises out of the declining returns in subsequent weeks resulting from weaker attendance and falling payouts from the distributor-exhibitor agreements. In the pooled data, adding an additional big budget film lowers opening weekend revenue by 6.8%. While this estimate is smaller than that found in the big budget sample it does provide more reliability with a higher chi square, nevertheless the same necessity for maximizing revenues in the opening weekend exists. Another explanation is the decomposition of the data. When the small budget films are added to the big budget films the competitive estimate must go down.

Next, the second measure of budgets is included into the base model. These estimates are found in Table 4.8. This measure does not solely use big budgets. Instead, the sum of all budgets in a week is used. As such, larger sums should result in greater competition.⁶⁴ As Table 4.8 reveals, competition is negative and significant in each data set, albeit at very low magnitudes. The estimate found in the pooled data reveal that a one percent increase in competition leads to .000000025% decrease in opening weekend revenue. While the estimate does not result in a large magnitude, note that a one percent increase in competition, measured as the summation of budgets, is a small increase in budget size. Consider the maximum aggregate budget of \$310 million. A one percent increase in the aggregate budget is \$3.1 million; this increase is equivalent to a film that opens in a limited number of theaters. Moreover, such a film would likely have little impact on the box office revenues of a big budget film. It is likely that a ten to thirty percent increase would be needed to significantly affect revenues, yet a ten percent

⁶⁴ The increase in competition can result from a large number of small budget films, a small number of large budget films or somewhere in between. See chapter 3 section 3.4.

increase is still likely to have little effect on a big budget film. With the inclusion of a big budget film, the competitive effect is greater. Suppose, a film with a budget of \$200 million is added to a particular weekend, this results in about a 4% decrease in opening weekend revenues.

Table 4.8 Competition Regression: Continuous Competition

Variable	Pooled	Big Budget	Small Budget
Constant	31.3812 (12.3182)**	141.8404 (33.1835)***	23.8705 (13.4161)*
lnbud	0.0143 (0.0104)	-0.0017 (0.2928)	0.0078 (0.0112)
lntheat	-14.0327 (1.3089)***	-28.4914 (6.1356)***	-12.1531 (1.4329)***
lntheat ²	1.0368 (0.0870)***	1.9458 (0.3930)***	0.9097 (0.0957)***
Competition	-0.2531E-8 (0.4644E-9)***	-0.3165E-8 (0.1100E-8)***	-0.2297E-8 (0.5062E-9)***
Memorial Day	0.3251 (0.0594)***	0.4306 (0.0847)***	0.1830 (0.0784)**
July 4 th	0.2002 (0.0514)***	0.0571 (0.0812)	0.2280 (0.0631)***
Thanksgiving	0.1652 (0.0514)**	0.2212 (0.0831)***	0.1250 (0.0629)**
Christmas	0.0627 (0.0565)	0.1292 (0.1108)	0.0740 (0.0632)
Metacritic	0.0122 (0.0009)***	0.0095 (0.0020)***	0.0124 (0.0009)***
Director	0.0757 (0.0464)	0.0843 (0.0656)	-0.0023 (0.0599)
Executive Producer	0.0983 (0.0362)***	0.0854 (0.0590)	0.0507 (0.0426)
Star	0.0669 (0.0362)*	0.0728 (0.0621)	0.0884 (0.0426)**
Sequel	0.1809 (0.0461)***	0.2453 (0.0701)***	0.1618 (0.0551)***
Comic	0.1939 (0.0908)**	0.5420 (0.1414)***	0.0803 (0.1094)
lnPDI	3.3666 (1.2284)***	-2.4983 (2.2930)	3.4396 (1.3505)**
Time	-0.0027 (0.0066)***	-0.1606E-4 (0.0012)	-0.0026 (0.0072)***
n	1161	173	988
LL	-786.99	-69.44	-685.92
χ^2	39.86	8.65	36.10

To test for seasonal effects, the second measure of competition is interacted with the holiday dummy variables, as the second measure is a continuous measure as opposed to the discrete nature of the first measure of competition. First, the estimates for the pooled data set are presented, Table 4.9. The pooled data estimates show that competition negatively affects opening weekend revenue in each of the five variants; however, the interaction terms have no significance, except for *Memorial_Comp* in the Pooled1 regression. The first model presented is Pooled 1. This model includes interaction terms between the four peak seasons and the competition variable, and is the unrestricted model. *Memorial_Comp* is marginally significant, slightly above the 5% level, whereas the other interactions are not significant. A chi-square test on Pooled 1 from Table 4.9 and Pooled from 4.8 leads to a value of 4.46 with four degrees of freedom, meaning the interaction terms can be excluded from the restricted model. In effect, competition has no bigger effect on returns in peak seasons. As Einav (2007) points out, the clustering of big budget films during peak seasons is suboptimal and suggests releasing films on a broader scale. With competition having no bigger effect on returns in peak seasons, experimenting with big budget releases outside peak seasons may result in even greater opening weekend revenues. Actual evidence exists of big budget films stretching the peak season beyond normal boundaries. Sony released *Spider-Man* (2002) on May 3rd effectively eschewing it from competition. Likewise, Paramount released *Iron Man* (2008) on May 2nd. Both films performed extremely well, with *Spider-Man* grossing \$403 million and *Iron Man* grossing \$318 million domestically.

A further issue is to decompose the effects from big budget films and small budget films. By separating the pooled data into two sub datasets, exploration of specific

Table 4.9 Competition Regression of Pooled Movies: Seasonal Interactions

Variable	Pooled 1	Pooled 2	Pooled 3
Constant	31.2694 (12.3550)**	30.7917 (12.3116)**	31.0139 (12.3242)**
ln Budget	0.0140 (0.0104)	0.0144 (0.0104)	0.0141 (0.0104)
ln Theaters	-13.9105 (1.3117)***	-13.9683 (1.3077)***	-13.9681 (1.3113)***
ln Theaters ²	1.0288 (0.0872)***	1.0323 (0.0870)***	1.0325 (0.0872)***
Competition	-0.2000E-8 (0.6110E-9)***	-0.2367E-8 (0.4763E-9)***	-0.2434E-8 (0.4856E-9)***
Memorial Day	0.4360 (0.0877)***	0.4220 (0.0862)***	0.3266 (0.0595)***
July 4 th	0.2673 (0.0886)***	0.2002 (0.0514)***	0.2482 (0.0874)***
Thanksgiving	0.1438 (0.0897)	0.1635 (0.0519)***	0.1639 (0.0519)***
Christmas	0.1494 (0.1014)	0.0586 (0.0565)	0.0597 (0.0567)
Director	0.0682 (0.0465)	0.0719 (0.0464)	0.0754 (0.0464)
Ex Producer	0.0969 (0.0364)***	0.0950 (0.0363)***	0.0976 (0.0363)***
Metacritic	0.0122 (0.0009)***	0.0122 (0.0009)***	0.0122 (0.0009)***
Star	0.0669 (0.0363)*	0.0657 (0.0362)*	0.0658 (0.0363)*
Sequel	0.1743 (0.0461)***	0.1769 (0.0461)***	0.1796 (0.0461)***
Comic	0.1995 (0.0910)**	0.2027 (0.0909)**	0.1918 (0.0909)**

Table 4.9 Continued

Variable	Pooled 1	Pooled 2	Pooled 3
Memorial_Comp	-0.3167E-8 (0.1855E-8)*	-0.2804E-8 (0.1814E-8)	- -
July_Comp	-0.1455E-8 (0.1513E-8)	- -	-0.9992E-9 (0.1469E-8)
Thanks_Comp	0.2463E-8 (0.1383E-8)	- -	- -
Christmas_Comp	-0.1447E-8 (0.1314E-8)	- -	- -
ln PDI	3.3253 (1.2306)***	3.4062 (1.2276)***	3.3808 (1.2282)***
Time	-0.0027 (0.0007)***	-0.0027 (0.0007)***	-0.0027 (0.007)***
N	1161	1161	1161
Log Likelihood	-784.76	-785.81	-786.77
χ^2	37.83	38.89	38.76

Table 4.9 Continued

Variable	Pooled 4	Pooled 5
Constant	31.7791 (12.3321)***	32.1325 (12.3483)***
ln Budget	0.0145 (0.0104)	0.0142 (0.0104)
ln Theaters	-14.0720 (1.3102)***	-14.0585 (1.3086)***
ln Theaters ²	1.0394 (0.0871)***	1.0389 (0.0870)***
Competition	-0.2643E-8 (0.4934E-8)***	-0.2351E-8 (0.5075E-9)***
Memorial Day	0.3242 (0.0594)***	0.3247 (0.0594)***
July 4 th	0.2011 (0.0514)***	0.1977 (0.0515)***
Thanksgiving	0.1169 (0.0885)	0.1618 (0.0520)***
Christmas	0.0662 (0.0567)	0.1355 (0.1005)
Director	0.0744 (0.0464)	0.0736 (0.0464)
Ex Producer	0.0978 (0.0362)***	0.1011 (0.0363)***
Metacritic	0.0122 (0.0009)***	0.0122 (0.0009)***
Star	0.0671 (0.0362)*	0.0692 (0.0363)*
Sequel	0.1808 (0.0461)***	0.1807 (0.0460)***
Comic	0.1931 (0.0909)**	0.1931 (0.0908)**

Table 4.9 Cont.

Variable	Pooled 4	Pooled 5
Memorial_Comp	-	-
	-	-
July_Comp	-	-
	-	-
Thanks_Comp	0.90E9 (0.1335E-8)	-
Christmas_Comp	-	-0.1114E-8 (0.1270E-8)
ln PDI	3.3387 (1.2289)***	3.2905 (1.2316)***
Time	-0.0027 (0.0007)***	-0.0027 (0.0007)***
N	1161	1161
Log Likelihood	-786.77	-786.62
χ^2	39.11	40.38

big budget effects can be undertaken. What this amounts to is performing another likelihood ratio test on the separate samples. Table 4.10 presents the results from the large budget sub dataset and Table 4.11 presents the results from the small budget sub dataset. The likelihood ratio tests for the big budget and small budget datasets reveal chi-square statistics of 1.3 and 5.28, respectively, giving more evidence of no seasonal effects in competition.

**Table 4.10 Competition Regression of Big Budget Movies:
Seasonal Interactions**

Variable	Large 1	Large 2	Large 3
Constant	141.8450 (33.4802)***	141.3138 (33.1281)***	144.6683 (33.2845)***
ln Budget	0.0026 (0.0303)	-0.0008 (0.0292)	0.0036 (0.0303)
ln Theaters	-28.5747 (6.1015)***	-28.2825 (6.1255)***	-28.7063 (6.1350)***
ln Theaters ²	1.9510 (0.3909)***	1.9327 (0.3923)***	1.9594 (0.3929)***
Competition	-0.2780E-8 (0.1903E-8)	-0.2980E-8 (0.1145E-8)***	-0.3593E-8 (0.1202E-8)***
Memorial Day	0.4742 (0.1155)***	0.4666 (0.1083)***	0.4264 (0.0846)***
July 4 th	0.0297 (0.1177)	0.0610 (0.0814)	-0.0023 (0.1090)
Thanksgiving	0.2943 (0.1318)**	0.2210 (0.0831)***	0.2214 (0.0829)***
Christmas	0.1472 (0.1832)	0.1268 (0.1110)	0.1465 (0.1126)
Director	0.0807 (0.0673)	0.0812 (0.0658)	0.0758 (0.0663)
Ex Producer	0.0813 (0.0597)	0.0815 (0.0594)	0.0847 (0.0588)
Metacritic	0.0092 (0.0020)***	0.0093 (0.0020)***	0.0094 (0.0020)***
Star	0.0729 (0.0619)	0.0728 (0.0620)	0.0720 (0.0619)
Sequel	0.2450 (0.0702)***	0.2446 (0.0701)***	0.2472 (0.0700)***
Comic	0.5360 (0.1407)***	0.5413 (0.1412)***	0.5340 (0.1415)***

Table 4.10 Continued

Variable	Large 4	Large 5
Constant	140.0984 (33.1581)***	141.6325 (33.5349)***
ln Budget	-0.0017 (0.0294)	-0.0017 (0.0293)
ln Theaters	-28.6351 (6.1001)***	-28.4734 (6.1437)***
ln Theaters ²	1.9546 (0.3908)***	1.9446 (0.3935)***
Competition	-0.2821E-8 (0.1190E-8)**	-0.3189E-8 (0.1264E-8)**
Memorial Day	0.4348 (0.0846)***	0.4305 (0.0847)***
July 4 th	0.0609 (0.0810)	0.0572 (0.0812)
Thanksgiving	0.2948 (0.1237)**	0.2214 (0.0832)***
Christmas	0.1226 (0.1119)	0.1241 (0.1795)
Director	0.0897 (0.0662)	0.0844 (0.0657)
Ex Producer	0.0859 (0.0590)	0.0852 (0.0594)
Metacritic	0.0094 (0.0020)***	0.0095 (0.0020)***
Star	0.0728 (0.0619)	0.0727 (0.0622)
Sequel	0.2438 (0.0700)***	0.2451 (0.0705)***
Comic	0.5411 (0.1405)***	0.5420 (0.1414)***

Table 4.10 Continued

Variable	Large 1	Large 2	Large 3	Large 4	Large 5
Memorial_Comp	-0.1746E-8 (0.3101E-8)	-0.1504E-8 (0.2828E-8)	-	-	-
July_Comp	-0.1269E-8 (0.2996E-8)	-	-0.2150E-8 (0.2640E-8)	-	-
Thanks_Comp	-0.1994E-8 (0.2855E-8)	-	-	-0.1986E-8 (0.2508E-8)	-
Christmas_Comp	-0.3082E-9 (0.2678E-8)	-	-	-	0.9105E-10 (0.2333E-8)
ln PDI	-2.4686 (2.3549)	-2.5335 (2.2908)	-2.7264 (2.3046)	-2.2387 (2.3227)	-2.4824 (2.3276)
Time	-0.4891E-4 (0.0012)	0.3953E-5 (0.0012)	0.6870E-4 (0.0012)	-0.00015 (0.0012)	-0.2425E-4 (0.0012)
N	173	173	173	173	173
Log Likelihood	-68.79	-69.30	-69.11	-69.14	-69.44
LR	8.54	8.68	8.87	8.38	8.66

**Table 4.11 Competition Regression of Small Budget Movies:
Seasonal Interactions**

Variable	Small 1	Small 2	Small 3
Constant	25.2334 (13.4399)*	23.7227 (13.4199)*	23.5589 (13.4045)*
ln Budget	0.0083 (0.0111)	0.0078 (0.0112)	0.0086 (0.0111)
ln Theaters	-12.1889 (1.4307)***	-12.1536 (1.4327)***	-12.0900 (1.4320)***
ln Theaters ²	0.9123 (0.0956)***	0.9097 (0.0957)***	0.9053 (0.0957)***
Competition	-0.1951E-8 (0.6415E-9)***	-0.2258E-8 (0.5171E-9)***	-0.2110E-8 (0.5242E-9)***
Memorial Day	0.2301 (0.1262)*	0.2190 (0.1255)*	0.1831 (0.0783)**
July 4 th	0.3783 (0.1259)***	0.2272 (0.0631)***	0.3748 (0.1253)***
Thanksgiving	0.0126 (0.1132)	0.1242 (0.0629)**	0.1206 (0.0629)*
Christmas	0.1932 (0.1143)*	0.0728 (0.0633)	0.0677 (0.0634)
Director	-0.0037 (0.0426)	-0.0022 (0.0599)	-0.0012 (0.0599)
Ex Producer	0.0531 (0.0426)	0.0506 (0.0426)	0.0503 (0.0426)
Metacritic	0.0124 (0.0009)***	0.0124 (0.0009)***	0.0124 (0.0009)***
Star	0.0863 (0.0428)**	0.0875 (0.0427)**	0.0839 (0.0427)**
Sequel	0.1585 (0.0551)***	0.1610 (0.0552)***	0.1620 (0.0551)***
Comic	0.0775 (0.1095)	0.0832 (0.1097)	0.0755 (0.1094)

Table 4.11 Continued

Variable	Small 4	Small 5
Constant	24.9735 (13.4289)*	24.9367 (13.4382)*
ln Budget	0.0080 (0.0112)	0.0075 (0.0111)
ln Theaters	-12.2580 (1.4329)***	-12.1778 (1.4312)***
ln Theaters ²	0.9165 (0.0957)***	0.9119 (0.0956)***
Competition	-0.2552E-8 (0.5358E-9)***	-0.2014E-8 (0.5521E-9)***
Memorial Day	0.1836 (0.0784)**	0.1818 (0.0783)**
July 4 th	0.2324 (0.0632)***	0.2226 (0.0632)***
Thanksgiving	-0.1111 (0.1124)	0.1185 (0.0630)*
Christmas	0.0814 (0.0634)	0.1945 (0.1136)*
Director	-0.0005 (0.0599)	-0.0066 (0.0599)
Ex Producer	0.0493 (0.0426)	0.0545 (0.0426)
Metacritic	0.0124 (0.0009)***	0.0123 (0.0009)***
Star	0.0879 (0.0426)**	0.0926 (0.0427)**
Sequel	0.1614 (0.0551)***	0.1595 (0.0551)***
Comic	0.0801 (0.1093)	0.0787 (0.1093)

Table 4.11 Continued

Variable	Small 1	Small 2	Small 3	Small 4	Small 5
Memorial_Comp	-0.1132E-8 (0.2348E-8)	-0.8511E-9 (0.2322E-8)	-	-	-
July_Comp	-0.2693E-8 (0.1927E-8)	-	-0.2574E-8 (0.1896E-8)	-	-
Thanks_Comp	0.1653E-8 (0.1581E-8)	-	-	0.2249E-8 (0.1544E-8)	-
Christmas_Comp	-0.1833E-8 (0.1457E-8)	-	-	-	-0.1813E-8 (0.1422E-8)
ln PDI	3.2982 (1.3526)**	3.4566 (1.3512)**	3.4470 (1.3493)**	3.3617 (1.3507)**	3.3263 (1.3533)**
Time	-0.0026 (0.0007)***	-0.0026 (0.0007)***	-0.0026 (0.0007)***	-0.0026 (0.0007)***	-0.0026 (0.0007)***
N	988	988	988	988	988
Log Likelihood	-683.28	-685.86	-685.01	-684.87	-685.12
LR	34.82	35.78	34.97	35.06	37.14

There are two possible arguments for the lack of within season effects. First, films with big budgets typically follow a one-a-week release schedule with distributors taking turns releasing their films, effectively eliminating any competition in the week of greatest returns. Distributors that do release against the big budget films often do so with a smaller budgeted film. Therefore, the competition for that week remains low, but high enough to remain a factor in decreasing opening weekend revenues. The second argument draws from the first. A comparison of the mean value of competition across seasons, Table 4.12, shows that Christmas has the highest mean value and Memorial Day has the lowest mean value, revealing the marginal significance found in *Memorial_Comp*. An explanation for Thanksgiving and Christmas lies in the total number of films released, as compared to Memorial Day and July 4th, which results in more intense competition for Memorial Day and July 4th. Distributors push movies out for these two holidays to meet deadlines for Academy Award consideration and general demand. Thus, even against big budgets there are more films (190) being released during these seasons versus July 4th and Memorial Day (163). Memorial Day and July 4th face lower mean values in the entire sample and the big budget sample. This likely reflects the the propensity to release larger budgeted films in these days, which crowds out competition for fear of lowering individual film revenues, which may cause the significance found in Memorial day. If competition remains low then an increase would hurt other films. Whereas, Thanksgiving and Christmas have historically been saturated with films and distributors have adapted their release patterns.

Table 4.12 Mean Values of Competition Across Seasons

Season	Mean (All Movies)	Mean (Big Budget Movies)
Memorial Day	62023880.61	40262068.98
July 4 th	92708333.34	59878787.89
Thanksgiving	101882653.00	74232142.87
Christmas	133116304.00	122911765.00
All other times	69882673.25	63550000.01

Chapter 5

Conclusion

The evolution of the film industry and technology led to changes in the production and distribution of films. Hollywood altered the number and composition of films as it progressed into its latest era; moving away from weekly releases towards distribution of films. Moreover, major distributors coupled with select distributors have engaged in the distribution of bigger budgeted films to enhance overall profitability. This paradigm was necessary as distributors were faced with declining attendances due to the rise of substitute entertainment, namely television. Yet, Hollywood's distributors coped well with television as they entered the respective market and profited from their growing libraries and capitalized on their own creations. Substitute media was not finished; however, the introduction of home video, movie channels, and pay-per-view, was a colossal test to the first run attractions and their ability to profit. Consumers with a higher opportunity cost of time waited out movies thereby reducing profitability at theaters. Distributors would yet again prove resilient, as they sold rights to films and introduced their own video cassettes and later DVDs. Subsequently, this ushered in a new wave of distribution arms for many firms, as home video became a separate entity from first run attractions. Aside from incorporating alternative media into their industry, distributors sought to increase revenues by focusing on blockbusters.

While the premise of competition among distributors has always existed, it may perhaps have fostered into a greatest form with the introduction of the Blockbuster Era. With distributors releasing fewer features, as a part of their business was now focused on television and home video, their ability to remain profitable for the year could be questionable. Certainly, bad management, in the case of RKO, led to its downfall, but others, e.g. MGM, were impeded with lack of competition. MGM did not fully embrace the Blockbuster Era as other major distributors did; instead, MGM opted for smaller releases away from the competition. This anti-competitive behavior was MGM's own undoing. While the occasional sleeper proved profitable, in the movie industry, sleepers are rare. Other majors persisted with full embrace of the Blockbuster Era. Releasing films in fewer numbers requires those films to be profitable, yet as already stated with MGM, sleepers do not always emerge. Instead, profitable distributors embraced the blockbuster as a means to achieve the desired goal of profit. By releasing a handful of big budget films per year, distributors were able to cover losses from other films and report a profit for the year. However, this strategy too has a weakness, competition.

Prior to the Blockbuster Era, attendance reached its peak before the Great Depression and saw its last surge during WWII. Since then, attendance has fallen to roughly 20 million a year with minimal growth. Releasing big budgets films has required that attendance be relatively high, and such times exist sparsely through the year. These times are mainly tied with holiday seasons such as Memorial Day, July 4th, Thanksgiving, and Christmas. In the current film environment, it is difficult to be a sole major release hence competition prevails. In economics, it is common to assume that a greater degree of competition results in better outcomes for consumers. Yet, in the film industry, this is not necessarily true. A greater number of distributors lead to increases in the number of products and hence a greater ability to find a

movie that one would desire, more distributors leads to an increase in the number of big budget films and thereby leading to more competition for box office revenue. This affects both consumers and producers. The average moviegoer loses welfare as the number of big budget films grows and the decision to see one film or the other grows as well. Producers lose welfare in that their revenues are reduced from the enhanced competition. Thus, even if economic theory dictates competition results in greater welfare, for particular products such as big budget films, this seems not to be the case.

Chapter three sets out to solve this problem by incorporating game theory. The first sets of games are noncooperative and are simultaneously played. Payoffs to each player are specified such that when both players release a film on the same weekend there is a competitive loss. The competitive loss is a function of the respective budgets and is assumed to increase as budget sizes increase. Payoffs are assumed greater in the peak weekend, i.e. a holiday weekend, than the early weekend, i.e. non-holiday weekend. With each payoff specified, the goal was to specify certain assumptions that would yield Nash equilibrium for the game. Nash equilibria are best replies and yield an optimal outcome for each player, yet may not yield a suitable outcome for society in general. Two games were initially analyzed: one of big budget films competing against one another and the other of a big budget and small budget film competing. In the first game, one assumption led to the outcome of both distributors releasing on the peak weekend. The other assumption provided two pure Nash equilibria and one mixed strategy. In the second game, it was assumed that the big budget film will always release on the peak weekend, as competing against a small budget film would do little to overall revenue. Under the first two assumptions of game two, the Nash equilibrium was for both to release on the peak weekend. Under assumption three, however, the small budget film would release on the early weekend. A

final game not formally specified, was that of a small budget film versus another small budget film. This game needed no formal specification as it can be easily substituted into the big budget versus big budget game.

For future empirical work, a theoretical distribution was specified for movie revenues. The three parameter lognormal distribution was used and accompanying tables providing parameter estimates and goodness of fit tests were given.

To conclude chapter three, another game was specified that drew from a particular solution, the mixed strategy, of the first game. The mixed strategy proved to be a coordination failure among the distributors. If they opt to play the mixed strategy then determining which strategy each gets to play results in lower expected payoffs than had they been able to coordinate strategies. To solve this coordination failure, a correlated equilibria was introduced. In the game, a mediator was introduced to provide private signals to each player and the players could either follow the advice of the mediator or ignore it. The mediator also specified probabilities of each action. With the payoffs unchanged, the significance relied on the mediator's signals and the player's beliefs of the signals. It was shown that if both players follow the mediator's advice that expected payoffs to both would increase. This implies that the mixed strategy was Pareto inferior and the correlated equilibrium was a Pareto improvement. Following the mediator also is a welfare enhancement as producers now separate. This separation also creates an environment in which consumers gain as the average moviegoer is afforded the opportunity of seeing both movies on separate weeks with they are new releases. In Hollywood, a pre-screening audience may serve as a mediator to two distributors. Viewing both films provides the audience with the necessary information to advise each distributor as to release scheduling. Two factors may play a pivotal role here. The first is the need for the opening bump that a peak

weekend creates. Many films are unproven formulas and thus need the high demand generated in the peak week to carry it. Moreover, the proven formulas are only guaranteed by some probability less than 1 of achieving significant returns. The second factor is the availability criteria. Not every film needs to be released on a peak weekend, especially those that are almost ensured to succeed. Such films are likely to come in the form of sequels or book adaptations. These films generate enough demand on their own. Hence, they only need the peak weekend to increase their successful run. Based on these two criteria, a mediator (audience) can rationally advise each distributor towards release.

To determine if such a competitive effect exists among distributors empirical models are specified and tested in chapter four. The movie economics literature has seen a variety of models and variables used to determine box office revenue. To account for the breadth of these previous models a parsimonious regression was specified. The nature of box office revenue causes wide variability in the data and a multiplicative heteroskedastic regression was used to correct the variability. From the parsimonious regression, six models were tested for variable significance and model stability. The model that satisfied the goodness of fit criteria the best was selected as the base model for further testing of competition. Two competition variables were constructed; the first being one that only measures the number of big budget films during a given week – a discrete variable, and the other sums the budgets of all new releases during a given week – a continuous variable. These variables were then incorporated into three different models, each measuring different sets of data. The main data set was the pooled data set, and it was divided into only big budget movies and only small budget movies. In each data set, competition was negative implying there is a competitive effect among films. Of the three, the big budget data set produced the largest competitive loss, which was expected. Further testing of

competition involved seasonal effects. This entailed the use of interaction variables. Seasonal variables were defined as the holidays: Memorial Day, July 4th, Thanksgiving, and Christmas/New Year. Each of the four was given a two week buffer prior to and after the actual day of the holiday. This accounts for build up and dissemination of the holiday. It was found that all interactions were negative, though the only significant variable was the interaction between Christmas/New Year and competition under the pooled data. This showed there was no seasonal effect in competition; however, it must be noted this was tested using only the continuous competition variable and may differ using the discrete competition variable. In addition, the use of opening weekend revenues may have had an effect in variable significance as budgets were insignificant in all models, yet usually are significant when using total box office revenue as the dependent variable. Coincidentally, the data used in this sample draw from 1998-2008, which has seen numerous big budget films released weeks before peak dates. This move may characterize the future of Hollywood, as distributors kick off the summer or other holiday season with big budget releases in an effort to remove the clustering of films.

The goal of this dissertation was to improve upon the movie economics literature by introducing a game theory model using correlated equilibria as the solution concept. Expected payoffs to distributors can increase if a mediator assigns actions. Moreover, the competitive effect in movies was quantified to the extent of including only opening weekend revenues.

This endeavor does not solely apply to the film industry, but has applicability to other newly released products with revenues that decline as time progresses, or products where a limited number of new releases compete for specific release dates. Future research from the work of this dissertation may focus on the total loss and gain in welfare from competition in releases, or competition among films with similar traits as opposed to budgets.

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