Production Cost Structure and Commercial Success in the New Film Industry
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1 Introduction

In a country that thrives on commercialism and image, the motion picture industry is an engine of social commentary, celebrity, and enormous cash flows. From the development of the first kinetoscope to our current star-studded event-movie culture, the industry has evolved and grown to become one of the largest and most influential cultural forces in the world today.

Substantial critical analysis and literature exist discussing aesthetic qualities in film production. This paper does not follow that particular line of inquiry. Instead, we examine film as an industry focused on profitability, in which all decisions are based on the ultimate bottom-line. More specifically, the purpose of this paper is to relate temporal cost decisions and profitability by reconciling the contrasting qualities of high upfront costs with a high degree of uncertainty of reward at the outset of a film project. Since the genesis of the industry, the structure of film financing and the nature of revenue accrual have undergone profound change, wrought both by external forces and competition from within. In this paper we try to provide an overview of how the industry actually operates, and an understanding of the seemingly irrational ways in which decisions are often made.

This paper is organized as follows. It will first explain the political, legal, and economic forces that led to a shift in contract and cost structure in the feature film industry. It will then present an economic model explaining how, based on economic intuition, we should expect costs of feature film production to be structured once equilibrium is attained. Next, it will give an overview of the current body of academic literature on forecasting box office receipts, revenues, and other measures of profitability in the film industry. It will then present an econometric model that
attempts to provide empirical evidence for the conclusions of the earlier economic model. Next will be a discussion of the data compiled, econometric analysis of said data, and an interpretation of the results. Finally, possible extensions and further research will be presented, followed by a conclusion.

2 History and Evolution of the Industry

2.1 Edison and Early Film

Today's major studios can each be traced to their common geneses in the arcades and parlors of the turn of the century, where Thomas A. Edison's innovation of pictures simulating movement offered a fantastic distraction to an evermore entertainment-seeking public. The movie's humble beginnings were around 1889, when Edison fine-tuned the kinetoscope, a novelty box in which 50 feet of picture film was moved with such rapidity that it appeared to simulate motion to the single person viewing the spectacle through a magnifying lens. Demand for the kinetoscope grew quickly, and it could soon be seen en masse in the penny arcades of America's large cities. The Edison lab continued to innovate, next producing in 1896 the vitascope, which took the technology of the kinetoscope and projected it life-size onto a screen, allowing for the possibility of multiple persons viewing the same film simultaneously.¹ Movies of this era were short, silent films produced by a variety of independent producers. Initially, the homogenous products were shown in nickelodeons, where for only a nickel one could escape reality for a few short moments. Exhibitors realized quickly that establishing exhibition halls would allow profits to roll in while keeping rental costs of the films the same, and the Edison Trust's patented projectors offered just such an opportunity.

Many of these early entrepreneurs were self-educated, first-generation Jewish immigrants seeking to make a new life for themselves free from the perils of Eastern Europe. Seeing further profit opportunity, several of these ambitious immigrants strived for competitive advantage over other exhibitors. They sought to achieve economies of scale by buying more halls for exhibition. Louis Mayer, one of the future founders of MGM, expanded to a circuit of theaters in the northeastern US, allowing him to physically transport film reels by bicycle from one location to another and choose showtimes with profit-maximizing precision.² Others followed suit,

¹See Zierer (1947) for more indepth history of the early technological innovations that prompted industry evolution, as well as very interesting urban geographical explanations for the industry's move to Hollywood.

²See Epstein (2005) for a good description of these early innovators in the film industry.
further streamlining the exhibition process.

The immigrants continued to consolidate the exhibition arm of the new film industry. Early on, the major exhibitors began to realize that films were not getting made quickly enough to keep their theaters filled. Vertical integration into production seemed like the most efficient next step; with low production costs and control over screens, the exhibitors could effectively manage both content and content-delivery, allowing them to extract further rents from the public.

At this time, the growing power of exhibitors was hindered only by pressure from the Edison Trust. With patents on both the projector and the camera, as well as a contract binding the principal manufacturer of raw film, the Eastman Kodak Company, to only sell to Edison-licensed companies, the Trust had a very firm stranglehold on the film industry. When independent producers attempted to buy raw stock from other suppliers to produce films, Edison’s Trust applied pressure of litigation to force them to pay exorbitant licensing fees. Many have argued that the root of conflict between the Trust and the immigrants was both economic and social in nature (see Epstein 2005). Regardless of source, it is clear that conflict existed that restricted the short-term growth of independents. At first, the ad-hoc producers used complex deception to avoid litigation, filming movies with Edison cameras disguised by façades of non-patented technology. As pressure grew, though, the major exhibitors decided that the time had come to put physical distance between themselves and Edison.

They set their sights on the newly incorporated west-coast city of Hollywood. Early filming took place outdoors to make use of better light to supplement the low quality of early filmmaking tools. Los Angeles’ beautiful weather and landscapes offered unprecedented opportunity to shoot year-round. The advent of sound in the motion picture industry, first adopted by Warner Brothers in 1928 for their The Jazz Singer and followed closely by RKO and the other major studios of the time, led to investment in physical sound facilities, further anchoring the major players of the industry to Hollywood. With an entire country between them and the lawyers of the Edison Trust, they promptly established what soon became the golden era of the studio system.

2.2 The Rise of the Studio System

Few could have foreseen what the film industry’s meager beginnings would yield in less than a century. The public began to frequent the new movie theaters on a weekly basis; upwards of 7,000,000 eager moviegoers crowded into US theaters daily for the entertainment that had quickly swept the nation, indicating “an appeal
to at least half the nation.”

Over the next 30 years, the men who were once poor immigrants became the new elite, the moguls of the new studio system. They exerted tremendous power by transforming the film industry into what came to be described as an industrial machine. The studio system looked predominately to only one place for revenue: the American box office. Through control of every component of the value chain, the studio system was able to efficiently ensure that product of constant quality filled their screens (and thus the seats in their theaters) regularly.

### 2.2.1 Exhibition

By the 1920's, virtually all first-run movie theaters and the majority of second-run movie theaters were owned by the studios. In the simplest sense, this vertical integration ensured a constant outlet for a studio's own films. Additionally, it allowed for a great deal of price discrimination. The typical exhibition scheme began with a film showing in a studio's own first-run cinemas in major city centers, where studios could charge a considerable premium and still ensure capacity their theaters. As admission in certain first-run theaters began to dwindle, the studios would transfer negatives from theaters with declining revenue/screen to first-run theaters in other cities. The next step in the process would be for the films to be shown in second- and third-run, mostly independent, theaters in the less centralized towns for cheaper prices. Revenues from company-owned box office were entirely internalized, and the share of revenue yielded to independent theaters was small (around 30-40%). Costs of production were still quite low, so profitability in this arena was exceptional.

At the same time, a tit-for-tat situation of unofficial industry cooperation emerged. Because the vast majority of first-run theaters were owned by one of the six major studios, each studio was often seller to another studio in one city and buyer from that studio in a different city. Harsh negotiations in one city would thus lead to equally tough terms in the other city – instead, preferential treatment for studios became the industry standard, creating a powerful entry barrier for independent exhibitors. An even more potent barrier to entry, however, was the studios’ near 100% control of content. The studios possessed immense leverage in that the majority of revenues came from their own theaters, so they could afford to not rent their films to independents. An independent theater could thus not get the top movies with stars that would fill their seats unless they agreed to severely disadvantageous terms dictated by the studios’ distribution arms. During this era, many independent theaters were forced to specialize in films with less marketability (art house films, etc), attempting to serve a

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3Johnston (1926) p. 20
niche market as they were wholly unable to compete with the studio-owned first-run theaters.

2.2.2 Distribution

The studios' vertical integration into efficient means of distribution similarly offered immense advantages against independents through economies of scale and leverage in negotiations. One of the more infamous practices of studio-owned distribution arms was that of block booking. The primary goal of independent theaters at the time was to maximize ticket sales (concessions were growing in importance, but were nowhere near the level of significance that they are at today). If a theater predicted that a particular studio-produced film was going to have a small demand, screen scarcity would lead them to prefer rental of a different film with greater demand. Through the process of block booking, however, the studios packaged these B-list movies with their top movies in an all-or-nothing deal for either six months' or a year's worth of movies. If the theater refused, it would not have enough content to keep seats filled. If it accepted, it was forced to waste precious screen space showing films it knew would be unsuccessful. The studio's negotiating position of extreme leverage forced the independent theaters to accept poor terms or no terms.4

Yet another tactic utilized by the studio distributors took advantage of asymmetric information. The studios knew the quality of their films, while the independent theaters could only know the quality of the films if they were invited to a screening. In general, the theaters wanted to see a film before they agreed to rent it. The studios, however, had a strong incentive to get their films to exhibition as soon after production as possible (in order to minimize interest accruing on the immense financing required to produce a film). The studios therefore often used their leverage to engage in practices of blind-selling, whereby independent theaters were forced to agree to show a film even before it was completed. Finally, the studios' distribution arms held a major advantage against independent distributors: lower costs of physical distribution and marketing created a large barrier to entry. Distribution costs of studio distributors were incredibly low, around $60,000 per picture, primarily because films only opened in a few select theaters in a region at a time. Because of this, films could be shown in New York and then transferred to California for considerably less cost than cutting new negatives. Wide openings were not the norm as they are today – the goal was highly controlled exhibitions that would extract as

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4For an interesting argument in favor of block booking policies based on economic efficiency, see Caves (2002), p.163-165.
many rents as possible over time. Costs of advertising were comparably low (around $30,000 per picture), primarily because posters and such could be transferred with film reels as a film closed in one city and opened in another.

2.2.3 Production

While integration into the distribution and exhibition arenas of film offered unprecedented control of the product’s outlet, this control would be of little use without a constant stream of consistent-quality product to exhibit. Around the turn of the century, the European film community had begun producing feature-length films. The new innovation was a huge success with audiences, and the Hollywood community was quick to incorporate it into their process. In so doing, however, the average cost of a film skyrocketed in comparison with the shorter films of the previous era. For the studios to turn a profit, they had to generally be able to produce their films for less money than their net receipts totaled.\(^5\) Two main components of the studio system enabled the studio to become tremendously efficient producers of movies and collectors of the resulting windfalls: total in-house production, and the realization of the power of stars.

The shift to in-house production was a striking one. The studios are typically regarded with amusement or scorn, citing excessive spending and elaborate lifestyles as the antithesis of efficiency in a business. The reality, however, is that the studio system was one of the most efficient means of production imaginable. Within a matter of years, the studios purchased enormous amounts of real-estate in Hollywood and set about physically establishing what is currently thought of as studio lots: a huge all-encompassing environment for the production of feature films. Each stage of the productive process was internalized to streamline costs. In-house writers and script doctors were paid in stages for various drafts, treatments, and finished scripts.\(^6\) To lower the cost of filming on location, enormous backlots were constructed enabling entire movies to be filmed in one setting. Make-up houses, soundstages, post-production facilities, and nearly every other factor of production was internalized into the studio system to maximize overall profits by keeping production costs

\(^5\)This is of course an oversimplification, as rents in exhibition were occasionally ceded to other studios, costs of marketing and distribution were significantly different from zero, etc, but the point remains that costs had to be streamlined to ensure profit maximization.

\(^6\)This screenplay staged-contract developed over time because of a combination of incentive problems and legality issues. Initially studios received thousands of external submissions of scripts, but writers often filed plagiarism suits against the studio if anything resembling their failed script appeared in a project. This led to in-house writers and options on any external projects (see Caves 2002).
to a minimum.

Arguably, one of the largest transformations of the industry was brought about by the discovery of film stars' widespread appeal to audiences; the studios' manipulation of this realization through subsequent marketing of every facet of a star's life was masterful. In the early years of film, films were largely homogenous so the marketing of a film was relatively small (often limited only to the movie's name on the marquis of the cinemas). Early filmgoers did not have a wide variety of films from which to choose – they simply attended their local theater on a weekly basis, regardless of what film was actually playing. As film production and theaters proliferated, the audience suddenly had a new dimension of choice in deciding whether to 'consume' a movie or not. Early exhibitors competed on price, as economic theory predicts for a market of homogenous goods. Slowly, however, it was realized that the public had a fascination with the star actors of movies. With this realization, the studios finally had an opportunity to brand certain movies through inclusion of a star, differentiating them from the competition by sending a certain signal of quality to public that the film must be better because it has a star in it.\(^7\)

Additionally, the studios realized the immediate benefit of cultivating a particular image of the star both onscreen (through the type of characters the star played) and offscreen (through media outlets, press, etc). Having a particular star in a movie conveyed something to the public about the level of quality of the film and what could be expected of the film. Marketing was becoming more focused on particular demographics, so this was a significant way of directing marketing efforts. Developing a star became a refined art, but to cement an image in the public's mind required an immense amount of control over everything the public heard about a star. To ensure this, the studios developed a talent contract considered to be mutually beneficial to both actor and studio. Much like the pop music contracts of today, the unknown actor signed an exclusivity contract with the studio for 7 years with the option to renew and/or renegotiate at an escalating salary every 6-12 months thereafter. Under the conditions of the contract, the studio controlled every aspect of the actor's life for those next 7+ years. The studio chose what roles the actor would play, crafted every press release and interview that the actor participated in, had full use of his

\(^7\)Oddly, studio names never were a source of true brand equity, even in the early days of film, with the only possible exceptions being Disney and Pixar. This could stem from the wide variability of studio projects, and the want to not associate one's brand name with a spectacularly unpopular product. Stars proved more consistent measures of quality, as a star's image and roles that they played were all carefully planned and controlled. A parallel can be easily drawn to Pixar and Disney, whose image represents a particular type of movie, limiting the variability of product and giving the audience an idea of what to expect.
image in advertising, and often went so far as forcing the actor to change his name or lie about certain aspects of his life to ensure the façade that the studio was working to generate. In exchange, the actor had a relatively stable salary, low risk, and his reputation was being built up at the expense of the studio.

This contract allowed the studio to effectively harvest all windfalls from the star they were developing, and though the newly-minted stars often developed egos, their power in negotiation remained relatively constant. If a star decided to break contract, the studios were quick to bring the issue to court, and never lost. Furthermore, a star had no realistic alternative if they decided that they were too big for their contract. Not only did the major studios of the era maintain fantastic working relationships, but a star who broke contract with one studio would not be hired by another studio out of fear of being sued themselves for abetting contractual evasion. Independent producers were not an option for the fallen star, primarily because independent producers largely did not and could not exist given that the major studios controlled all major exhibition venues (thereby preventing independent producers from having any audience large enough to even break-even on a film’s production). Given the political economy of the time and the nature of the value chain, the contract demonstrated an interesting equilibrium whereby the studios were able to seize the major share of value added by the star.

2.2.4 Conclusion

The two main reasons for the studio system’s prevalence are best described by Caves (2002) in his Creative Industries:

One reason was efficiency: this was simply the most economically effective way to organize the production of Hollywood-style films. The other reason was rent-seeking: the studios succeeded in intercepting some rents imputed to the stars and other film-making talents. Because of the market power and entrenchment of the major studios’ film distribution and exhibition networks, a star could not benefit from competitive bidding for

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8Stories abound about such conditions. Rock Hudson was forced to conceal his homosexuality and construct two imaginary marriages to maintain his image as a romantic leading man. Tom Cruise was required to say that he’d performed all stunts in MI2 to cement the tagline of the movie (Tom Cruise IS Ethan Hunt), when in actuality 6 stunt doubles had been used for his stunts. (Epstein 2005).

9Voluntary renegotiation initiated by the studios did exist, however, in order to maintain good working relationships with exceptional stars. Bette Davis’ contracts, for example, showed large increases in salary over time, as well as reduced number of films that she was required to make (Caves 2002).
her services (at least until her contract expired). That the studios thrived on both efficient production and successful monopsony\(^{10}\) is a hypothesis that can be checked against the performance of the new structure that replaced it.\(^{11}\)

The studio system survived and proved highly lucrative for more than a quarter century. The system was loath to change; it took three major changes in the environment, two market and one legal, to force the studios to evolve to the system in place today.

### 2.3 Paramount Disintegration and Spot Production

#### 2.3.1 Tax Considerations

Around the time of World War II, personal income tax rates skyrocketed to previously unheard of levels. With top marginal income tax rates of 94% in 1944 and 1945,\(^ {12}\) the highly paid stars of the era had a strong incentive to form their own production companies, thereby reducing their effective tax rates from the draconian 90% to the more reasonable 60% corporate tax rate. Caves (2002) explains that the studio heads were happy to accommodate their stars (in exchange for lower star fees, of course) by signing shorter-term contracts. In so doing, the studio heads had begun to allow their stars more freedom from the totalitarian control of previous studio moguls. This slippery slope towards greater star independence was the beginning of a shift to spot production, where production contracts were geared towards a single film’s production rather than the previous standard of multi-picture or time-based deals.

#### 2.3.2 Introduction of the Television

Few technological innovations have wreaked quite as much havoc on the film industry as the television. Studio executives were frozen in fear, and rightfully so. Box office sales had already been on the decline, negative costs were on the rise, and new content was available free through the use of a television. After years of sitting atop a highly lucrative industry not even penetrable by a depression (in actuality, box office sales increased throughout the late 1920's and early 1930's), the studio heads were unaccustomed to dealing with such a disruptive change to the industry. A swift, collective response was required to ward off the new challenge.

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\(^{10}\) A monopsony is a situation where there is only one buyer in a market with many sellers.


\(^{12}\) IRS (2003). Note: top marginal tax rate was subject to a maximum effective tax rate limitation of 90% of net income, though this was still remarkably high.
The decided upon course of action was for all studios to refuse to sell content to the TV networks. Television is only valuable to consumers if it has programming (similar to most other technology adoption, critical mass is required for a new technology to be perceived as worth buying), so by starving the television networks of content the studios could prevent widespread adoption of the new threatening technology. The studios even went so far as to refuse renting their immense sound stages and production resources to television networks for production of television content. With 20-20 hindsight, it is easily seen that in doing so, the studios deprived themselves of an immense revenue stream, but the studios perceived threat of television as large enough to sacrifice these potential revenues.

This tactic proved especially disastrous when smaller production companies rushed to fill the demand for television programming. Walt Disney paved the way with a seven-year contract to produce Disneyland, a weekly, hour-long television show. The show served dual purposes as advertising for Disney’s emerging empire of characters and other licensed goodies and as programming for the new American Broadcasting Network (ABC). A subsidiary of MCA followed suit under the guidance of Lew Wasserman by producing game shows and other low-cost programming for the networks. Wasserman especially saw an opportunity in packaging programming with the talent that MCA represented, securing even higher rents for the company. Other corporate entities followed the pack, seeing the profitability in such a venture. General Electric lent its name to MCA’s General Electric Theater, as did Alfred Hitchcock to Alfred Hitchcock Presents. By the time the studio heads had realized their error, programming had reached the so-called ‘critical mass,’ providing justification for the fact that television could be found in 2/3 of all American households by 1959.

The next major effort by the studios, differentiation, was what ultimately transformed the industry. Realizing that starving the networks for programming was largely impossible, they next attempted to differentiate themselves on quality of content and experience. The studios invested heavily in new technologies to heighten the theatrical experience above the typical newsreel and game show fare of TV. To enhance the visual experience, the studios shifted production from the 4:3 ratio of television programming to a wider format: CinemaScope. Other innovative technologies were developed, including Cinerama, in which triple projectors were used to show films on split screens, and 3D, where audience members were provided with polarized glasses that would give certain components of the specially shot film the illusion of coming off the screen. Other developed technologies focused more on making going to the movies a systatic experience. Most, including a track of time-released aromas (Smell-O-Vision), never caught on. Others, including the addition of six channels of sound in theaters, changed the way movies are exhibited even to this day.
The focus of the movie industry had shifted from ensuring that a constant stream of films kept movie theaters filled to providing highly differentiated content that could compete with television programming. Speed of delivery was given lower priority than uniqueness and novelty, characteristics deemed crucial for maintaining entertainment market share. As movies became more specialized, the factors of production required to make movies were forced to specialize. Studio integration into total in-house production no longer offered the cost-saving potential that it did under the previous system. Studios went through a period of heavy divestiture, as post-production facilities, costume shops, special effects houses, and other production resources were spun off into more-specialized third-party production houses. What replaced the earlier studio production system, therefore, was one of flexible specialization, where production factors were hired primarily on a one-picture basis. These factors are chosen for a particular project based upon timing (availability at the exact time necessary) and suitability to the highly-specialized requirements of the particular project. This high degree of specialization is readily apparent in the drastically rising costs of film production in the 1950's (the average real negative cost rose by 33% between 1945 and 1955) coupled with the dramatically decreased number of films being produced despite increasing prevalence of independents (the 5 majors produced 52% less movies in 1956 than they did in 1940).

2.3.3 US v. Paramount et al (1948)

The third major agent of change for the structure of the film industry came from the legal system. For nearly 10 years the US Justice Department had been working on an antitrust suit against the major studios, arguing that practices stemming from the studios' control of distribution and exhibition mechanisms for feature films constituted restraint of trade under the Sherman Anti-Trust Act. As discussed above, the studios were highly integrated into the exhibition of movies, ensuring studio-produced films better access to consumers than independent films, thereby creating an effective barrier to entry for independent producers and studios. Similarly, the studios utilized practices of block booking to force independent exhibitors to take movies that they otherwise would not want, giving independent exhibitors a significant competitive disadvantage. It was clear that the major studios had effectively constructed a significant barrier to entry into exhibition and production.13

13De Vany argues compellingly that the characteristics cited by Paramount as barriers of trade in violation of the Sherman Anti-Trust Act actually evolved under highly competitive conditions and are optimal for the industry on both supply and demand sides. (De Vany 2004, Chapter 7)
It took 10 years of appeals and argument at almost every level of the court system before the ruling came down against the seven major studios of the time. The resulting decrees (issued from 1946-1949) required primarily two extreme changes be made by the major studios. First, the studios were required to completely divest themselves of all their exhibition halls. Second, the practice of block booking became forbidden in dealings with independent theaters. These two changes yielded profound changes in the structure of the film industry, and a completely revolutionized role the major studios played in it.

The end of the studios' block booking practices signaled greater freedom for independent theaters. No longer were they force-fed movies that they knew would not be maximizing profits. While this alone did not revolutionize the film exhibition industry, it certainly removed a significant competitive advantage that studio-owned theaters had over independents. Additionally, this allowed independents the ability to pay higher prices for movies they really wanted and potentially outbid even studio-owned outlets. This enabled them greater flexibility and independence in how they operated, from choosing what advertising they contributed to what film, to deciding what prices they were able to charge for admission.

When the studios began to sell off their theaters following the Paramount decree, a large opportunity opened for independents. The independent theaters during the studio era had had inferior locations and largely run-down facilities in comparison to the studio-owned theaters. These independents for the most part faded away because their inefficient operations were already failing to compete with new challenges like the television, and they did not have the price elasticity advantages of movie theaters that were successfully exploiting the suburbanization of American cities. Other chains rose to take their place, however, and utilized large-scale operations to take advantage of economies of scale and run the smaller independents out of the industry.

With new major players entering the industry, the structure of contracts changed significantly. As before, the studios sought to maximize rentals at the box office (ie the more people that buy a ticket to a movie, the more revenue the studio receives). Since the studios no longer owned the theaters, the box office rentals had to be shared between theater and studio. Specific contract details were negotiated on a per picture basis.

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It should be noted, however, that the end of block booking pertains only to domestic theaters. The practice of block booking continues today through the studios' international distribution arms, as anti-trust law does not rule international trade.

Again, see Caves (2002) for an argument in favor of block booking. (Caves 2002, p. 163-165)

Early advertising was financed completely at the theater level, and usually was composed simply of the movie's name on the theater's marquee, the occasional poster with a star's likeness in the theater lobby, and a movie trailer (so called because it originally trailed the feature picture).
basis between the studios and the theaters, but the industry standard became a sliding scale where the majority of opening weekend revenue (oftentimes as much as 90%) were given to the studios with each successive week shifting along the scale in favor of the theater. As a general benchmark, studios end up receiving approximately 50% of domestic box office rentals; the larger studios receive an intuitive higher percentage (52-53% generally go to Warner Brothers, Fox, etc while New Line receives around 48%).

The forced divestiture by studios of their exhibition arms surprisingly did not propel as much change in exhibition as it did in production. Suddenly, the virtually oligopolistic hold on film exhibition had been lifted. Independent producers finally had potential outlets for their works, making movies produced independently financially viable (or at least offered potential viability). Perhaps less intuitively, this gave star actors and directors a new degree of independence and power in negotiations as well. Under the earlier system of 7-year star contracts, studios had great leverage in negotiations because of the effective monopoly they held on theaters – if stars broke or did not renew their contracts, they had no alternative source for work. Lew Wasserman, president of an enormous talent agency, MCA, correctly foresaw that the Paramount settlement would allow for greater ability of the stars to capture the rents they generated. In the years leading up to the Paramount decrees, Wasserman aggressively expanded MCA’s movie component by signing numerous stars and acquiring multiple competing talent agencies, anticipating the day when this could be translated into leverage at the negotiating table, which would in turn generate large commissions for MCA. By 1948, thanks in large part to Wasserman’s business acumen and foresight, nearly half of all stars under contract to the studios were signed by MCA.

When the Paramount ruling came down, just such an opportunity arose. With independent producers entering the film market, producers had to compete for the stars that could open a movie. Wasserman parlayed this new leverage into a contractual innovation that forever changed the relationship between studio and star: the participation agreement. According to Epstein (2005), Wasserman in 1950 managed to secure a deal for his client, Jimmy Stewart, in which he would receive 50% of profits of Universal’s Winchester 73 for his starring role – a substantial step up from his $50,000 salary for a comparable role just 2 years earlier. Weinstein (1998) traces

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17 The larger theater chains had considerably more leverage than smaller independents, and could typically negotiate better deals with the studios. Ironically, the Paramount decree broke up a highly concentrated exhibition industry only to yield another highly concentrated exhibition industry.

18 Figures based on an interview personally conducted on 3/21/05 with a top executive at Warner Brothers.
the origins of participation contracts earlier to David Belasko and Warner in 1923, and cites other examples including Al Jolson’s first-dollar gross participation contract, explained below. In its early form, participation contracts were rarely used by the more stable studios (e.g., MGM) while the weaker studios (e.g., Warner and RKO) occasionally opted for their inclusion with top stars, typically for a combination of cash constraint and risk-sharing motives. The studios were able to forego a large upfront payment, which, though it implied an often-larger payment after release, made it considerably easier to raise capital to get a project off the ground. As the stars’ leverage in negotiations increased, participation contracts moved from being the exception to being the rule, even for lower level stars.

This paper has argued that it was increased leverage and decreased amount of stars who could open a movie that were the major arbiters of change in star contracts, but Ravid (2003) enumerates a number of benefits of participation contracts for the studios. First, profit-sharing offers a potential solution to agency problems by aligning incentives. Secondly, as previously discussed participation contracts allows for sharing of project risk. According to Weinstein (1998), variation of movie revenues has increased over time, so increasing movie risk offers perhaps an especially pertinent explanation for percentage deals. Thirdly, a star accepting a participation offer may indicate that the actor knows something more about a movie than the studio does and thus values it more. This may help overcome an asymmetric information problem. Finally, as mentioned above, participation contracts save the studio a potentially large upfront free, making initial capital considerably easier to raise.

Contracts with the stars, as a result of MCA and other talent agencies’ efforts, now take one of three forms, or a combination thereof:

1. Fixed Fee: A fixed fee is guaranteed to the star for their participation. For larger stars, this is more often than not treated contractually as an advance of one of the following two participation agreements.

2. Gross Participation: Generally only granted to the top stars, this type of agreement offers the star a percentage of gross revenues. The much sought-after first-dollar gross participation agreement implies a percentage of gross receipts

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19Typically gross revenues’ implies only domestic box office or in rare cases domestic and international box office revenues, but in special cases the percentage can be pegged to other ancillary markets as well. Arnold Schwarzenegger, for example received a first-dollar gross participation agreement on domestic, international, home video, and merchandise markets for his role in Terminator 3.
from the first revenue dollar, while more common is a percentage of gross after some breakpoint is reached.

3. Net Participation: Much more common with all but the top stars in Hollywood, this type of contract offers a percentage of revenues after the break-even point has been reached. These changed terms were a significant contributor to the sharp increase in negative costs\(^\text{20}\) since Paramount, and have played an enormous role in shaping the structure of production costs of movies today.

2.3.4 Summary

The average cost of producing a film in 2004 was $63.6 million, with average per picture marketing expenditure well over $30 million.\(^\text{21}\) There are now almost 37,000 movie screens in the US, an increasing number of which are digital and feature more advanced technology than could have been imagined even a decade ago. The motion picture industry has become a mainstay of American culture, resisting and evolving in light of Depression, legal and policy shifts, and intense market threats. This evolution is most exemplified by the changes in contractual arrangements enumerated above. This paper will now examine the primary cost structures employed by the film industry today in an effort to examine whether one is financially dominant or dominated.

3 Economic Model

3.1 Introduction

This model is an attempt to simulate the basic decision of production in the film industry after a project has been green-lighted: whether to complete production of the film. Traditional economics dictates that, at the margin, an investment should be undertaken if and only if the marginal revenue of that decision exceeds its marginal cost. Furthermore, any expenditure made prior to the decision point that is not recoverable should be treated as a sunk cost, and thus not factored into the decision in any way. This model extends these economic intuitions to the film industry, illustrating that:

\(^{20}\)Negative costs are the costs of producing the physical negative of a film. These costs include production costs, studio overhead, and capitalized interest.

\(^{21}\)Figures from MPA (2004b).
1. Decisions to continue production of a film that producers know will be poorly received may still be both rational and optimal; and

2. Different organizations of production costs result in strikingly different production decisions.

This section will first state and describe the assumptions of the model, then examine the processes of the model and how decisions are made, and will finally discuss the model’s implications.

### 3.2 Assumptions

Consider a three period economy:

Let \( t_k, (k = 0,1,2) \) represent period \( k \)

In this economy there is one firm, \( m \), which is characterized as being able to produce one movie in a three period timeframe. In the production of a movie, total cost is composed of an exogenously given variable cost component \( (V) \) that is distributed evenly over the course of production (ie 1/2\( V \) is expended at \( t_1 \) and 1/2\( V \) is expended at \( t_2 \)) and an exogenously given fixed cost component \( (F) \) that is paid in one lump sum at one point in time, such that total cost of production of a movie is defined by the equation,

\[
TC = V + F
\]

(1)

The fixed costs of production of a movie are greater than the variable production costs, so

\[
F > V
\]

(2)

The firm can have one of two possible cost structures, illustrated in Figure 1 on the following page. In the first possible structure (Frontloaded), \( F \) is paid at \( t_0 \), while \( V \) is evenly distributed throughout the production process. In the second possible structure (Backloaded), \( F \) is paid at \( t_1 \), while \( V \) is again evenly distributed throughout. In addition, the firm has a characteristic, quality \( (Q) \), that is randomly determined and can take one of two values, Good or Bad. At \( t_0 \), the variable \( Q \) is completely unknown to the firm. At \( t_1 \), a perfect signal of quality is revealed, so the variable \( Q \) is known to the firm with 100% certainty. We can therefore characterize a type of firm, \( m \), as

\[
m_i = m(\text{structure}_i, \text{quality}_i)
\]

(3)

At \( t_2 \), the firm releases the film and receives
Figure 1: Representative cost curves of the two modeled cost structures, with percentage total cost and time on the vertical and horizontal axes respectively. (A) represents structure Frontloaded, with a high upfront percentage of total cost. (B) depicts structure Backloaded, with fixed cost expenditure at $t_1$

$$TR = \begin{cases} TR_1 & \text{if quality = good} \\ TR_2 & \text{if quality = bad} \end{cases}$$

such that

$$\frac{1}{2}V < TR_2 < F + V < TR_1$$

Finally, as in most economic models, it is assumed that the firm’s objective is to maximize profits, so the firm seeks to maximize:

$$\pi = TR - TC$$

### 3.3 Processes

For each $t_k$, the firm has two possible actions, Continue or Stop, and since the firm is a profit maximizer (as given in equation 6 above), its optimal strategy function is:

$$f_k = f(MC, E[MR]) = \begin{cases} \text{Continue} & \text{if } MC \leq MR \\ \text{Stop} & \text{if } MC > MR \end{cases}$$

Because of the nature of revenues in the industry, $MR = 0$ if the movie is not completed, and $MR = TR$ if it is completed. This model is best characterized as
a one player dynamic decision tree, as shown in figures 2 and 3 on page 20. The dashed rectangle around the nodes in period 1 indicate incomplete information – at $t_0$, as the quality of the movie is unknown. Because incomplete information occurs, a harsanyi transformation is performed in the model, presenting nature as initial decider of quality before production actually begins.

If at $t_1$ the quality is revealed to be Good, the firm’s dominant strategy is to continue production of the movie regardless of what cost structure the firm has because profit for completion is positive by equation 5.

In the event that quality is deemed Bad, significant differences occur. For a firm with cost structure Frontloaded, the majority of the cost $(F + 1/2V)$ is to be treated as a sunk cost at $t_1$, when the quality signal is revealed. The relevant comparison at $t_1$ then is the marginal cost $(1/2V)$ and the marginal revenue of completion $(TR_2)$. By equation 5 above, it is evident that completion of the film under this cost structure is the rational and optimal choice because $TR_2 - (1/2V) > 0$. Even though the net profit of the film’s production is negative, the choice to complete the film is rational purely because of how much of the cost is sunk in before the quality of the film is known.

This is not the case for a firm of cost structure Backloaded. At time $t_1$, only $1/2V$ is treated as sunk cost. For this firm to proceed with production the marginal
Figure 3: Decision tree for m (backloaded)

Revenue of completion must be greater than $F + 1/2V$, which is only true when quality of the film is Good. Under this cost structure, a firm will always stop production if quality is revealed to be Bad.

If it is assumed that Good and Bad quality films are equally likely, it is possible to easily calculate the expected profits of each type of cost structure:

$$E[\pi(\text{Frontloaded})] = .5(TR_1 - (F + V)) + .5(TR_2 - (F + V))$$
$$E[\pi(\text{Backloaded})] = .5(TR_1 - (F + V)) + .5(-.5V)$$

And, by equations 2 and 5, $E[\pi(\text{Backloaded})] > E[\pi(\text{Frontloaded})]$. Furthermore, because $(TR_2 - (F + V)) < (-.5V)$, Backloaded dominates Frontloaded regardless of the probabilities associated with quality. The inequalities in equation 5 used to constrain the possible revenues were chosen largely to demonstrate how cost structure could lead to different optimal strategies. Different revenue summations do not significantly alter the interpretation of the model. If $TR_2 > F + V$, it would follow that the film would not be halted regardless of cost structure as it would always turn a profit. Similarly, if $TR_1 < F + V$, neither a Bad nor a Good film would have a positive net cash flow, so the film would be halted regardless of cost structure. It can thus be said that in this model, the expected value of a firm with a cost structure exhibiting high up front costs is lower than one exhibiting low initial costs because
the latter has the opportunity to halt production once a signal for film quality is revealed.

3.4 Implications

This model presents a simplified version of a number of key features of the modern day film industry, so, while relatively simple, its predictive power is striking. Executives at the major studios constantly attempt to find the next big smash, but the number of unsuccessful feature films produced annually points to the “nobody knows anything” nature of the industry (Caves 1991). Industry executives agree that picking the right script is much more luck than skill, so modeling the uncertainty with a harsanyi transformation at the outset seems appropriate.

Additionally, as discussed in the earlier literature review, the vast majority of films today are characterized by an extremely large proportion of production costs being expended at the very early stages of production. As the model demonstrates, if high fixed costs are exhibited up front, it is the dominant strategy to continue production in an attempt to recoup as much of the investment as possible. While the economic model detailed above shows the different optimal strategies for drastically different cost structures, the argument can be easily generalized. The general argument can be made:

Let \( C_1 \) and \( C_2 \) be the cost curves of two movies that are identical in every way except for the structure of their cost curve.

\[
\text{If } \frac{d^2C_1}{dt^2} < \frac{d^2C_2}{dt^2}, \text{ then } E[\pi(C_1)] > E[\pi(C_2)] \tag{8}
\]

Specifically, the concavity of a film’s cost curve positively affects the percentage of total cost incurred prior to revelation of a film’s quality. Decisions made when that revelation occurs are wholly dependent on the marginal cost of the film project, not the estimated total project cost. These decisions to complete production are therefore directly influenced by the concavity of a film’s cost curve. Greater concavity results in a larger portion of costs being incurred before quality is known, so the probability of such a film’s completion regardless of quality is larger. If it is later discovered that such a film’s likelihood of commercial success is low, the expected profits of the film become potentially low or even negative. Had the concavity of the curve been smaller, the proportion of costs incurred prior to this discovery would have been similarly smaller, resulting in a different probability of completing a film that would be poorly received. We therefore expect greater concavity to be strongly related to lower rates of return.
4 Econometric Model

In reality, the cost structure of film production is not quite as clear-cut as the above model indicates. Major players in a film (main actors, writers, director, producer, etc) are typically given both a fixed fee that is guaranteed regardless of the movie’s completion (pay-or-play) and a participation portion of the contract whereby the player is given either a certain portion of the movie’s revenue or they’re given certain fees at negotiated break points in a film’s gross. For the purpose of analysis, the revenue-sharing portion of the contracts are not included in production costs as they ought to be considered a form of revenue distribution rather than an additional cost of production, and are thus not factored into decisions of whether to complete a film.

A cost curve for a typical modern-day movie can be found in Figure 4 above. At $t_0$, the script has been green-lighted for production with at least one major player (typically either a main actor or director) attached to the project, as indicated by the positive y-intercept. The stepwise figures are a result of additional major players being added to the film; each step signifies a certain guaranteed pay-or-play fee promised to the player, which is treated as a sunk cost as it is not recoverable. Time $t_r$ represents the release date of the picture, and $t_2$ represents the approximate point at which market research begins to give some sense for the commercial quality of the film.

Additionally, it is generally understood that the producers of a film have a degree of choice in determining their film’s concavity. Because of the time value of money,
it would ordinarily be much preferred to not spend any of the total cost of a produc-
tion until as far into the future as possible. In film production, though, a tradeoff
exists between the time value of money and higher total costs. In determining cost
structure, a producer must decide whether to give a fixed fee to a participant today
or offer a percentage of revenues or profits at a later date. We must assume that pro-
ducers seek to maximize returns, so they determine the optimal distribution for each
film project based upon a risk assessment of participation contracts, while simulta-
neously taking into account the heterogeneity of components in the film process. In
the following analysis, we assume that each film project has an optimal concavity
that is determined by the producers. We treat a film’s cost curve’s concavity as an
ex ante characteristic of a film project very similar to other film demographics used
in box office receipt forecasting.

To offer empirical evidence for the above economic model, a relationship between
concavity of a film’s cost curve and its financial success must be established empir-
ically. Econometrically, the basic relationship to be established can be summarized
by the equations,

\[ R_i = \alpha + \beta_1 K \]  \hspace{1cm} (9) 

and

\[ K_i = \int_0^{b_i} \left( C_i - \frac{t_{ri}}{TC_i} \ast t \right) dt \]  \hspace{1cm} (10) 

where

\[ R_i \] = return on investment to film i

\[ K_i \] = a measure of the concavity of film i’s cost curve, defined as the difference
between the area under film i’s cost curve and the uniform cost curve.

\[ C_i \] = the percentage of the cost of film i expended at time t

\[ t_{ri} \] = the time at which film i is released

\[ TC_i \] = the percentage of the cost of film i expended at time \( t_{ri} \); namely, 100.

If \( \beta_1 < 0 \), we interpret this to mean that films with higher concavity on average have
lower rates of return, but do not conclude that a particular film could have exhibited
a higher rate of return had it had a less concave cost curve. This analysis is useful,
therefore, not in determining the optimal level of concavity for a particular film, but
instead as an aid in choosing a particular film, given its endogenous optimal cost
structure.
Before delving further into the estimation, it will be helpful to explain what exactly is meant by the terms revenue and profitability in the movie industry, and to discuss the academic literature's treatment of the subject.

4.1 Revenues and Profitability

Revenue in the film industry can mean many different things. During the era of film's genesis, film revenues came from one place only: domestic box office. As world economies grow more interconnected through globalizing forces, international box office has become an increasing source of film revenue. Certain movies, usually discernible by greater demand from children and families, have significant tie-ins to merchandising and other ancillary markets. Disney's revenues in particular show a huge licensing component for it's memorable characters, huge merchandising opportunities, as well as amusement parks based solely on the intellectual property created by their movies. Finally, most studio executives agree that the most important and growing source of revenue today is the home video market, which encompasses VHS and DVD rentals, as well as video and DVD sales and the newer Internet video-on-demand services starting to appear.

Early academic studies of the film industry focus primarily on forecasting domestic box office revenues based on ex ante demographics of a film. The first of two main explanations for this is that when many earlier studies were undertaken, domestic box office accounted for the largest portion of total film revenues. Secondly, actual data for ancillary markets are much more difficult to attain as most of these markets continue in perpetuity, and figures are usually closely guarded by the highly secretive studios. Domestic box office, on the other hand, has been routinely tracked by many firms, and has become somewhat of a national phenomenon with box office figured posted daily in periodicals like Variety. Additionally, as will be discussed below, significant correlation was shown between domestic box office and most ancillary markets, so the focus on domestic box office was useful at the very least as a proxy for total revenues in academic study, if not interpreted as total revenues itself. According to Ravid (2005), though, domestic theatrical revenues now account for less than 20% on average of a film's total revenues, which he uses to call for greater focus on the harder-to-acquire ancillary market revenue data. Similarly, Vogel (2001) illustrates that the gross revenue derived from home video has exceeded that from domestic box office since even the late 1980's. If correlation between domestic box office and ancillary markets remains despite change in total revenue makeup, it might still be useful to rely on domestic box office as a proxy when other market data is unattainable.
Studies of correlation between domestic and foreign box office figures appear encouraging. In a study of 175 major movies released between 1991 and 1993, Ravid and Basuroy (2003) find a correlation of $r=0.86$ between domestic and foreign box office revenues. Weinberg (2003) compared domestic and international box office figures for the 100 largest box office films in the US in 2001 and reported a correlation of $r=.88$. In our analysis of a considerably smaller dataset, we find evidence corroborating these results, showing a similar correlation of $r=.921$, significant at the 1% level between domestic and foreign box office results for 23 motion pictures.

Early studies on the correlation between domestic box office and video rentals proved similarly encouraging. Ravid and Basuroy (2003), returning to their 175 movies released between 1991 and 1993, found a correlation between domestic box office and video revenues of $r=.70$. At this time, however, the vast majority of home entertainment revenue stemmed from movie copies sold to rental companies for high prices (around $60 a piece); the concept of sell-through pricing had not yet been adopted. Weinberg (2003) analyzed the top 100 movies released in the US in 2001 and found correlation between domestic box office with DVD sales of $r=.81$, though other ancillary markets showed decreasing degrees of correlation. The data used in this paper was not separated into various home video components, but a similar general correlation between domestic box office and total home video revenues was found with $r=.525$. Lehman and Weinberg (2000) used substantially more complex tools of analysis to demonstrate that a video’s sales and rate of decay are significantly related to performance of the film in the domestic box office. In their paper, Lehman and Weinberg explain that different release dates, pricing strategies, and other managerial actions could change the revenue distribution of a film, and suggests that domestic box office’s reliability as a predictor of video revenues stems primarily from the industry having a relatively fixed decision rule of when to release a video (approximately 6 months, though this length has decreased slightly since the paper was published). This assertion implies that profit-maximizing video distributors could change practice to increase revenues and would in doing so decrease the predictive power of box office revenue. Additionally, many have hypothesized that the DVD, with the potential for inclusion of many features not seen in theaters or on VHS, is increasingly seen by consumers as a product different from what is shown at the theaters, indicating that the markets may not be as related as formerly thought (Weinberg 2003; Ravid 2005; Epstein 2005). With DVD player penetration at only 43.1% of US households in 2003, we can only expect this effect to increase in the

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22Domestic box office with VHS sales, DVD rentals, and VHS sales respectively were $r=.55$, $r=.24$, and $r=.40$.
23Epstein (2005)
coming years.

Other ancillary markets have not been studied as thoroughly as international box office and home video. An executive at Warner Brothers explained that network deals and other ancillary markets are often pegged to domestic box office figures, but merchandising revenues are greatly affected by genre, rating, and, more generally, target audience. In our data sample, a significant correlation between domestic box office and total revenues was found with \( r = .815 \), but we feel strongly because of the arguments above that it is important to examine both domestic and total revenues in our analysis.

As Ravid (2005) wrote, “it’s easy to produce movies that make a lot of money—just put in a lot of money. However, that may not be the profit-maximizing strategy.” The economic model presented earlier seeks to establish a relationship between the concavity of a film’s cost curve and its profitability. Profitability measures in the film industry, however, are remarkably elusive, primarily because of complex accounting tools utilized by the studios. The film Gone in 60 Seconds, for example, was touted by Disney as a major commercial success, grossing $242 million in the world-wide box office with production costs totaling only $103 million. Profit statements, however, showed that the movie was produced at a large loss. Why? Marketing expenditures topped $60 million, physical prints cost $13 million, another $10 million was spent on insurance, local taxes, and customs clearances, $17 million was charged for studio overhead, and another $41 million for interest accrued during production. The movie in total ended up costing a staggering $206.5 million. Additionally, as discussed before, box office gross gets split between theaters and distributors, so only about $140 million actually made it on the revenue side to Disney, yielding an overall loss of $160 million. Additionally, gross participants’ percentage of revenues are factored into costs of production before any net participant is paid, shifting the breakeven point even further. The vast majority of these details go unreported, and are very difficult to account for in empirical analysis performed by studio outsiders. This movie is not abnormal; nearly all movies follow a similar pattern. Accounting for profitability is thus a very difficult proposition in the film industry.

Most of the relevant literature sought to forecast some semblance of revenues based upon film demographics. Ravid (1999) expanded the literature empirically by focusing on forecasting economic profitability of films. Realizing the difficulty in measuring profitability, Ravid constructed a proxy for economic returns using the

\[ \text{Profit} = \text{Revenue} - \text{Costs} \]

24 Based on an interview with a studio executive at Warner Brothers personally conducted on 3/21/05.

25 Ravid (2005), p. 6
most easily accessible and measurable variables available: revenues/negative cost, where negative cost is the cost of producing a film's negatives. This measure is, more simply, \(1 + \text{(return on initial investment)}\). In using this as a proxy, it is assumed that advertising and distribution expenditures are in constant proportion to negative costs.\(^{26}\) It must be noted that as this proxy is constructed, a ratio for a film of greater than one does not imply that the film broke even. The proxy is useful in comparison, though, in that if one film has a higher ratio than another, it is possible to claim that the first was more profitable than the second.

Countless factors have been shown in the academic literature to have a relationship with film revenues and/or film profitability. This paper will now examine the literature on each of these main factors, and use this knowledge to control for these factors in its later estimation of the above equation.

### 4.2 Budgets

First, a definition of terms: the term negative cost is defined in the literature as the costs incurred to produce the initial negative of a film. This cost includes development, production, and post-production expenditure, but does not include promotional or distributional considerations. General economic intuition indicates that spending more money on factors of production yields additional revenue. This result has been confirmed in multiple studies (Ravid 1999; Ravid 2003; Moul 2005; Ravid 2005). Studies relating negative cost to profitability are scarce. Ravid (1999) demonstrates a significant negative relationship between the log of negative cost and his profitability proxy, indicating that larger movies yield, on average, lower rates of return. Ravid (2003) shows similar results. Ravid (2005), however, shows that negative cost is not significantly related to rate of return. These divergent results indicate that negative cost warrants inspection in our analysis.

### 4.3 Marketing

In a market with imperfect information, marketing is thought to increase awareness of product and therefore increase demand. The movie industry, an industry with no real branding effect, requires that a new market be created for each individual film. Because consumers tend to see a movie only once, Moul (2005) argues that movies exhibit characteristics associated with durable goods. He continues, explaining that while durable goods typically follow a quadratic diffusion pattern, movies tend to

\(^{26}\)Ravid(1999) showed this assumption to be a valid one, with correlations so high that there were problems running regressions with all costs present as individual regressors.
follow a pattern of high opening and steady decline over time. For this to be the case, Moul argues, word-of-mouth effects must be dominated by advertising effects. The drastically increased advertising budgets of movies over the past few decades certainly do not contradict the hypothesis that studios have generally adopted an advertising scheme intended to overwhelm word-of-mouth, but this theory remains to be tested empirically.

Radas and Shugan (1998), in contrast, deseasonalized data on 673 films released between 1991 and 1993, and came to the conclusion that most advertising seems to accelerate time, shifting later sales to earlier time periods. They theorize, therefore, that advertising does not actually increase total demand, but rather changes the time at which that demand is acted upon. Timing in the film industry is critical, though. If a person foregoes watching Terminator 3 one week to see it in a few weeks, a few weeks down the road a whole new array of movie consumption options confront them. This theory requires further empirical work, but it is clear that marketing has at least some economic role in determining revenues. Because we assume marketing exhibits diminishing marginal returns, marketing has relevance to profitability analysis as well.

4.4 Stars

The film industry is unique in that every movie produced is a new product, for which an individual market must be created. Unlike many industries, film does not easily lend itself to branding efforts. Studios produce films of constant technical quality, but content varies widely from project to project, rendering studio names ineffective branding mechanisms. Much of the academic literature has focused on the role of the star as a branding tool, describing a star’s inclusion in a project as a signal to the potential viewers of anything ranging from the movie’s genre to quality of the project. Since the early use of stars in films, a star’s persona on and off-screen has been carefully crafted. Stars that step beyond their image typically find their star power diminished. This effect supports the star branding theory. Additionally, Moul (2004) argues that the true benefit of stars is the free ink, or externalities associated with news about a star that aid a movie’s name recognition. Late night television shows often feature these stars in interviews that offer a free opportunity for the studios to advertise their movie. Numerous other hypotheses of the effect of

27Winona Ryder’s shoplifting arrest in 2002, for example, conflicted with her innocent on and off-screen persona, so it became increasingly difficult to cast her in roles of that type because the audience had a much harder time accepting her in that type of role. The fees she was able to command therefore took a hit as well. (See Epstein 2005)
stars exist; it is clear that stars have become an important component of the film industry.

Numerous studies exist supporting the hypothesis that inclusion of a star increases domestic revenues. Litman (1989) shows that participation of stars has a significant positive relationship with revenues. Ravid (1999) includes international and home video revenue in his data sample and similarly concludes that stars have a positive effect on total revenues. In this study, Ravid includes a number of alternative star definitions including past Academy Award nominations, past movie gross, and an ordinal variable measuring the effect of multiple academy award nominations and/or wins. In his sample, all star variables demonstrated a significant effect on total film revenues.

As Ravid (1999) points out, however, there are two competing economic concepts in the use of stars. The first, as discussed above, is that of signaling with an expensive star, which should increase revenues. The second, rent capture, dictates that stars should capture all their added value in equilibrium. Stars are paid inordinate amounts of money to appear in movies, often in up-front fees. With fewer stars who can open a movie, star costs are escalating even further. De Vany (1999) sought to address these contradictory economic concepts, and found that controlling for presence of a star had no statistical significance with respect to profitability. De Vany’s study, though, made use only of domestic box office data. He then remarked on apparent heterogeneity of stars and very different resulting effects. To measure these effects, he ran regressions using individual controls for each person on Variety’s Top 100 Most Powerful People in Hollywood list put out annually by Variety. Ultimately he concluded that the estimated effects of these stars was not useful, as past performance in film has little effect on future success.

Ravid (1999) expanded on this work by measuring the effect of a star on profitability in film, using his proxy of total revenues/negative cost for return on investment. While his study demonstrated a positive significant star effect on total revenues, his analysis showed presence of a star to be insignificant with respect to profitability. Based on his and other results, De Vany (2004) draws the conclusions that the relationship between stars and demand are too complex to model, namely because stars have a high degree of choice of projects, individual stars have individual effects, and these effects are rapidly and constantly changing. Albert (1998), in response to De Vany’s conclusion, argues that the presence of a star in a movie does not simply ensure higher or lower profitability, but rather that it actually shifts the movie to a different probability distribution of success. This paper will look at the star’s effect.

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28Based on comments from a personal interview on 1/24/05 with a top executive at a major studio.
on both revenues and returns in an effort to corroborate or offer empirical evidence against De Vany's random-pattern theory.

4.5 Rating

Since the inception of the MPAA's first rating system in 1968, revenue patterns have started to emerge that show large differences between movies of different ratings. In general, movies with a G rating are geared towards families. These movies typically have a much larger degree of merchandising tie-ins that can tap into huge revenue streams not accessible by R-rated movies. Disney's golden formula of low cost movies with licensable content geared at families and children exploited the different ancillary market opportunities. Disregarding merchandising though, box office and home video revenue distribution differences between G and R-rated movies are quite large. One simple economic argument is market size; G and PG movies, and arguably PG13 as well, have a much larger potential market than R-rated movies.

This hypothesis has significant empirical support in the literature. Most recently, Fee (2002) finds that G-rated movies have a significantly positive effect on revenues relative to movies of other ratings. He finds this effect holds when the dependent variable is his proxy for profitability (domestic box office/negative cost), though this argument is weaker as it takes into account only domestic box office and, as discussed above, correlation between domestic box office and ancillary markets appears to be weakening. De Vany (2004) similarly demonstrates that R-rated films are dominated by other ratings in terms of revenues, returns on production cost, and their proxy for real profit.29 Ravid (1999) shows similar results hold for total revenues and a proxy for profitability calculated using revenues from domestic, international, and home video markets – family friendly ratings (G and PG) appear to increase revenues and returns relative to less family-friendly ratings.

4.6 Seasonality

Looking at a breakdown of movie attendees, it is readily apparent why there may be seasonality factors at play in film revenue distributions. As a market segment, teenagers account for nearly a third of all movie attendees, though teenagers only account for roughly 15% of the civilian population. Additionally, 88% of the teen

De Vany's proxy for real profit is one half domestic box office revenues minus negative cost. This is an adequate proxy for profit if we assume that i) the producers' share of theatrical revenues is 50%, ii) ancillary markets are highly correlated with domestic box office, but is a useful proxy for relative profitability within the domestic market nonetheless.
population that attends movies does so frequently, compared with only 28% of moviegoers overall.\textsuperscript{30} It is unsurprising, then, that total box office appears to peak when school is not in session. Moul (2005) roughly offers econometric evidence of this effect, showing a significantly positive effect of a holiday on total box office gross. The market for movies, though, is a competitive one. If it is clear that a holiday release is more profitable and that film release date is chosen by producers, there should be significant clustering of movies around holiday times. This increased competition should at the very least dilute the effect of a holiday opening, if not negate it completely. As Einav (2002) explains, the observed seasonal pattern of [movie] sales is a combination of both seasonality in underlying demand and seasonal variation in the quality of movies released. By decomposing the seasonality effect into these two components, Einav (2002) concludes that seasonal demand patterns are actually much smaller than the industry believes, resulting in too many holiday openings. Radas and Shugan (1998) similarly realize these contradictory effects of seasonal demand and endogenous release choice. In their analysis, they examine 673 films released between 1991 and 1993. By de-seasonalizing the revenue figures, Radas and Shugan produce evidence that competitive movies have the ability to expand the market beyond seasonal effects. Based upon these empirical results, it appears that release date has a significant role in determining revenues, so holiday release will be controlled for in this paper’s analysis.

\section*{4.7 Awards}

Many Hollywood executives believe that an academy award nomination or win will yield increased post-Oscar revenues. A relationship between an Oscar win and profitability has yet to be established, though Litman and Kohl (1989) demonstrate a weak relationship between a nomination for best picture and revenues. Nominations in other categories or a win in the best picture category are not shown to significantly contribute to film revenues.

\section*{4.8 Cost Structure}

As discussed in the economic model above, this paper hypothesizes that the structure of costs throughout production has a significant effect on rate of return because of economic theory of sunk costs and the cost v. revenue decisions made at the margin. The general equations that we wish to estimate, based upon Ravid (1999)’s

\footnotesize{\textsuperscript{30}Figures from the MPA(2004a). The study defines a frequent moviegoer as someone who goes to the movie at least once a month.}
specification, are:

\[
\ln(TOTREV_i) = \alpha_1 + \beta_1 \ln(NEGATIVE_i) + \beta_2 \ln(MARKETING_i) \\
+ \delta_1 \text{STAR}_i + \delta_2 \text{RATING}_i + \delta_3 \text{HOLIDAY}_i + \delta_4 \text{AWARD}_i \tag{11}
\]

and

\[
ROI_i = \alpha_2 + \beta_3 \ln(NEGATIVE_i) + \beta_4 \ln(MARKETING_i) + \beta_5 K_i \\
+ \delta_5 \text{STAR}_i + \delta_6 \text{RATING}_i + \delta_7 \text{HOLIDAY}_i + \delta_8 \text{AWARD}_i \tag{12}
\]

where \( TOTREV_i \) = total revenues from box office and ancillary markets for film \( i \)

\( ROI_i \) = a measure of profitability of film \( i \)

\( K_i \) = the proxy for concavity of film \( i \)'s cost curve

\( NEGATIVE_i \) = the negative cost of film \( i \)

\( MARKETING_i \) = expenditure on marketing for film \( i \)

\( \text{STAR}_i \) = a dummy variable controlling for presence of a star

\( \text{RATING}_i \) = a dummy variable taking 1 if rating is not R

\( \text{HOLIDAY}_i \) = a dummy variable controlling for holiday release

\( \text{AWARD}_i \) = a dummy variable controlling for oscar nominations or wins

While we cannot estimate these equations as given because of data considerations discussed in the following section, these equations will be estimated in a series of separate steps. Expected first derivatives based upon the economic and econometric reasons discussed above are:

\[
\frac{d\text{NEGATIVE}}{dTOTREV}, \frac{d\text{MARKETING}}{dTOTREV} > 0
\]

\[
\delta_1, \delta_2, \delta_3, \delta_4 > 0
\]

\[
\frac{dK}{dROI} < 0
\]

All other first derivatives do not have expected signs, stemming from contradicting economic intuition discussed above.
5 Data

The data were collected from a number of sources. The sample collected consists of 23 movies released by a major studio between 1995 and 2000. This time interval serves two useful purposes: i) it allows enough time for ancillary market revenues to accrue, and ii) it was the time interval for which I was able to acquire data. The data for each movie falls into one of three categories.

First, information was gathered on costs accrued in the production of each film. This information was compiled from information received directly from contacts at the major studios who have chosen to retain anonymity. For each film, details of all above-the-line contracts were compiled. The relevant portion of these contractual details includes fixed fee components, structure of participation components, and date signed. Additionally, an overall breakdown of other costs was compiled for each film. Exact marketing expenditures come from this cost breakdown, as do number of weeks of production. Any guaranteed fee was treated as spent on the day that it was guaranteed by contract. These guaranteed above-the-line fees will be known as fixed costs from this point forward. Other costs not attributed to above-the-line contracts will be termed variable costs. In constructing a cost curve over time for each film, variable costs are assumed to be spent at a constant rate over the duration of the production. This assumption was confirmed as relatively accurate by executives at several studios. The cost curve for each film was constructed in this manner from greenlight to release.

Our proxy for the concavity of each film’s cost curve, K, was constructed in the following way. Each film’s length of production was standardized to one year. Costs over the year were standardized as a percentage of total cost at time t. For the 52 weeks,

\[ K_i = \sum_{n=1}^{52} \%C_x - \%UC_x \]

where \( C_x \) = the actual cost expended in week x; and

\( UC_x \) = the amount that would have been expended in week x if the cost had been evenly distributed over entire time period (ie the Uniform Cost Curve)

so that K measures the sum of the difference between actual cost and average cost for each week. In a sense, it is a Riemann sum estimation of the difference between the areas under the actual and uniform cost curves of each film. It is a useful measure for comparing the concavities of two films'
cost curves, but is not meaningful purely as a number. \( K \), as constructed, has a theoretical maximum of 600 and minimum of 0.

Second, information was gathered on revenues received for each film. A full breakdown of all revenues from box office and all ancillary markets was compiled from information received directly from the studios. Revenues reported are the exact revenues relegated to the studios, and thus differ substantially from overall estimated box office gross reported in Variety and the like. Half of the films' revenues are accurate as of 1/26/05, and the other half is accurate as of 3/18/05. The portion of revenues accrued during this 2 month period is minimal, and far too small to significantly affect analysis. This paper utilizes Ravid's proxy for a film's profitability in its analysis, calculated as total revenues/negative cost. It should be noted that this proxy is not a linear transformation of revenues. In fact, the profitability proxy and total revenues measures exhibit a relatively low correlation of \( r=0.190 \).

Finally, demographics of each movie were compiled from two sources: boxofficemojo.com and movies.yahoo.com. Genre listings for each movie were compiled from these sources; all but one fell into the rough categories of comedy, drama, and action, with the one outlier being a horror film. MPAA ratings were similarly gathered to construct the dummy variable RATING, which takes a value of 1 if the film has a non-R rating.\(^{31}\) Release year, opening weekend box office figures, and number of screens at widest release point were all gathered from www.boxofficemojo.com. Release date was received from the studios, and confirmed by www.boxofficemojo.com. The dummy variable HOLIDAY takes a value of 1 if the release date was within 3 days of Summer, Thanksgiving, Christmas, President's Day, or Easter.

Inspiration for measures of star power came from Ravid (1999). We use four alternative definitions for a star in our analysis. STARNOM is a dummy variable taking the value one if at least one above the line actor in the film has been previously nominated for an Academy Award. STARWIN is a dummy variable taking the value one if at least one above-the-line actor in the film has previously won an Academy Award. STARVALUAWARD is an ordinal variable constructed by summing the number of above-the-line actors in the film that have been previously nominated for an Academy Award and the number of above-the-line actors in the film that have previously won an Academy Award. STARNEXT is a dummy variable that takes the value 1 if an above-the-line actor was an above-the-line actor in a top 20 annual domestic box office gross film.

Inspiration for measures of awards came from Dodds (1988). We use three mea-

---

\(^{31}\) Only 1 each of G and PG movies was in the sample. Exclusion of these two datapoints did not change the effect in analysis, so the RATING variable was constructed as it is.
Table 5: Descriptive statistics of non-dummy variables.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Median</th>
<th>Std. Dev.</th>
<th>Maximum</th>
<th>Minimum</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOMREV</td>
<td>36730.53</td>
<td>33100.00</td>
<td>23498.17</td>
<td>88242.00</td>
<td>4916.00</td>
</tr>
<tr>
<td>TOTREV</td>
<td>164247.50</td>
<td>142940.00</td>
<td>99577.32</td>
<td>369884.00</td>
<td>9832.00</td>
</tr>
<tr>
<td>ROI_DOM</td>
<td>51.00</td>
<td>0.66</td>
<td>238.77</td>
<td>1146.31</td>
<td>0.22</td>
</tr>
<tr>
<td>ROI_TOT</td>
<td>162.70</td>
<td>2.80</td>
<td>844.50</td>
<td>4056.10</td>
<td>0.58</td>
</tr>
<tr>
<td>NEGATIVE</td>
<td>56505.10</td>
<td>66000.00</td>
<td>44256.17</td>
<td>175327.00</td>
<td>61.30</td>
</tr>
<tr>
<td>MARKETING</td>
<td>19830.61</td>
<td>16076.00</td>
<td>12508.46</td>
<td>46007.00</td>
<td>12508.46</td>
</tr>
<tr>
<td>MKT_STANDARD</td>
<td>2.43</td>
<td>0.41</td>
<td>8.73</td>
<td>42.40</td>
<td>0.13</td>
</tr>
<tr>
<td>NUMWEEKS</td>
<td>78.39</td>
<td>79.00</td>
<td>28.35</td>
<td>145.00</td>
<td>36.00</td>
</tr>
<tr>
<td>K</td>
<td>127.64</td>
<td>119.45</td>
<td>80.24</td>
<td>279.98</td>
<td>0.00</td>
</tr>
<tr>
<td>OPENING</td>
<td>14760.74</td>
<td>13931.00</td>
<td>9216.70</td>
<td>39414.00</td>
<td>3022.00</td>
</tr>
<tr>
<td>WIDEST_RELEASE</td>
<td>2278.04</td>
<td>2515.00</td>
<td>645.45</td>
<td>2933.00</td>
<td>678.00</td>
</tr>
</tbody>
</table>

Figure 5: Descriptive statistics of non-dummy variables.

Scales for award effect in our analysis. Major award categories are defined as Best Picture, Best Actor, and Best Actress Academy Awards. AWARDNOM is a dummy variable that takes a value of 1 if the film was nominated in any of the major categories. AWARDWIN is a dummy variable that takes a value of 1 if the film won any of the major categories. AWARDVALU is an ordinal variable that sums the number of major category nominations and wins the film has. Additional demographic data was compiled, including studio distributing the film and certain subject and content control variables, but size of dataset restricted ability to use these variables in analysis.

In the data, two films in particular exhibit extremely high rates of profitability relative to the other films in the sample. Both films were independently produced with small budgets, distributed by a major distributor, and rated R. Neither film won any awards of note, nor did they have any known actors or director. The first, a comedy, exhibited an unusual distribution of revenues wherein more than 70% of its profits were derived from home video. The second, a horror, had roughly equal revenues from the three major markets of domestic box office, international box office, and home video. Because both of these movies had a profitability measures larger than the next largest by a factor of more than 10, these were examined carefully in analysis and treated both as suspected outliers and potentially informative datapoints in various stages.
Figure 6: This table contains OLS regressions estimating effects of production and marketing costs on revenues and profitability. In column (i), the dependent variable is the log of total revenues. In column (ii), the dependent variable is a proxy for profitability, namely Total Revenues/Negative Cost. Columns (iii) and (iv) re-run regressions (i) and (ii) with two extreme outliers removed. Standard errors are reported in brackets. All variables are explained in Appendix A. *=sig. At .1 level, **=sig. At .05 level, ***=sig. At .01 level.

6 Results

Figure 5 shows descriptive statistics about the major non-dummy variables used in our analysis. As is typical of the movie industry, the data shows a large degree of variance. The 23 films in our sample range in negative cost from about $61,000 up to $175 million. Total revenues in the sample range from $9 million to $369 million, and the proxy for profitability ranges from 0.58 to 4056.10. The large difference between the profitability proxy’s mean and median is telling as to the highly skewed distribution of the profitability proxy, also evidenced by a kurtosis statistic of 21.03. The proxy for concavity ranged from films having cost curves approximating their average cost curve (K=0) to films with greater upfront expenditure, with a sample maximum of approximately 280.

Ten of the films in the sample sport actors who had previously won an academy award (STARAWARD=1). Thirteen of the films feature actors who have been nominated for an Academy Award (STARNOM=1), and fourteen of the films have actors who have previously opened a top 20 annual domestic grossing film (STARNEXT=1). Four of the films in the sample were nominated for major Academy Awards (AWARD-
NOM=1) and only one of the films in the sample won a major award (AWARD-WIN=1). Ten of the films in the sample were classified as comedies, five as dramas, seven as actions, and one as horror. Nine of the films were rated R, twelve were PG13, and 1 each PG and G. Each of the films was distributed by one of five major studios. Eleven of the films were released within three days of a holiday period (HOLIDAY=1).

Figure 6 on the previous page shows the results of regressions of marketing and production costs on revenue and profitability. Regressions 1 and 2 were found to generally be problematic because of two large outliers skewing coefficient estimates. The scale of coefficients in regression 2 are quite large, in order to accommodate for two highly profitable films in the sample. When these two outliers were removed and regressions 1 and 2 were re-run with the data subset, the results were in line with expectations and are reported in columns 3 and 4. The revenue regression indicates that total revenues are significantly dependent on negative costs, and the coefficient is positive as expected. Though marketing is not shown to be statistically significant, its sign is in the right direction, in that increased marketing expenditure is expected to increase revenues.

The profitability regression on the restricted sample is reported in Column 4, the results indicate the marginal significance of negative costs on profitability, and the coefficient implies that larger budget movies are on average less profitable than smaller budget films. The low goodness of fit statistics of regression 4 and the only marginal significance of negative costs on profitability, however, lead us to question the predictive power of the estimated equation.

Figure 7 on the preceding page reports the results of including the concavity measure in the regression on profitability. Column 1 shows the results of estimation based on the full sample, and column 2 reports the results of the estimation with the two outliers removed. Both regressions corroborate Ravid(1999)'s results that, ceteris paribus, higher negative costs seem to be significantly related to lower rates of return. While the economic model presented earlier estimated that the coefficient on K should be negative, both regressions show insignificant, positive effects. In examining a scatterplot of rates of return and the proxy for concavity (Figure 5 in Appendix B), no pattern is immediately discernible.

Figure 8 shows the effects of controlling for a holiday opening on the estimations of revenues and profitability. A plethora of evidence in the literature shows a positive effect of a holiday opening on total revenues stemming from the increased ability to tap into the lucrative teenager market when school is out. This effect is shown in column 1, where the HOLIDAY dummy shows a significant positive coefficient estimate. Successful estimation of profitability again eludes us, however. It seems
Figure 7: This table contains OLS regressions estimating effects of negative and marketing costs and concavity on profitability. In both columns the dependent variable is a proxy for profitability, namely Total Revenues/Negative Cost. Column 2 re-runs regression 1 with two extreme outliers removed. Standard errors are reported in brackets. All variables are explained in Appendix A. *=sig. at .1 level, **=sig. at .05 level, ***=sig. at .01 level.
<table>
<thead>
<tr>
<th>Variable:</th>
<th>(1) ln(TOTREV)</th>
<th>(2) ROI_TOT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Revenues</td>
<td>Profitability</td>
</tr>
<tr>
<td></td>
<td>Regression</td>
<td>Regression</td>
</tr>
<tr>
<td></td>
<td>with HOLIDAY</td>
<td>with HOLIDAY,</td>
</tr>
<tr>
<td>ln(NEGATIVE)</td>
<td>-0.016171</td>
<td>-1.425889</td>
</tr>
<tr>
<td></td>
<td>[0.174]</td>
<td>[0.991]</td>
</tr>
<tr>
<td>ln(MARKETING)</td>
<td>0.511357</td>
<td>0.295587</td>
</tr>
<tr>
<td></td>
<td>[0.511]</td>
<td>[0.196]</td>
</tr>
<tr>
<td>HOLIDAY</td>
<td>0.767163*</td>
<td>2.238879</td>
</tr>
<tr>
<td></td>
<td>[0.391]</td>
<td>[1.573]</td>
</tr>
<tr>
<td>CONSTANT</td>
<td>0.767163</td>
<td>14.80223</td>
</tr>
<tr>
<td></td>
<td>[2.254]</td>
<td>[9.617]</td>
</tr>
<tr>
<td>ADJUSTED R²</td>
<td>0.329984</td>
<td>0.112237</td>
</tr>
<tr>
<td>F-statistic</td>
<td>4.611682</td>
<td>1.842845</td>
</tr>
<tr>
<td>Prob.</td>
<td>0.013781</td>
<td>0.177688</td>
</tr>
<tr>
<td>N</td>
<td>23</td>
<td>21</td>
</tr>
</tbody>
</table>

Figure 8: This table contains OLS regressions estimating effects of negative and marketing costs and a holiday opening on revenues and profitability. In column 1 the dependant variables is Total Revenues, and in column 2 the dependant variable is a proxy for profitability, namely Total Revenues/Negative Cost. Column 2 is run on the subset with two extreme outliers removed. Standard errors are reported in brackets. *—sig. at .1 level, **—sig. at .05 level, ***—sig. at .01 level.
<table>
<thead>
<tr>
<th>Variable</th>
<th>(1) In(TOTREV)</th>
<th>(2) ROI TOT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Revenues Regression with Genre control dummies</td>
<td>Profitability Regression with Genre control dummies, based on subsample with 2 outliers removed</td>
</tr>
<tr>
<td>ln(NEGATIVE)</td>
<td>0.638376** [0.228]</td>
<td>-0.830614 [1.234]</td>
</tr>
<tr>
<td>ln(MARKETING)</td>
<td>0.54192* [0.268]</td>
<td>1.56014 [1.449]</td>
</tr>
<tr>
<td>ACTION</td>
<td>-0.51989 [0.420]</td>
<td>-2.897471 [2.271]</td>
</tr>
<tr>
<td>DRAMA</td>
<td>-0.847727* [0.415]</td>
<td>-3.4965 [2.248]</td>
</tr>
<tr>
<td>CONSTANT</td>
<td>-0.07838 [2.070]</td>
<td>-1.104438 [11.204]</td>
</tr>
<tr>
<td>ADJUSTED R²</td>
<td>0.652248 0.091054</td>
<td>10.37806 1.500876</td>
</tr>
<tr>
<td>F-statistic</td>
<td>23 21 23 21</td>
<td></td>
</tr>
</tbody>
</table>

Figure 9: This table contains OLS regressions estimating effects of negative and marketing costs and genre on revenues and profitability. In column 1 the dependent variables is Total Revenues, and in column 2 the dependent variable is a proxy for profitability, namely Total Revenues/Negative Cost. Column 2 is run on the subset with two extreme outliers removed. Standard Errors are reported in brackets. Genre dummy variables are relative to COMEDY. *=sig. at .1 level, **=sig. at .05 level, ***=sig. at .01 level.

that a holiday opening is not significantly related to profitability, indicating perhaps that theaters are able to take advantage of the increased demand (by studios) for scarce screen space by negotiating more advantageous contractual details, driving down profitability.

Figure 9 shows the results of including genre control variables in the regressions. Again, negative cost and marketing seem to have a significant positive relationship with total revenues, but are not significantly related to return on investment. Column 1 does, however, show that dramas on average have lower revenues than comedies, but this effect does not translate into higher profitability. Genre does not appear significant in profitability determination.

Oscar nominations largely were not shown to be significantly related to revenues
<table>
<thead>
<tr>
<th>Variable:</th>
<th>(1) ln(TOTREV)</th>
<th>(2) ln(TOTREV)</th>
<th>(3) ln(TOTREV) Two outliers removed, with specification (1)</th>
<th>(4) ln(TOTREV) Two outliers removed, with specification (2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ln(NEGATIVE)</td>
<td>-0.248710 [0.169]</td>
<td>-0.176246 [0.188]</td>
<td>0.410711** [0.183]</td>
<td>0.765379*** [0.215]</td>
</tr>
<tr>
<td>ln(MARKETING)</td>
<td>0.904695** [0.336]</td>
<td>0.883513** [0.350]</td>
<td>0.451566* [0.250]</td>
<td>0.291613 [0.292]</td>
</tr>
<tr>
<td>STARNEXT</td>
<td>0.49446 [0.397]</td>
<td>----</td>
<td>0.530742* [0.278]</td>
<td>----</td>
</tr>
<tr>
<td>STARNOM</td>
<td>----</td>
<td>0.029928 [0.458]</td>
<td>----</td>
<td>0.726215** [0.330]</td>
</tr>
<tr>
<td>ADJUSTED R^2</td>
<td>0.254974</td>
<td>0.194407</td>
<td>0.660524</td>
<td>0.678964</td>
</tr>
<tr>
<td>F-statistic</td>
<td>3.509723</td>
<td>2.769692</td>
<td>13.97145</td>
<td>15.0994</td>
</tr>
<tr>
<td>Prob.</td>
<td>0.03534</td>
<td>0.069859</td>
<td>0.000076</td>
<td>0.000048</td>
</tr>
<tr>
<td>N</td>
<td>23</td>
<td>23</td>
<td>21</td>
<td>21</td>
</tr>
</tbody>
</table>

Figure 10: This table contains OLS regressions estimating effects of production and marketing costs and star presence on revenues. The dependent variable in all specifications is ln(total revenues) Columns (3) and (4) re-run regressions (1) and (2) with two extreme outliers removed. Standard errors are reported in brackets. All variables are explained in Appendix A. *=sig. at .1 level, **=sig. at .05 level, ***=sig. at .01 level.

or profitability. Similarly, Oscar wins were not telling. We do not, however, take these findings as conclusive evidence that Academy Awards are insignificant. Only 4 films in the sample were nominated for Academy Awards, only one of which won, so even had a strong relationship been shown it would have been highly questionable. Rating effects were similarly not shown significant in any regressions. Again, much of this stems from data issues. The rating effect is typically associated with G and PG rated movies relative to R rated movies. Our sample, however, featured only 1 PG and 1 G rated movie, and the importance of a PG13 rating in determining revenues or profitability relative to an R rating seems insignificant. The role of star power is probably the most long-standing discussion in the film industry literature. Initial regression results, reported in Figure 10 on page 40, indicate that all definitions of star presence have a significant, positive relationship with total revenues when the subset of the sample with two outliers removed are analyzed. Columns 3 and 4 show a strong positive star effect on revenues. As previously discussed, the star effect is
Figure 11: This table contains OLS regressions estimating effects of production and marketing costs and star presence on profitability. The dependent variable in all specifications is a proxy for ROI, Total Revenues/Negative Cost. Standard errors are reported in brackets. All variables are explained in Appendix A. *=sig. at .1 level, **=sig. at .05 level, ***=sig. at .01 level.
more complex than it appears. To weight the two competing economic concepts of
signaling and rent capture, we ran similar regressions on profitability. The results are
reported in Figure 11 on the preceding page. It appears that while stars contribute
to film rentals, they have a weakly significant negative contribution to profitability.
This seems to imply that stars cost more than they're worth, signaling perhaps the
degree to which leverage in negotiations have changed since the fall of the studio
system.

The final star hypothesis we wished to test was that posited by Albert (1998)
that rather than simply increasing revenues or shifting profitability, inclusion of a star
actually shifts the film to a different expected profitability distribution. To test this
hypothesis, we performed univariate tests to compare both the means and variances
of subsamples in the presence and absence of a star. Additionally, we reasoned that
generally fixed up-front fees in films stem from stars demanding early payment. If
this is the case, then it is possible that presence of a star could also change the
distribution of cost curves in the sample, represented by K. Figures 12 and 13 on the
previous page report the results of the univariate tests.

While the univariate tests did not lend support to Albert (1998)'s theory, the
test statistics created indicate that the means of the two subsamples are significantly

---

### Table: Univariate Tests for STARNEXT (N = 14) vs. STARNEXT = 0 (N = 9)

<table>
<thead>
<tr>
<th></th>
<th>STARNEXT = 1</th>
<th>STARNEXT = 0</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MEAN</td>
<td>SD</td>
<td>MEAN</td>
</tr>
<tr>
<td>K</td>
<td>163.5628</td>
<td>73.2348</td>
<td>71.7604</td>
</tr>
<tr>
<td>ROI_TOT</td>
<td>3.8966</td>
<td>3.9339</td>
<td>460.8333</td>
</tr>
<tr>
<td>TOTREV</td>
<td>185681.5</td>
<td>96279.11</td>
<td>130905.67</td>
</tr>
</tbody>
</table>

---

### Table: Univariate Tests for STARNOM (N = 13) vs. STARNOM = 0 (N = 10)

<table>
<thead>
<tr>
<th></th>
<th>STARNOM = 1</th>
<th>STARNOM = 0</th>
<th>t-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>MEAN</td>
<td>SD</td>
<td>MEAN</td>
</tr>
<tr>
<td>K</td>
<td>161.3247</td>
<td>68.4109</td>
<td>83.8502</td>
</tr>
<tr>
<td>ROI_TOT</td>
<td>2.0802</td>
<td>0.8788</td>
<td>417.5009</td>
</tr>
<tr>
<td>TOTREV</td>
<td>164791.62</td>
<td>87092.974</td>
<td>163540.1</td>
</tr>
</tbody>
</table>

---

Figure 12: Univariate Tests for STARNEXT (films with an above-the-line actor who
has opened a top 20 annual movie) and non-STARNEXT films. * = sig. at .01 level

Figure 13: Univariate Tests for STARNOM (films with an above-the-line actor who
has been previously nominated for an Academy Award) and non-STARNOM films.
* = sig at .05 level
Figure 14: This table contains OLS regressions estimating effects of production and marketing costs, star presence, concavity, and interaction between concavity and star presence on profitability.

different, implying that star presence is related to the degree of concavity in a film’s cost curve as hypothesized. In an effort to unravel the star effects and effects of concavity on profitability, the earlier profitability regression was re-run with an interaction term to measure the effect of concavity on profitability when in presence of a star relative to the effect when in absence. The final model of results are reported in Figure 14.

The results indicate that higher concavity in the absence of a star is related to greater rates of return, but that the relative effect of higher concavity in the presence of a star is to decrease profitability. One explanation for this phenomenon is that there are conditions of asymmetric information in film production. If a star were to agree to participate in a movie that he knew would flop, his optimal strategy would be to demand a high fixed fee upfront. Similarly, a star that participates in a movie that she believes will be a resounding success should agree to take a percentage of the revenues and forego the fixed fee. James Cameron received only a percentage of revenues for his widely acclaimed and highly successful Titanic. Following similar reasoning, we could expect Ben Affleck and Jennifer Lopez to have requested large upfront fees for their recent bomb Gigli, though actual figures have not been released.
7 Discussion and Extensions

The economic model developed in this paper is built upon three basic assumptions. First, it is assumed that there is a perfect (or near perfect) revelation of a film’s commerciability during the production process. Second, it is assumed that when this quality is revealed, it is at least possible that the remaining costs to be incurred for completion are greater than the expected revenues (i.e., the time at which quality is known still allows for the possibility of halting a film’s production). Thirdly, it is assumed that the film producers are profit maximizers. Violation of any of these assumptions could easily result in the unclearness of the relationship between concavity and film profitability evident in the data.

Predicting the commercial success of a film based upon demographics has proven remarkably difficult. The vast majority of studies in the literature are able only to predict up to a third of variance based on film concept. Shugan (2000) combines this basic concept analysis with analysis of intent-to-view surveys administered to respondents after they were given information about the film. This combined analysis is able to predict 63% of variability of revenues. It seems plausible that market research yields a fuzzy enough commerciability signal that it is not yet possible to truly make informed decisions to halt production. Additionally, most studies in the literature offering reasonable forecasts of revenue distribution are based upon data from either just before or just after a film’s release. Accurate forecasts might be useful at such a point in determining optimal advertising and distribution allocations, but would be useless in a marginal decision of whether to stop production of a movie.

The possibility that the first two main assumptions of the model are not valid are based in the current academic literature. Academics studying the movie industry are typically looked upon by the studios as outsiders for one simple reason: the vast majority of their research is, by necessity, based upon public data. This is a huge limitation for film research conducted by “outsiders,” but does not imply that greater forecasting ability does not exist within the industry. In fact, the Motion Picture Association of America has been in existence for many years offering studio executives the opportunity to publish and read insider research under the strict conditions that no outsider has access (see Epstein 2005). Most journalists engaged in investigative reporting appear to describe the hidden culture inside Hollywood as one dominated by bottom-line ideologies driven by statistical modeling. Hayes (2004)’s description of his experience in the industry offers insight into the industry’s nature:

32See Moul (2005)
33See Moul (2005), Shugan (2000)
We met the people behind Hollywood’s sales culture – those who sell the films into the theaters, sell tickets at the box office, and massage the messages the studios want to sell to the public. It’s a culture of pollsters and statisticians obsessed with screen counts, rental terms and fucking the competition.\(^{34}\)

It is difficult to conclude, then, that the limitations of market research detailed in current academic journals are necessarily binding to the agents making decisions in the industry. More research on the virtues and limits of market research in the film industry should be undertaken.

The assumption that all participants act as profit maximizers is perhaps the most interesting. The production of a film requires a plethora of contributors for the final project to be realized. Typically, those making the major production decisions (studio executives, producers, etc) are not the same people that are risking their money by investing in the film. The film industry is therefore rife with potential for managerial implications of principal-agent problems. Einav (2002) concludes that the likely reason for the overclustering of movies around a holiday period is that studio executives would rather accept the lower revenues stemming from overcompetition than risk their job by opening on a non-holiday and bombing. Ravid (2003) similarly proffers agency issues as the reason for overproduction of R-rated movies, shown to be statistically dominated by G-rated movies. He explains that R-rated movies lose money less often, and their high rate of production stems from executive hedging. Problems of agency may arise with regard to our measure of concavity, with executives seeking to limit the risk to their job by following more traditional cost distributions. Additionally, the notion of halting production is taboo in the industry, so a studio executive could easily decide to go ahead with production on a film expected to generate a large loss rather than scrapping the project and risking future job ramifications. Further research into principal-agency issues in the film industry should be pursued.

Aside from the possibility of the three assumptions discussed above being violated, our study suffered from data problems common to research into the film industry. Public data is fairly easy to come by, but analysis may be misleading. Instead, we opted to pursue internal data to get as accurate results as possible, and, in so doing, severely limited the size of the resulting data sample. Further analysis should be performed to corroborate the results of this paper to ensure that these are not merely the results of a skewed, small data set.

8 Conclusion

Studio executives, academics, and starving would-be screenwriters all seek the elusive formula that will generate huge demand for a film at minimal cost. The general consensus is that Hollywood houses an industry in which statistical modeling is useful, but the high degree of heterogeneity renders past performance as only mildly indicative of future success. The academic literature seems to conclude that forecasting box office receipts based on \textit{ex ante} characteristics is possible, but not precise. Key characteristics (budget size, marketing expenditure, star presence, etc) have been shown to be significantly related to higher revenues. The more pertinent question of forecasting profitability, however, has yet to be resolved.

This paper sought to find yet another \textit{ex ante} characteristic on which to aid the analysis of film profitability. Most of the literature's major findings were replicated in this paper's data, discrediting claims that the small dataset was not representative of the actual population. Only limited patterns could be discerned in the distribution of profitability, the most empirically significant of which was the possible presence of asymmetric information indicated by the significant interaction of cost curve concavity and star presence on the profitability proxy.

References


Appendix A

TOTREV Total Revenues from Domestic and International Box Office and all ancillary markets (in $thousands)

INTREV International Box Office Revenue (in $thousands)

HOMEREV Home Video Revenues (includes DVD and VHS sales and rentals, in $thousands)

DOMREV Domestic Box Office Revenue (in $thousands)

ROLTOT Proxy for Total ROI (TOTREV/NEGATIVE)

NEGATIVE Total Negative Cost of the film (i.e., total cost incurred to produce the negatives of a film) (in $thousands)

MARKETING Total Marketing Expenditure of the film (in $thousands)

NUMWEEKS Number of Weeks from Greenlight to Release

K Difference between area under actual cost curve and area under uniform cost curve

DRAMA Genre Dummy Variable taking 1 if the movie was classified as a Drama, 0 if not

ACTION Genre Dummy Variable taking 1 if the movie was classified as an Action, 0 if not

COMEDY Genre Dummy Variable taking 1 if the movie was classified as a Comedy, 0 if not

RATING Rating Dummy Variable taking 1 if the movie was rated G, PG, or PG13, 0 if movie was rated R

STARAWARD Star Dummy Variable (1 if an actor or director in film has won an Oscar, 0 if not)

STARNEXT Star Dummy Variable (1 if an above-the-line actor has opened a top 20 annual movie, 0 if not)

STARNOM Star Dummy Variable (1 if an actor or director in film has been nominated for an Oscar, 0 if not)

STARVALUAWARD Star Ordinal Variable (Sum of Number of past nominated people in a movie and 2*past award wins)

AWARDWIN Award Dummy Variable (1 if movie won an Oscar in major cat., 0 if not)

AWARDNOM Award Dummy Variable (1 if movie was nominated for an Oscar in major cat., 0 if not)

AWARDVALU Award Ordinal Variable (Sum of Number of nominations and number of wins in major cat.)

HOLIDAY Seasonality Dummy Variable taking 1 if opening weekend was around Thanksgiving, Christmas, President’s Day, Easter, or Summer