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Estimating the Effects of Integrated Film Production on Box-Office Performance: Do Inhouse Effects Influence Studio Moguls?

Daniel M. Polyakov
Claremont McKenna College

1. Introduction

Every year hundreds of movies are produced all around the world with hopes of creating the next blockbuster hit. It takes many people to put together a high-budget film, in addition to the millions of dollars, yet despite the countless economic studies done on the film industry, the fact remains that there is no formula for success when it comes to making a blockbuster movie. From the day a spec script is submitted to production companies, to the film's release date, all the players involved collaborate to make their final product a box-office hit. While it is most evident that the top grossing films of each year follow a more consistent structure than their less financially successful counterparts, large production budgets and movie stars don't always please the crowds, leaving financiers and economists in search of those variables that have the most positive effects on high-budget film returns.

In an effort to further develop the model for a successful film, I examine the top 10 grossing movies released between 1995 and 2010. In an effort to answer whether or not internally produced studio films have positive effects on box-office results, I will use a binary variable representing in-house production to estimate its effects on the natural log of both rate of return and profit. In accordance with these results, I will determine whether the major studios take the 'in-house effect' into account when strategizing their future releases.

In summary, by conducting research on past studies that have been done to estimate box-office indicators, I can mimic past regression models and incorporate the effect of in-house productions. Similarly, by comparing the indicators associated with in-house productions by each studio to their historical in-house allocations, I examine any trends that correlate the in-house effect on returns to production integration patterns. Exploring the manner in which studios make decisions regarding their intended blockbusters may provide industry researchers and filmmakers with another method of predicting the success of a film.

This study proceeds in the following manner. Section 2 offers a review of relevant literature. Section 3 discusses theoretical interpretation and estimation methods. Section 4 describes the data collection process. Section 5 presents the empirical findings, and Section 6 concludes.

2. Literature Review

The distribution of revenues in the film industry has been the subject of numerous studies for decades. The development of a functional model that could economically and statistically explain the disheartening flops and tremendous blockbuster successes would drastically change the risk involved in making a high-budget film. Industry researchers have measured the various effects of genres, ratings, star presence, critical review, and even production methods on box-office returns (see for example, Albert 1998; Walls 2005; Suarez-Vazquez 2011). Filmmakers have produced movies year after year involving every combination of the above variables, hoping that their production will reach the top of the charts. Do the studios respond to such trends? The organization of the industry has been said to transform from its Fordist structure during the "golden age" to what Christopherson and Storper (1989) would classify as flexible specialization. This paper examines two categories of literature: previous models created to better understand the driving forces of box-office returns, and studies on the evolving disintegration that has taken place between producers, distributors, and exhibitors.

2.1 Variable Effects on Box-Office Returns

Considering the different variables which may have an effect on box-office returns is an elementary step towards understanding what factors produce a blockbuster hit. The fact of the matter remains that there is no formulated combination which can predict how

moviegoers will receive a film. De Vany and Walls (1999) provide evidence that box-office revenue and profit distributions are abnormal. Describing revenues as being Pareto-distributed and having infinite variance tells that, "The mean of box-office revenue is dominated by a few rare blockbuster movies . . . there is no typical movie because box-office revenue outcomes do not converge to an average" (285).

Building on their findings, Walls (2005a) uses a sample of 1,989 films to model the effects of genre, release year, star presence, sequel, MPAA rating, year of release, and several other variables on the natural log of revenues using a stable distribution.[1] Sometimes referred to as "Levy-stable", this distribution model is being revived in practice due to its ability to account for large degrees of uncertainty. It removes the effect of infinite variance when examining regression results. Based upon this method, he finds that leading indicators of revenues include production cost and star presence (183).

Ravid (1999) conducts a study of 175 films and finds that the leading indicators of revenue are a film's budget, followed by its rating and sequel effect. The caveat in this study comes with the effect of production budget on revenues and returns, which he notices to occupy all the significance of effect on revenues (488). He notices that while big budgets signal high revenues (money makes money), they simultaneously lower rates of return via the increased costs causing for a significantly decreased effect of budgets on rates of return. "There is no necessary relation between what a film costs and what it might earn" (Aksoy and Robins 1992, 12). This is consistent with our intuition; it is not out of the ordinary to see a film that costs over $150 million to produce underperform in

[1]The stable distribution model remains invariant under convolution and is based on a general version of the central limit theorem.

the box-office. There must be other factors that signal box-office success and failure; indicators which capture the preferences of the audience.

Diverging from the norm, Suarez-Vazquez (2011) adds to the study of a film's box-office success by testing how audiences are influenced by two of the profound factors which drive box-office success. She explores the effect of critical reviews and the role of stars on viewers' evaluation of the film, as well as the variables' interactive effect. Her study concludes that while positive and neutral reviews have little effect, negative reviews provide an indication of the viewer's sentiment prior to seeing the movie. In contrast, 'the superstar effect' provides no influence on viewer expectations. Intuitively, these findings seem obvious, if a viewer reads a negative review, the person is less likely to be interested in seeing the film. Furthermore, we have all seen movies we wish we hadn't that are infested with 'star power'. This examination of effects on individual viewers provides a stepping stone in understanding box-office habits at market levels.

It is explicit in the above literature that the modeling and estimation of box-office revenues is by no means a science. The various methods and theories involved in modeling the film industry all incrementally add to the modest understanding of what drives a film to the top of the box-office.

2.2 Film Industry Structure and Flexibility

As the financiers, studios frequently are the decisive factor of whether a movie goes into development or not. Understanding the industry's inherent structure is crucial when examining the influential forces behind the motion picture studios. Fordism, a post-war

organization production model based on the principles of Henry Ford's assembly line, along with integration, characterizes the earliest decades of the film industry. Storper (1989) investigates the transition of studios away from low quality, mass produced in-house films towards a more flexibly specialized structure, where the embedded studio structure remains, but integration is not implied and, "Skilled workers use flexible capital equipment to produce a constantly changing variety of goods"(274). He attributes this transition to the emergence of television, and to the 'The Paramount Decree' (*U.S. v. Paramount Pictures, Inc.,* 334 US 131, 1948). This anti-trust case not only put an end to studios controlling both distribution and exhibition, but played a pivotal role in the transition into the 'New Hollywood' era.[2] Movies were still produced by the studios; however, in contrast to the prior 'Classical Hollywood', there was a larger scale of outsourcing talent, and more importantly, creative thought.

The disintegration of distributors and exhibitors opened the door for filmmakers to "think outside the box" and eventually led the studios to disintegrate at a deeper level, namely through outside funding, externally hired writers and producers. In our current era of Hollywood, the major studios serve as financiers and marketers, while production companies develop and piece together the film. The title "producer" is one that often puzzles audiences due to its lack of specification. Edwards and Skerbelis (2009) explain a film's journey to creation and distinguish between the various meanings of "producer", as well as its overlap with the studios' role. Most simply, producers are involved minimally or extensively in finding the script, searching for funding, negotiating property rights,

[2] *New Hollywood* is a time period in film history from the late '50s to mid-'80s characterized by youth, rejuvenation, and creativity.

hiring creative talent, and sometimes marketing the film (66). Other producer credits, 'executive producer' for example, are given when an entity, such as a studio, provides no less than 25 percent of the funding.[3] These distinctions are crucial when examining the studios' integration tendencies and responsiveness to box-office performance.

In their study about the globalization of the film industry, Aksoy and Robins (1992) discuss the studios' growing market share in the late '80s. Concentration ratios indicate whether a majority portion of an industry's market share is controlled by several leading firms.[4] The CR_5 increased from its 1986 value of 61.3% to 69.7% in 1990, indicating that the top five studios collectively increased their market share by 8.4%. While the industry has experienced structural disintegration, Aksoy and Robins claim that, "The film industry is becoming more concentrated and more integrated than ever before" (11). From a flexible specialization standpoint, this claim is not consistent with the idea that studios take on projects brought to them by outside producers, finance scripts written by freelance writers, and present their films at theaters all over the world. However, the argument can be made that these studios have merely integrated in other forms. Flexibility in creative management and production is enabled due to a concentration of a small number of large studios possessing the distribution rights to a majority of the world's film library. With each production, studios are able to change their levels of integration, allowing for flexible specialization on a per project basis.

[3]See: Producers Guild of America

[4] http://www.investopedia.com/terms/c/concentrationratio.asp

My contribution is to link the literatures by creating an independent variable that measures the *in-house* production effect on the returns of top 10 box-office films from 1995 through 2010. By taking into account variables already studied, (genre, stars, budget etc.), as well as previously tested estimation techniques, it can be determined whether in-house production has positive effect on returns.

Based on the results, I can examine how the studios respond to their past performance when deciding which projects to take on in the future, and determine if their decisions are influenced by the in-house effect. The following section discusses the framework and economic theory used to format the empirical analysis.

3. Theory

Using the ordinary least squares method (OLS), I first set out to answer whether the in-house variable exhibits a positive effect on box-office returns. Further, by regressing the same variables against profits, and examining the absolute value of the OLS coefficients, I can determine which measurement of success is more responsive to the in-house effect. Accepting this data, I examine the studios' past tendencies towards production integration, and in turn, determine if their decisions are reflective of the in-house effects on box-office success.

Prior to testing, I define an in-house production as any film which is produced directly by the studio, by one of its subsidiaries, or by a production company that has an exclusive distribution contract with the given studio. Per this interpretation, 'executive producer' credits do not meet in-house criteria.[1] This study, therefore assumes the production company as the entity responsible for piecing together the project. If the given production company is contractually tied to the distributor at the time of release, then the film is considered an in-house production.

For example, in all eight movies of the *Harry Potter* series, Warner Brothers has distributed and been given some form of production title which varies from film to film. The project was originally brought to the studio by HeyDay Films, an English production

[1]Edwards and Skerbelis (2009) note that if a production company sets up the movie at a studio, the producer still develops the project, although the studio periodically provides input.

company who has developed each installation. Aside from *Harry Potter*, HeyDay Films has no contractual ties with Warner Brothers.[2] Therefore, I do not consider the *Harry Potter* films to be in-house productions. In contrast, Legendary Pictures, a subsidiary of Warner Brothers, who produced both *Batman Begins (2005)* and *Dark Knight (2008)*, is interpreted as in-house.[3] This subjective distinction poses potential bias considering that such franchise movies account for roughly 25% of top 10 blockbusters in my sample.[4]

3.1 Estimating the In-house Effect on Film Returns

In order to quantify the effects of in-house production on rate of return I build a log-linear regression of the following form:

$$(1)\quad \ln RR_i = \beta_0 + \beta_1 INH_i + \beta_2 Stars_i + \beta_3 Sequel_i + \beta_4 ProdBudget_i + \Gamma[ProdMethod, Rating, Genre, Year, Distributor]_i + \mu_i.$$

In the above equation, RR is rate of return, *i* indexes individual movies, *INH* is a dummy variable equal to 1 when the movie is produced in-house (by a subsidiary or exclusively contracted production company), and zero if not, *Stars* and *Sequel* are dummy variables equal to 1 if a movie has a star or is a sequel or prequel, and zero if not, *ProdBudget* is a continuous variable accounting solely for the production costs (in millions) of making the movie, and Γ is a representation of those coefficients which are indexed as dummies in order to examine the betas (β) of the various production methods, MPAA ratings, genres,

[2] Jeff Jensen and Daniel Fierman, (2001) "Harry Potter Comes Alive," *Entertainment Weekly,* last modified September 14 2001, http://www.ew.com/ew/article/0,,254808,00.html.

[3] "About," Legendary Pictures, accessed November 20, 2011, http://www.legendary.com/about/.

[4] Accounting for the franchises of: *Harry Potter, Twilight, Pirates of the Caribbean, X-Men, Star Wars, James Bond, Batman, Shrek, Indiana Jones,* and *the Bourne saga.*

release years and distributors of each film (see Table 1). Variables for release year and distributors will be referred to as *Yr* and *ID* respectively. Finally, μ is an error term consistent with its standard characteristics.[5] Similarly, by changing the dependent variable in Equation (1), and forming:

$$\textbf{(2)}\quad \ln \text{Profit}_i = \beta_0 + \beta_1 \text{INH}_i + \beta_2 \text{Stars}_i + \beta_3 \text{Sequel}_i + \beta_4 \text{ProdBudget}_i + \Gamma[\text{ProdMethod, Rating, Genre, Yr, ID}]_i + \mu_i$$

I estimate the same effects on log-profits. The comparability of outcomes across various dependent variables explains why a log-linear format has been used in numerous film industry studies in the past, Ravid (1999) and Walls (2005a) included. In a log-linear regression, if β_1= -0.2326, the indication is that when INH=1 there is a negative 23.26% change in rate of return (see Table 2, Regression 1). By initially controlling solely for INH, and then adding regressors, I develop models which involve both continuous and binary variables; allowing me to compare the in-house effects between both measurements of box-office success.

3.2 Analyzing Studios' In-House Responsiveness

In order to determine whether the in-house effect has an influential role in studio decision making, I must first assume that the goal of the studios is to make as large a return on their investment as possible. Therefore assuming the in-house effects tend to increase returns, I would begin by analyzing studios' historical tendencies regarding integrated versus outsourced production. To do this, I separate the range of years in my

[5] An error term is a variable in a statistical model that is created when the model does not fully represent the actual relationship between the independent variables and the dependent variable. As a result of this incomplete relationship, the error term is the amount at which the equation may differ during empirical analysis.

sample into three periods; Yr_{95}, Yr_{00}, and Yr_{05}, which corresponds with the first year of each of the ranges 1995-1999, 2000-2004, and 2005-2010 respectively.

Further, in order to estimate each studio's in-house effects within a given period, I generate an interactive variable consisting of *year* (Yr_x), *distributor* (ID_y), and the *in-house* dummy (see Table 5). I then incorporate the interactive variable into a new regression equation to estimate the effect of internally produced movies released in Yr_x, distributed by ID_y on box-office success. The model for log-rate of return appears as the following:

$$\textbf{(3)}\quad \ln RRt_i = \beta_0 + \beta_1 Stars_i + \beta_2 Sequel_i + \beta_3 ProdBudget_i + \Gamma[ProdMethod, Rating, Genre]_i + \Phi Yr_x * ID_y * INH_i + \mu_i .$$

As we proceed, I will be referring to this interactive variable as Yr_xID_yI. For example, when referencing the coefficient corresponding to Sony's in-house effects regarding movies from Y_{00} (2000-2004), it will read $Yr_{00}ID_4I$ and provide us with the percent change in return that is associated with Sony's in-house productions between 2000 and 2004. By cross-referencing each studio's percentage change of in-house productions from period to period with the effects of Yr_xID_yI on returns, I determine whether a positive relationship exists between the coefficients of Yr_xID_yI and each studio's allocation of in-house productions (see Table 5). Substituting profit as the dependent variable, Equation (4) estimates the effect of Yr_xID_yI on profits when controlling for the same variables in Equation (3). Notice, in both equations, I neglect to control for *year*, *in-house,* and *ID* as individual regressors. This was decided in response to their negative effect on

significance levels of Φ, the coefficient of the interactive variable; and serves to minimize multi-collinearity.[6]

Supplementing this found relationship with the film industry's organizational theories exercised by Christopherson and Storper (1989) or Aksoy and Robins (1992) could aid in determining whether or not the industry is tending more towards vertical integration or flexible specialization.

This paper continues on to provide information regarding the data sample and discuss the empirical results of my study. The following section discusses data collection and the creation of variables.

[6] "Multicollinearity," Statistics Solutions, accessed November 22, 2011, http://www.statisticssolutions.com/resources/dissertation-resources/data-entry-and-management/multicollinearity.

4. Data

The data set for this study is comprised of information provided by *The- Numbers*, an on-line database which contains film industry data (e.g. production budgets, domestic and international revenues, and box-office and DVD sale trends) for almost 13,000 movies. I supplement *The-Numbers* data with information from the Internet Movie Database (IMDb) in order fill any missing information and to resolve any conflicts associated with the assumed interpretations discussed in section 3. My study restricts the sample to the top 10 films from the years 1995 through 2010, therefore allowing me to analyze only the most successful films in the market. For similar reasons that De Vany and Walls (1999) use a Levy-stable distribution to account for infinite distribution, I limit my sample to 160 films in order to narrow the distribution of revenues.

Data from *The-Numbers* indicates that in 1997, two of the top ten box-office films were anniversary re-releases of *The Godfather (1972)* and *Star Wars: Episode IV (1977)*. Furthermore, Paramount's blockbuster sensation, *Titanic (1997)*, which grossed a world-wide total of $1.84 billion, occupied top spots in both 1997 and 1998. Similarly, *Avatar (2009)* held top ranks in 2009 and 2010. These dual rankings are mostly certainly attributed to both films' mid-December releases. Lastly, production budgets for *The Birdcage (1996)* and Disney's live-action version of *101 Dalmatians (2006)* are not readily available and are therefore omitted when estimating effects on rate of return. By not including films produced outside the timeframe of my study, and not double-counting dually recorded films, I conclude with a sample size of 154 films (see Table 1).

To account for each film's worldwide box-office gross returns, yearly rank, production method, genre, rating, production and distribution credits, and production budget, I adhere to *The-Numbers*' classification of the above categories. Let it be noted that production budgets are revered to by some as 'trade secrets' and are therefore assumed to be accurate estimates of the actual cost of production. As such, I do not include advertising costs in my study. My costs equal the estimated cost of making the film, not marketing it; although in practice these two figures often go hand-in-hand. *The-Numbers* also adjusts box-office returns to account for inflation, which eliminates any bias that could be created by examining a lengthy period of time. I use IMDb to determine the presence of stars, more distinctively distinguish distribution and production credits, and to verify production budget estimates.

Due to inconsistencies in the interpretation of producer, this cross-examination between sources plays a monumental role in developing the *in-house* variable. By utilizing IMDb's detailed film credit system, I analyze a given production company's prior relationship with the respective distributor. Furthermore, the IMDb provides relevant articles regarding industry mergers and acquisitions; without which the in-house distinction may not be possible. During the sample period, companies such Pixar, DreamWorks, Castle Rock, and Marvel have all entered into and/or exited from exclusive contracting with a distributor. Tracing this progression of studio integration has proven to be essential in determining in-house status.

4.1 Creating the In-house Effect

In order to gather the information necessary to apply my theory, I followed the examples of researchers such as Ravid (1999), Walls (2005 a,b), and Suarez-Vazquez

(2011), and collected data on the same set of variables. Seeing that *The-Numbers* records data regarding these variables indicates that there have been countless studies involving them; as such, I set out to generate the *in-house effect* (*INH)*. Referencing the assumed interpretations discussed in section 3, provided by Edwards and Skerbelis (2009), Houghton (1991), and the Producers Guild of America, *INH* as previously mentioned, is a binary variable which accounts for the producer and distributor of each film, and takes the value of 1 if the movie is an in-house production. Per Table 1, of the 156 movies in the initial sample, 88 were deemed *in-house*, resulting in a mean of 0.564. A side-effect of such a neutral distribution could be an underestimation of the variable's effect on measured success, along with the possibility of a decrease in the significance levels of the result. By controlling for *INH*, as well as controls used in previous studies, I examine the effects exhibited in Tables 2 & 3.

The other variables involved in Equations (1) and (2) account for a crucial part of the study. By generating indices of binary variables to estimate each outcome of *production method, rating, genre,* and *distributor*, I see that the most successful genre within the years of my study adventure.[1] Likewise, Disney and Warner Brothers studios distributed the most top 10 movies with 29 and 28 respectively. I am able to compare the effects of the above mentioned variables to that of the *INH* variable and evaluate whether *INH* has a positive effect on rate of return and profit. I equate *profit* as the difference between the world-wide gross and the production budget. Similarly, I define rate of return as profit

[1]Summary statistics of the sample variables can be found in Table 1.

divided by production budget. More about the empirical in-house effects will be discussed in Section 5.

4.2 In-house Interaction with Individual Studios

By referencing my gathered data set, I organize the amount of internally produced films by distributor and release period, omitting the distributors which did not release movies in each of the three periods.[2] According to Table 4, the only leading studio to internally produce every top 10 film was DreamWorks.[3] Regression coefficients from Yr_{05} are omitted from Table 4 because there is nothing that can be told about the correlation between Yr_{05} results and future in-house allocation as the future films that would apply are just entering development.

Constructing periods Yr_{95}, Yr_{00}, and Yr_{05}, involved generating parameters that categorized the release years. For example, Yr_{95} is defined as movies with (Yr=>1995, Yr=<1999). By interacting each of the three periods with each of the distributors (ID) and the binary in-house variable (INH), we achieve the aforementioned Yr_xID_yI. When regressed against profits for example, this variable indicates the effect of a given studio's internally produced movies within a specified time period on profits. As such, coefficients from Yr_{95} should aid in determining levels of integrated production in Yr_{00}. Likewise, the same should apply between Yr_{00} and Yr_{05}. Each studio's in-house allocation and percent change between periods is depicted in Table 4. Table 5 provides the

[2]See Section 3.2 for release year categorization.

[3]Although included as controls in the regression analysis, the following distributors are not examined with respect to studio integration trends due to lack of presence among top 10 films: New Line Cinema, Newmarket Films, Miramax Films, IFC Films, Artisan Ent., United Artists, and Summit Ent.

coefficients corresponding to Yr_xID_yI in Equations (3) and (4). Additionally, correlations between integration tendencies and the coefficients are depicted using (+) and (-). It should be noted that Sony (ID_4), which distributes zero top 10 in-house productions during Yr_{95}, does not generate a measurable effect on either return or profit.

The remainder of this study aims to relate the empirical findings in the upcoming section to previous studies of production, integration, and box-office indicators; hopefully, providing a significant contribution to the economic and organizational study of the film industry.

5. Empirical Analysis

In order to first determine if a positive relationship exists between in-house production and rate of return, I build the OLS regression model in Equation (1) by adding regressors until I reach Regression 7 which provides me with the in-house effects on rate of return when controlling for all the independent variables in the study. Likewise, I follow the same method using Equation (2) in order to examine the effects on profit.

The consequential step is to regress the interactive variable, (Yr_xID_yI) per Equations (3) and (4). Relating these results to the assembled data allows for inferences to be made regarding the influence of the *in-house* effect on the respective studio's integrated production levels.

5.1 In-House Relationship with Box-Office Success

When regressing *INH* against the natural log of rate-of-return, I find that the effects of *INH* in the first three regressions, which incrementally control for *in-house, stars,* and *sequel,* all have p-values< 0.10 (see Table 2). When solely controlling for *INH*, β_1 corresponds to a -23.26% change in rate of return. Regressions (2) and (3) provide a 'less negative' effect of roughly -20.0%. This indicates that there is indeed, some degree of significance associated with the in-house effect on rate of return. Regression 4 includes Regression 3 as well as a control for *production budget.* Similarly to the observation of Ravid (1999), production budget captures all of the significance, yet with a value of -

0.007, appears to have relatively no effect on rate of return. This result is both expected and surprising. On one hand, it would be assumed to a certain degree that the more money spent on a movie the more likely it is of performing well in the box-office. On the other hand, there is a directly negative correlation between increased costs and rate of return, when holding profits constant. Regression 5 adds controls for the various production methods to Regression 4. Regression 6 includes Regression 5, and in addition controls for *rating* and *genre*. Lastly, Regression 7 controls for all variables depicted in Equation (1). As we add controls, the effect of in-house production becomes less negative, ultimately corresponding to a 5% increase in rate of return, when controlling for all other variables.

Examining Equation (2), I determine the in-house effects on profit. First and foremost, note that *INH* has an opposite effect on profits than it does for rate of return. Regression 1 from Equation (2) indicates *INH* is associated with a 3.61% increase in profits whereas, in Equation (1) *INH* corresponds to a 23.26% decrease in rate of return when a film is produced in-house.[1] Adding controls appears to have no correlation with the in-house effect on profits.

Evidently, the discrepancy between in-house effects on rate of return and profit is attributed to some degree of bias, omitted variables or too many variables. For example, solely using production budgets to determine profits, an omitted variable could potentially be advertising costs, which often play an influential role in not only a film's success but greatly alter is rate of return. Theoretically however, both measures of box-

[1]Equations (1) and (2) correspond to Tables 2 and 3, respectively.

office success, rate of return and profit, should be influenced in the same manner by the in-house effect; if anything, depicting only minimal differences. By evaluating Equations (3) and (4), I can to determine the effect of integrated production by studio, and in turn decide if there is a correlation between the studios' levels of integration and their in-house effect on returns.

5.2 Studio Responsiveness to the In-House Effect

Based upon the figures found in Tables 4 and 5, we find that the in-house effects on both rate of return and profit have little influence on the respective studio. Based on Equation (3), which measures the effects of Yr_xID_yI on rate of return, we find that Disney's in-house productions increase their rate of return by 1.9% in Yr_{95}. Likewise, with the p-value<0.01, Paramount's effect in the same period corresponds to a 32.7% increase in returns. In both cases, the distributors respond by increasing their in-house ratio during the following period (Yr_{00}). When examining the following period however, Disney continues to increase its in-house ratio despite the indicated negative effects on return. While Paramount's in-house effect is said to increase their rate of return by 14% in Yr_{00} they decrease their in-house ratio by 21.43% in the following period.

When examining Equation (4), we find similar results. When $Yr_{95}ID_7INH$ has a largely negative effect on profits, -41.3%; Warner Brothers responds positively and decreases its in-house productions by 41.67%. Alternatively, as $Yr_{00}ID_7INH$ provides a -41.4% effect on profits, the studio increases its production integration by 39.29%. This initial correlation implies that given the proper assumptions, or even a larger data sample,

there might be some conclusive evidence connecting box-office returns with production integration levels. Amongst the results of both Equations (3) and (4), only one scenario involving one studio appears to provide a trend. In both periods, Universal negatively responds to the interactive in-house indicator of profits.

Ultimately, my empirical findings contradict the hypothesis that the *INH* variable exhibits positive effects on measures of success. In fact, Equation (1), with my highest levels of significance, indicates just the opposite (see Table 2). The results of Equation (2) correspond with my hypothesis, yet with low levels of significance. Equations (3) and (4), when regarding certain studios during certain periods, agree with my hypothesis that studios actions would relate positively to their in-house coefficients. The lack of consistency, however, makes it difficult to accept that *INH* serves as an indicator of the industrial structure of the film industry.

6. Conclusion

This study provides a complementary introduction of the *in-house* variable to prior literature on the film industry. While various studies attempt to quantify/predict box-office success, each is faced with a level of uncertainty. Similarly to the studied effects of 'star presence' or genre on film returns, I answered whether integrated production has its own effect. Using the natural log of both profit and return, my results indicate percentage changes and are therefore comparable with other studies on the same topic.

When contrasting in-house integration levels with industrial organization theory, the lack of correlation corresponds perfectly. The film industry, which goes back and forth between high levels of integration and periods of flexible specialization exhibits very little traceable tendencies. One year, audiences love vampires, the next they don't; such preferences are unpredictable. The inherent structure of the industry implies integration; however, to what extent remains undefined.

As exemplified in the sample data, there is a balance between integrated and outsourced productions. The inconsistency between effects on profits and rate of return reflects this balance. Consequently, it appears that other indicators share the same inconsistency. The wide range of my empirical findings reflects the lack of understanding researchers have on what drives a movie to the top of the box-office. As the results differ between measurements of rate of return and profits, I find that my study is inconclusive

when determining if there is a positive in-house effect on box-office success. Likewise, based on my results, I find that the studios fail to follow structure regarding integrated production. While this can be attributed to bias caused by inaccurate interpretation of production credits and/or limiting the sample range of data to specific box-office ranks; I find that my results do not deviate very much from those of my forerunners.

Filmmaking remains a risky business. While estimates can be made regarding a films chance for success, we cannot accurately measure the effect of changing any one variable in a film. The factors which separate a hit from a flop are significant only on a movie by movie basis; hence I conclude that the manner in which an audience receives a film is unquantifiable and unpredictable.

7. Tables

1: Summary Statistics

Variable	Number of Observations	Frequency	Mean	Standard Deviation	Minimum	Maximum
Inhouse	156	88	0.5641	0.4975	0	1
Prod. Budget[$]	154	-	105.958	58.125	0.6	300
Stars	156	147	0.9423	0.2339	0	1
Sequel	156	50	0.3205	0.4682	0	1
Rate of Return	154	-	8.0177	33.4743	0.509	412.83
Ln Rate of Return	154	-	1.437	0.7845	-0.6734	6.023
Profit[$]	154	-	432.6	287.5871	89.246	2546.919
Ln Profit	154	-	5.9072	0.5635	4.491	7.843
WW Cume[$]	156	-	534.771	314.671	152.036	2783.92
Ln WW Cume	156	-	6.1524	0.4979	5.024	7.931
Production Method						
Digital Animation	156	31	0.1987	-	0	1
Live Action	156	98	0.6282	0.4848	0	1
Animation/Live Action	156	25	0.1603	0.368	0	1
Hand Animation	156	2	0.0128	0.1129	0	1
Rating						
G	156	14	0.0897	-	0	1
PG	156	36	0.2308	0.4227	0	1
PG-13	156	83	0.5321	0.5006	0	1
R	156	23	0.1474	0.3557	0	1
Genre						
Action	156	39	0.25	-	0	1
Adventure	156	60	0.3846	0.4881	0	1
Comedy	156	29	0.1859	0.3903	0	1
Drama	156	11	0.0705	0.2568	0	1
Horror	156	3	0.0192	0.1378	0	1
Musical	156	1	0.0064	0.0801	0	1
Romantic Comedy	156	4	0.0256	0.1586	0	1
Sci-Fi	156	1	0.0064	0.0801	0	1
Thriller/Suspense	156	8	0.0513	0.2213	0	1
Distributor (ID)						
Disney	156	29	0.1859	-	0	1
DreamWorks	156	7	0.0449	0.2077	0	1
Paramount	156	20	0.1282	0.3354	0	1
Sony	156	16	0.1026	0.3044	0	1
Universal	156	18	0.1154	0.3205	0	1
20th Century Fox	156	19	0.1218	0.3281	0	1
Warner Brothers	156	28	0.1795	0.385	0	1
New Line Cinema	156	9	0.05769	0.2339	0	1
Newmarket Films	156	1	0.0064	0.0801	0	1
Miramax Films	156	2	0.0128	0.1129	0	1
IFC Films	156	1	0.0064	0.0801	0	1
Artisan Ent.	156	1	0.0064	0.0801	0	1
United Artists	156	2	0.0129	0.1129	0	1
Summit Ent.	156	3	0.0192	0.1377	0	1

[$] Measured in millions

* Variable '*Year*' omitted on account of redundancy - All years have a mean of 0.0641 and include 10 films except: 1997 (8), 1998 (9), and 2010 (9).

Table 2: Determinants of Ln Rate of Return (OLS Coefficients)

VARIABLES	(1) Ln Rate of Return	(2) Ln Rate of Return	(3) Ln Rate of Return	(4) Ln Rate of Return	(5) Ln Rate of Return	(6) Ln Rate of Return	(7) Ln Rate of Return°
Inhouse	-0.2326*	-0.1976*	-0.1998*	-0.092	-0.097	-0.019	0.057
	(0.132)	(0.1165)	(0.117)	(0.099)	(0.115)	(0.124)	(0.121)
Stars		-1.221**	-1.208**	-0.966**	-0.908**	-0.752**	-0.313
		(0.517)	(0.515)	(0.434)	(0.455)	(0.367)	(0.259)
Sequel			-0.0528	0.1756	0.113	0.155	0.128
			(0.1155)	(0.115)	(0.1102)	(0.109)	(0.125)
Prod. Budget				-0.007***	-0.008***	-0.0075***	-0.008***
				(0.001)	(0.001)	(0.001)	(0.002)
Live Action					-0.219*	-0.2595	0.091
					(0.128)	(0.167)	(0.199)
Animation/ Live Action					0.2612	0.259	0.592***
					(0.184)	(0.181)	(0.223)
Hand Animation					-0.245*	-0.237	-0.166
					(0.128)	(0.194)	(0.299)
PG						0.032	0.0604
						(0.196)	(0.2402)
PG-13						0.229	0.195
						(0.229)	(0.269)
R						0.1866	0.032
						(0.266)	(0.3002)
Adventure						0.397***	0.372***
						(0.143)	(0.133)
Comedy						0.259*	0.199
						(0.141)	(0.159)
Drama						0.391**	0.115
						(0.191)	(0.213)
Horror						1.327	0.302
						(0.926)	(0.229)
Musical						0.668***	-0.579*
						(0.128)	(0.348)
Rom. Comedy						0.741*	0.3795
						(0.394)	(0.268)
Sci-Fi						-0.307**	-0.851***
						(0.137)	(0.265)
Thriller/ Suspense						0.474	0.3275
						(0.313)	(0.376)
DreamWorks							0.124
							(0.254)
Paramount							-0.276
							(0.202)
Sony							-0.276)
							(0.205)
Universal							-0.346*
							(0.196)
Fox							-0.071
							(0.195)
Warner Bros.							-0.343**
							(0.171)
Constant	1.568***	2.698***	2.705***	3.075***	3.22***	2.565***	1.9485***
	(0.111)	(0.527)	(0.529)	(0.468)	(0.524)	(0.469)	(0.432)
Observations	154	154	154	154	154	154	154
R-Squared	0.0218	0.1553	0.1563	0.3881	0.4353	0.5192	0.7423

Standard Errors in parentheses

*** p<0.01, ** p<0.05, * p<0.10

° Regression (7) reflects coefficients when controlling for all distributors and years. Years are omitted due to lack of relevance. Missing distributors due to insignificant market share.

Table 3: Determinants of Ln Profit (OLS Coefficients)

VARIABLES	(1) Ln Profit	(2) Ln Profit	(3) Ln Profit	(4) Ln Profit	(5) Ln Profit	(6) Ln Profit	(7) Ln Profit°
Inhouse	0.0361	0.0390	0.0508	-0.0002	-0.0043	0.0461	0.0541
	(0.0914)	(.0913)	(0.0883)	(0.0859)	(0.0954)	(0.1049)	(0.1167)
Stars		-0.1031	-0.1720	-0.2867*	-0.2097	-0.1984	-0.2792
		(0.1613)	(0.1751)	(0.1605)	(0.1397)	(0.1685)	(0.2355)
Sequel			0.2973***	0.18895*	0.1067	0.0999	0.0978
			(0.09489)	(0.10698)	(0.0937)	(0.0935)	(0.1203)
Prod. Budget				0.0033***	0.0023**	0.00186*	0.0004
				(0.0009)	(0.0009)	(0.0010)	(0.0017)
Live Action					-0.2824**	-0.3532**	0.0174
					(0.1117)	(0.14375)	(0.2031)
Animation/ Live Action					0.3542**	0.27399*	0.5609**
					(0.1495)	(0.1528)	(0.2178)
Hand Animation					-0.2713**	-0.02396	-0.1104
					(0.1025)	(0.17099)	(0.2511)
PG						0.11866	0.0356
						(0.1855)	(0.2333)
PG-13						0.3551*	0.1492
						(0.2045)	(0.2686)
R						0.2181	-0.0383
						(0.2303)	(0.3014)
Adventure						0.3283***	0.2968**
						(0.1258)	(0.1328)
Comedy						0.0842	0.1657
						(0.1237)	(0.1522)
Drama						0.2535	-0.0641
						(0.1905)	(0.2497)
Horror						0.2058	0.3002
						(0.1279)	(0.183)
Musical						0.1943*	-0.419
						(0.1102)	(0.3465)
Rom. Comedy						0.3347**	0.0693
						(0.1406)	(0.201)
Sci-Fi						-0.2796**	-0.679***
						(0.1141)	(0.2569)
Thriller/ Suspense						0.3983	0.28297
						(0.2729)	(0.3518)
DreamWorks							0.1771
							(0.2533)
Paramount							-0.1222
							(0.1941)
Sony							-0.1868
							(0.2036)
Universal							-0.1962
							(0.1984)
Fox							0.0227
							(0.1862)
Warner Bros.							-0.2488
							(0.1808)
Constant	5.887***	5.9823***	5.944***	5.768***	5.953***	5.573***	5.51***
	(0.0675)	(0.1627)	(0.1740)	(0.15686)	(0.1928)	(0.2764)	(0.4038)
Observations	154	154	154	154	154	154	154
R-Squared	0.001	0.0029	0.0634	0.1645	0.3237	0.4040	0.527

Standard Errors in parentheses

*** p<0.01, ** p<0.05, * p<0.10

° Regression (7) reflects coefficients when controlling for all distributors and years. Years omitted due to lack of relevance. Missing distributors due to insignificant market share.

Table 4: Distributor's In-House Production Allocation

ID	Distributor	INH % Yr_{95}	% Change	INH % Yr_{00}	% Change	INH % Yr_{05}	INH/Total
1	Disney	84.62%	1.10%	85.71%	3.17%	88.89%	25/29
2	DreamWorks	100.00%	0.00%	100.00%	0.00%	100.00%	7/7
3	Paramount	20.00%	80.00%	100.00%	-21.43%	78.57%	13/20
4	Sony	0.00%	100.00%	100.00%	-28.57%	71.43%	9/16
5	Universal	42.86%	-20.63%	22.22%	77.78%	100.00%	7/18
6	Fox	40.00%	-23.33%	16.67%	58.33%	75.00%	9/19
7	Warner Bros.	66.67%	-41.67%	25.00%	39.29%	64.29%	15/28

Table 5: Interactive Variable Statistics and Coefficients

Variable	Ln Rate of Return	Correlation w/ Next Period	Ln Profit	Correlation w/ Next Period	INH Frequency
$Yr_{95}ID_1INH$	0.019	+	-0.072	-	11
	(0.284)		(0.249)		
$Yr_{95}ID_2INH$	0.249	+*	0.433**	+*	1
	(0.238)		(0.2095)		
$Yr_{95}ID_3INH$	0.327***	+	0.374***	+	1
	(0.125)		(0.115)		
$Yr_{95}ID_4INH$	-		-		0
	-		-		
$Yr_{95}ID_5INH$	-0.044	+	0.006	-	3
	(0.126)		(0.117)		
$Yr_{95}ID_6INH$	-0.4197	+	-0.051	+	2
	(0.343)		(0.171)		
$Yr_{95}ID_7INH$	-0.491	+	-0.413	+	4
	(0.3695)		(0.363)		
$Yr_{00}ID_1INH$	-0.015	-	0.174	+	6
	(0.355)		(0.2698)		
$Yr_{00}ID_2INH$	-0.115	+*	0.063	+*	5
	(0.408)		(0.312)		
$Yr_{00}ID_3INH$	0.140	-	0.294**	-	1
	(0.144)		(0.129)		
$Yr_{00}ID_4INH$	-0.215	+	-0.157	+	4
	(0.3599)		(0.342)		
$Yr_{00}ID_5INH$	-0.357***	-	-0.122	-	2
	(0.121)		(0.112)		
$Yr_{00}ID_6INH$	-0.023	-	-0.080	-	1
	(0.269)		(0.210)		
$Yr_{00}ID_7INH$	-0.413	-	-0.414	-	2
	(0.464)		(0.500)		
Constant	2.63***		5.553***		
	(0.574)		(0.325)		
Observations	154		154		87
R-Squared	0.5773		0.4808		

Standard Errors in parentheses

*** p<0.01, ** p<0.05, * p<0.10

+* DreamWorks (ID2) films consist of only in-house productions.

† Regression coefficients reflect controls for stars, sequel, production budget, production method, rating, genre and omitted interactive variables. Values omitted due to lack of relevance regarding empirical analysis.

8. References

"About." Legendary Pictures, accessed November 20, 2011, http://www.legendary.com/about/.

Aksoy, Asu and Kevin Robins. 1992. "Hollywood for the 21St Century: Global Competition for Critical Mass in Image Markets." *Cambridge Journal of Economics* 16 (1): 1-22.

Albert, Steven. 1998. "Movie Stars and the Distribution of Financially Successful Films in the Motion Picture Industry." *Journal of Cultural Economics* 22 (4): 249-270.

Christopherson, Susan and Michael Storper. 1989. "The Effect of Flexible Specialization on Industrial Politics and the Labor Market: The Motion Picture Industry." *Industrial and Labor Relations Review* 42 (3): 331-347.

"Code of Credits: Theatrical Motion Pictures Credit Guidelines." Producers Guild of America, accessed November 20, 2011, http://www.producersguild.org/?coc_tmp_2.

De Vany, Arthur and W. David Walls.1999. "Uncertainty in the Movie Industry: Does Star Power Reduce the Terror of the Box Office?" *Journal of Cultural Economics* 23 (4): 285-318.

Edwards, Rona and Monika Skerbelis. 2009. *I Liked it, Didn't Love it - Screenplay Development from the Inside Out*. 2nd ed. Los Angeles: Edwards Skerbelis Entertainment.

Gil, Ricard. 2008. "Revenue Sharing Distortions and Vertical Integration in the Movie Industry." *The Journal of Law, Economics, & Organization* 25 (2): 579-610.

Graser, Marc and Tatiana Siegel. "Disney Signs Deal with DreamWorks." *Variety*: November 19, 2011.

Horn, John. 2010. "Word of Mouth: Disney Tries to Pull a Hit Out of its Bag of Tricks." *Los Angeles Times*, July 15, 2010.

Houghton, Buck. 1991. *What a Producer does: The Art of Moviemaking (Not the Business)*. 1st ed. Los Angeles: Silman James Press.

"The Internet Movie Database (IMDb)." accessed September 27, 2011, http://www.imdb.com.

"Investopedia.", accessed November 20, 2011, http://www.investopedia.com/.

Jensen, Jeff and Daniel Fierman. 2001. "Harry Potter Comes Alive." *Entertainment Weekly Inc.*

Leaver, Adam. 2010. "A Different Take: Hollywood's Unresolved Business Model." *Review of International Political Economy* 17 (3): 454-480.

Morawetz, Norbert, Jane Hardy, Colin Haslam, and Keith Randle. 2007. "Finance, Policy and Industrial Dynamics: The Rise of Co-Productions in the Film Industry." *Industry and Innovation* 14 (4): 421-443.

"Multicollinearity." Statistics Solutions, accessed November 22, 2011, http://www.statisticssolutions.com/resources/dissertation-resources/data-entry-and-management/multicollinearity.

Ornstein, Stanley I. 2007. "Motion Pictures: Competition, Distribution, and Efficiencies." In *Industry and Firm Studies*, edited by Victor J. Tremblay and Carol Horton Tremblay. 4th ed., 181-204. Armonk, New York: M.E. Sharpe.

Ravid, S. Abraham. 1999. "Information, Blockbusters, and Stars: A Study of the Film Industry." *Journal of Business* 72 (4): 463-492.

Simonton, Dean Keith. 2005. "Cinematic Creativity and Production Budgets: Does Money make the Movie?" *Journal of Creative Behavior* 39: 1-15.

Storper, Michael. 1989. "The Transition to Flexible Specialisation in the US Film Industry: External Economies, the Division of Labour, and the Crossing of Industrial Divides." *Cambridge Journal of Economics* 13 (2): 273-305.

Suarez-Vazquez, Ana. 2011. "Critic Power or Star Power? Tthe Influence of Hallmarks of Quality of Motion Pictures: An Experimental Approach." *Journal of Cultural Economics* 35 (2): 119-135.

"U.S. Movie Market Summary 1995-2011." accessed September 27, 2011, http://www.the-numbers.com/market/.

United States v. Paramount Pictures, Inc., 344 U.S. 131 (U.S. Supreme Court 1948).

Walls, W. David. 2005a. "Model Movie Success when 'Nobody Knows Anything': Conditional Stable-Distribution Analysis of Film Returns." *Journal of Cultural Economics* 29 (3): 177-190.

—. 2005b. "Modelling Heavy Tails and Skewness in Film Returns." *Applied Financial Economics* 15 (17): 1181-1188.