

# Project Returns from Investment Decisions: Evidence from Biopics

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*Managers can make investment decisions to maximize firm value or profits by choosing projects with competitive advantage. Alternatively, managers can choose projects that enhance private benefits such as prestige or job security from risk minimization. Our analysis of biopics projects in the movie industry indicates that these projects provide managers with substantial private benefits from prestige but not risk minimization. We also find that the ex-post returns from biopics are not significantly different from those from fictional projects. These results are consistent with a competitive equilibrium in which a meaningful determinant of project choice is the tradeoff between private benefits from prestige and commercial success.*

Field: Finance

## 1. Introduction

Investment and financing policy decisions remain the two most important decisions made by financial managers. Whereas investment decisions are typically concerned with the kinds of projects in which a financial manager should invest the firm's money, financial decisions involve the various ways in which the firm raises money for its projects. Although a considerable body of research has evolved on project-specific theories on investment and financing policy decisions, empirical evidence on these decisions remains understandably limited to the firm-level as data is typically only available at the aggregate-level for the entire portfolio of the firm's projects.

In this paper, we investigate examine project-specific empirical evidence on investment policy by looking at project choice in the movie industry. Specifically, we examine biopics, a particular kind of a movie project based on the life of an actual person and compare these to movie projects based fictional characters. Our motivation for examining investment decisions in the movie industry is that

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we are able to obtain rich project-by-project data for both biopics as well as fictional movie projects. Our interest in the use of the movie industry as a useful laboratory for testing various theories in financial economics also follows recent trends in the increased attention of the movie industry by finance scholars. Fee (2002), for example, examines the choice of an entrepreneur to obtain project finance from a large outside investor and thus abandon control versus getting independent funds and maintain control. Fee investigates these trade-offs using the motion picture industry as a laboratory because “the institutional features of the motion picture industry closely resemble those modeled in the theoretical literature” (p. 682). Palia, Ravid and Reisel (2008) examine strategic alliances in the movie industry because among other reasons “a movie project has a short-term horizon with a clear starting and ending point” (p. 484).

The rest of the paper proceeds as follows. In section 2, we develop our hypotheses. Section 3 describes the methods used for our analysis. Section 4 reports our results including a discussion of the prestige gained from movie projects and a multivariate analysis of the performance of these projects. Section 5 concludes.

## **2. Hypothesis development**

We develop hypotheses with respect to agency problems between managers and shareholders as well as a hypothesis concerned with issues of competitive equilibrium for firms making a choice between whether to make a biopic versus a fictional movie project.

**2.1. Hypotheses related to agency theory.** Since the seminal work on agency problems by Jensen and Meckling (1976), an extensive literature has documented the agency conflicts arising from the separation of ownership and control. Extant theoretical research on agency conflicts suggests two possible managerial motives for choosing a particular project. Biopics may cater to the needs of an audience population that is significantly large enough to generate more competitive advantage to the firm that makes biopics rather than fictional movie projects. If value or profit maximization is the ultimate motive for the manager, biopics rather than fictional movie projects would be chosen by the manager because of their higher returns. We call this hypothesis the *Shareholder-Interest Hypothesis*.

On the other hand, managers may have motives different from value or profit maximization with the movie projects they choose to make. Such managers may choose to make biopics for a variety of private benefits. For example, managers may be attracted to the creative complexity offered by biopics and choose to make biopics because of the prestige that making such projects offers. Given the extreme uncertainty in the movie industry (DeVany and Walls, 2002) and the absence of managerial job security (Weinstein, 1998), Ravid (2004) argues that

many decisions regarding project choice in the movie industry are essentially an end result of risk minimization to enhance job security. Managers may choose to make biopics because they feel that biopics are less risky on account of audience familiarity with the material. If so, still another private benefit that managers may attempt to extract from their project choice decisions is job security from risk minimization. To the extent that project choice by managers is motivated by desires to extract private benefits such as prestige or job security, biopics would be associated with lower returns than fictional projects. We label this hypothesis the *Management-Interest Hypothesis*.

**2.2 Hypothesis related to competitive equilibrium.** Competitive equilibrium asserts that the returns from biopics should not be significantly different from those for fictional movie projects. If biopics produced systematically lower returns than those for fictional movie projects, we would expect biopics would not continue to exist in the marketplace. If, on the other hand, biopics produced systematically higher returns than fictional projects, and an unlimited supply of biopic scripts was always available, we would expect all movie projects to be biopics. That biopics manage to survive and that not all movie projects are biopics suggests that biopics are associated with returns that are not significantly different from those for fictional projects. We label this hypothesis the *Competitive Equilibrium Hypothesis*.

### 3. Methods

**3.1 Sample.** Our sample of movie projects includes all narrative English-language feature films that were released in theaters in North America from 1990 to 2007. We excluded documentaries and foreign-language movies to make the attributes of the movies in our sample more similar. Also, we excluded movies that were not released on at least 100 screens during their theatrical run, because such movies tend to be classified as art house movies that are best modeled individually. Finally we also excluded movies that are based on true stories because of their close similarity to biopics.

For each movie project in our biopics and factual movie subsamples, we obtain data items from well-known suppliers of data for the movie industry including *Baseline/Film Tracker* and its partner *Kagan LLC*, *Variety*, *IMDB* and *Box Office Mojo*. Also, for each movie, we manually collect additional pieces of data to identify unique characteristics of each project. Collectively, our dataset includes data items that provide proxies for estimating the performance, private benefits and control variables described below.

**3.2 Variables.** We use three sets of variables in our investigation and describe each of these below.

**3.2.1 Performance variables.** Performance from a movie project should ideally reflect a comprehensive stream of revenues and costs in domestic and foreign

markets. Despite the importance of including all streams of revenues and costs, most academic studies have only used revenue from domestic theatrical exhibition as a metric for movie performance. Hadida (2009) finds that over a three-decade period only eight studies use both revenues and costs and do so usually by only using domestic income. Most authors acknowledge not using more comprehensive measures of performance is because of the high cost of obtaining the necessary data. Also, Eliashberg, Elberse, and Leenders (2006) speculate that the prevalence of using income from domestic theatrical exhibition as a metric for movie performance possibly reflects the movie industry's fixation with revenues rather than returns. For each movie project in our sample, we measure performance using the project's return, which we calculate by dividing revenues by costs in domestic and foreign markets.

**3.2.2 Private benefits variables.** We use two variables related to private benefits and describe each of them below.

*Prestige.* The *Management-Interest Hypothesis* assumes that managers choose projects that maximize their private benefits such as prestige. Unlike many of the more readily quantifiable variables described in this section, estimates of prestige can be difficult and occasionally questionable. As a measure for prestige, we use the Academy Awards (Oscars) given by the Academy of Motion Picture Arts and Sciences. These awards evidently receive the most visibility and are widely regarded as being the most prominent in providing prestige to both the nominees and the winners.

*Job security from risk minimization.* Servaes, Tamayo and Tufano (2009) discuss various benefits and costs to firms from corporate risk management. One private benefit that managers attempt to extract from their project choice is risk minimization to enhance job security. Following Ravid and Basuroy's (2004) examination of this issue with R-rated movies, we conduct a close examination of the returns for all movies in our sample. First we examine the variance of the returns for the biopics in our sample and compare this to the variance for fictional movies. Second, we investigate whether biopics break-even more often than fictional movies. Finally, we examine the distribution of the returns to gain insights into whether biopics are more likely to be flops because as Ravid (2004) notes "it is only with major flops that you lose your job."

**3.2.3 Control variables.** Prior research on commercial success in the movie industry has identified several possible determinants which we describe below.

*Star and director power.* Whereas both powerful stars and directors can affect movie performance, extant evidence on this issue, particularly for director power, is mixed. To identify powerful stars and directors our main sources are James Ulmer's lists of A and A+ stars as well as A and A+ directors. To construct these lists, scores of industry specialists are polled to determine a crew member's value in a global film marketplace.

*R-rated.* As G, PG, and PG-13-rated films are expected to have a larger audience than R-rated films, revenues from R-rated films should be negatively correlated with film performance. To capture the effect of ratings, we use a dummy variable that is set to unity when the film is R-rated and zero otherwise.

*Genre.* Several studies have argued for a correlation between a film's genre and its performance. As with ratings, the argument typically made is that certain genres are more likely to have a larger audience, whereas other genres have a limited appeal. We use a dummy variable to capture the effect of genre on returns. The variable takes on a value of one when *Baseline/ Filmtracker*, our source for genres, classifies the genre as action, sci-fi, horror, thriller, animation, or family, and zero if the genre is a comedy, drama, or romance.

*Budget.* A large production budget acts as a signaling mechanism, which shapes the viewing public's perception of the film. Previous studies a strong positive relationship between budget size and film performance.

*Sequels.* Sequels are movies that go on with the original elements of an earlier successful movie typically with one or more lead characters of the original movie. Chang and Ki (2005) summarize several empirical studies supporting the view that sequels enhance a movie's performance. The dummy variable "sequel" takes on a value of unity if a movie in the sample is a sequel and zero otherwise.

*Maximum number of screens.* Academic research has shown that the maximum number of screens on which a movie is released is an important predictor of its financial success.

*Season.* Einav (2007), among others, suggests that the season of the year in which a movie is released can be a significant determinant of its performance. We use a dummy variable "season" that takes on a value of unity if a movie in the sample was released in theaters in North America during the Christmas/Summer season and zero otherwise.

*Composite critical reviews.* Several studies have found that reviews can impact a movie's performance. We construct a numerical composite measure of this variable using three widely-known movie guides: *Leonard Maltin's Movie and Video Guide*, *TV Guide*, and *Videhound's Golden Movie Retriever*.

## **4. Results**

Descriptive statistics of the movie projects in our sample are presented in Table 1. The sample contains 129 (4.2%) and 2,923 (95.8%) fictional projects. Thus the overwhelming majority of the projects in our sample are fictional projects. The means and medians of various variables described in the previous section are similar to those in previous studies. In order to preserve comparability, the

numbers for budget, total revenues and returns were adjusted for inflation. Also, as total revenues and returns are skewed, we used specifications that logged these variables in the multivariate regressions described at the end of this section.

Table 1  
Descriptive Statistics

Variable	Mean	Median
Biopic	0.04	0
Sequel	0.10	0
Star power	0.22	0
Director power	0.08	0
Composite critical reviews	58.27	58.33
Maximum screens	1,745.78	1,776
Season	0.47	0
R-Rated	0.46	0
Budget (\$ millions)	39.09	28.22
Genre	0.39	0
Total revenues (\$ millions)	157.97	83.22
Rate of return	1.47	1.29

To test the hypotheses described in Section 2, we first evaluate various risk characteristics of the movie projects in our sample. Ferrari and Rudd (2008) note that “with studios able to only take a few bets per year, and executives justifiably worried that one wrong decision will end a career, the opportunities for learning are restricted and the incentives to sacrifice return for comfort are strong.” A comparison of the variance of returns for biopics (1.13) with that for fictional movie projects (0.087), as shown in Table 2, indicates that there are no statistically significant differences between these two subsamples. To gain insights into whether these are any meaningful differences between the upside and downside risks of the movies in our sample, we decompose variances of returns into mean squared deviations (MSDs) of returns when returns are greater than or equal to one and also when returns are less than one. In both cases, MSDs for biopics are not significantly different from those for fictional movie projects.

Following Ravid and Basuroy (2004), we also examine whether biopics are more likely to break-even than fictional movie projects. Our results show that biopics are not more likely to break-even than fictional movie projects. Finally, we examine the distribution of returns for biopics and fictional movie projects using industry heuristics such as a return equal to at least three represents a “hit” and a return less than 0.5 represents a “flop.” Once again our results do not show any statistical differences between biopics and fictional movie projects. Collectively, these results do not provide any evidence that managers choose biopic projects

for risk minimization for job security, as predicted by the *Management-Interest Hypothesis*.

Table 2  
Comparison of risk characteristics for biopics vs. fictional movies

	Biopics (1)	Fictional movies (2)	p-value for the difference between (1) and (2)
Number	129	2,923	
Variance of rate of return	1.13	0.87	0.110
Percentage with rate of return $\geq 1$	60.61	63.67	0.387
Mean squared deviation (MSD) of rate of return when rate of return $\geq 1$			
MSD	0.97	0.68	0.107
Number	76	1,861	
Mean squared deviation (MSD) of rate of return when rate of return $< 1$			
MSD	0.07	0.06	0.352
Number	53	1,062	
Percentages with various rate of return values			
Number	129	2,923	
3.00 and higher	Percentage 9.30	6.67	0.245
1.00 to 2.99	Percentage 49.61	57.00	0.098
0.50 to 0.99	Percentage 27.91	24.29	0.350
0.01 to 0.49	Percentage 13.18	12.04	0.699

We use analysis of variance to compare differences in variances, the Pearson's chi-squared test to compare differences in percentages, and an F-test to compare differences in mean squared deviations (MSDs). All reported p-values are for two-tailed tests.

Table 3 compares the Academy Awards received by biopics with those received by fictional movie projects. In the first two rows, we examine Academy Award nominations by investigating the percentage of movies that received at least one nomination and also by checking the mean number of Academy Awards received. In both cases we note that there is a substantial difference between award nominations, conditional on whether the movie is a biopic versus a fictional project. This difference is sustained when we repeat this examination in the next two rows by now looking at movies that won Academy Awards. In the next four rows, when we repeat our investigation by only looking at major awards (Best Picture, Best Actor, Best Actress, and Best Director). Once again, irrespective of whether we examine award nominations or wins, the difference between biopics and fictional movie projects is substantial and statistically significant. Overall, our results on awards suggest that there is significantly more

prestige to be gained from making biopics than fictional projects. This result is consistent with the *Management-Interest Hypothesis*.

Table 3  
Comparison of Academy Awards for biopics vs. fictional movies

	Biopics (1)	Fictional movies (2)	p-value for the difference between (1) and (2)
N	129	2,923	
Percentage with at least one Academy Award nomination	48.06	14.57	0.000
Mean number of Academy Award nominations	1.55	0.40	0.000
Percentage with at least one Academy Award win	20.93	4.38	0.000
Mean number of Academy Award wins	0.36	0.09	0.002
Percentage with at least one major Academy Award nomination	29.46	4.99	0.000
Mean number of major Academy Award nominations	0.51	0.08	0.000
Percentage with at least one major Academy Award win	10.08	1.16	0.000
Mean number of major Academy award wins	0.12	0.02	0.003

We use the Pearson's chi-squared test to compare differences in percentages and t-tests to compare differences in means. All reported p-values are for two-tailed tests.

The last set of tests we perform relate to the commercial performance of the movies in our sample. The *Management-Interest Hypothesis* predicts that performance of biopics should be worse than that for fictional movies whereas the *Shareholder-Interest Hypothesis* make the reverse prediction. For reasons discussed in section 3 we use two sets of variables to measure performance: rate of return and total revenues. For each variable we present our results for a linear specification as well a log transformation of the dependent variable (to correct for outliers). Our key test variable is the biopic dummy variable set equal to unity if the movie is a biopic and zero otherwise. The control variables we used were discussed in section 3.

Table 4 presents the results of our regressions. Whereas the signs of the control variables are similar to those in previous studies, the biopic dummy remains insignificant in all four regressions. On the whole, these results indicate that the performance of biopics is not better or worse than fictional movie projects. This result is not consistent with the *Management-Interest* or *Shareholder-Interest Hypothesis*. It is, however, consistent with the *Competitive Equilibrium Hypothesis*.

## 5. Conclusions

Although a considerable body of theoretical research has evolved on project-specific theories on investment policy decisions, empirical evidence on these decisions remains justifiably restricted to the firm-level as data is usually only

Table 4  
Determinants of rate of return and revenue regressions

Dependable Variable	Rate of return	Log of rate of return	Revenues	Log of revenues
Intercept	-0.733 (0.000)	-0.704 (0.000)	-315.342 (0.000)	0.392 (0.000)
Biopic	-0.089 (0.276)	-0.027 (0.266)	-21.679 (0.089)	0.005 (0.860)
Sequel	0.314 (0.000)	0.098 (0.000)	63.423 (0.000)	0.076 (0.000)
Star Power	0.078 (0.033)	0.036 (0.001)	4.405 (0.652)	0.079 (0.000)
Director Power	0.113 (0.061)	0.027 (0.104)	24.545 (0.107)	0.083 (0.000)
Composite Critical Reviews	0.028 (0.000)	0.009 (0.000)	4.212 (0.000)	0.012 (0.000)
Maximum Screens	0.0004 (0.000)	0.0002 (0.000)	0.0780 (0.000)	0.0004 (0.000)
Season	0.216 (0.000)	0.069 (0.000)	40.015 (0.000)	0.067 (0.000)
R-Rated	0.025 (0.400)	0.010 (0.316)	-20.874 (0.000)	-0.002 (0.881)
Budget	-0.009 (0.000)	-0.003 (0.000)	1.684 (0.000)	0.001 (0.000)
Genre	0.006 (0.841)	0.005 (0.652)	20.510 (0.001)	0.012 (0.319)
N	3,052	3,052	3,052	3,052
Adjusted R <sup>2</sup>	0.30	0.35	0.52	0.71
F-value	132.91	162.15	329.72	740.53

This table reports the estimated coefficients from OLS regression analysis. P-values are reported in parenthesis. Results are corrected for heteroskedasticity using the White (1980) correction.

available at the aggregate-level for the entire portfolio of the firm's projects. In this paper, we investigated project-specific empirical evidence on investment policy by looking at the movie industry. Specifically we looked at biopics, a particular kind of a movie project based on the life of an actual person and compared these to movie projects based fictional characters.

We examined movie projects in our sample within the context of extant theoretical research that suggests several hypotheses to explain managerial motives for choosing a particular project. The *Management-Interest Hypothesis* assumes that managers choose projects that maximize their private benefits such as prestige or job security from risk minimization. The *Shareholder-Interest Hypothesis* is based on value or profit maximization being the ultimate motive for the manager. Our analysis of biopics indicated that these projects provide

managers with substantial private benefits from prestige but not risk minimization. We also found that the ex-post returns from biopics are not significantly different from those from fictional projects. These results are consistent with the *Competitive Equilibrium Hypothesis* in which a meaningful determinant of project choice is the tradeoff between private benefits from prestige and commercial success.

While our work highlights the role of managerial agency conflicts in investment decisions, much remains to be done. What role do other factors play with how managers make project choices? The movie industry offers a particularly useful laboratory for empirically testing various theories in financial economics because of the rich project-by-project data available for hundreds of projects in this industry. Future work examining other projects in the movie industry will further enhance our understanding of the motives and consequences of project choice.

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