RFS Advance Access published December 12, 2007

Choosing to Cofinance: Analysis of Project-Specific Alliances in the Movie Industry

Darius Palia
Rutgers Business School, Newark and New Brunswick

S. Abraham Ravid
Rutgers Business School, Newark and New Brunswick, and Johnson School of Management, Cornell University

Natalia Reisel
Southern Methodist University

We use a movie industry project-by-project dataset to analyze the choice of financing a project internally versus financing it through outside alliances. The results indicate that project risk is positively correlated with alliance formation. Movie studios produce a variety of films and tend to develop their safest projects internally. Our findings are consistent with internal capital market explanations. We find mixed evidence regarding resource pooling, i.e., sharing the cost of large projects. Finally, the evidence shows that projects developed internally perform similarly to projects developed through outside alliances. (*JEL* G32, L24)

Strategic alliances are an increasingly common vehicle for organizing corporate investment. Activities once conducted within a firm are now often shared between several distinct firms. While the study of the theory of the firm goes back at least to Coase (1937), only recently has research proposed specific explanations for alliance formation. These explanations generally relate to collaboration between firms on individual projects, which presents a challenge for empirical research because project-level data are often unavailable.

We construct a project-level dataset from the movie industry to test alternative explanations for alliance formation. Our focus is on how project characteristics

We thank Janis Berzins, Sris Chatterjee, Ben Esty, Gautam Goswami, Bill Greene, John Hadity, Jeff Korchek, Josh Lerner, Adam Lubin, Zaur Rzakhanov, and Yusif Simaan; and participants in the Fifth Annual Business and Economics Scholars Workshop in Motion Picture Industry Studies, the 2004 International Industrial Organization Conference, a seminar in IDC, and the 2006 European Finance Association Meetings for helpful comments and discussion. We thank the Whitcomb Financial Services Center for financial support, and Ravid thanks the Sanger family foundation for financial support. We especially thank an anonymous referee and Robert McDonald (editor) for many useful comments that have significantly improved the paper. All errors remain our own responsibility. Address correspondence to Natalia Reisel, Cox School of Business, SMU, Dallas, TX 75275, or e-mail: nreisel@smu.edu.

doi:10.1093/rfs/hhm064

determine the choice of organizational structure, namely, how they impact the firm's decision to form an alliance.

Strategic alliances take different forms in different industry settings. In the movie industry, an alliance forms when one company collaborates with another to develop and finance a movie jointly. Movie alliances are enabled through temporary contracts, often termed cofinancing agreements, without establishing a new entity. These contracts typically cover a single movie, but may also involve several movies. The alliance partners share production and distribution costs and agree to split future revenues. Once an alliance is formed, most major decisions going forward are made jointly by the partners.

The movie industry provides an ideal setting for exploration of the role of strategic alliances. First, alliances in the movie industry are more homogeneous than alliances in some other industries. Biotechnology firms, for example, collaborate at different points of project development. Alliances in the movie industry are often formed at the same stage of project development. The boundaries of movie projects are also well defined; a movie project has a short-term horizon and a clear starting and ending point. Projects in other industries are often complex and less distinct or highly interrelated; they also have long-term horizons, which make it more difficult to identify project boundaries. These features let us clearly identify the unit of analysis (a movie) and distinguish projects developed within a firm from projects that are developed via alliances.

Most importantly, however, the movie industry offers a wealth of project-by-project data. We can thus examine project-level risk, characteristics of project managers, and the financial performance of individual projects. Firm-level and project-level data allow differentiation between various explanations for alliance formation.

Our results show that project risk matters in the decision to form an alliance. There is evidence that studios finance their least risky projects internally. Studios that are more likely to form alliances have higher project-risk differentials, and are somewhat more likely to be financially constrained. These results are consistent with evidence in Robinson (2006), who suggests that alliances resolve contracting problems in an internal capital market and allow undertaking of riskier projects than those undertaken within one firm. We also find that projects developed internally do not perform significantly differently from projects developed through alliances, suggesting that firms optimally choose their organizational structure for project development.

Our results complement findings of other researchers who have examined various aspects of alliance formation. Chan et al. (1997) find positive and significant stock returns associated with the announcement of alliances. Allen and Phillips (2000) show that firms that form alliances or joint ventures perform better following block equity purchases by the partnering firms. Filson and Morales (2006) report that the likelihood of equity links between partnering firms depends on the nature of the project and on prior alliance activity.

Several authors have examined the structure of alliance contracts. Lerner and Merges (1998); and Lerner, Shane, and Tsai (2003) look at contracts between small biotechnology firms and large pharmaceutical corporations. They find that more control rights are assigned to the biotechnology firm when it has greater access to financial resources. Elfenbein and Lerner (2003) show that ownership shares in Internet portal alliance contracts are highly sensitive to the relative contributions by the contracting parties.[1]

Robinson and Stuart (2007) find evidence that ownership and contractual control are substitutes, as are reputation and contractual control. Interestingly, they also find that firms choose to contract on actions that are difficult to verify, which makes relational mechanisms important in enforcing contracts.

Robinson (2006) finds that alliances cluster in inherently risky industries. He also finds that they occur between industries with different risk characteristics and, similar to our results, riskier divisions within a multi-division firm are more likely than others to form alliances.

The rest of the paper is organized as follows. In the next section, we provide an overview of alliances in the movie industry. In Section 2, we analyze different motives for alliance formation and derive testable hypotheses. Section 3 describes the data and variable proxies. Section 4 presents the results. Section 5 offers conclusions.

1. Alliances in the Movie Industry

Movie projects usually occur in several stages: screenwriting and development; assembly of a creative team; preproduction (preparation for filming); production (filming); postproduction (editing, effects, sound); and ultimately distribution (whether in theaters or television or via DVD).

1.1 The industrial organization of movie projects

Studios or independent production companies buy screenplays or commission screenplays in-house. Screenplays are then "developed," that is, extensively rewritten and changed.[2] There are many more screenplays written and developed than movies made. Halbfinger (2005) estimates that there are 75,000 screenplays "floating around" Hollywood, compared to several hundreds of films made each year.

The screenplay development process, which may take a few months or many years, involves both changes to the screenplay and attempts to assemble a creative team. Talent agencies may also take part in this process. At this stage,

[1] Other aspects of knowledge transfers in alliances are explored in Gomes-Casseres, Hagedoorn, and Jaffe (2006); and in Mathews (2006). The latter work also models the impact of alliances on market entry decisions. See a summary by Lerner and Rajan (2006).

[2] Goetzmann et al. (2006) note that a playwright contractually controls a play written for the theater. No one is allowed to change the written text without explicit permission. In the movie business, this is very different. Don Jacoby, who received $1.5 million for a script, told *Variety* in November 1998, "Not eight words from the original script were in the movie."

even though a studio may have already spent hundreds of thousands of dollars, there is no contractual commitment to actually make the movie.

The project begins to take shape when studio executives are presented with a package that includes the screenplay, the projected budget, and the creative team, which would be the primary cast members, the line producer, and the director, who is essentially the manager of the project (see John, Ravid, and Sunder, 2006). This is the "assembly" stage. At this stage, the project is approved, including a budget and a production schedule. Most alliance decisions are made at the assembly stage.

Movies are expensive projects. The average total cost of a movie in 2005 was $96.2 million, representing $60 million in production costs and $36.2 million in marketing costs (according to MPAA.org). Marketing costs are usually concentrated early in the release cycle. During the actual preproduction, production, and postproduction processes, which usually last a year or less, the movie project is under the control of the director, but it is monitored by financiers (studios and alliance partners). If a movie is over budget, the studios and alliance partners might intervene.

When a movie is completed, it is then distributed. A distributor is the company that provides the movie to theater owners (exhibitors) around the country. Both distributors and exhibitors share the revenues. If the film is produced by a major studio, the distributor will typically be the studio itself. If the film is not produced by a major studio (i.e., it is an independent production), a distribution deal is very important, or the movie may never see a theater screen. Without US theater distribution, movies may go directly to video or to DVD, may be presold as television movies, or may be sold exclusively in some foreign territories.

Most major movies do get US distribution. Our sample only includes films that have reached US theater distribution, because there is little information about most other movies.

1.2 Forms of strategic alliances in the movie industry

In defining strategic alliances, we follow Chan et al. (1997); Filson and Morales (2006); and Robinson (2006). A strategic alliance involves: (i) two or more legally independent firms; (ii) a relationship based on a contract without establishment of a new entity and no indefinite pooling of resources as in a joint venture and a merger; and (iii) a combination of resources outside the marketplace. Cofinancing agreements in the movie industry are consistent with this characterization. They are contracts between two legally distinct organizations that specify how the two entities share the costs and revenues of expensive projects, and they are always limited in scope and duration.

A studio or a production company that decides to form an alliance can approach several types of partners. They may be another studio, a production company, or a dedicated financing partner. The agreements may be for one project or for several, and they take different forms. There are "one-pot deals" and "two-pot deals."

In one-pot deals (also called “central pot” or “50-50” deals), the partners pool resources and share the revenues equally. Distribution is allocated by prior agreement. For example, Warner Bros. and Universal Studios agreed to split the production costs and the revenues of the movie *Twister*. A coin toss gave Warner Bros. the North American distribution rights and Universal Studios the foreign distribution rights (Welkos, *Los Angeles Times*, 1996).

In two-pot deals, typically the cofinancing partners split the rights; one receives domestic rights and keeps all revenues from that source, and the other gets the foreign rights and all foreign revenues. An example of a two-pot deal is in financing of the movie, *True Lies*. 20th Century Fox invested about $80 million in *True Lies* in return for the domestic rights; Universal Studios invested about $30 million for the foreign rights.

Other types of deals may include more complicated slices of the revenue stream. One partner may acquire rights for certain territories only (say, Italy or France or Hong Kong), or television rights, or sequel rights.

1.3 Movie alliances versus alliances in other industries

Some studies on alliances examine the biotechnology, pharmaceutical, and airline industries (e.g., Lerner and Merges, 1998; Chen and Ross, 2000; Lerner, Shane, and Tsai, 2003; Guedj and Scharfstein, 2004; Filson and Morales, 2006; and Robinson and Stuart, 2007). Most studies focus on the biotechnology and pharmaceutical industries.

There are differences and similarities between movie industry alliances and biotechnology industry alliances. Alliances in the movie industry generally form after the research and development (R&D) stage, and the parties split the costs of production and distribution. Typically what passes for R&D in the movie industry may be time-consuming, but it is inexpensive compared to the production process. In contrast, alliances in biotechnology and pharmaceutical industries are often formed before the R&D stage. R&D in the biotechnology and pharmaceutical industries is expensive, whereas production is relatively inexpensive. Both biotechnology and movie alliances, however, are often formed at the stage that requires significant contributions of resources by the parties involved.

In the biotechnology and pharmaceutical industries, projects are often terminated before completion, while in the movie industry, the likelihood of completion is extremely high (see John, Ravid, and Sunder, 2006). As in biotechnology, however, significant risk remains even after alliance formation because movie revenues are highly uncertain. As in other industries, incomplete contract problems are likely to be present in the movie industry (see Fee, 2002).

Finally, in some cases, alliances in the movie industry are between a studio and a small production company, which would resemble biotechnology alliances that are often between small research firms and large pharmaceutical firms (see Lerner and Merges, 1998; Gans, Hsu, and Stern, 2002; Lerner, Shane, and Tsai, 2003; and Filson and Morales, 2006). In other cases, the alliances are between similar-sized partners, as in the airline industry (Chen and Ross, 2000).

2. Motives for Alliance Formation and Testable Hypotheses

There are a variety of possible motivations for alliance formation. We discuss them in developing testable hypotheses for our study.

2.1 Risk reduction hypothesis

The strategic management literature often advocates risk reduction as a motive for alliance formation. The basic argument is that firms are reluctant to finance high-risk projects internally.[3] Under the assumption of perfect capital markets, the financial economics literature would suggest that firm-level risk reduction activities are not optimal for diversified shareholders as they can achieve their preferred level of risk by diversifying their own portfolios. Under different market frictions, though, risk reduction might be valuable to shareholders. Alliances where costs and revenues are shared can serve a hedging purpose.

Several authors provide different characterizations of the frictions that may lead firms to hedge. First, firms might want to reduce their risk because of a convex statutory tax function (see Smith and Stulz, 1985; and Graham and Smith, 1999). Second, firms might indulge in risk reduction to minimize their expected bankruptcy costs (see Smith and Stulz, 1985; Mayers and Smith, 1990; Bessembinder, 1991; and Adam, Dasgupta, and Titman, 2004). Third, firms may want to reduce their risk exposure because of managerial risk aversion (see Stulz, 1984; Smith and Stulz, 1985; Contractor and Lorange, 1988; Tufano, 1996; and Ravid and Basuroy, 2004), or because of managerial labor market reputations (see DeMarzo and Duffie, 1995; and Breeden and Viswanathan, 1996).[4]

The risk reduction hypothesis stipulates a positive relation between project risk and alliance formation, particularly for firms that fit the specific profile each theory proposes. Although one would expect riskier projects to be hedged first, firms may decide to hedge all their projects or some percentage of them (see Tufano, 1996; and Haushalter, 2000). We thus test whether the firms that are more likely to form alliances in our sample tend to be different from other firms, along the dimensions suggested by the theory.

---

3 See, for example, Mody (1993); Bleeke and Ernest (1995); Nanda and Williamson (1995); and Folta (1998). Under this hypothesis, alliances may be viewed as a real option. Companies may be interested in acquiring an activity, but do not want to commit fully until additional information becomes available. This option becomes more valuable as the risk of the environment increases.

4 We are unable to test the managerial risk aversion hypothesis directly, as we need compensation data at the segment level, which is not available. Casual evidence as well as several conversations with industry insiders suggests that different studio executives may have different degrees of risk aversion. For example, when Sumner Redstone took over Paramount, "he instituted what he termed a 'risk averse' financing strategy, requiring that all the studio's films receive at least 25% of their financing from outside investors," (Epstein, 2005).

2.2 Internal capital markets hypothesis

Another risk-related explanation for alliance formation is based on internal capital markets. Froot, Scharfstein, and Stein (1993) initiated this strand of literature. Building on Stein (1997); Robinson (2006) suggests that an alliance may be formed to overcome the incentive problem arising as a result of *ex-post* winner picking. That is, when a financially constrained firm faces multiple projects with different levels of risk, it will allocate limited resources only to the most successful projects. As a result, the manager of a project with a low probability of success is unwilling to supply *ex-ante* effort, since it is most likely to be wasted.

In an attempt to improve the incentive for the manager of a riskier project, a firm may structure that project to take place outside the boundaries of the firm, and form a strategic alliance. A legally enforceable contract between two distinct entities would guarantee a baseline level of financing. Hence, the optimal organizational structure is a function of the risk differential between projects available to the firm.

Relative rather than absolute project risk would be an important factor in explaining alliance formation under the internal capital markets hypothesis. For example, a risky Internet venture might form alliances for all its projects under the risk reduction hypothesis, but the internal capital market hypothesis suggests that the least risky endeavors will be financed internally.[5]

We acknowledge that it may be difficult to differentiate the internal capital markets and the risk reduction hypotheses. An advantage of our project-level data, however, is that we can test whether firms tend to form alliances for projects that are riskier than other projects within the firm.

2.3 Managerial bargaining power hypothesis

Theoretical models of organizational structure by Grossman and Hart (1986); Hart and Moore (1990); Aghion and Tirole (1994); and Fulghieri and Sevilir (2003) posit that a project manager gains more per unit of contribution in the form of monetary compensation or control benefits when an activity is carried out through alliances. Within this framework, the likelihood that an alliance is formed and control rights are assigned to the manager of the project is positively related to the efficiency of managerial contribution and to the bargaining power of each party. Lerner and Merges (1998); and Lerner, Shane, and Tsai (2003) find partial support for this claim.

According to the managerial bargaining power hypothesis, alliance formation should be positively related to the efficiency of managerial contribution and to the managers' bargaining power. John, Ravid, and Sunder (2006) show that in the film industry, film directors are "project managers." We use characteristics of film directors to capture their bargaining power.

---

[5] Robinson's (2006) model assumes that both projects have the same expected value (conditional on high effort), making a low probability of success synonymous with project-relative risk. This allows him to test the relative risk argument using firm-level data.

2.4 Market structure hypothesis

Some authors analyze the possible anticompetitive effects of strategic alliances. Chen and Ross (2000) argue that strategic alliances involving the sharing of production capacity that are common in the airline industries may be seen as a form of collusion. On the other hand, Yong (2004) shows that anticompetitive alliances may not always be stable.

The anticompetitive motive predicts that alliance formation is associated with an increase in industry concentration. We test this hypothesis using an industry concentration ratio, although DeVany (2004) points out that concentration ratios mean less in the movie industry than in other industries.

Additionally, we include year dummies. Under the market structure hypothesis, one might expect to find a time trend in alliance formation, as market shares and industry structures change. Time (year) dummies, however, would capture not just an anticompetitive effect, but also any macroeconomic changes that affect the movie industry.

2.5 Resource-pooling hypothesis

Film industry insiders often cite resource pooling as a motive for alliance formation.[6] Firms may decide to combine resources because a firm cannot undertake large-scale investment projects on its own. Theory would explain this by various frictions (see Esty, 2003, 2004).

Under this hypothesis, the larger a project, the more likely it is to be developed through an alliance. We use the movie budget as a proxy for size.

2.6 Specialization hypothesis

Aghion and Tirole (1994, Proposition 2) suggest that partners should split property rights according to the partners' comparative advantages in creating value. In the movie industry, for example, if one studio is better at marketing in the United States and another in international markets, an alliance that accords US distribution rights for all projects to the first studio and international rights to the second studio may create value.

This idea has been extensively developed in the strategic management literature. Authors suggest that firms form alliances to facilitate interfirm learning, to formulate and coordinate technical standards, and to gain access to another firm's capabilities (Kogut, 1988; Hamel, Doz, and Prahalad, 1989; Cohen and Levinthal, 1990; Hamel, 1991; and Mowery, Oxley, and Silverman, 1996). Khanna and Tice (2001); and Guedj and Scharfstein (2004) find evidence against the specialization hypothesis.

We cannot observe each firm's comparative advantage for *every* project; therefore, we test the specialization hypothesis using movie profitability data. The specialization hypothesis would predict that more profitable movies should be made under cofinancing arrangements.

[6] Chetwynd (1999) observes that studios and finance companies increasingly rely on cofinancing to cover the skyrocketing cost of films.

2.7 Lemons hypothesis

Pisano (1997) finds in the biotechnology industry that many more partnered or collaborative projects are terminated than internally developed projects. This result is interpreted as support for Akerlof's "lemons" theory [see Akerlof (1970)]. In our case, as the developer learns the quality of a project, the developer will try to cofinance poorer-quality ones. A possible partner realizes it may be an inferior project, and thus pays less to the developer.

We cannot observe the contractual structure of each deal. Therefore, we test this hypothesis using movie profitability data. The lemons hypothesis would predict that less profitable movies will be made under cofinancing arrangements.

3. Data and Variables

We now describe the data and construct the variables used in our tests. We perform both project-level (movie-level) and firm-level (studio-level) tests.

3.1 Data

We manually collected data on movies from a variety of sources. This resulted in a sample of 275 films produced by 12 major studios. All movie-level tests were conducted on this sample. Our analysis also requires data on studio characteristics. We obtained such data from Compustat and the Institutional Brokers Estimate System (IBES). The data were available for 10 publicly held studios. Studio-level tests that require financial data were conducted on this group of studios.

We assembled two datasets at the movie level. One consists of cofinanced films and the other solely financed films. Each set was assembled through press search and public sources as well as consultations with studio executives.

We concentrated on the more well-known studios and production companies for which more data are available: Universal Studios, Paramount Pictures, Warner Bros., 20th Century Fox, Walt Disney (including Walt Disney Pictures and Touchstone Pictures), Miramax, Sony (including Columbia Pictures and TriStar Pictures), Metro-Goldwyn-Mayer (MGM), DreamWorks, SKG, New Line Cinema, PolyGram Pictures, and Savoy Pictures.[7] The collective market share of these studios in the period 1994 to 2000 exceeded 90%.

To identify cofinancing alliances, we searched the DJI Publications Library using the "all publications" option. The library provides the full text of 6000 leading business newspapers, magazines, trade journals, and newsletters as well as television and radio transcripts. At the time of the search, the library also included titles specializing in entertainment news, including *Variety*, *Daily Variety*, *Hollywood Reporter*, and *Screen Finance*. Some of these publications

[7] PolyGram Pictures was acquired by Seagram Co., owner of Universal Studios, in 1998. Savoy Pictures was bought by Silver King Communications in 1996. Sony merged Columbia and TriStar Pictures in 1998.

were removed from the list at the end of 2001 (DJI provided a list of removed publications). Both *Variety* and *Daily Variety* were removed at the end of December 2001.

After December 2001, we used the Entertainment News section of Academic Universe (LexisNexis), which covers more than 100 major publications and includes both *Variety* and *Daily Variety*. For each studio, we conducted a search using the key words "co-finance," "co-fund" (or variations of these words like "co-financing" or "co-financed"), and "film," "movie," or "picture."

We also consulted with several executives from major film companies. They provided us with additional cofinanced films and reviewed our final list. Cross-verification between press reports and industry insiders suggests that our final list is correct. Our industry contacts, for example, provided a list of all movies cofinanced and internally developed by Paramount Pictures in 1999 and 2000. In 1999, Paramount cofinanced nine movies; information about cofinancing for eight of them was also available in the press. In 2000, the press provided information on seven of the 11 films cofinanced by Paramount Pictures.

Using this approach, we identified 148 cofinanced movies. It is not a comprehensive list, but there is no obvious source of bias we could identify.

We used the Internet Movie Database (imdb.com) to identify solely financed movies. It includes detailed information on a wide variety of movies, including release dates and company credits. For each year and each major studio, we selected all movies satisfying two criteria: (i) only the selected studio received production credits; and (ii) no information pertaining to cofinancing was provided by the press.[8] We also confirmed our data with industry insiders. Our final subsample consists of 127 solely financed movies.

Financial data for each movie were provided by Baseline/FilmTracker. The data from Baseline/FilmTracker include budget, distribution costs, and international, domestic, and video revenues. We adjust the numbers to account for inflation using the Bureau of Labor Statistics annual Consumer Price Index for all urban consumers.

The Internet Movie Database (imdb.com), the Motion Picture Association of America (MPAA) database, and the Academy Award Web site were sources of data on movie ratings and casts. *Hollywood Reporter* provided data on studio market share. Company- and segment-level financial data are from Compustat. Analyst earning forecast data are obtained from IBES.

3.2 Variables

3.2.1 Project risk variables Movies differ with respect to various characteristics, such as whether they are sequels or originals, their type (e.g., children's, horror), and whether they feature stars.[9] Characteristics are typically known

[8] Each movie title was searched in DJI using the "all publications" option and in the Entertainment News Section in LexisNexis.

[9] The literature shows that the impact of stars on films is ambiguous. Ravid (1999) finds no support for the hypothesis that stars signal quality. Basuroy, Chatterjee, and Ravid (2003) suggest that a star may be hired simply

by the time a financing decision is made. We collected movie ratings from MPAA.org. We used the "movie connection" section of IMDB to identify sequels.

Although MPAA ratings are given when a movie is released, they reflect broad project characteristics that are known in advance. For example, a family film with no violent or sexual scenes and no profanity will be rated G. A violent, sexually explicit drama will generally be rated R.[10]

To create the risk variables, we compare the standard deviation of the rate of return for various *ex-ante* movie characteristics.[11] The rate of return is calculated as total revenue generated by the movie from all sources divided by the cost of production and distribution. Total revenue is the sum of the following: domestic box office revenue generated by a film during its theater run in the United States and Canada, domestic video revenue (which includes sales and rentals), and international box office revenue.[12]

Total costs are the costs of physical production (budget) plus advertising and marketing costs, which include the cost of film prints supplied to exhibitors. The average rate of return on the movies in our sample is 106%, which is consistent with that in other studies (see Ravid, 1999).[13]

3.2.2 Managerial bargaining power variables To examine the managerial bargaining power hypothesis, we need characteristics of the "project manager," that is, the movie director. We use two variables to capture the director's bargaining power. The first is a dummy variable set to unity if the film's director has won an Academy Award for best director, and zero otherwise. The second is another dummy variable set to unity if the film's director is also the

---

because of the extreme uncertainty of a project when executives wish to be covered in case the project fails. Given the various issues with the star variable, and in order to accurately capture *ex-ante* low-risk projects, we do not include stars as a possible category for risk.

10 In Ravid (1999); DeVany and Walls (2002); Fee (2002); and Ravid and Basuroy (2004), movie ratings classify movie types better than genres (e.g., comedy, drama).

11 Goettler and Leslie (2005) use the standard deviation of *ex-ante* returns as a predictor of individual movie success. They use only US revenues, and their definition of cofinancing is different from ours. Goettler and Leslie conclude that their measure has no predictive power, making it less useful for our tests. For prediction issues, see also DeVany and Walls (2002).

12 Revenues are shared between studios and exhibitors. Exhibitors receive an approximately constant proportion of domestic box office revenues (see Filson, Switzer, and Besocke, 2005), so our profitability measure is a good proxy for the studio's share of the movie's profits. In some cases, a star may receive a share of revenue. Data on how revenues are shared with stars are generally unavailable, however.

13 Our profitability measure (rate of return) reflects the economic value of the project. It is *not* a measure of "net profits" as used in the movie industry for compensation contracts. Calculation of these net profits has received much attention (see Goldberg, 1997). Artists, given a share of the movie's "net profits" as part of their employment contracts, are surprised to learn that an apparently successful movie made zero or small net profits. In contingent compensation contracts, net profits are not calculated according to GAAP (see Weinstein, 1998), but according to a different set of rules. Costs as defined in the net profits contract include budget, print, and advertising costs, and also discretionary items such as distribution fees, which are actually profits of the distributing studios, various overhead charges, and inflated interest expenses. The revenues in these contracts may include fractions of different revenue items such as video receipts. Most finance professionals would view net profits as out-of-the-money options granted to some of the participants rather than any economically meaningful measure of profits.

producer, or the scriptwriter, or an actor, and zero otherwise. We assume that a director's bargaining power and managerial contribution increases with the additional responsibilities of scriptwriter, producer, or actor. Data on movie directors are obtained from IMDB and the Academy Award Web site.

3.2.3 Market structure variables We use two measures of competitiveness to establish a relation between alliance formation and the level of industry concentration. The first is the Herfindahl Index in the year the film was released. This index is a sum of squared market shares of each studio, according to annual domestic market shares as reported by the *Hollywood Reporter*. It varies annually for studios because of the different numbers of films released annually and different annual revenues of movies. The Herfindahl Index in the movie industry may not be as good a proxy for the level of industry concentration as in other industries, so we interpret the results based on this index cautiously. The second measure is year dummy variables. The latter measure, however, captures changes in the movie industry over time that may not be correlated with industry competitiveness.

3.2.4 Resource-pooling variables We use movie budgets to test the resource-pooling motive for alliance formation. Because the impact of movie budgets could be nonlinear, we allow for a quadratic term.

3.2.5 Specialization and lemons variables We use rate of return and revenues to compare the financial performance of solely financed and cofinanced projects, and to test the predictions of the specialization and lemons hypotheses.[14]

4. Tests and Results

Summary statistics for project-level data are presented in Table 1. Just over half of our movies are R-rated, like movies in general (see MPAA.org). In our sample, 5.5% of the directors in our sample have won an Academy Award. Additional responsibilities (such as actor/producer/scriptwriter) are held by 42.55% of directors.

The average (median) movie in our sample costs $47.5 million ($41.0 million) to make. Average (median) revenue is $152.2 million ($88.0 million) per project. The average movie had a ratio of revenues to costs of 2.0646, which translates into an average rate of return of 106.5%. Yet the median rate of return is 40.8%, suggesting that some movies are highly profitable, skewing the distribution. To take account of this, when we use movie profitability as the dependent variable in the regression, we also include specifications that use the natural log transformation of the rate of return.

[14] The rate of return, ln(rate of return), ln(total revenues), and ln(revenue per site) are dependent variables.

Table 1
Summary statistics

Variable	Mean	Median	Standard deviation	Number of observations
Projects developed via alliances	0.5382	1	0.4994	275
Project risk				
G-rated	0.0436	0	0.2047	275
PG-rated	0.1236	0	0.3298	275
PG13-rated	0.3200	0	0.4673	275
R-rated	0.5127	1	0.5007	275
Sequel	0.0727	0	0.2602	275
Managerial bargaining power				
Director who won an Academy Award	0.0545	0	0.2275	275
Director who is also an actor/producer/writer	0.4255	0	0.4953	275
Market structure				
Herfindahl Index	1139.1729	1179.1300	94.5507	7
Resource pooling				
Budget (in millions)	47.4744	40.9915	35.8897	274
Other variables				
Total revenue (in millions)	152.1912	87.9960	188.4935	271
Rate of return	2.0646	1.4080	2.1711	271

The table presents descriptive statistics for movies in our sample. These movies (projects) were developed by 12 major studios between 1994 and 2000. "Projects developed via alliances" is a dummy variable set to unity if a movie is financed through an alliance. G, PG, PG-13, and R-rated are dummy variables set to unity based on movie ratings conferred by the MPAA. "Sequel" is dummy variable set to unity when the movie is a continuation of a previously released movie. "Director who won an Academy Award" is a dummy variable set to unity when the movie's director had previously won an Academy Award. "Director who is also an actor/producer/writer" is a dummy variable set to unity when the movie's director is also an actor, or a producer, or a writer in that specific film. Herfindahl Index is the sum of squared market shares of all studios for each year. Budget is the cost of production of the movie. Total revenue is the total revenue from all sources for the movie. Rate of return is total revenue divided by total costs for each movie.

Table 2
Moments of distribution of the rate of return for different types of movies

	Comparison of standard deviation						
	Variable = 1		Variable = 0				
Variable	Std. dev.	N	Std. dev.	N	Differences in std. dev.	p-value	Skewness
PG-rated	0.9598	34	2.2839	237	−1.3241	<0.0001	0.4345
Sequel	1.6446	20	2.2052	251	−0.5606	0.1329	0.4680
Sequel[a]	1.6446	20	2.3235	219	−0.6789	0.0790	
PG13-rated	1.9618	87	2.2683	184	−0.3065	0.1295	2.4864
R-rated	2.0104	138	2.3263	133	−0.3159	0.0913	2.6540
G-rated	4.8001	12	1.8915	259	2.9086	<0.0001	1.8995
PG-rated or Sequel	1.3625	52	2.3235	219	−0.9610	<0.0001	0.8951

The standard deviation of the rate of return for movie type under question is compared to all other movies. All variables are described in Table 1. The sample includes movies (projects) developed by major studios between 1994 and 2000.
[a]Standard deviation of sequels compared to all other movies, where all other movies exclude PG-rated movies.

4.1 Proxies for project risk

Movie ratings and sequel status are proxies for project risk in our sample. Table 2 compares risk characteristics of the various ratings. We compare the standard deviation of the rate of return of G-rated movies with all non-G-rated movies. G-rated movies have the highest standard deviation (4.8) compared to all movies without a G-rating (1.89).[15] PG-rated movies have the lowest standard deviation at 0.9598, versus 2.2839 for non-PG-rated movies. This difference is highly statistically significant. Sequels also seem to provide a safe bet; they have the second lowest standard deviation of rate of return (1.64), significantly different from the standard deviation of the rate of returns for nonsequel movies (2.21) at the 13% level. When we eliminate PG-rated movies from the nonsequel sample, the difference between the standard deviations of rate of return on sequels and rate of return on nonsequels is statistically significant at the 8% level.

Very high skewness indicates that the success of a category is driven by a few very successful projects; low skewness reflects a relatively predictable symmetric distribution. Both PG-rated movies and sequels have very low skewness, suggesting a relatively symmetrical distribution.

These results as to both standard deviation and skewness lead us to classify PG-rated movies and sequels as low-risk projects. In some tests, henceforth, we set a low-risk dummy variable to unity if a movie is either PG-rated or a sequel, and zero otherwise.

4.2 Analysis of motives for alliance formation using movie-level data

Table 3 shows univariate comparisons between solely financed movies and movies developed through alliances. It shows that low-risk projects, the PG-rated movies and sequels, are likely to be solely financed. This is some evidence in support of the risk reduction and internal capital market hypotheses.

We also find that whether a director has won an Academy Award or has the specified additional responsibilities in the movie has no significant impact on the probability of alliance formation. This is some evidence against the managerial bargaining power hypothesis.

Larger budgets seem to prompt alliances, showing preliminary support for the resource-pooling hypothesis. Movies made under alliances also earn more than movies made internally by studios. In fact, though, the higher revenues do not seem to justify the extra cost, as the difference in rates of return is not statistically significant. This finding does not support either the specialization or lemons hypotheses.

The results of the probit regressions are presented in Table 4. We include variables that may explain the choice of alliance formation as suggested by various theories. We test the specialization and lemons hypotheses using project profitability in Section 4.4.

Evidence that is consistent with the risk reduction and internal capital market hypotheses is that the low-risk projects (PG-rated films and sequels) are less likely to be financed though alliances. As in the univariate results, we find no evidence for the managerial bargaining power hypothesis. Both director-related variables are insignificantly related to the probability of alliance formation.

[15] Given that there are only 12 films rated G, we do not place a lot of emphasis on this rating category, and in our tests, lump it with other medium-risk categories.

Table 3
Differences in medians and means

Panel A: Differences in medians for continuous variables

Variable	Medians: Alliance	Medians: Internally developed	*p*-value
Resource pooling			
Budget (in millions)	47.0500	33.9000	0.0091
Other variables			
Total revenue (in millions)	97.5230	73.9105	0.2467
Rate of return	1.3353	1.4991	0.5135

Panel B: Differences in means

Variable	Means: Alliance	Means: Internally developed	*p*-value[a]
Project risk			
G-rated	0.0473	0.0394	0.7484
PG-rated	0.0676	0.1890	0.0023
PG13-rated	0.3041	0.3386	0.5406
R-rated	0.5811	0.4331	0.0144
Sequel	0.0338	0.1181	0.0073
Managerial bargaining power			
Director who won an Academy Award	0.4257	0.4252	0.6214
Director who is also an actor/producer/writer	0.0608	0.0472	0.9936
Resource pooling			
Budget (in millions)	51.3932	42.8714	0.0500
Other variables			
Total revenue (in millions)	154.1214	149.9697	0.8595
Rate of return	1.9526	2.1934	0.3717

The table compares projects developed through alliances and projects developed internally. The sample includes movies (projects) developed by major studios between 1994 and 2000. All variables are described in Table 1.
[a]For dummy variables, *p*-values are reported using Pearson chi-square tests.

Movies with larger budgets are more likely to be made through alliances, lending some support for the resource-pooling hypothesis. We also see an increasing time trend in alliance formation. More movies were developed through financing alliances in the late 1990s and in 2000 than in the early 1990s. The trend is consistent with trends reported for some other industries.[16]

This result suggests that changes in the industry structure over time (not necessarily anticompetitive motives) may trigger more alliances. That is, despite an increase in alliance formation over time, we do not see a decline in the level of competition over time as measured by the Herfindahl Index, which is negatively related to the likelihood of alliance formation. While we have noted that the Herfindahl Index may be less meaningful in the movie industry, this finding would contradict the market structure hypothesis, which predicts a positive relationship between alliance formation and the level of industry concentration.

16 See Lerner and Merges (1998); Rothaermel (2001); and Filson and Morales (2006) regarding the pharmaceutical and biotechnological industries; Chen and Ross (2000) regarding the airline industry; Stuart (2000) regarding the semiconductor industry; and Lerner and Merges (1998); and Robinson (2006) regarding research-intensive industries.

Table 4
Probability of alliance

Variable	Marginal effects	*p*-value	Marginal effects	*p*-value	Marginal effects	*p*-value	Marginal effects	*p*-value	Marginal effects	*p*-value	Marginal effects	*p*-value
Intercept	−0.0083	(.9698)	1.8250	(.0001)	−0.0927	(.4588)	1.5714	(.0003)	−0.1060	(.3592)	1.5714	(.0003)
Project risk												
PG-rated (relative to G)	−0.3861	(.0480)	−0.3641	(.0470)								
PG13-rated (relative to G)	−0.2241	(.2492)	−0.1968	(.2650)								
R-rated (relative to G)	−0.0356	(.8547)	0.0009	(.9958)								
Sequel	−0.3361	(.0173)	−0.3195	(.0091)								
PG or Sequel					−0.3092	(.0005)	−0.3069	(.0002)	−0.3082	(.0004)	−0.3069	(.0002)
Managerial bargaining power												
Director who won an Academy Award	0.0201	(.8780)	−0.0062	(.9645)	0.0388	(.7708)	0.0145	(.9133)			0.0145	(.9133)
Director who is also an actor/producer/ writer	−0.0397	(.5676)	−0.0626	(.3441)	−0.0196	(.7777)	−0.04538	(.4915)			−0.0454	(.4915)
Resource pooling												
Budget	0.0437	(.0556)	0.0474	(.0310)	0.0384	(.0814)	0.0408	(.0577)	0.0401	(.0592)	0.0408	(.0577)
$Budget^2$	−0.0018	(.1439)	−0.0017	(.2041)	−0.0018	(.1376)	−0.0016	(.2149)	-0.0019	(.1109)	−0.0016	(.2149)
Market structure												
Herfindahl Index			−0.0016	(.0000)			−0.0014	(.0001)			−0.0014	(.0001)
Year 1994	−0.3594	(.0102)			−0.3643	(.0083)			−0.3611	(.0087)		
Year 1995	−0.1505	(.2974)			−0.1326	(.3526)			−0.1303	(.3581)		
Year 1997	0.2285	(.0646)			0.2312	(.0584)			0.2353	(.0522)		
Year 1998	0.0852	(.5006)			0.0685	(.5897)			0.0689	(.5874)		
Year 1999	0.1165	(.3128)			0.0974	(.4053)			0.0958	(.4134)		
Year 2000	0.3657	(.0014)			0.3453	(.0025)			0.3464	(.0024)		
Log Likelihood	−151.5492		−164.9306		−155.6286		−169.3162		−155.6965		−189.0382	
Likelihood ratio *p*-value	<.0001		<.0001		<.0001		<.0001		<.0001		<.0001	
% predicted correctly	70.438		65.693		68.978		66.788		68.978		66.79	

The table presents results of probit regression estimating probability of alliance. The sample includes 274 movies (projects) developed between 1994 and 2000. All variables are described in Table 1. Marginal effects are calculated at the mean (see Greene, 2000). Results are corrected for heteroskedasticity.

Tables 3 and 4 suggest that high-risk (low-risk) movies are made through alliances (internally), which is consistent with both the internal capital market and risk reduction hypotheses. In these tables, we compare projects across the firms, not within the firms. The internal capital market hypothesis, in particular Robinson (2006), suggests that alliance formation is more likely for projects that are riskier than other projects made by the *same* firm. Relative rather than absolute project risk would be an important factor in explaining alliance formation under the internal capital markets hypothesis. In order to test this hypothesis directly, we see if our results on low-risk movies hold when we include studio dummy variables. All 12 studios in our sample make some low-risk movies and some high-risk movies.

By including studio dummies, we are controlling for any effects related to firm characteristics, which may affect the decision to form an alliance. Further, this allows comparing projects within a studio, not across studios. If the low-risk variable is still negatively correlated with alliance formation even in the presence of studio dummies, we can support Robinson's (2006) model. On the other hand, if the low-risk variable becomes insignificant, then we can reject Robinson's (2006) model.

Included in Table 5 are variables found to be statistically significant in Table 4. After controlling for studio effects, it is still true that *relatively* low-risk movies are internally financed, while higher-risk films are developed through alliances. This is evidence in support of Robinson (2006). Given that a firm may reduce overall risk by forming alliances for their riskier projects, this result is also consistent with the risk-reduction hypothesis.

The budget variable is still positive, but it loses its statistical significance. This can indicate that some studios prefer to produce big-budget films and others specialize in low-budget features.

In the last specification in Table 5, we include a dummy variable to control for movies made in the earlier years (1994–1996) versus the later years in the sample (1997–2000). The inclusion of such a variable has no significant impact on our results.

These results support the internal capital market and risk reduction hypotheses. Support for the resource-pooling hypothesis is much weaker.

4.3 Analysis of risk reduction and internal capital market hypotheses using studio-level data

The analysis so far has been conducted at the movie level. In this section, we include firm- and segment-level data in order to distinguish between the risk reduction and internal capital market hypotheses.

The results of Table 5 suggest that studios 2, 5, 6, 11, and 12 are consistently more likely to form alliances than the other seven studios. We call this group of five studios Group 1. The other seven studios are included in Group 2. In Table 6, we report analysis of the differences between the two groups of firms in order to better understand the motives for alliance formation.

Table 5
Probability of alliance controlling for studio effects

Variable	Marginal effects	p-value	Marginal effects	p-value	Marginal effects	p-value
Intercept	−0.2413	(.0733)	1.6835	(.0001)	−0.0126	(.8973)
Project risk						
PG or Sequel	−0.4120	(.0000)	−0.3794	(.0000)	−0.3951	(.0000)
Resource pooling						
Budget	0.0027	(.8093)	0.0097	(.3427)	0.0057	(.5964)
Studio effects						
Studio 1	0.1950	(.0416)	0.1366	(.1291)	0.1726	(.0615)
Studio 2	0.3527	(.0000)	0.3315	(.0000)	0.3497	(.0000)
Studio 4	0.1875	(.1000)	0.1407	(.1789)	0.1744	(.1086)
Studio 5	0.2264	(.0250)	0.2065	(.0307)	0.2059	(.0367)
Studio 6	0.2580	(.0141)	0.2571	(.0105)	0.2675	(.0082)
Studio 7	−0.1109	(.3560)	−0.0824	(.4631)	−0.1000	(.3912)
Studio 8	0.0159	(.9466)	−0.0458	(.8387)	0.0216	(.9281)
Studio 9	0.0355	(.7856)	0.0665	(.5961)	0.0541	(.6758)
Studio 10	0.1539	(.3795)	0.1405	(.3910)	0.1925	(.2404)
Studio 11	0.4302	(.0000)	0.4337	(.0000)	0.4354	(.0000)
Studio 12	0.4187	(.0000)	0.4189	(.0000)	0.4202	(.0000)
Market structure						
Herfindahl Index			−0.0016	(.0000)		
Year 1994	−0.3344	(.0323)				
Year 1995	−0.2134	(.1669)				
Year 1997	0.2613	(.0177)				
Year 1998	0.1063	(.3919)				
Year 1999	0.1479	(.1949)				
Year 2000	0.3392	(.0012)				
$1994 \leq$ year ≤ 1996					−0.4077	(.0000)
Log Likelihood	−134.8955	−148.4814	−141.7206			
Likelihood ratio p-value	<.0001	<.0001	<.0001			
% predicted correctly	75.912%	73.358%	75.182%			

The table presents results of probit regression estimating probability of alliance. The sample includes 274 movies (projects) developed between 1994 and 2000. All variables are described in Table 1. Marginal effects are calculated at the mean (see Greene, 2000). Results are corrected for heteroskedasticity.

Table 6
Group analysis

Panel A: Project risk differential

	Group 1		Group 2		
	Std. Dev.	N	Std. Dev.	N	p-value[b]
Full sample	2.4984	120	1.8222	166	<.0001
Projects excluding PG-rated or Sequel (high-risk)	2.7925	90	1.8774	141	<.0001
PG-rated or Sequel (low-risk)	1.2781	30	1.4914	25	.4247
Mean difference between high-and low-risk projects within studios[a]	1.4458	3	0.0266	6	.0306

The table presents a comparison of project risks and financial characteristics for two groups of studios. Group 1 includes studios that are more likely to form alliances (from Table 5, studios 2, 5, 6, 11, and 12). Group 2 includes all other studios. The sample includes movies (projects) developed by major studios between 1994 and 2000. We select "filmed entertainment division" as our relevant segment in Compustat. Financial data and earnings forecasts are included with a one-year lag from the project release date. Segment data, financial data, and earnings forecasts are unavailable for studios 8 and 9.

[a]Differences in standard deviation between high- and low-risk projects for each studio.

[b]Difference in group standard deviations.

Table 6
Continued

Panel B: Differences in the proportion of high-risk projects

	Group 1		Group 2		
	Mean	*N*	Mean	*N*	*p*-value[b]
Proportion of high-risk projects[a]	0.7574	5	0.8402	7	0.1320

[a]Proportion of high-risk to total number of projects for each studio.
[b]Difference in group means.

Panel C: Segment-level analysis

	Mean	
	Group 1	Group 2
Total assets (in millions)	4,984	5,673
Sales (in millions)	3,163	3,720
Operating profit plus depreciation to assets	0.0352	0.0511
Capital expenditures to assets	0.0156	0.0138

Panel D: Company-level analysis: Financial constraints, bankruptcy costs, and taxes

	Mean	
	Group 1	Group 2
Total assets (in millions)	22,152	27,404
Market capitalization (in millions)	18,884	29,089
Sales (in millions)	15,993	12,373
S&P company credit rating	9.500	10.800
Total debt to assets	0.2537	0.3397
Dividend per share	0.2568	0.3659
Operating income to assets	0.1164	0.0954
Capital expenditures to assets	0.0071	0.0281
Earnings surprise	0.0031	0.0023
Earnings dispersion	0.0024	0.0020
Marginal tax rate	0.2583	0.2750
Expected bankruptcy costs	0.0008	0.0015
Proportion of firm value likely to be lost in liquidation	0.0287	0.0427

Company ratings in Compustat are reported using numbers. The credit rating for Group 1 is in the A- to BBB+ range. The credit rating for Group 2 is in the BBB+ to BBB range. Earnings surprise is defined as the absolute value of the difference between the median earnings estimate and the actual earnings per share, normalized by the stock price at the end of the year (see Gomes and Phillips, 2005). Earnings dispersion is defined as the standard deviation of outstanding earnings forecasts normalized by the stock price (see Gomes and Phillips, 2005). The marginal tax rate is calculated by referring the firm's net income to the statutory tax schedule, where net income is the estimated taxable income less net operating loss carry forwards. Taxable income is measured as net income, minus the ratio of deferred taxes to the statutory tax rate, plus income taxes paid, plus the sum of minority interests and extra and discontinued items divided by 1 minus the statutory tax rate (see Graham, 1996). Expected bankruptcy costs is the product of term that is related to the likelihood of financial distress (the standard deviation of the first difference in the firm's historical EBIT divided by the mean level of book assets) and a term measuring the proportion of firm value likely to be lost in liquidation (asset intangibility, as measured by the sum of research and development and advertising expenses divided by sales) (see Graham, 2000).

Robinson's (2006) argument suggests that studios that are more likely to form alliances (Group 1) may have projects with a higher risk differential than the projects undertaken by studios that are less likely to form alliances (Group 2). Panel A of Table 6 shows that average project risk is significantly higher for Group 1 than for Group 2. This statistically significant difference is driven by high-risk projects (i.e., all projects except PG-rated movies or sequels).

For each studio, we calculate the difference between the standard deviations of the rate of return of high-risk projects (non-PG-rated and nonsequel) and low-risk projects (PG-rated or sequel). For Group 1, the mean difference between the standard deviations of the rate of return of low-risk and high-risk projects is 1.45; for Group 2, the mean difference is 0.03. The difference between the two groups of studios is statistically significant at the 5% level ($p = .03$). The much higher spread in project risk for Group 1 firms over Group 2 firms is consistent with Robinson (2006).

Panel B of Table 6 compares the proportions of high-risk movies made by each group of studios. We find that Group 1 develops fewer high-risk projects (76% of the total) than Group 2 (84% of the total), but the difference is not statistically significant ($p = .13$). In other words, proportions of high-risk projects are similar for either group of studios.

The results in panels A and B of Table 6 suggest that Group 1 studios have a higher project risk differential than Group 2 studios, but they have a similar proportion of high-risk projects. This is generally consistent with the internal capital market hypothesis, which suggests that it is the risk differential between projects within a studio that motivates alliance formation.

In panels C and D of Table 6, we use segment- and company-level data to compare the financial characteristics of the two groups of studios.[17] The risk reduction hypothesis predicts different marginal tax rates or bankruptcy costs for the two groups of studios. As in Haushalter (2000), we expect Group 1 studios (those more likely to form alliances) to have lower marginal tax rates or higher bankruptcy costs than Group 2 studios (those less likely to form alliances). The internal market hypothesis predicts that Group 1 studios are more likely to be financially constrained than Group 2 studios.

In panel C of Table 6, we compute the means of various financial variables from segment-level data without t-statistics, given that we have financial data for only 10 studios. Group 1 studios are smaller (in terms of both assets and sales) and less profitable (in terms of operating profit plus depreciation to assets). If smaller and less profitable segments are proxies for financial constraints, there is some evidence in support of the internal capital market hypothesis.

Means of various proxies for firm-level financial constraints for Groups 1 and 2 are presented in panel D of Table 6.[18] The proxies include S&P debt

[17] Financial data are not available for two studios in Group 2. Group 2 now includes five studios.

[18] Note that many studios are part of extremely large firms. The parent company's financial characteristics might not be a good proxy for the studio's financial characteristics. Yet, firm-level data allow us to expand the proxies beyond size and profitability.

ratings, debt-to-assets ratio, dividends per share, and asymmetric information variables (earning surprise and earnings dispersion).[19]

We find some evidence that Group 1 studios are financially constrained, because they are smaller in terms of asset size and market capitalization and have lower dividends per share. Both groups, though, have investment-grade debt ratings and lower levels of asymmetric information than the average firm in the Gomes and Phillips (2005) sample (where average earnings surprise is 1.9% and average earnings dispersion is 1.1%).

The last two variables in panel D of Table 6, marginal tax rates and bankruptcy costs, test for other explanations for alliance formation. First, we compare the marginal tax rates of each group, following Graham's (1996) methodology.[20] The results indicate marginal tax rates similar for each group, which does not support a tax-based motive for alliance formation.

Tests for expected bankruptcy costs follow Graham (2000).[21] We find that Group 1 firms have lower expected bankruptcy costs than Group 2 firms (0.0008 versus 0.0015). We also find that the proportion of firm value likely to be lost in liquidation, i.e., the loss conditional on bankruptcy, is slightly lower for Group 1 firms than Group 2 firms (0.0287 versus 0.0427). These results are inconsistent with a bankruptcy cost explanation.

The evidence in Table 6 supports the internal capital market hypothesis. There is no evidence here to support the risk reduction motive.

Our final test to differentiate the risk reduction and internal capital market hypotheses uses a methodology similar to that of Haushalter (2000) to investigate the relation between the extent of alliance activity and firm characteristics. The dependent variable is the fraction of the studio's movies that are cofinanced in a year in our sample. Given that the dependent variable is bounded at zero, we use a Tobit regression, and because of sample size, the regressions are univariate.

Panel A of Table 7 presents results using segment-level data, and panel B results using company-level data. Some specifications use dummy variables for missing data that are not reported in the table. Because the proportions of cofinanced movies developed by the same studio over a period may not be independent, we use cluster adjusted t-statistics (see Williams, 2000 for details).

[19] The last two proxies follow Gomes and Phillips (2005). The first proxy is earnings surprise, defined as the absolute value of the difference between the median earnings forecast and the actual earnings per share, normalized by the stock price at the end of the year. The second proxy is earnings dispersion, defined as the standard deviation of outstanding earnings forecasts normalized by the stock price.

[20] Net income is estimated taxable income less net operating loss carry forwards. Taxable income is net income, minus the ratio of deferred taxes to the statutory tax rate, plus income taxes paid, plus the sum of minority interests and extra and discontinued items divided by 1 minus the statutory tax rate.

[21] Expected bankruptcy costs are calculated as the product of a term related to the likelihood of financial distress (the standard deviation of the first difference in the firm's historical EBIT divided by the mean level of book assets) and a term measuring the proportion of firm value likely to be lost in liquidation (the sum of research and development and advertising expenses divided by sales).

We define clusters at the segment level (company level) using Compustat's unique segment (company) identifier, *gvkey*.

Profitability is significantly negatively related to the extent of alliance activity both at the segment and at the company level. If lower profitability is a proxy for financial constraints, then financially constrained firms indeed tend to form alliances, consistent with the internal capital market hypothesis. All other variables are statistically insignificant.

While the profitability result may provide some support for bankruptcy-motivated hedging, direct proxies for bankruptcy costs do not support this view. Our analysis of the financial characteristics of the two groups of studios supports the internal capital markets hypothesis, but not the risk reduction hypothesis.

4.4 Tests of the specialization and lemons hypotheses

The specialization hypothesis predicts that movies developed through cofinancing alliances should be more profitable than solely financed movies. The lemons hypothesis predicts the converse. We test these predictions in a multivariate regression framework where the dependent variable is the movie's profitability.

Ravid (1999); DeVany and Walls (2002); Fee (2002); and Ravid and Basuroy (2004) use a comprehensive set of control variables in movie profitability regressions. We include their control variables, namely, MPAA rating, a sequel dummy, budget of the movie, maximum number of theaters a film was playing in (sites), total number of reviews, and ratio of positive reviews. The last two variables serve as proxies for the attention that a movie receives and its quality. To capture the potential effect of star power on a movie's success or failure, we identify actors who had won or had been nominated for an Academy Award (stars) (see Ravid, 1999). As before, we include two director characteristics: directors who had won an Academy Award, and directors with other responsibilities. Finally, we add year dummies to capture any time effect.

Our main variable of interest is a cofinancing dummy variable, which is set to unity if the movie is cofinanced and is set to zero otherwise. If this variable is significant, in the presence of all the control variables, it may be that cofinancing is more profitable or that sole financing is less profitable. We also use revenues as our dependent variable because the movie industry often focuses on revenues.

Tables 8 and 9 present the results of this analysis. The signs of the control variables are consistent with other results for movie industry data. The alliance dummy affects neither revenues nor the rates of return of projects. When we examine revenue per site and logarithmic transformation of the dependent variables, the cofinancing dummy variable remains statistically insignificant.

Overall, our findings seem to indicate that projects developed through alliances are not better than projects developed internally. This result is consistent with Goettler and Leslie (2005) and does not support either the specialization

Table 7
Extent of alliance activity

Panel A: Segment-level analysis

	Parameter estimate			
Intercept	0.6756	0.9770***	0.6918***	0.6793***
Ln(total assets)	−0.0117			
Ln(sales)		−0.0500		
Operating profit plus depreciation to assets			−1.9197***	
Capital expenditures to assets				−6.2936
Log Likelihood	−36.8047	−36.8493	−33.3081	−36.8066

The table presents results of Tobit regressions. The dependent variable is the ratio of movies developed through alliance to total number of movies for each year for each studio. The sample includes movies (projects) developed by major studios between 1994 and 2000. Financial data and earnings forecasts are included with one-year lag from the project release date. Financial data and earnings forecasts are unavailable for studios 8 and 9. All variables are described in Table 6, panel D. Regressions include a set of dummies for missing data that are not reported. *t*-statistics are adjusted for clustering (see Williams, 2000). *,**,***denote statistically significance at the 10%, 5%, and 1% level, respectively.

Panel B: Company-level analysis

	Parameter estimate											
Intercept	0.7863	0.8977	0.7869*	0.6871***	0.6562***	0.5514***	0.7274***	0.5599***	0.4903***	0.7044***	0.6096***	0.6103***
ln(total assets)	−0.0239											
ln(market capitalization)		−0.0357										
ln(sales)			−0.0237									
S&P company credit rating				−0.0179								
Total debt to assets					−0.3607							
Dividend per share						0.0097						
Operating income to assets							−0.7913***					
Earnings surprise								−4.1003				
Earnings dispersion									23.0515			
Marginal tax rate										−0.4679		
Expected bankruptcy costs											−60.2184	
Proportion of firm value likely to be lost in liquidation												−1.5088
Log Likelihood	−36.227	−36.012	−34.370	−37.123	−36.086	−36.743	−34.239	−38.332	−38.139	−33.856	−36.868	−35.831

Table 8
Rate of return regressions

	Rate of return				ln (Rate of return)			
	Parameter estimate	*p*-value	Parameter estimate	*p*-value	Parameter estimate	*p*-value	Parameter estimate	*p*-value
Intercept	1.9676	(.1038)	1.4628	(.2040)	−0.4504	(.1076)	−0.6379	(.0243)
Alliance	−0.1775	(.4712)	0.0588	(.7979)	−0.0890	(.3193)	0.0412	(.6532)
PG–rated (relative to G)	−2.6918	(.0382)	−2.3981	(.0580)	−0.6209	(.0141)	−0.4693	(.0458)
PG13–rated (relative to G)	−2.2813	(.0826)	−1.8837	(.1310)	−0.4135	(.0947)	−0.2027	(.3614)
R–rated (relative to G)	−2.3995	(.0645)	−2.0952	(.0895)	−0.5022	(.0383)	−0.3473	(.1103)
Sequel	−0.4642	(.2891)	−0.6621	(.1260)	−0.0933	(.5666)	−0.1939	(.2134)
Director who won an Academy Award	−0.6993	(.0640)	−0.8026	(.0315)	−0.2613	(.0814)	−0.2918	(.0534)
Director who is also an actor/producer/writer	0.0064	(.9783)	0.1356	(.5450)	0.0366	(.6825)	0.1034	(.2243)
Budget	−0.5365	(.0001)	−0.5240	(.0000)	−0.2045	(.0001)	−0.1988	(.0000)
Budget^2	0.0213	(.0075)	0.0219	(.0038)	0.0087	(.0104)	0.0090	(.0068)
Positive review/(positive + negative reviews)	1.7205	(.0000)	1.8266	(.0000)	0.9149	(.0000)	0.9750	(.0000)
Total number of reviews	0.0805	(.0023)	0.0560	(.0188)	0.0247	(.0013)	0.0115	(.1632)
Sites	0.0011	(.0000)	0.0012	(.0000)	0.0006	(.0000)	0.0006	(.0000)
Stars	−0.2286	(.2694)	−0.0779	(.7191)	−0.1478	(.0835)	−0.0663	(.4305)
Year 1994			1.0984	(.0364)			0.4725	(.0071)
Year 1995			0.7731	(.0891)			0.3438	(.0790)
Year 1997			0.0915	(.7699)			−0.0317	(.8490)
Year 1998			0.0437	(.8915)			−0.1156	(.5034)
Year 1999			−0.4842	(.1143)			−0.2828	(.0789)
Year 2000			−0.1521	(.6976)			−0.1932	(.2927)
Adjusted R^2	0.3054		0.43992		0.3926		0.33039	

The table presents results of OLS regressions. Dependent variables are rate of return and ln(rate of return). The sample includes 271 movies (projects) developed between 1994 and 2000. Sites is maximum number of theaters, at any given time, where the movie was playing. Star is an actor who had previously won an Academy Award or had been nominated for it. All other variables are described in Table 1. Results are corrected for heteroskedasticity.

Table 9
Revenue regressions

	ln(Total revenue)		ln(Revenue per site)	
	Parameter estimate	*p*-value	Parameter estimate	*p*-value
Intercept	15.7067	(.0000)	8.9241	(.0000)
Alliance	−0.0248	(.7917)	−0.1178	(.2980)
PG-rated (relative to G)	−0.6367	(.0114)	−1.8458	(.0016)
PG13-rated (relative to G)	−0.4362	(.0704)	−1.3133	(.0221)
R-rated (relative to G)	−0.6196	(.0085)	−1.3356	(.0188)
Sequel	−0.4433	(.0040)	0.0588	(.7663)
Director who won an Academy Award	−0.3346	(.0362)	0.1616	(.4803)
Director who is also an actor/producer/writer	−0.0055	(.9497)	−0.0039	(.9685)
Budget	0.1319	(.0010)	0.0153	(.6332)
Budget^2	−0.0043	(.0232)	0.0010	(.5592)
Positive review/(positive + negative reviews)	0.8900	(.0000)	1.2092	(.0000)
Total number of reviews	0.0246	(.0018)	0.0196	(.0714)
Sites	0.0009	(.0000)		
Stars	−0.0473	(.5764)	−0.0063	(.9528)
Year 1994	0.4516	(.0044)	0.1413	(.5375)
Year 1995	0.2582	(.1510)	0.0223	(.9243)
Year 1997	0.0169	(.9153)	0.1757	(.3496)
Year 1998	0.0724	(.6384)	0.4348	(.0316)
Year 1999	−0.1811	(.2117)	0.2581	(.1814)
Year 2000	−0.1988	(.2405)	0.0578	(.7902)
Adjusted R^2	0.7390		0.3596	

The table presents results of OLS regressions. Dependent variables are total revenue and revenue per site. The sample includes 271 movies (projects) developed between 1994 and 2000. Sites are the maximum number of theaters, at any given time, where the movie was playing. Star is an actor who had previously won an Academy Award or had been nominated for it. All other variables are described in Table 1. Results are corrected for heteroskedasticity.

or the lemons hypotheses. This finding is also consistent with the work of Robinson (2006), who suggests that if firms select their optimal organizational structures, projects developed via alliances should perform much the same as projects developed internally.

5. Conclusions

We have used movie industry data to investigate firm choice of organizational structure for corporate investment. The dataset includes both movies developed internally and movies developed via strategic alliances. We supplement project-level data with firm- and industry-level data to analyze motives for alliance formation.

We find that project risk matters in the decision to form an alliance. There is evidence that studios finance their least risky projects internally. Moreover, we find that studios that are more likely to form alliances have higher project risk differentials, and are somewhat more likely to be financially constrained.

These results are consistent with Robinson (2006), who suggests that alliances resolve contracting issues in internal capital market and allow firms to undertake projects that are generally riskier than other projects within the firm. We find partial support for the resource-pooling motive for alliance formation.

Finally, we show that the performance of projects developed internally does not differ significantly from those developed through alliances, suggesting that firms choose their optimal organizational structures.

Our findings may have implications for the theory of the firm. Zingales (2000) suggests that new theories of the firms must address new firm boundaries that have become "fuzzy." Alliances represent relatively new organizational form that can extend the boundaries of the firm. Our results suggest that firms adopt this organizational form to take advantage of investment opportunities that they might not undertake otherwise.

References

Adam, T., S. Dasgupta, and S. Titman. 2004. Financial Constraints, Competition, and Hedging in Industry Equilibrium. Working Paper, University of Texas.

Aghion, P., and J. Tirole. 1994. The Management of Innovation. *Quarterly Journal of Economics* 109(4):1185–1208.

Akerlof, G. 1970. The Market for 'Lemons': Qualitative Uncertainty and the Market Mechanism. *Quarterly Journal of Economics* 84:488–500.

Allen, J., and G. Phillips. 2000. Corporate Equity Ownership, Strategic Alliances, and Product Market Relationship. *Journal of Finance* 55(6):2791–2815.

Basuroy, S., S. Chatterjee, and S. A. Ravid. 2003. How Critical Are Critical Reviews? The Box Office Effects of Film Critics, Star Power, and Budgets. *Journal of Marketing* 67:103–17.

Bessembinder, H. 1991. Forward Contracts and Firm Value: Incentives and Contracting Effects. *Journal of Financial and Quantitative Analysis* 26:491–532.

Bleeke, J., and D. Ernst. 1995. Is Your Strategic Alliance Really a Sale? *Harvard Business Review* 73(1):97–105.

Breeden, D., and S. Viswanathan. 1996. Why Do Firms Hedge? An Asymmetric Information Model. Working Paper, Duke University.

Chan, S., J. Kensinger, A. Keown, and J. Martin. 1997. Do Strategic Alliances Create Value? *Journal of Financial Economics* 46:199–221.

Chen, Z., and T. Ross. 2000. Strategic Alliances, Shared Facilities, and Entry Deterrence. *Rand Journal of Economics* 31(2):326–44.

Chetwynd, J. 1999. Lights, Camera, Money? Financiers Play Growing Role in Movie Making. *USA Today*, March.

Coase, R. 1937. The Nature of the Firm. *Economica* 4:386–405.

Cohen, W., and D. Levinthal. 1990. Absorptive Capacity: A New Prospective and Learning and Innovation. *Administrative Science Quarterly* 35:128–52.

Contractor, F., and P. Lorange. 1988. *Cooperative Strategies in International Business*. Lexington Books, Lexington, MA.

DeMarzo, P., and D. Duffie. 1995. Corporate Incentives for Hedging and Hedge Accounting. *The Review of Financial Studies* 8:743–71.

DeVany, A. 2004. *Hollywood Economics: How Extreme Uncertainty Shapes the Film Industry.* London: Routledge.

DeVany, A., and D. Walls. 2002. Does Hollywood Make Too Many R-Rated Movies? Risk, Stochastic Dominance, and the Illusion of Expectation. *Journal of Business* 75(3):425–51.

Elfenbein, D., and J. Lerner. 2003. Ownership and Control Rights in Internet Portal Alliances, 1995–1999. *Rand Journal of Economics* 34:356–69.

Epstein, E. J. 2005. *The Big Picture—The New Logic of Money and Power in Hollywood*, Random House, New York, NY.

Esty, B. 2003. Amoco (A): Policy Statement on the Use of Project Finance. Harvard Business School Case, 9-201-054, revised January 2003.

Esty, B. 2004. When Do Foreign Banks Finance Domestic Investment? New Evidence on the Importance of Financial and Legal Systems. Working Paper, Harvard University.

Fee, E. 2002. The Costs of Outside Equity Control: Evidence from Motion Picture Financing Decisions. *Journal of Business* 75(4):681–711.

Filson, D., and R. Morales. 2006. Equity Links and Information Acquisition in Biotechnology Alliances. *Journal of Economic Behavior and Organization* 59:1–28.

Filson, D., D. D. Switzer, and P. Besocke. 2005. At the Movies: The Economics of Exhibition Contracts. *Economic Inquiry* 43(2):354–69.

Folta, T. 1998. Governance and Uncertainty: The Trade-Off Between Administrative Control and Commitment. *Strategic Management Journal* 19:1007–28.

Froot, K., D. Scharfstein, and J. Stein. 1993. Risk Management—Coordinating Corporate Investment and Financing Policies. *Journal of Finance* 48:1629–58.

Fulghieri, P., and M. Sevilir. 2003. The Ownership and Financing of Innovation in R&D Races. Working Paper, SSRN.

Gans, J., D. H. Hsu, and S. Stern. 2002. When Does Start-Up Innovation Spur the Gale of Creative Destruction? *The RAND Journal of Economics* 33:571–86.

Goettler, R., and P. Leslie. 2005. Cofinancing to Manage Risk in the Motion Picture Industry. *Journal of Economics and Management Strategy* 14:231.

Goetzmann, W., S. A. Ravid, R. Sverdlove, and V. Pons. 2006. Soft Information Hard Sell—The Role of Soft Information in the Pricing of Intellectual Property: Evidence from Screenplays Sales. Working Paper, Yale University, and NBER Working Paper 10468.

Goldberg, V. 1997. The Net Profits Puzzle. *Columbia Law Review* 97:524–550.

Gomes, A., and G. Phillips. 2005. Why Do Public Firms Issue Private and Public Equity, Convertibles, and Debt? Working Paper, University of Pennsylvania.

Gomes-Casseres, B., B. J. Hagedoorn, and A. B. Jaffe. 2006. Do Alliances Promote Knowledge Flows? *Journal of Financial Economics* 80(1):5–34.

Graham, J. 1996. Proxies for the Marginal Tax Rates. *Journal of Financial Economics* 42:187–222.

Graham, J. 2000. How Big Are the Tax Benefits of Debt? *Journal of Finance* 55:1901–41.

Graham, J., and C. Smith. 1999. Tax Incentives to Hedge. *Journal of Finance* 54:2241–62.

Greene, W. 2000. *Econometric Analysis*. Prentice-Hall, Inc, Upper Saddle River, NJ.

Grossman, S., and O. Hart. 1986. The Costs and Benefits of Ownership: A Theory of Lateral and Vertical Integration. *Journal of Political Economy* 94:691–719.

Guedj, I., and D. Scharfstein. 2004. Organizational Scope and Investment: Evidence from the Drug Development Strategies and Performance of Biopharmaceutical Firms. Working Paper, MIT.

Halbfinger, D. 2005. Pentagon's New Goal: Put Science into Scripts. *The New York Times*, August 4, E1.

Hamel, G. 1991. Competition for Competence and Inter-Partner Learning within International Strategic Alliances. *Strategic Management Journal* 12:83–103.

Hamel, G., Y. Doz, and C. Prahalad. 1989. Collaborate with Your Competitors and Win. *Harvard Business Review* 67:133–9.

Hart, O., and J. Moore. 1990. Property Rights and the Nature of the Firm. *Journal of Political Economy* 98:1119–58.

Haushalter, D. 2000. Financing Policy, Basis Risk, and Corporate Hedging: Evidence from Oil and Gas Producers. *Journal of Finance* 55:107–52.

John, K., S. A. Ravid, and J. Sunder. 2006. Performance and Managerial Turnover—Evidence from the Careers of Film Directors. Working Paper, New York University.

Khanna, N., and S. Tice. 2001. The Bright Side of Internal Capital Markets. *Journal of Finance* 56:1489–527.

Kogut, B. 1988. Joint Ventures: Theoretical and Empirical Perspectives. *Strategic Management Journal* 9(4):319–32.

Lerner, J., and R. Merges. 1998. The Control of Technology Alliances: An Empirical Analysis of the Biotechnology Industry. *Journal of Industrial Economics* 46(2):125–56.

Lerner, J., and R. Rajan. 2006. NBER Conference on Corporate Alliances. *Journal of Financial Economics* 80(1):1–3.

Lerner, J., H. Shane, and A. Tsai. 2003. Do Equity Financing Cycles Matter? Evidence from Biotechnology Alliances. *Journal of Financial Economics* 67(3):411–46.

Mathews, R. D. 2006. Strategic Alliances, Equity Stakes, and Entry Deterrence. *Journal of Financial Economics* 80(1):35–80.

Mayers, D., and C. Smith. 1990. On the Corporate Demand for Insurance: Evidence from the Reinsurance Market. *Journal of Business* 63:19–40.

Mody, A. 1993. Learning Though Alliances. *Journal of Economic Behavior and Organization* 20:151–70.

Mowery, D., J. Oxley, and B. Silverman. 1996. Strategic Alliances and Inter-Firm Knowledge Transfer. *Strategic Management Journal* 17:77–91.

Nanda, A., and P. Williamson. 1995. Use Joint Ventures to Ease the Pain of Restructuring. *Harvard Business Review* 73(6):119–28.

Pisano, G. 1997. R&D Performance, Collaborative Arrangements, and the Market for Know-How: A Test of the "Lemons" Hypothesis in Biotechnology. Working Paper, Harvard Business School.

Ravid, S. A. 1999. Information, Blockbusters, and Stars: A Study of the Film Industry. *Journal of Business* 72(4):463–92.

Ravid, S. A., and S. Basuroy. 2004. Beyond Morality and Ethics: Executive Objective Function, the R-Rating Puzzle, and the Production of Violent Films. *Journal of Business* 77(2):155–92.

Robinson, D. 2006. Strategic Alliances and the Boundaries of the Firm. Working Paper, Duke University; forthcoming in *Review of Financial Studies*.

Robinson, D., and T. Stuart. 2007. Financial Contracting in Biotech Strategic Alliances. Working Paper, Duke University.

Rothaermel, F. 2001. Complementary Assets, Strategic Alliances, and the Incumbent's Advantage: An Empirical Study of Industry and Firm Effects in the Biopharmaceutical Industry. *Research Policy* 30:1235–51.

Smith, C. W., and R. Stulz. 1985. The Determinants of Firms, Hedging Policies. *Journal of Financial and Quantitative Analysis* 20:391–405.

Snyder, G. 2006. Other People's Money. *Weekly Variety*, January 23–29, 1.

Stein, J. 1997. Internal Capital Markets and the Competition for Corporate Resources. *Journal of Finance* 52:111–33.

Stuart, T. 2000. Interorganizational Alliances and the Performance of Firms: A Study of Growth and Innovation Rates in a High-Technology Industry. *Strategic Management Journal* 21(8):791–811.

Stulz, R. 1984. Optimal Hedging Policies. *Journal of Financial and Quantitative Analysis* 19:127–40.

Tufano, P. 1996. Who Manages Risk? An Empirical Examination of Risk Management Practices in the Gold Mining Industry. *Journal of Finance* 31:1097–1137.

Weinstein, M. 1998. Profit-Sharing Contracts in Hollywood: Evolution and Analysis. *Journal of Legal Studies* 67–112.

Welkos, R. 1996. Sharing the Risk and Wealth. *Los Angeles Times*, April 8.

Williams, R. 2000. A Note on Robust Variance Estimation for Cluster-Correlated Data. *Biometrics* 56:645–6.

Yong, J. 2004. Horizontal Monopolization via Alliances, or Why a Conspiracy to Monopolize is Harder Than It Appears. Working Paper, National University of Singapore.

Zingales, L. 2000. In Search of New Foundations. *Journal of Finance* 55(4):1623–53.