USING REAL OPTIONS TO MAKE DECISIONS IN THE MOTION PICTURE INDUSTRY

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Managers often face problems regarding whether to continue a project or scrap it. Traditional capital budgeting frameworks aren't particularly helpful in this regard because they assume a static investment decision-making process in which managers consider projects as do-it-now-or-never propositions. That is, traditional capital budgeting approaches assume that managers undertake "discrete" investments rather than investments that unravel in stages. The applied discounted cash flow (DCF) or net present value (NPV) methods need a beginning and ending time, suggesting that a project will produce cash flows without cessation from start to end. These stylized characterizations of investments are questionable, particularly in situations of high uncertainty, because the logic of DCF and NPV may lead to flawed decisions.

Real options, however, provide an alternative approach to thinking about capital investments by taking into account that companies can postpone a business decision, either to continue or abandon projects, based on how future uncertainty unfolds. A real option is the right, but not the obligation, to undertake a business decision. Essentially, a real options approach recognizes that managers invest in projects in stages based on new information that more closely reflects the realities of firms' rapidly changing operational and competitive environments.

Table 1 summarizes the key differences between traditional DCF methods and a real options approach to major capital outlays. As the table shows, DCF assumes investment projects as now-or-never decisions, whereas real options consider investment decisions as dynamic and staggered. In addition, DCF methods aren't tailored to flexibility, but the real options approach incorporates the flexibility of when and how much to invest. Furthermore, DCF considers volatility as a negative factor in determining project value and suggests that managers should expect—and set—higher discount rates for projects with more volatile cash flows. On the other hand, mathematical models of option valuation illustrate that the value of any option increases when volatility goes up. Thus, a real options approach values volatility positively. In sum, a real options approach is more relevant when a project contains staged investments whose outcomes are uncertain.

Real Options Research

Though real options are intuitively appealing, few studies have documented their use in practice. In this article, we'll summarize findings of a study that we conducted under the auspices of the IMA Research Foundation. The context for our study is the U.S. motion picture industry—an industry that's notoriously risky and, therefore, especially conducive to embracing the features of real options logic. Indeed, the major firms (studios) regularly introduce a number of very costly new products (movies) whose success is difficult to predict. Our research for the IMA Research Foundation involved two stages.

In the first stage, we gathered information about the production and marketing costs of movies from published sources as well as in-depth interviews with a number of professionals working in the motion picture industry. As our prior articles have outlined (see "The Movie Industry in the Spotlight," p. 59), any movie project has several key stages of decision making, such as property acquisition, script development, greenlighting of production, releasing on opening weekends, and post-opening marketing support.

In the second stage of our research, we conducted statistical analyses of how real options manifest themselves at two junctures in the decision-making process of a motion picture—at the time of initial investment (pro-

Table 1: Differences between DCF and Real Options Analysis of Capital Investments

	DECISION TIMELINE	ACKNOWLEDGEMENT OF FLEXIBILITY	VALUE OR RISK
DCF	One-time game: "now or never"	Attach zero value of flexibility (flexibility is ignored)	Negative value of volatility (NPV is negatively related to discount rate, which is higher for higher volatility)
Real options	Dynamic game: "now or wait"	Positive value of flexibility	Positive value of volatility

Table 2: Top 10 Domestic Box Office Yearly Grosses, 2011

RANK	MOVIE TITLE	DOMESTIC GROSS	SEQUEL (YES/NO)
1	Harry Potter and the Deathly Hallows, Part 2	$381,011,219	Yes
2	Transformers: Dark of the Moon	$352,390,543	Yes
3	The Twilight Saga: Breaking Dawn, Part 1	$281,287,133	Yes
4	The Hangover, Part II	$254,464,305	Yes
5	Pirates of the Caribbean: On Stranger Tides	$241,071,802	Yes
6	Fast Five	$209,837,675	Yes
7	Mission: Impossible – Ghost Protocol	$209,397,903	Yes
8	Cars 2	$191,452,396	Yes
9	Sherlock Holmes: A Game of Shadows	$186,848,418	Yes
10	Thor	$181,030,624	No

Source: Boxofficemojo.com

duction) and at the point when executives decide how many marketing dollars to spend. Specifically, the first real option is a *growth option*, which is the right to make additional investments if the initial investment is successful. The growth option in the movie industry is to produce sequels after a successful original movie. The second type of real option is an *abandonment option*, which relates to the amount of spending on advertising. During and after a movie's opening weekend, studio executives must decide whether and how much to continue to back a movie based on such information as opening box office receipts and tracking data. We'll discuss each category of real options next.

Growth Options of Sequels

One way in which the studios manage uncertainty in investments is by producing sequels—follow-ups to successful original movies. Our interviews with industry executives revealed that, in today's environment, studios plan the majority of their movies with growth potential in mind. Although sequels may be planned simultaneously with the original movie, sequels and originals typically are neither jointly produced nor marketed, and the original movie doesn't share production or marketing costs with the sequel. Hence, a sequel presents an investment option at a later time based on an assessment of the original's success. Indeed, for each sequel, the studio needs to select entirely new scripts, sets, locations, and even actors, and each sequel has its own marketing budget and campaign. There are three franchises in which

production of two of the films occurred back to back and each of the two films was released separately. Thus, while there may have been some production savings from using common sets and props, the films had separate marketing budgets as they were released approximately a year apart. The films were *Pirates of the Caribbean, Dead Man's Chest* and *At World's End* (films two and three of the series); *Harry Potter and the Deathly Hallows, Parts 1 and 2* (films seven and eight in the series); and *The Twlight Saga: Breaking Dawn, Parts 1 and 2* (films four and five in the series).

Sequels present lower risk for the studios because moviegoers are familiar with the original movie's characters and context. Accordingly, nine out of the top 10 domestic box office hits in 2011 were sequels, with *Harry Potter and the Deathly Hallows, Part 2* being the highest-grossing movie of 2011 (see Table 2).

Figure 1 illustrates real options thinking with regard to sequels. Assume a planned original movie project, Project X, will cost $100 million to produce and is estimated to have a 50-50 chance of generating discounted cash flows of $10 million or $180 million. The project has a negative NPV of $5 million because the expected cash inflow is $95 million (0.5 × 10 + 0.5 × 180) while the cash outflow is $100 million. The studio will scrap the project based on

Figure 1: Real Option Value of a Sequel
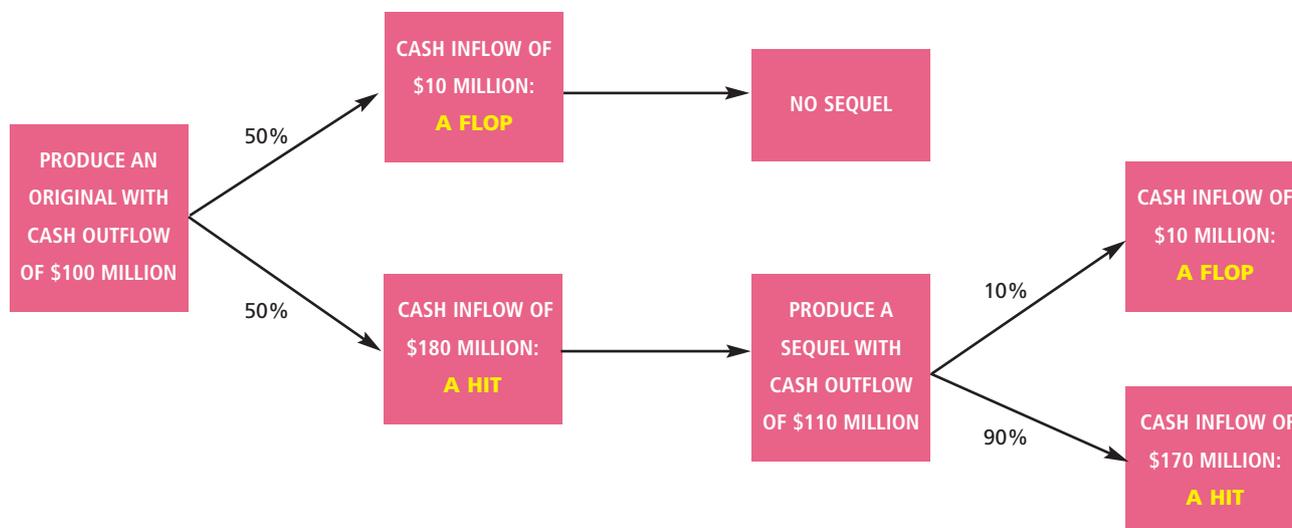
Note: For simplicity, we omit the script development, advertising, and releasing stages.

NPV calculations. But if the studio plans a sequel and considers the investment with the sequel's option value in mind, it will reach a different conclusion. We'll now illustrate this real options logic.

Industry data suggests that sequels usually incur higher production costs. Let's say the sequel to Project X has an estimated cost of $110 million and has a 10% chance of generating $10 million of cash inflow and a 90% chance of generating $170 million of cash inflow. Recall that if the original is successful, the odds of the sequel being successful are better. The expected NPV from the sequel is $44 million $[(0.1 \times 10 + 0.9 \times 170) - 110]$. Since there's a 50% chance that a sequel will be produced (reflecting the 50% chance that the original grosses well), the value of the growth option embedded in the sequel is $22 million ($0.5 \times 44). Thus the expected total cash inflow of investing in the original film under real options logic is $17 million ($22 million – $5 million loss on the original film). Once the real option on the sequel is factored in, the project should be greenlighted.

Beyond this straightforward example, in our empirical study we used two comparisons to test the implications of growth options in the context of sequels. First, we matched 132 sequels with 132 original films without sequels. We found that sequels earn a higher return on investment (102%) than original films without sequels (70%). This evidence confirms our expectation that sequels are more profitable. Next, we matched 132 original films with sequels against another 132 original films
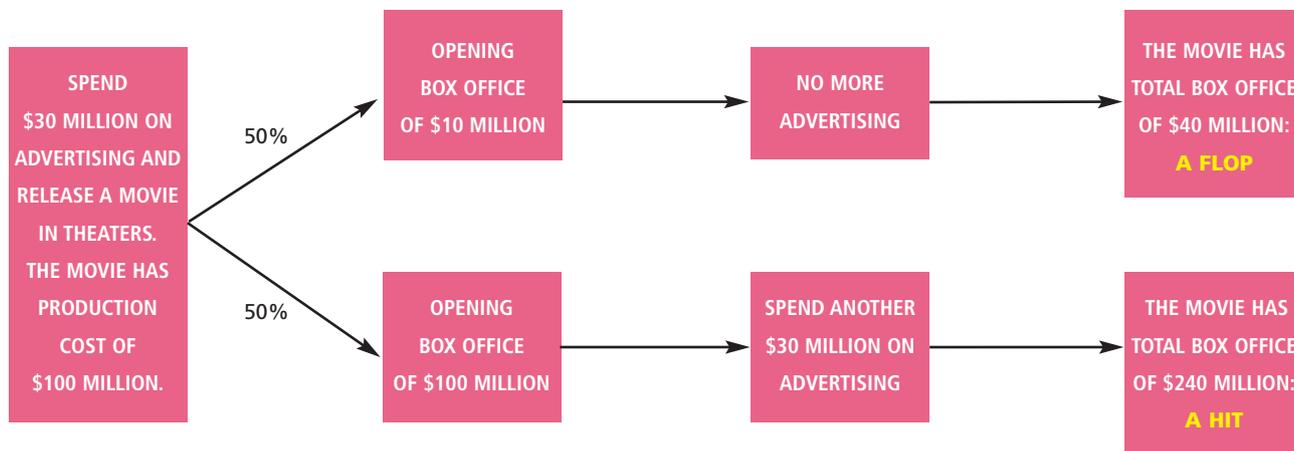
without sequels. We found that studios incur higher production and marketing costs for original films with sequels ($56 million) compared to those without sequels ($45 million). This result is consistent with our expectation that the value of a growth option in a sequel justifies higher costs for an original movie. Overall, our empirical results indicate that studio managers have a growth option in mind when planning the original film.

Real Options in Spending Advertising Dollars

After the studio greenlights a film, it begins to leak information through interviews with directors and stars. During post-production (i.e., after the film is produced but before test screening), studios track audience responses to trailers and interviews with producers, directors, and the cast. The process begins with Nielsen Media Research calling between 400 and 500 people at random several times a week to determine if they are aware of the film and whether they intend to pay to see it. After post-production, films are also test screened with focus groups. Then after they poll the audience, studios may still make changes to selected scenes in the film and adjust their marketing strategy. Based on pre-release audience test results, studios may make several decisions about the film, with the following possible outcomes:

1. If the film generates good audience test results, then the marketing budget is kept as is.

2. If the film generates very good audience test results,

Figure 2: Real Option Value of Waiting to Invest in Advertising

SPEND $30 MILLION ON ADVERTISING AND RELEASE A MOVIE IN THEATERS. THE MOVIE HAS PRODUCTION COST OF $100 MILLION.	OPENING BOX OFFICE OF $10 MILLION	NO MORE ADVERTISING	THE MOVIE HAS TOTAL BOX OFFICE OF $40 MILLION: A FLOP
	OPENING BOX OFFICE OF $100 MILLION	SPEND ANOTHER $30 MILLION ON ADVERTISING	THE MOVIE HAS TOTAL BOX OFFICE OF $240 MILLION: A HIT

(50% upper branch, 50% lower branch)

Note: For simplicity, we omitted the script development and production stages.

The numbers are representative of the facts in the motion picture industry and consistent with the numbers used in Table 2. The differences in cash inflows are as follows: In the **flop** scenario, cash inflow after advertising is $10 million (40-30). In the **hit** scenario, the cash inflow after advertising is $180 million (240-30-30).

then the marketing budget often is increased.

3. If the film generates poor audience test results, then (a) the marketing budget can be increased to overcome the poor results if the studio believes that the film is strong but that the marketing campaign has been ineffective (or sometimes the film itself can be altered to overcome its weak reception), or (b) the film can be "abandoned," and its planned marketing budget is saved. In this case, the film is often sent straight to video.

Once a studio decides to release a movie in theaters, it will spend about 75% of its marketing budget before the movie opens. The marketing budget varies from movie to movie, with a current range of $30 million to $50 million for a feature film. The remaining 25% of the marketing budget, often called the remainder, is flexible and spent depending on audience exit polls and actual box office performance during the opening weekend. This is a significant amount of advertising for which the studio can potentially exercise an option, or, as a studio executive explained, "While the budget for marketing costs is set before production of the movie begins, movie marketing costs involve *judgment.*"

If the movie meets or exceeds the desired opening box office revenue target—that is, when it's *tracking* well— then the studio might spend more to promote the movie. Alternatively, if a movie's initial revenues fall below expectations, managers have the option to spend less on marketing it or exercising an *abandonment option.* Marketing decisions in this context are consistent with the

real options framework as they depend on a *wait-and-see* approach based on the availability of new information, such as opening box office results after theatrical release. According to a studio executive, "By Saturday night [of the opening weekend], it is quite clear how the movie is going to do in theaters. If it looks like it is going to do really well, the marketing budget will be increased; if it does poorly, it can be pulled from theaters quickly and the marketing money saved."

Figure 2 illustrates the previously described real options logic applied to advertising cost. If a movie generates low box office revenue during the opening weekend, the studio usually abandons it and saves the planned advertising money for other movies. On the other hand, if the movie generates high box office revenue in the opening weekend, studios will invest more on advertising with the aim of the movie proceeding to become a hit. Studios are then more likely to produce a sequel following the movie, as we described in the first part of the article.

The post-release scenarios we just described allow us to compare marketing expenditures across categories of movies, which includes those that open successfully vs. those that don't. In our empirical study, we investigated the implications of this *wait-and-see* type of real option on the pattern of marketing expenditure. We used a large sample of 1,752 movies released in the United States between 1990 and 2006. We found that the incurrence of marketing costs varies with the initial success of a movie in theaters, indicating that movie executives exercise

their *wait-and-see* option based on a movie's success before incurring more marketing costs. Of note, these results—especially those indicating *abandonment* of rather poorly performing movies at the opening—go against the widely held belief and presumed pressures for *spend-it-or-lose it* budgeting behaviors and human tendencies toward *escalating commitments*. This suggests that real options can have powerful effects beyond just the appraisal of capital decisions and into the dynamic process of spending over time.

So far, we've introduced two applications of real options theory in the motion picture industry. For simplicity, we separated them. But in most contexts, almost all capital expenditures are staged investments, and an option exists for further investment at each stage. These options are tied together. For instance, exercising the real option of spending more advertising dollars after observing a strong opening box office unlocks the opportunity to produce a sequel.

Real Options Implementation in Other Industries

The real options approach to making investment decisions under uncertainty is a highly useful framework, especially when projects warrant multiple stages of investments. Though real options provide a company with flexibility to adapt to changes in its environment, we also suggest that it's a tool managers can use to navigate corporate finance and competitive strategy. Surveys con-ducted by other researchers show that only about 10% to 15% of *Fortune* 1,000 companies use the real options approach, and their degree of usage varies. This may be the result of the lack of clear examples.

In the movie industry, each movie project is a strategic investment, and one of the most valuable assets for major movie studios is a portfolio of movies. Movie project management has common characteristics with new product development in other industry settings. We believe the real options approaches can be applied just as successfully to capital investment decisions in a variety of settings, such as the pharmaceutical, paper, cable, and construction industries. For instance, in the pharmaceutical industry, Merck is the best-known user of real options to manage risk. In the paper industry, Kimberly-Clark's strategic imperative of organic growth leads to managerial application of real options to deal with uncertainty in its growth strategy. These examples reveal that leadership has to have a long-term view in order to successfully implement real options. We believe that further studies should focus on practical challenges of implementing real options and the need for organizational support for the new capital investment thinking. **SF**

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THE MOVIE INDUSTRY IN THE SPOTLIGHT

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