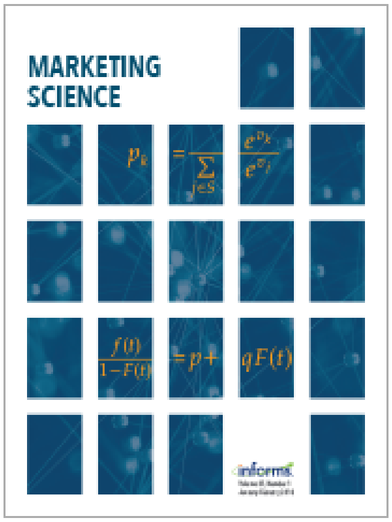

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How Complex Do Movie Channel Contracts Need to Be?

Sumit Raut
Tata Consultancy Services, Mumbai 400096, India, sumit.raut@tcs.com

Sanjeev Swami
Department of Management, Dayalbagh Educational Institute, Dayalbagh, Agra 282110, India, sswami1853@gmail.com

Eunkyu Lee
Whitman School of Management, Syracuse University, Syracuse, New York 13244, elee06@syr.edu

Charles B. Weinberg
Sauder School of Business, University of British Columbia, Vancouver, British Columbia V6T 1Z2, Canada, charles.weinberg@sauder.ubc.ca

The motion picture industry is characterized by a dynamic market environment, limited shelf space and product category management, and consequently, complex channel contracts specifying the split of box office revenue between distributors and exhibitors. Although such a contracting practice creates a considerable administrative effort and channel conflict, it is not clear whether such complexity is necessary for superior channel performance. This study investigates this question by analyzing the impact of movie contract structure on movie scheduling and channel member profitability. We develop and analyze a game-theoretic model using the genetic algorithm approach and a decision support system, *SilverScreener*, to capture strategic behaviors of channel members in a complex market environment. We find that simpler two-part tariff or 50/50 split contracts perform as well as the current contracts. Thus, the complexity of the market environment need not be reflected in the complexity of the channel contracts. Channel contract structure has significant impact on channel member profitability and the exhibitor's movie-scheduling behavior. In particular, our results indicate that the flat rate contract structure represents an attractive alternative to the current practice for distributors.

Key words: channel contracts; movie industry; game theory
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1. Introduction

Designing optimal contracts between manufacturers and retailers is one of the most critical factors affecting channel coordination and the relative profit share of each channel member. An extensive theoretical literature has investigated this issue (e.g., Jeuland and Shugan 1983; Moorthy 1988, 2005; Chu and Desai 1995; Ingene and Parry 1995; Purohit 1997; Villas-Boas 1998; Li 2005; Chuan and Chen 2005), typically taking the approach of a static game-theoretic analysis within the context of one or a few products being marketed through established retail outlets. Consequently, despite their valuable contributions, these studies have largely ignored three important characteristics of the marketing environment—*dynamics*, *limited shelf space*, and *product category management*. In such a market environment, existing products experience demand decay over time, and new products are frequently introduced to replace old ones. Constrained by limited shelf space, retail managers, then, must optimally decide when to carry which products to maximize the total profits generated from the product category over a period of time. In this paper, we investigate the impact of channel contracts on channel coordination and individual channel member performance in such a complex real-world setting.

An example of such a complex market environment is found in the motion picture industry. First, it is dynamic. Lehmann and Weinberg (2000) show that the weekly box office revenue for a movie typically follows an exponential decay over time, with the demand being the highest in the first week after mass market release and then decreasing noticeably each week (27% per week, on average, in their sample). Second, the market is characterized by frequent new product introductions. For example, in the five weeks of October 2005, 22 new movies, starting with the widely promoted *The Greatest Game Ever Played* and concluding with *The Legend of Zorro*, vied for the limited number of screens in a month that is not even in the prime season. For the December 23–26, 2005 weekend, six movies grossing $4 million or more were introduced into an already crowded market (including *King Kong* and *The Family Stone*) to capture the peak holiday box office. Consequently, a large number of movies do not gain sufficient access for exhibition, contributing to a high failure rate of movies (*Variety* 1995). Third, faced by the dynamic market environment and the limited screen space, maximizing profits for a movie season by a careful scheduling of movie release timing and screen allocation is a major concern for both distributors and exhibitors, respectively (Krider and Weinberg 1998, Swami et al. 1999).

Given the complexity found in the motion picture market environment, it is not surprising that channel contracts specifying the split of box office revenue between suppliers (Hollywood studios or distributors) and movie exhibitors (theaters) are also highly complicated. These contract terms are typically designed by the distributor for each movie and involve complex sliding scales in which the distributor's share of the box office revenue is high in the opening week of the movie and gradually decreases over time. Recent studies by Swami et al. (2003) and Filson et al. (2005) reveal great variability of sliding scale contract terms across movies. In addition, the distributor typically has the option of invoking the "90%/10% over house nut" rule (see §2 for details.), further complicating the structure of movie channel contracts.

Designing and negotiating such complex contract terms for each movie leads to substantial administrative cost. One might speculate that it is an inevitable cost that movie channel members are willing to bear in order to operate the channel smoothly in a complex market environment. However, the current contract has been a source of channel conflict (*Variety* 2004) and the exact benefit of utilizing such complicated contracts is not clear. Thus rises a natural question: How complex do movie channel contracts need to be?

Therefore, in this paper, we examine the effectiveness of alternative channel contracts in a dynamic multiproduct market within the context of the motion picture industry. Our study is "experimental" in nature in that it analyzes a series of "what if" scenarios. Due to the difficulty of conducting field experiments in which movie studios would implement various channel contracts in negotiating with exhibitors, we instead employ the next-best alternative by analyzing the impact of alternative channel contracts within a stylized industry model, as seen in numerous previous channel studies. In particular, our model of industry consists of two competing manufacturers (distributors) and one retailer (exhibitor), as seen in Choi's (1991) study. However, in our attempt to realistically capture the complex characteristics of the dynamic multiproduct market of the motion picture industry, our model sacrifices the mathematical tractability of simpler channel models. We overcome this by using a successfully implemented decision support tool called *SilverScreener* (Swami et al. 1999) (henceforth SEW 1999) as the optimal "retailer reaction function" and the genetic algorithm technique to capture the distributors' optimal decisions on contract terms.

Our analysis leads to two main findings. First, we find that the current contract practice leads to total channel profits that are comparable to what can be achieved by joint profit maximization among the three channel members (i.e., vertically integrated channel). In this sense, one may say the current contracts lead to near-perfect channel coordination. However, we demonstrate that a simple 50/50 split of the box office revenue also leads to near-perfect channel coordination and that there exist other simpler channel contract structures that do not seriously affect the total channel profits. Thus, the need for channel coordination does not seem to justify the complexity of the current contract practice. Second, in contrast to its minimal impact on total channel profits, movie channel contract structure has significant effects on individual channel member profitability and the exhibitor's movie-scheduling decision. In particular, our results reveal that there exists a financial incentive for movie distributors to switch to a simple flat rate contract. Interestingly, we find that such a change leads not only to greater profits for distributors, but also to a significantly larger number of movies obtaining screen exposure. At a broader level, our findings generally indicate that movie channel contracts do not have to be nearly as complex as they currently are.

Filson et al. (2005) analyzed data collected from 13 theaters in the Wehrenberg chain and also found that a simpler two-part tariff contract could produce approximately the same revenue as the current contracts. However, their model assumes a fixed movie exhibition schedule (i.e., number of movies and run lengths are held constant) and no competitive actions among distributors. By acknowledging this limitation, they attribute the continued use of the current sliding contracts to the fact that simpler two-part tariff contracts "would encourage the exhibitor to shorten the run length" (p. 365). In contrast, our model takes a game theory framework in which each of the competing distributors offers contracts strategically designed to induce more favorable movie scheduling by a strategic exhibitor who determines movie selection and run length. In this way, we are able to examine the impact of various channel contract types on movie schedules and equilibrium profits and, consequently, reach a very different conclusion that favors the use of simpler contracts over the current contracts.

Our findings provide new insights into the distribution dimension of the marketing of motion pictures. The lure and the challenge of the movie business have received substantial attention of marketing scholars in the recent years (Krider and Weinberg 1998, Eliashberg et al. 2000, Lehmann and Weinberg 2000, Krider et al. 2005, Filson et al. 2005, Ainslie et al. 2005). However, little attention has been given to the management of the relationship between the channel partners, although it is a significant concern in the industry (Eliashberg et al. 2006, Wierenga 2006).

A methodological challenge is that our model involves the movie exhibitor's decision on whether or not to play a particular movie in a given week, the effect of which *cannot be captured by a continuously differentiable profit function*. Furthermore, the channel system includes two competing distributors introducing *as many as forty new products* of varying quality over *multiple periods*.[1] The lack of a continuously differentiable payoff function and the sheer number of decision variables, some of which are binary variables, make it impossible to analyze our model with the typical approach of mathematical derivation of closed-form equilibrium solutions. We overcome this challenge by using a combination of *SilverScreener* and the genetic algorithm method, which allows us to identify the optimal retailer (i.e., exhibitor) strategy and the equilibrium manufacturer (i.e., distributor) strategy. In this way, although our study focuses strictly on the movie channel contract problem, it also points to the future research possibility of analyzing a host of complex channel strategy problems that cannot be investigated using the traditional game-theoretic approach.

The rest of this paper is organized as follows. In the next section, we provide a detailed description of the channel contract problem in the motion picture industry. Section 3 discusses the development of the stylized model and the method of model analysis. We present the analysis results in §4 and provide a discussion of key model assumptions in light of real-world environment and practices in §5, followed by concluding remarks and suggested directions for further research in §6.

2. Channel Contract in the Motion Picture Industry

Current Industry Practice

There exists a fairly standard but complicated structure for channel contracts in the movie industry, as described in SEW (1999) and Filson et al. (2005). A typical exhibition contract for a movie states a fixed obligation period and a differential revenue-sharing scheme in different weeks between the distributor and the exhibitor.[2]

In a given week, the revenue-sharing scheme splits the gross of a movie between a distributor and an exhibitor by one of the two rules: (a) 90%/10% over house nut,[3] or (b) minimum gross percentage. Between these two rules, the distributor chooses to use whichever maximizes its share of the box office revenue for the given week. If the *90%/10% over house nut* rule is chosen, then the distributor receives 90% of the gross after the exhibitor has deducted and retained the house nut amount, leaving the exhibitor with 10% of the gross over house nut plus the house nut amount. The 90%/10% over house nut rule is intended to "kick in" if the week's box office revenue is unusually high.[4] Otherwise, the *minimum gross percentage* rule is invoked to split the whole gross amount (without house nut deduction) according to the specified minimum percentage for that week.

A critical channel contract decision under the current practice is the specification of the minimum gross percentage terms. On the one hand, the distributor would like to set this term high to capture a large "slice" of the box office revenue "pie." On the other hand, if this term is set too high, the distributor runs the risk of losing the "shelf space" by failing to provide a sufficient economic incentive for the exhibitor to play the distributor's movie. The exhibitor's economic incentive is not limited to the box office revenue, because the exhibitor also earns some income from concession sales such as popcorn, candies, and soft drinks. The concession sales, however, depend on individual demands generated by the movies playing at the theater. The exhibitor does not share the concession income with the distributor. The distributor must take all of these factors into consideration to set the optimal minimum gross percentage schedule for a movie.

Considering the fact that weekly movie demand varies substantially across movies as well as over time

[1] By contrast, the few published dynamic models in the literature typically cover two periods. Purohit (1997) uses such a model to study a single automobile manufacturer's channel policy with regard to new, rental, and used cars.

[2] The obligation period limits the ability of an exhibitor to replace a movie with less than satisfactory box office performance in the initial weeks after its release. The obligation period may range from 2 to 10 weeks depending on the respective bargaining power of the distributor and exhibitor and the marketability of a particular movie.

[3] House nut is a small negotiated amount that the exhibitor receives from the distributor. It does not necessarily bear any relationship to the theater's actual expenses, and is only meant to allow for some cushion in the exhibitor's profit margins.

[4] Filson et al. (2005) report that the 90%/10% rule kicks in for less than 3% of contracts in which it is available, and even then for one or two weeks at most. We obtained similar results in our simulations.

for the same movie, it is not surprising to find that the minimum gross percentage terms vary substantially across movies and from week to week. Swami et al. (2003) analyze data collected from a multiplex movie theater and report that, for a given movie, the weekly minimum gross percentage is the highest for the first week of exhibition and gradually decreases in the subsequent weeks, following a *sliding scale* schedule. They also find considerable variability in these contract terms across movies, leading to at least 17 different sliding scale schedules applied to 133 movies during a one-year period. In addition, they demonstrate that a movie's first-week box office revenue is significantly and positively correlated with the distributor's share of it, indicating that distributors capture a larger share of first-week box office revenues for stronger movies.

The current practice of movie channel contracts as described above is quite complicated (Fellman 2004). Such complexity might be inevitable to a certain degree because of the market dynamics (i.e., frequent release of new movies, seasonality, and movie demand decay over time), the weekly decision making of exhibitors, and the variability of movie strength and decay rate within each distributor's portfolio of movies. Nevertheless, the current practice of designing such a complex contract for each movie for each exhibitor takes considerable managerial effort. A 2004 *Variety* article succinctly summarizes the situation. "Distribs and exhibs spend much of their time fighting picture by picture, theater by theater to divvy up streams of cash from movie ticket sales" (*Variety* 2004, p. 1). Such ongoing complaints about the current contracts in the industry point to a need for exploring alternative ways to design channel contracts that are simpler, yet more profitable, for channel members.

Table 1 Illustrative Example of the Impact of Movie Channel Contracts

	Week 1	Week 2	Week 3	Week 4
(a) Weekly movie demands				
Movie 1	100	70	0	0
Movie 2		80	56	0
Movie 3			100	70
Channel coordinating exhibition schedule	Movie 1	Movie 2	Movie 3	Movie 3
Total channel revenue for season*		374.5		
(b) Exhibitor profit streams under a sliding scale contract (70%; 50%)				
Movie 1	37	39.9	0	0
Movie 2		29.6	31.92	0
Movie 3			37	39.9
Exhibitor's preferred exhibition schedule	Movie 1	Movie 1	Movie 3	Movie 3
Total channel revenue for season*		363.8		
Total distributor revenue for season		210		
Total exhibitor profit for season*		153.8		
Distributor 1 season revenue		210		
Distributor 2 season revenue		0		
(c) Exhibitor profit streams under a two-part tariff contract (F, 60%)				
Movie 1	47	32.9	0	0
Movie 2		37.6	26.32	0
Movie 3			47	32.9
Exhibitor's preferred exhibition schedule	Movie 1	Movie 2	Movie 3	Movie 3
Total channel revenue for season*		374.5		
Total distributor revenue for season		$210 + 3F$		
Total exhibitor profit for season*		$164.5 - 3F$		
Distributor 1 season revenue		$162 + 2F$		
Distributor 2 season revenue		$48 + F$		

*Includes concession sale revenue net of the costs of concession sales and movie exhibition.

Illustration of the Impact of Channel Contracts

Finding alternative channel contracts that are simpler and more profitable than the current industry practice requires analyzing a model that richly captures the complex market environment. Before we present such a model in §3, however, we first demonstrate how channel contract structure and distributor-level competition affect the performance of the movie channel as well as its individual members using the simple numerical examples shown in Table 1.

In Table 1(a), we consider a four-week season for a channel composed of one distributor and one exhibitor. The distributor releases one new movie in each of the first three weeks. Movies 1 and 3 are strong movies, generating the box office revenues of 100 and 70, if played. Movie 2 is a weaker movie and can generate box office revenues of 80 and 56. Note that, in weeks 2 and 3, there are more movies available (two) than the number of screens (one). Thus, the exhibitor must decide which movie to play to maximize its profits. From the channel system's point of view, it is easy to see that the total channel revenue-maximizing exhibition schedule is to play movie 1 in week 1, movie 2 in week 2, and movie 3 in weeks 3 and 4, which results in a total channel revenue of 374.5 for the season.[5] Table 1(b) shows what will happen to this scenario if the box office revenue is split following a sliding scale of 70% and 50% in favor of the distributor for the first and second weeks of exhibition, respectively. This contract creates a misalignment between the channel revenue stream and the exhibitor profit stream, resulting in a movie exhibition schedule that is suboptimal

[5] This figure comes from the total box office revenue plus concession revenue minus the variable costs of movie exhibition and concession sales. SEW (1999) report that, on average, the concession revenue minus the variable costs amounts to 7% of the box office revenue. The same number is used throughout this paper.

for the channel system. Specifically, in week 2, movie 2 can lead to greater box office revenue (80) than movie 1 (70). However, the exhibitor can earn a greater profit by playing movie 1 instead of movie 2. Consequently, the exhibitor chooses to play movie 1 for weeks 1 and 2 and movie 3 for weeks 3 and 4, completely eliminating movie 2 from its exhibition schedule. This decreases the total channel revenue from 374.5 to 363.8.

We next examine an alternative contract structure, two-part tariff, which has been suggested as a channel coordination mechanism (Moorthy 1987, Coughlan and Wernerfelt 1989, Ingene and Parry 1995). Table 1(c) shows the impact of a two-part tariff contract that requires the exhibitor to pay the distributor a fixed payment, F, as well as 60% of its box office revenue for each movie. Under this contract, the weekly profit stream for the exhibitor is perfectly aligned with the movie demand pattern (in Table 1(a)), causing the exhibitor to schedule movies in the way that maximizes the total channel revenue. Thus, the channel is perfectly coordinated. In addition, as long as $0 < 3F < 10.7$, both the distributor and the exhibitor are better off than under the sliding scale contract. Therefore, this example shows the potential of the two-part tariff contract structure as a WIN-WIN alternative to the current practice.

The above example provides some basic understanding of why channel contracts matter and how different contract structures induce different movie-scheduling behavior. Nevertheless, it is not meant to give the premature impression that two-part tariffs represent a better contract in a more complex real-world environment. In particular, introducing competition to this numerical example quickly complicates the situation. To see this, consider the example in Table 1 again, but this time, assume that there are two competing distributors, Distributor 1 releasing movies 1 and 3 and Distributor 2 releasing movie 2. All other assumptions remain the same. In this case, the exhibitor's scheduling decisions remain the same, because the exhibitor simply tries to maximize its season profits regardless of whether the movies are supplied all by one distributor or by multiple distributors.

At the distributor level of the channel, however, the situation is much different from the monopolist distributor case. Specifically, under the sliding scale contract scenario, Distributor 1 earns revenue of 210, whereas Distributor 2 earns nothing. When the two-part tariff contract of a fixed fee F and 60% of box office revenue is applied, Distributor 1's revenue becomes $(162 + 2F)$ and Distributor 2's revenue becomes $(48 + F)$. For Distributor 1 to be better off under the two-part tariff contract instead of the sliding scale contract, the condition, $F > 24$, must hold. This also makes Distributor 2 better off under the two-part tariff contract. However, if the condition holds, the exhibitor is much worse off under the two-part tariff contract scenario. Thus, the two-part tariff contract, which provided a WIN-WIN solution for the one-distributor channel, does not represent a WIN-WIN-WIN solution for the two-distributor channel. Thus, as McGuire and Staelin (1983) demonstrated in a simpler environment, an optimal channel strategy in the absence of competition may not be optimal in competitive markets.

Furthermore, note that the above example assumes, for simplicity, that the two distributors use the same contract types with the same contract terms. However, one cannot rule out the possibility that two competing distributors might prefer to offer different contract terms or even two different contract types to the exhibitor. Given these possibilities, it is extremely difficult for one to use either intuition or the existing literature to predict what each distributor's optimal strategy is and what the resulting equilibrium will be like. To address this issue, we next develop a stylized industry model and conduct an equilibrium analysis of the channel contract problem in the motion picture industry.

3. Model Development and Analysis

Industry Structure

Our model of the industry consists of two competing distributors, D1 and D2, and one multiplex exhibitor with six screens. The two distributors are assumed to be symmetric in size (i.e., frequency of new movie releases) and product quality. In this way, our industry model resembles Choi's (1991) "two manufacturers one common retailer" model. However, the dynamic nature of product demand, frequent new product introductions, the limited retail shelf space, and the management of a product portfolio further complicate our model.

Market Environment

The above channel structure is then applied to a movie season represented by simulated demand data sets. We assume a movie season that is 12 weeks long, approximating the length of the summer peak season. During each of the first 10 weeks of the season, four new movies are released, two of which belong to Distributor 1 and the other two movies belong to Distributor 2. If the exhibitor chooses to play a new movie, it must be shown for a minimum obligation period of 2 weeks. We assume no new movies are released in weeks 11 and 12 primarily to avoid artificial end period effects and to allow movies released in week 10 to be played beyond the obligation period of 2 weeks. In addition, we assume that six movies were playing at the end of the previous season and that the exhibitor can continue to play any of them in the new season.[6] Therefore, the movies released in week 1 of the season are not guaranteed to have theater exhibition unless the exhibitor finds it more profitable to replace some of the currently playing movies with the newly released ones. These market characteristics mimic the limited shelf space for movie exhibition, typically observed in the peak seasons of summer and from Thanksgiving Day to New Year's Day. Specifically, the maximum number of new movies the exhibitor can play over the 12-week season is 30 (10 weeks of new releases times 6 screens divided by 2 weeks of obligation period per movie) compared to the 40 new movies considered during the season.

Our model takes into account the fact that the 40 new releases may vary in quality and popularity, leading to different levels of opening strength and decay. Consistent with the empirical results in Krider and Weinberg (1998) and Jedidi et al. (1998), we assume that the weekly box office revenue for movie j, REV_{jt}, decays exponentially over time, captured by the function, $REV_{jt} = 1{,}000 * e^{\alpha_j - \beta_j t}$, where α_j and β_j measure opening and decay rates and t represents the number of weeks after release. The latter study also shows that most mainstream Hollywood films can be classified into one of the four types. Following the actual proportions of the four types of movies reported in that study, we randomly determine the type of each new movie. For instance, a new movie has a 19% probability of being a Type I: "Hollywood Hero," characterized by very high opening strength and a high decay rate ($\alpha_j = -1.484$, $\beta_j = 0.224$). Similarly, a movie might be a Type II: "Mega Movie" (high opening strength and slow decay; $\alpha_j = -1.614$, $\beta_j = 0.11$), a Type III: "Fast Fade" (very low opening strength and very fast decay; $\alpha_j = -2.52$, $\beta_j = 0.439$); or a Type IV: "Fair Flicks" (low opening strength and moderate decay; $\alpha_j = -2.255$, $\beta_j = 0.258$) with probabilities of 7%, 38%, and 36%, respectively.[7] Once a movie's type is determined, we assume the channel members know the expected revenue from playing the movie for any given week.

[6] Thus, a total of 46 movies were considered in each simulated season.

[7] Specifically, a random number is drawn among integers between 1 and 100 for each movie. Then the movie is assumed to be Type I if the random number is between 1 and 19, Type II if it is between 20 and 26, Type III if it is between 27 and 64, and Type IV if it is between 65 and 100. In this way, we treat the timing of a particular movie release as being exogenous, in order to focus our attention on the channel contract aspect of the industry. Krider and Weinberg (1998) analyzed the strategic aspect of the new movie release-timing decision by a movie distributor.

Channel Member Behavior

Following the convention of the motion picture industry, we assume that the distributors design the channel contracts and that the exhibitor selects and schedules movies for exhibition each week. Each channel member is assumed to seek to maximize its own profits as described below.

Distributors. Each distributor can choose between the current contract structure or a simpler alternative contract structure. The current industry practice involves sliding scale contract terms complemented by the 90%/10% rule with a house nut amount scaled appropriately to the other parameters of the problem. Using the data reported by Swami et al. (2003), the minimum gross percentages for the distributor in the sliding scale for different types of movies are specified as follows:

Type I Movies: 60% (1st week), 50% (2nd week), 40% (3rd week), and 35% (balance weeks).

Type II Movies: 70% (1st week), 60% (2nd week), 50% (3rd week), and 40% (balance weeks).

Type III and IV Movies: 50% (1st week), 40% (2nd week), and 35% (balance weeks).[8]

If the current contract structure is chosen by a distributor, its cumulative season revenue is expressed as follows:

$$\sum_{m=1}^{20}\left[E_m\left(\sum_{t=1}^{T_m} I_{\theta_{mt}} \cdot \{0.9 \cdot (REV_{mt} - C)\} + (1 - I_{\theta_{mt}}) \cdot p_{mt} \cdot REV_{mt}\right)\right] \tag{1}$$

where

p_{mt} = the minimum gross percentages for distributor for movie m in its tth week of its play,
REV_{mt} = box office revenue for movie m in week t after its release,
C = house nut (fixed amount paid by the distributor to exhibitor),
T_m = play-length of movie m,
E_m = 1, if the exhibitor chooses to play movie m at its theater, or 0, otherwise.

θ_{mt} is a logical condition given by

$$\theta_{mt} = 0.9 \cdot (REV_{mt} - C) > p_{mt} \cdot REV_{mt}, \quad \text{and} \tag{2}$$

I_θ is an indicator variable with $I_\theta = 1$, if $\theta = TRUE$, or 0, otherwise.

In Equation (1), the first expression inside the interior summation corresponds to the *90%/10% rule* of the current contract terms given by the conditions in

[8] According to the data, these were the representative contract terms used for both Type III and Type IV.

Equation (2). The second expression reflects the application of the *minimum gross percentage rule* following the sliding scale contract terms.

As an alternative to the current contract structure, we first consider the two-part tariff contract structure, based on its well-documented effectiveness for channel coordination (Moorthy 1987, Coughlan and Wernerfelt 1989, Ingene and Parry 1995) and potential to produce comparable revenues for the movie channel (Filson et al. 2005). If the two-part tariff structure is chosen, the distributor's objective function is specified as follows:

$$\max_{p_m,\,F_m} \sum_{m=1}^{20}\left[E_m\left(F_m + \sum_{t=1}^{T_m} p_m \cdot REV_{mt}\right)\right]. \tag{3}$$

In other words, the distributor determines the optimum combination of (p_m, F_m) for each type of movie to maximize cumulative revenue from all the movies that it releases. p_m represents the distributor's share of weekly box office revenue, whereas F_m indicates fixed-fee arrangements, if any, between the distributor and exhibitor for each type of movie. In this expression, a negative value of F_m would imply a slotting fee paid by the distributor to the exhibitor. Therefore, a distributor using the two-part tariff contract needs to decide only six contract terms (variable and fixed components for three groups of movies) over the time horizon.[9]

We comment on three aspects of Equation (3). First, note that the two-part tariff contract in Equation (3) is substantially simpler than the current contract structure specified in Equation (1). This is due to the fact that the two-part tariff contract does not involve the *90%/10%* rule and that the distributor's share of revenue, p_m, is time invariant, leading to a smaller number of contract parameters. Second, because no existing two-part tariff contract terms can be found in the movie industry practice, the specific contract terms need to be determined by solving the optimization problem. The complexity of the model makes it impossible to solve this optimization problem mathematically as is typically done in game-theoretic analyses of marketing channels. Instead, we employ the genetic algorithm approach, as discussed later. Third, solving the optimization problem in Equation (3) requires the distributor to have the information on the exhibitor's exhibition decisions, captured by E_m and T_m. As is typically done in previous analytical channel studies (e.g., McGuire and Staelin 1983, Choi 1991, Sayman et al. 2002), we assume the distributor makes optimal decisions on p_m and F_m with the foresight of how they will affect the exhibitor's optimal decisions on the choice of movies for theater exhibition (E_m) and their play-lengths (T_m).

In addition, we consider three other contract structures that are even simpler than the two-part tariff contracts. First, we set $F_m = 0$ in Equation (3) and allow each distributor to optimize on p_m only for each movie type. Second, we set $p_m = 0$ and have each distributor optimize on F_m only for each movie type. In this way, the former represents the case of flat-rate revenue sharing, whereas the latter represents the case of selling the right to play a movie at a fixed price. In either case, the distributor has only three decision variables (for Type I, for Type II, and for Types III and IV, each). Finally, we consider the simplest case in which $p_m = 0.5$ and $F_m = 0$. In this case, the distributor and the exhibitor simply split the box office revenue 50/50 with no optimization and regardless of the movie type. $p_m = 0.5$ reflects the general observation in the industry that movie distributors receive roughly half of the box office revenue (Filson et al. 2005).

Exhibitor. For the given contract terms offered by the distributors, the exhibitor, as a Stackelberg follower, seeks to maximize its season profits for the movie season. Thus, the objective function of the exhibitor, corresponding to Equation (1), is:

$$\max_{E_m,\,T_m} \sum_{m=1}^{46}\left[E_m\left(\sum_{t=1}^{T_m} I_{\theta_{mt}} \cdot \{C + 0.1\cdot(REV_{mt} - C)\} + (1 - I_{\theta_{mt}}) \cdot (1 - p_{mt}) \cdot REV_{mt} + (pop - VC)\cdot REV_{mt}\right)\right] \tag{4}$$

where *pop* and *VC* denote concession revenues and theater's variable costs, respectively, as a fraction of box office revenue. We assume $T_m \geq 2$, reflecting an obligation period of two weeks for each movie, following a typical industry practice.[10] Successful implementation of SilverScreener was accomplished with a minor variation of this objective function (Eliashberg et al. 2001).

If the distributor offers a two-part tariff contract, then the 90%/10% rule is not in effect and the exhibitor's objective function is as follows:

$$\max_{E_m,\,T_m} \sum_{m=1}^{46}\left[E_m\left(-F_m + \sum_{t=1}^{T_m}\left((1 - p_m)\cdot REV_{mt} + (pop - VC)\cdot REV_{mt}\right)\right)\right]. \tag{5}$$

[9] We use a common pair of (p_m, F_m) for Type III and Type IV movies, because our preliminary analysis showed that allowing them to take different values between the two movie types leads to little improvement.

[10] This condition does not apply to movies 41 to 46, designated as *dummy* movies, which were released in the previous movie season and playing at the beginning of the current season (i.e., $E_m = 1$ for $m = 41, 42, \ldots, 46$). For such movies, $T_m \geq 1$.

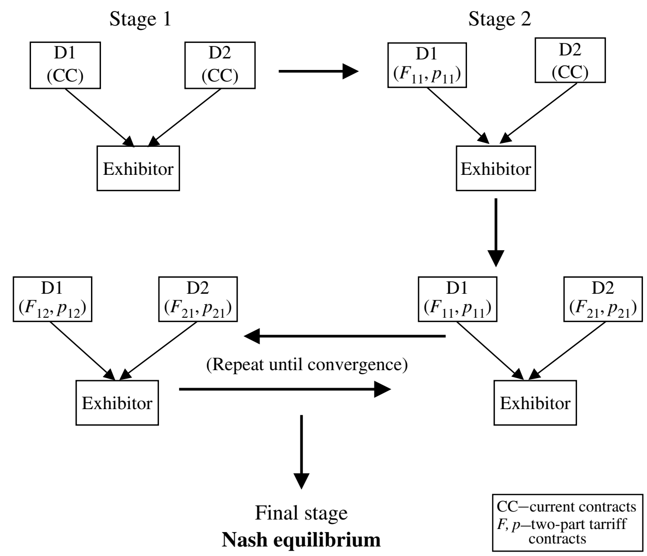
Note that the exhibitor's objective function is different from the distributors in four ways. First, although the distributor's cumulative revenue is from *its own movies only*, the exhibitor's cumulative profit can come from *any movies*, signified by the summation over all 46 movies[11] in Equations (4) and (5) as opposed to the summation over 20 movies in Equation (1). This incompatibility of objectives between the two parties can be a potential source of a channel coordination problem. Second, the exhibitor has an additional source of revenue from concession sales (shown by the last expression within the summation in Equations (4) and (5)). Because the profit from concession sales is directly related to the number of movie viewers and the movie ticket price usually remains unchanged across movies and over a season, it is reasonable to assume that concession profit is a fixed percentage of the box office revenue, as implemented in *SilverScreener* (Eliashberg et al. 2001). Third, for the same reason, we incorporate the per-viewer operational cost as a fixed percentage of the box office revenue. In our analysis, we set the value of $(pop - VC)$ at 7%, based on industry experience (see SEW 1999). Finally, the optimal exhibition-scheduling decision, represented by E_m and T_m, is produced by *SilverScreener*, developed by SEW (1999), and later implemented by Pathe (Eliashberg et al. 2001).

Model Analysis

Based on the model described above, we created 64 simulated movie seasons. Thirty-two of these were used for main analyses and the remaining 32 were held out for validation of results. Because we held the market environment parameters fixed across all the seasons, random variations were the only cause for any differences between one season and another. Because our interest is to identify contract terms that can be used without being altered too frequently, we assume that a distributor sets its contract terms to be used for a two-year period, which is roughly equivalent to eight movie seasons.[12] Accordingly, we created four data sets, each composed of eight randomly selected seasons. In each of these four data sets, we obtained Nash equilibrium contract terms for alternative channel contract structures and compared their effectiveness against the results obtained from applying the sliding scale contracts currently used in the industry.

Figure 1 illustrates our equilibrium analysis procedure for the case of two-part tariff contracts. First, we applied the current sliding scale (plus the 90%/10% rule) contract terms to both distributors. We then obtained the exhibitor's optimal movie exhibition schedule using *SilverScreener* and recorded the resulting profit for each channel member. Second, we moved to the case in which one of the distributors (D1) switches from current practice to a two-part tariff contract while the other (D2) continues to use the current contract terms. The optimal set of six contract terms for D1 was obtained by applying the genetic algorithm procedure consisting of a population size of 70 and 70 generations, which proved to produce good results within a reasonable amount of time. (See Raut 2007 and the Technical Appendix at http://mktsci.pubs.informs.org for details on the design and performance of this algorithm.) Third, conditional on D1's optimal two-part contract terms, we found optimal two-part contract terms for D2 using the same genetic algorithm approach. From this point on, we alternated between the two distributors, allowing one of them to update its optimal two-part contract terms at a time repeating the genetic algorithm procedures, until the contract terms converged to the Nash equilibrium point. The movie-scheduling decision of the exhibitor and the profit for each channel member were recorded at this equilibrium state for comparison against the results obtained from the current contract terms. Equilibrium contract terms for simpler contract structures were obtained using the same procedure.

Figure 1 Channel Structure and Equilibrium Analysis Procedure



4. Results

In this section, we discuss the results of our main analysis of the four data sets, each representing a period of eight seasons (roughly two years). Our main focus is on the comparison of results between the case

[11] Dummy movies are included in the exhibitor's objective function, but not in the distributor's objective function, as given by Equations (1) and (3), respectively.

[12] We also analyzed our model using a shorter (four seasons long) and a longer (32 seasons long) time horizon for the distributor's decision but found no meaningful differences in the main results.

of current contracting practice (Stage 1 in Figure 1) and the case where competing distributors employ simpler alternative contract structures. In addition, we obtained the results for the vertically integrated channel in which all three channel members are owned by one firm and, thus, maximize the joint revenue for the channel system. We use the vertical integration case results as a benchmark against which the other cases are compared.

Overall, the four data sets reflect consistent market environments, although the random component built into the model makes each data set represent a unique case. Specifically, the total box office revenue varies within a ±3% range across the four data sets, for all contracting situations considered. Similarly, the equilibrium contract terms identified for the four data sets exhibit some variations due to the random component of the model, but are generally consistent and intuitively appealing. Specifically, Table 2 shows that when two-part tariffs are used, the distributors extract fixed payments ($F > 0$) for stronger movies (Type I and II), but offer to pay the exhibitor fixed payments ($F < 0$) for weaker movies (Type III and IV), analogous to the practice of slotting allowances often

Table 2 **Equilibrium Contract Terms**

		Type I		Type II		Types III and IV	
Contract structure	Distributor	*F*	*p*	*F*	*p*	*F*	*p*
Data set 1							
2-part tariff	D1	139	0.31	75	0.54	−18	0.6
	D2	76	0.52	80	0.57	−36	0.73
Constrained 2-part tariff	D1	109	0.32	125	0.40	−17	0.31
	D2	114	0.32	147	0.39	−33	0.47
Flat rate ($F = 0$)	D1	0	0.69	0	0.71	0	0.43
	D2	0	0.65	0	0.68	0	0.42
Fixed price ($p = 0$)	D1	216	0	420	0	48	0
	D2	269	0	416	0	45	0
Data set 2							
2-part tariff	D1	98	0.49	46	0.58	−38	0.71
	D2	152	0.4	115	0.56	−20	0.57
Constrained 2-part tariff	D1	62	0.41	156	0.30	−31	0.43
	D2	117	0.36	93	0.44	−6	0.48
Flat rate ($F = 0$)	D1	0	0.61	0	0.56	0	0.44
	D2	0	0.63	0	0.66	0	0.44
Fixed price ($p = 0$)	D1	298	0	446	0	52	0
	D2	302	0	509	0	88	0
Data set 3							
2-part tariff	D1	103	0.45	90	0.57	−37	0.7
	D2	141	0.38	94	0.57	−12	0.5
Constrained 2-part tariff	D1	77	0.42	170	0.33	−26	0.38
	D2	116	0.32	88	0.45	−4	0.28
Flat rate ($F = 0$)	D1	0	0.64	0	0.65	0	0.43
	D2	0	0.74	0	0.68	0	0.43
Fixed price ($p = 0$)	D1	272	0	436	0	62	0
	D2	275	0	540	0	71	0
Data set 4							
2-part tariff	D1	134	0.30	109	0.44	−17	0.38
	D2	152	0.31	103	0.48	−12	0.45
Constrained 2-part tariff	D1	59	0.41	162	0.35	−25	0.58
	D2	116	0.26	35	0.51	−21	0.43
Flat rate ($F = 0$)	D1	0	0.64	0	0.65	0	0.43
	D2	0	0.74	0	0.68	0	0.43
Fixed price ($p = 0$)	D1	228	0	370	0	75	0
	D2	279	0	552	0	49	0
Average over 4 data sets							
2-part tariff		125	0.40	89	0.54	−24	0.58
Constrained 2-part tariff		96	0.37	122	0.40	−20	0.42
Flat rate ($F = 0$)		0	0.67	0	0.66	0	0.43
Fixed price ($p = 0$)		267	0	461	0	61	0

Table 3 Impact of Channel Contract on Revenues

Contract type	Average distributor revenue	Exhibitor revenue*	Total revenue for the channel system**
Vertical integration	N/A	N/A	69,677 (100%)
Current contracts	15,386	38,372	69,144 (99.2%)
Two-part tariff	18,377	31,810	68,484 (98.3%)
Constrained 2-part tariff	15,404	38,372	69,181 (99.3%)
Flat rate ($F = 0$)	18,448	30,414	67,311 (96.6%)
Fixed price ($p = 0$)	12,822	40,239	65,884 (94.6%)
50/50 split	15,495	38,139	69,128 (99.2%)

*These figures include the concession revenue minus operating costs, which is assumed to be 7% of box office revenue.

**Numbers in the parentheses represent the degree of channel coordination measured by the % of total channel profits in the vertically integrated channel.

observed in the grocery distribution channel. When the flat-rate ($F = 0$) structure is used, the distributors set their share of the box office revenue (p) higher for Type I and II movies than for Type III and IV. Similarly, under the fixed-price ($p = 0$) contract structure, Type I and II movies are sold at much higher prices than Type III and IV. Interestingly, the price (F) for Type II movies is much higher (461 on average) than for Type I (267 on average), reflecting the value of the slow decaying demand of Type II movies.

Next, we turn to the financial impact of these alternative channel contract structures. Table 3 shows the results of our analysis, averaged over the four data sets. First, we note that under the current contracts the distributors and the exhibitor split the box office revenue roughly in half, consistent with industry experiences.[13] Second, more importantly, the table shows that the current contracts lead to a near perfect level of channel coordination in the sense that the total channel system revenue is almost identical (99.2%) to that of the vertically integrated channel. However, according to the last column of the table, such a high degree of channel coordination is not unique to the current contracts. Specifically, two-part tariff contracts (98.3%) are found to be as effective as the current contracts, whereas the flat rate and fixed-price contract structures reach somewhat lower, but still very high (96.6% and 94.6%, respectively), levels of channel coordination. For the case of 50/50 split, it is not surprising to observe the almost perfect channel coordination, because the exhibitor's financial incentive is perfectly aligned with maximizing the revenue for the entire channel system (i.e., the exhibitor's objective function is a rescaled version of total channel revenue maximization).

[13] For instance, between 8/31/01 and 5/8/03, the share of box office revenue received by the 21 distributors supplying films to Wehrenberg Theaters of St. Louis, MO, ranged from 42% to 57% (Filson et al. 2005).

Third, despite the marginal impact of contract structure on total channel revenue, we find more noticeable effects on individual channel member revenues. For instance, Table 3 indicates that switching from the current contracts to two-part tariff contracts increases the distributor's revenue by nearly 20% (from 15,386 to 18,377) and decreases the exhibitor's revenue by a similar percentage. Thus, the two-part tariff contracts enabled the distributors to extract a larger share of box office revenues. Nevertheless, the exhibitor was still able to retain a significant portion (46% on average) of the total channel profits due to the fact that the two distributors had to compete for limited screen space by offering attractive contract terms to the exhibitor.

Fourth, having found that switching from the current contracts to two-part tariff contracts will be detrimental to the exhibitor's profitability, one might wonder what will happen if strong resistance from exhibitors keeps two-part tariff contracts from being implemented in the real world. To explore this question, we reanalyzed our model by adding a constraint that when designing two-part tariff contracts, each distributor must ensure that the exhibitor is not worse off than under the current contract practice. The result for this constrained two-part tariff case is shown in the fourth row of Table 3. Not surprisingly, imposing this constraint hurts the distributors' profitability but benefits the exhibitor's. Interestingly, the resulting payoffs for each channel member as well as the total channel system revenue are remarkably similar to the results under the current contracts. Therefore, on the revenue side, the constrained two-part tariff is as effective as the current contracts. Although this does not lead to better performance for the distributors, it is substantially simpler than the current contract structure and acceptable to all channel members. This implies that if its simpler contract structure leads to sufficient savings in administrative costs, the constrained two-part tariff contracts may represent an attractive alternative to the current contracting practice.

Fifth, our analysis shows that among the alternative contract structures considered in this paper, the flat-rate contract leads to the greatest revenue to the distributors. This revenue side benefit, combined with the potential administrative cost savings due to its simple contract structure, makes the flat-rate contract very attractive to distributors. However, whether the distributors will be able to switch to flat-rate contracting in the real world depends upon the potential resistance of exhibitors, because our result indicates that the flat rate is the least desirable contract type to them. In contrast, the exhibitor finds the fixed-price contract the most attractive, whereas the distributors find it the least attractive. Even the simple 50/50 split contract, which does not involve any optimization behavior by the distributors, results in much higher revenues for the distributors than the fixed-price contracts. This implies that the ability to share a portion of the box office each week through channel contracts is important for the distributors' profitability.

Finally, we find it interesting that the 50/50 split contract structure, which is by far the simplest, leads to basically the same revenue outcomes for the channel members as the current contracts, which are the most complicated. This strongly suggests that movie channel contracts do not have to be as complex as they currently are despite the complex characteristics of the market environment.

We also find that channel contract type has a significant impact on the exhibitor's movie-scheduling behavior, as shown in Table 4. As mentioned in §2, the current industry practice of sliding scale contracting tends to encourage exhibitors to play fewer movies for longer periods by allowing them to keep a larger share of the box office revenue if a movie is played longer (SEW 1999). Our result in Table 4 confirms this by demonstrating that the current contracts cause the exhibitor to play about 10% fewer movies than it would if the channel was vertically integrated. By comparing the number of movies for each type, one can see that, under the current contract terms, the exhibitor depends heavily on strong (Types I and II) movies. Although these movies represent only 26% (19% for Type I and 7% for Type II) of all movies released (Jedidi et al. 1998), they account for roughly 2/3 of those played by the exhibitor under the current contract practice. In contrast, on average, 156 of 205 movies belonging to Types III and IV fail to gain any screen exposure under the current contract practice.

However, when the distributors switch from the current practice to two-part tariffs, the exhibitor increases the number of Type III and IV movies played substantially, with little change to the number of Type I and Type II movies shown. Consequently, the total number of movies played increases. The two-part tariff induces this behavior because it provides a limited incentive for the exhibitor to continue playing declining Type I or Type II movies, when a Type III or Type IV movie is released with a slotting allowance. Interestingly, Table 4 shows that the number of movies played for each type under the two-part tariff contracts is very similar to that for the vertically integrated channel.

Table 4 Impact of Channel Contract on Number of Movies Played

Contract type	Type I	Type II	Types III and IV	Total	Relative to total in integrated channel (%)
Vertically integrated	61	27	63	150	
Current contracts	61	26	49	135	90.2
Two-part tariff	57	26	67	150	100.0
Constrained two-part tariff	60	26	73	159	106.3
Flat rate ($F = 0$)	61	26	87	174	116.4
Fixed price ($p = 0$)	54	20	43	117	78.1
50/50 split	61	27	52	139	92.7

Note. On average, 237 of new movies released in a dataset belong to Types III and IV.

The greatest increase in the total number of movies (16% over the vertically integrated channel and 26.2% higher than current contracts) was observed when the movie contracts were simplified to the flat-rate structure ($F = 0$). In contrast, when the simple fixed-price contract ($p = 0$) was applied, the number of movies decreased noticeably. This clearly demonstrates that the effect of including a fixed fee in the movie channel contract is to discourage movie exhibitors from replacing movies. Thus, among the contract structures analyzed in this paper, the flat-rate contract is the best for alleviating the shelf space scarcity problem in the movie distribution channel, although it is slightly inferior to two-part tariffs in achieving channel coordination.

In summary, our results demonstrate that simpler contract structures can be as effective as the more complicated sliding scale contract structure currently used in the motion picture industry. In addition, two-part tariffs may help alleviate the shelf space scarcity problem in the distribution channel, creating more opportunities for screen exhibition for movies with limited box office appeal. Our results on the effect of two-part tariff contracts are in some ways consistent with the empirical finding of Filson et al. (2005). However, our conclusion is very different. Their analysis did not take into the consideration the effect of contract type on movie exhibition schedules. Therefore, although their analysis showed that two-part tariffs and current contracts can lead to similar revenues, they speculate that the risk of changes in exhibition scheduling will probably make the simpler two-part tariff contract less attractive than the current contracts. In contrast, by incorporating the exhibitor's optimal movie-scheduling decision into the model, we show that switching from the current contracts to the two-part tariff contract structure affects movie scheduling, indeed, but has little impact on total channel revenue. Furthermore, our results imply that switching to even simpler contract types would be beneficial for movie distributors, although it may have a significant impact on the exhibitor's movie-scheduling behavior.

To ensure that these results are not driven by the fact that the two-part, flat-rate, and fixed-price contract terms were optimized for each of the four data sets, we conducted a validation analysis using a separate set of simulated data encompassing 32 movie seasons. Specifically, we used the average contract terms (F and p) for each movie type from Table 2 and

Table 5 Validation Analysis (32 Seasons)

Contract type	Average distributor revenue	Exhibitor revenue	Total revenue for the channel system	Number of movies played
Vertical integration			269,403	609
Current contracts	58,865	149,598	267,329	536
Two-part tariff	70,193	124,634	265,021	599
Constrained 2-part tariff	58,715	146,898	264,329	598
Flat rate ($F = 0$)	70,389	118,625	259,403	707
Fixed price ($p = 0$)	48,577	154,559	251,714	441
50/50 split	59,553	147,769	266,876	555

applied them to D1 and D2 to validate our results. In this way, the validation analysis mimics the situation in which each distributor commits to long-term (roughly eight years) contract terms based upon past experiences. The results are shown in Table 5.

As seen in Table 5, our validation analyses produced results that are consistent with those presented in the previous tables. Specifically, when both distributors implement two-part tariffs, the total revenue for the channel system remained almost the same as under the current contracts. If the two-part tariffs are used without the exhibitor profitability constraint, the switch from the current contracts benefited the distributors but hurt the exhibitor. When the constraint was imposed, the profitability for each channel member was comparable to that under the current contracts. When simpler one-part pricing contracts were applied ($F = 0$ or $p = 0$), the total channel profits deteriorated somewhat, as expected. In addition, our validation results indicate that the distributors prefer the flat-rate contract ($F = 0$), whereas the exhibitor finds the fixed-price contract ($p = 0$) more profitable, as observed in the main analysis. The effect of channel contract types on the number of movies scheduled for exhibition was also replicated, as shown in the last column of Table 5.

Finally, we also investigated the case in which only one distributor (D1) switches from the current contracts to two-part tariff contracts while the other distributor (D2) continues to use the current contracts, labeled as Stage 2 in Figure 1. By comparing the results for this case against the cases under current contracts (Stage 1) and under equilibrium two-part tariff contracts (Final Stage), we find that:

(a) D1 is better off in Stage 2 than in Stage 1,
(b) D2 is worse off in Stage 2 than in Stage 1, and
(c) D2 is better off in the final stage than in Stage 2.

Therefore, under the current contracts, each distributor has an incentive to unilaterally switch to two-part tariff contracting, and that, at the Nash equilibrium two-part tariff contract situation, neither distributor has an incentive to switch back to the current contracting practice. This implies that simpler contracts can represent stable and effective alternatives to the current contracts for the movie distribution channel.

5. Discussion

The results reported in the previous section come from a stylized model that is intended to capture the essence of the complex market environment that affects motion picture channel contracting. Although our model captures a number of key attributes not considered in previous work, some well-known characteristics of the real-world market environment are excluded from the model for the sake of analytical efficiency and clear identification of causal effects. In this section, we discuss the sensitivity of our findings to a number of these model assumptions.

Demand Seasonality

One of the important characteristics of movie demand is its noticeable seasonality. In the United States, the summer and the winter (between Thanksgiving and New Year's Day) seasons are characterized by a much higher proportion of high-demand movie (i.e., Type I and Type II movies) releases than the rest of the year. Our main analysis involves some season-to-season variations because we randomized the type of each movie. However, this was done while keeping the expected proportion of each movie type constant across all seasons.

To examine the sensitivity of our results to seasonality, we conducted two additional validation analyses. Each analysis involved the application of the same contract terms used in the validation analysis reported in Table 5 to a new data set that involves eight exhibition seasons. Out of the eight seasons, four of them represented peak seasons with a higher proportion of Type I and Type II movies. Specifically, in the first analysis reflecting "mild seasonality," the expected proportions of newly released movie types were 28.5% for Type I, 10.5% for Type II, 31% for Type III, and 30% for Type IV, reflecting a 50% increase for Type I and Type II movies from the proportions reported by Jedidi et al. (1998). This was counterbalanced by the corresponding decreased proportion of Type I and Type II movies in the remaining four (off-peak) seasons. The second analysis was conducted in an "extreme seasonality" environment, in which the expected proportions of Type I and Type II movies were increased (decreased) by 100% for the peak (off-peak) seasons. Under this scenario, Type I and Type II movies are released only during peak seasons.

The results of these additional analyses were consistent with the main findings reported in the previous section. For example, the total revenues for the channel system were virtually the same for the current contract and the two-part tariffs; the two-part tariffs with or without the exhibitor profitability constraints had the same relative effects on individual channel members as those reported in Table 5.

Beyond the Four Movie Types

We confine our analysis to four main types of movies, as identified by Jedidi et al. (1998). The industry, of course, observes other types of movies. Sleeper movies are typically characterized by unexpected successes, which may even build an audience over time. There are very few of these each year and their performance is unexpected by both the exhibitor and the distributor. Given these conditions, it is unclear how to contract for them in advance, and their infrequent occurrence makes it unlikely that their inclusion would have a substantial impact on our results.

Another type of movie is a platform movie, which is typically first released in a few select cities, and then, if it does well, achieves national release. Chen et al. (2006) report that only 10% of nationally released movies started out as platform movies. More importantly, although a platform movie may not follow an exponential decay pattern on a national basis as the number of theaters showing the movies increases, within each theater the movie typically follows an exponential decay pattern. Consequently, special treatment of platform movies seems unnecessary.

Theory and Practice

Whenever the results of an analytical model differ from practice, one can ask which is correct or why the industry does not follow the theoretical results. It is interesting in this regard to note that the nature of contracts between movie distributors and theaters has begun to change. For example, Shari Redstone's chapter on "The Exhibition Business" in Squire's *The Movie Business Book* (2004) notes that there is "a trend toward 'aggregate deals,' where a certain percentage of the film's entire run" is paid to the distributor (p. 396). Our discussions with exhibition industry managers indicate that the use of such contracts is increasing, in part because exhibitors are dissatisfied with obtaining only a small portion of revenues in the early weeks, particularly for movies with very wide openings. Moreover, as Filson et al. (2005) discuss, 10% of the contracts signed in 2001–2002 by the Wehrenberg chain involve aggregate contracts. Although aggregate contracts are not two-part tariffs and are set on a per-picture basis, they clearly indicate some dissatisfaction with the current contracting system and a move toward simpler contract structures, as suggested by our results.

Demand Uncertainty

Our approach abstracts away from demand uncertainty. Although there is undoubtedly uncertainty in movie revenue forecasts at the time contracts are signed (just before a movie's release), managers make decisions on an expected-value basis (Eliashberg et al. 2001) and industry experts have relatively good estimates of the demand, at least for the first weekend's box office (Elberse 2007). Moreover, there are a sufficient number of movies booked into each theater over a long-enough time period that it is likely that over- and underestimates due to short-term forecasting errors would largely balance out. Therefore, we believe that the effects of such uncertainty would have limited impact on our overall policy conclusions.

Effects of Competition

Our model includes competition between distributors but not among exhibitors. In many instances, a theater is effectively a local monopoly and does not need to consider competitive effects. In other cases, theaters may be geographically close to each other; in these cases, as Davis (2006) shows, there may be some competitive effects in terms of level of demand. Even in such situations, exhibition contracts that exclude a movie from being shown in nearby theaters are rarely seen in practice. The effects of competition are also limited because prices are constant across all movies shown at a theater at a particular time.

6. Conclusion

This paper addresses the important, but little explored, topic of channel contracts in the context of the complex real-world market environment characterized by dynamic market demand, limited shelf space and product category management. In particular, we investigate whether the complex market environment justifies such a complicated channel contract structure practice as observed in the motion picture industry. Our results demonstrate that simpler contracts can be as effective for channel coordination and channel member profitability as the current industry practice. Furthermore, we have shown that movie distributors have an incentive to switch from the current practice to simpler contracts unilaterally. Considering the substantial administrative effort required to implement the current channel-contracting policy, this suggests simpler channel contracts can be realistic and attractive alternatives in a dynamic multiproduct market such as the motion picture industry.

Specific contract structures considered in our study include two-part tariffs, flat-rate contracts, fixed-price contracts, and a 50/50 split. Distributors' choice out of this list in the real world will depend not only on the contract structure's effect on revenue and administrative cost, but also on its likelihood of acceptance by the exhibitors. If the exhibitor is not willing to accept any new contract that leads to less revenue than the current contracts, the constrained two-part tariffs or the 50/50 split contracts appear to be realistic alternatives. Because these two alternatives produce similar results, even the two-part tariff structure may be unnecessarily complicated. In fact, there has been some usage of so-called "aggregate" contracts (similar to the flat-rate contract in this paper) in which distributors offer fixed terms where the percentage rate is constant over time, but varies by movie (*Variety* 2004). One U.S. exhibitor gave us access to its contract terms for the first three months of 2006. Approximately half the movies were offered by distributors on aggregate terms, where the rate claimed by distributors varied from 46% to 55%. Perhaps this indicates that movie distributors are beginning to realize the benefit of switching to simpler contracts, but have to set the contract terms reasonably close to the 50/50 split case to make the contract acceptable to exhibitors.

Our analysis also demonstrates that the distributor's choice of channel contract type has a major implication for the exhibitor's screen allocation decisions. Specifically, our results indicate that the current practice of sliding scale contracting is designed to induce extended play-lengths for fewer movies, whereas simpler revenue-sharing contracts (two-part tariff and flat rate) provide stronger financial incentives for the exhibitor to play a larger number of movies. In particular, equilibrium two-part tariff contracts include fixed payments comparable to slotting allowances to the exhibitor resulting in an increased number of weaker movies receiving screen exposures. (In a study of the video rental market, Mortimer 2006 found that more copies of a video were stocked when distributors moved from a fixed-price contract [with a relatively high value of F] to a two-part tariff with a much lower value of F.) Thus, we find that although the movie distributors complain about the difficulty of obtaining sufficient screen space, the problem is, to a certain degree, self-imposed by their current use of the sliding scale contracts. Switching to simpler channel contracts will alleviate this problem in the movie distribution channel and enhance the likelihood of financial success for movies with more limited appeal or that are targeted to smaller segments of the market. From the public's point of view, this may also lead to an improved diversity in their choices of movies in theater exhibition.

At a broad level, our study highlights the importance of channel contracts in dynamic multiproduct markets in the real world. As demonstrated in this study, the structure and terms of channel contracts have a fundamental impact on the shelf space scheduling decisions made by retailers, which in turn will have serious implications for the success of new product introductions. Besides the marketing managers in the motion picture industry, practitioners dealing with such products as fashion apparel, shoes, books, music CDs, etc., need to examine their channel-contracting practices to ensure optimal channel coordination. Surprisingly little research has been done in this area, and our study represents an early attempt to address this issue. Although more research is needed beyond the context of the movie industry, our study indicates that effective channel contracts in these industries may not have to be of a complicated structure simply because of the complexity of the market environment.

The current lack of sufficient research on channel contracts in dynamic multiproduct markets reflects the methodological challenge associated with the research problem. Given the need for analyzing the impact of alternative channel contracts that are not currently in use, empirical research using historical industry data is not a viable alternative. Neither is the field experiment approach, which would require the cooperation of multiple channel members by significantly altering their long-established business practices while risking unknown financial consequences. This leaves the game-theoretic modeling approach as a logical methodological choice, but its typical analysis method requires mathematical tractability, which can be found only in very simple models that cannot reflect the complexity of many real-world situations. Our modeling approach represents a way to overcome this dilemma and extend the applicability of game-theoretic modeling for analyzing a host of interesting marketing problems. Specifically, when the model is too complex to solve mathematically, the decision-making behavior of players can be captured by established decision support expert systems such as *SilverScreener* and/or optimization techniques such as genetic algorithm.

We acknowledge some limitations of our study, which could be addressed in future research. First, following a typical practice in the motion picture industry, we implicitly assumed a fixed retail price (i.e., ticket price) for all movies and in all weeks. For this reason, the insights from our study might not be directly applicable to industries with similar dynamic characteristics (e.g., books, fashion products, fad toys), where retailers can vary retail prices according to the dynamic changes in demand conditions. Second, we modeled the two distributors as being symmetric, with equal size and equal movie quality levels. It will be interesting to see how our conclusions are affected if the model incorporates competition between a larger and/or stronger distributor and a smaller and/or weaker distributor.

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