

**Profits Out of the Picture:  
Research Issues and Revenue Sources  
Beyond the North American Box Office  
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Charles B. Weinberg  
UBC Faculty of Commerce

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Charles B. Weinberg is Presidents of SME Vancouver Professor of Marketing, University of British Columbia, 2053 Main Mall, Vancouver, B.C., V6T 1Z2, Canada. Phone 604-822-8327, Fax 604-822-4697, and email [weinberg@sauder.ubc.ca](mailto:weinberg@sauder.ubc.ca)

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## **Abstract**

In 2002, the average film released by the Motion Picture Association of America cost \$59 million to produce and another \$31 million for distribution and marketing, but earned only \$32.5 million (less than 40% of costs) in domestic box office revenues. This raises the question of whether a U.S. released movie is the primary product of the Hollywood studios, or a “loss leader” for a stream of products (including foreign box office and the sale and rental of videos—both DVDs and video tapes) that together earn more than three quarters the total revenue for Hollywood releases. In this paper we explore the relationship between the various markets and, in particular, provide evidence that the correlation between the box office and the video markets may be declining in recent years. We then explore a number of possible areas for future research including the timing decision between the movie’s release date and the video’s release date, the nature of the buying process in the video store (which involves multiple persons and issues of agency), product line structure including the extent to which movies and videos are complements or substitutes, price discrimination, and piracy.

## **Profits Out of the Picture: Research Issues and Revenue Sources Beyond the North American Box Office**

Disney's *The Lion King* released in 1994 earned North American box revenues of \$250 million, approximately a third of its total worldwide box office. Within 2 years, more than 50 million videos were sold, and retail merchandise sales exceeded \$1.5 billion. *The Lion King* "isn't a movie. It's an industry." (Hawkins, 1995)

### **Introduction**

Is a movie the primary product of Hollywood studios, or a "loss leader" for a stream of products that produces more than half the total revenue earned from each new Motion Picture Association of America [MPAA] release? According to data from the 2002 MPAA Economic Report ([www.mpa.org](http://www.mpa.org)), the domestic box office totaled \$9.5 billion, and the international box office gross was \$9.6 billion, but the VHS and DVD rental and sales market totaled more than \$20 billion.<sup>1</sup> Viewed alternatively, the average MPAA released film in 2002 earned domestic box office revenues of \$32.5 million, but cost \$59 million to produce and another \$31 million for distribution and marketing. Although Hollywood studios acting as distributors earn profits from distribution, ancillary products are crucial by design for the success of Hollywood.<sup>2</sup>

#### **(Table 1)**

This paper has three objectives. The first is to establish the magnitude of the major ancillary products. The second is to examine the nature of the relationships among these markets. The third, and most important, is to raise a set of challenging research issues that

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1 For historical reasons, "domestic" box office revenue typically refers to revenues in both the United States and Canada.

2 Hollywood studios not only distribute their own movies, but sometimes act as distributors of movies produced by others. For purposes of this paper, we do not distinguish between these two cases and use the terms "distributors" and "Hollywood studios" interchangeably. That is consistent with usage in most industry studies.

is important from the standpoint of both academic researchers and industry professionals. Since the majority of ancillary revenue comes from the VHS and DVD rental and sales markets—collectively referred to as the video market—the focus of the paper will be on the video market.

In true movie fashion, here is a sneak preview. One of the most interesting issues, and an organizing framework for the research topics to be discussed below, is the role of time in the movie industry. In brief, time is of the essence. Most mass-market movies follow a fairly standard time pattern. That is, as shown in Krider and Weinberg (1998), the first weekend of wide release achieves the highest attendance and then attendance follows a fairly regular exponential decline after that. **(Figure 1)** While the actual opening and decay rates may vary, the pattern is very consistent. Moreover, Lehmann and Weinberg [LW] (2000) reported a similar result for videos in a sample of 35 mid-90s movies. **(Figure 2)** In addition, LW found that a video's sales pattern was related to the movie's sales pattern.

The simplest question to ask is how long to wait after a movie is released to issue the video. If the video is released too long after the movie, then the excitement and hype surrounding the movie's release may well be dissipated. On the other hand, if the video is released very close to the movie's release date, then movie fans may feel that it is not worthwhile going to the movie and they should just see the video. In other words, to what extent does the movie serve as a promoter of the video, and to what extent does the video cannibalize box office revenues? Not only must the studio decide when to release the video, but it also must decide when to decide. Should a movie studio decide the video release date prior to a movie's release date, or should it gather box office data from the first few weeks and project video sales and then make a decision. LW showed that there was considerable profit opportunity from varying video release times based on early box office results.

Perhaps, however, the wrong question is being asked. At present, studios spend considerable effort determining the optimal opening date for their movies, and then release the video about six months later (with limited variation). But with the video market having twice the revenue of the box office market, perhaps studios should optimize the video release date, and then go backwards to determine the movie release date? Considering both release dates simultaneously would be a further step.

Moreover, if the video and movie are released close together, they are substitute products. If they are released further apart, then they are complements—with many people who saw the movie choosing to view the video as well. So, when do these products change from being substitutes to complements?

### **The Many Markets of Movies**

Disney's *The Lion King* (and also *Pocahontas*) is a classic example of a movie release designed to be successful not only in the North American box office, but also in a vast array of ancillary markets. (**Table 2**) Released June 14, 1994, for 3 months and then re-released for Thanksgiving, the revenue generating products included consumer products (both Disney's own and licensed), theme park attractions (within weeks of the movie's release), video (first released in April 1995, for one year), television, books, direct-to-video sequels, and even a live theater show (1997). Of an estimated \$1 billion in contribution to Disney, only about 15% came from the domestic box office. Although not as successful in dollar terms, *Pocahontas* had a similar result. (See Reavis 1998 for a detailed discussion of *The Lion King*).

Children's movies, and particularly Disney children's movies, may be the pioneers in exploiting outside markets. However, the practice is now widespread. For example, for each of the past six years, the largest domestic box office movie has had an even higher box office

outside North America. **(Table 3)** The top ten domestic films of 2001 all had significant sales overseas. **(Table 4).**

Looking across the domestic industry in 2002, MPAA reports that video rentals totaled \$8.2 billion in 2002 and video sales, \$12.1 Billion. **(Table 5)** The most dramatic growth is in the DVD sales market, accounting for \$8.7 Billion and growing 53% over the previous year. With DVD player penetration at less than 40% of US households at the end of 2002 (but growing rapidly), this market can only become more significant.

According to MPAA data, the average consumption per person of box office entertainment is 13 hours per year, compared to 77 hours per year of home video. Both these numbers are dwarfed by the 1661 hours per year spent watching TV. **(Table 6)**

In 2002, foreign box office in total was approximately equal to the U.S. box office (Groves, 2003).<sup>3</sup> While the 2002 result is due in part to currency fluctuations, the foreign market is a significant addition to the domestic box office. While data on the price that television stations pay for individual feature films is difficult to obtain in general, industry trade publications estimate that the networks pay approximately 15% of domestic box office for the rights for the first 3-4 showings of feature films. (www.variety.com, March 10, 2003)<sup>4</sup> Pay per view and video on demand, while possibly the wave of the future, are still important but smaller sources of revenue. The value of product licensing agreements also adds to the total revenues that flow from a movie. Particular films may also have special markets that can be developed. Movies such as *Spiderman* have impressive tie-ins with the comic book industry; other movies

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3 Of course, Hollywood studios receive only part of these gross revenues. Hollywood's share, termed "rentals" totaled \$3.6 billion for the domestic market and \$3.1 billion for the international market in 2002 (Groves, 2003). Distribution fees and other charges are additional sources of income. Industry sources frequently estimate Hollywood's share as about 50% of box office revenue.

4 Global sales of feature films, made-for-TV movies, television series and other products were \$11 billion (\$7.2 billion in the U.S.) to free television. Global sales to pay television were \$3.3 billion (\$1.5 billion in the U.S.) (Groves, 2003).

are the source (or even the result) of interactive video games.<sup>5</sup> While all these markets are important, as indicated earlier, this paper will concentrate on the video market, as that—along with foreign box office—is the most significant revenue stream beyond the domestic box office.

## Relationships Matter

### Overseas Box Office Results

Not surprisingly, foreign box office results are correlated with the North American box office. (**Table 7**) For a sample of 175 major movies released between 1991 and 1993, Ravid and Basuroy [RB] (2003) found a correlation of  $r = 0.86$  for total box office in the two markets.<sup>6</sup> While until fairly recently Hollywood studios typically released their movies overseas many months after their North American release, often utilizing returned prints from North American theaters, the cause and effect relationship between these two markets can be questioned. Do, for example, North American and overseas audiences have similar tastes, so that whatever movies do well in North America do well overseas? While there is some argument as to whether or not all genres traveled equally well (comedy may be less cross-cultural than action movies), the possible universality of movie audience tastes can be hypothesized as an explanation for the observed correlations. In addition, the large production budgets of Hollywood films may so dominate the spending level of locally produced films that they dominate local markets in the same proportion as they did in North America.<sup>7</sup> Another argument is that the advertising and

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5 For example, coincident with the release of *Spiderman*, the comic book industry launched massive promotions in which participating retailers gave away a free comic book to everyone coming to their stores.

6 Suman Basuroy's assistance in providing correlation statistics is gratefully acknowledged. Other variables, such as MPAA rating (e.g. PG, R) can further help in estimating this relationship. Jedidi et al (1998) present a data-based approach to grouping movies.

7 Waterman and Lee (2002a) indicate that the average 1995 U.S. movie in their sample cost \$12.3 million to produce, whereas the average movies made in the UK, France, Japan, Germany and Italy cost, respectively, \$6.0, \$4.7, \$4.3, \$4.1 and \$2.7 million to produce (Table 1).

word-of-mouth campaigns developed around North American movies, directly or indirectly influenced attendance in other markets as well.

More recently, many Hollywood movies have been released almost simultaneously in North America and in at least some major markets. Reasons for these new timing strategies include a more global management view, fear of piracy, and the desire to utilize worldwide satellite television and internet media to take advantage of the intensive launch marketing campaigns. In a study of 156 Hollywood movies released in North America in 1999 and also in four European countries, Elberse and Eliashberg (2003) found that US performance (defined as the average per screen revenues in the first two weeks) was significantly related to overseas opening week box office. Moreover, this relationship was mediated by the delay between the US and the foreign opening, the longer the delay, the weaker the impact of US performance (the U.S. performance also affected number of screens). This suggests that something more than similarity of audiences is at play.

More directly, the present paper analyzes total North American and foreign box office for the 100 largest box office films in the US in 2001<sup>8</sup>. As expected, a significant  $r = 0.88$  was obtained. Further analysis to investigate the effect of genre and release time on the relationship between domestic and foreign box offices would be interesting. Management attention to worldwide and not just US box office is well-justified both by the magnitude of the markets and the relationship between them.

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8 Data on foreign box office, video tape rentals, and DVD rentals are available for 87 of the top 100 domestic box office films of 2001. This sample is used throughout the paper unless otherwise noted.

## Video Markets

Not surprisingly, RB's data for the early 1990s also showed a strong relationship of  $r = 0.70$  for domestic box office and video revenues. (**Table 8**) Analyzing data for 35 movies and videos from 1994-95, LW found that a video's opening strength and decay rate were significantly related to a movie's box office performance. At that time, the majority of the video business for major movies was concentrated on the rental, not purchase, of videos. For example, 70% of the movies in LW's sample had a retail price of \$70 or more. With the exception of children's movies and some selected titles, the underlying assumption was that consumers were primarily interested in renting videos for one time viewing at home. (A research question that requires further examination is whether the renters wanted to repeat an experience they had in a movie theater or to see a movie that they had "missed" during its (usually short) box office run.)

DVDs — and the movie studios' interest in purchase (termed "sell-through") -- rather than rental changed all that. In 1997, the MPAA estimates there were only 600 movie titles available in DVD; by 2002 that number exceeded 20,000. With an average price of \$20.78 in 2002, the consumer "sell-through" market is now a major focus for movie producers ([www.mpa.org](http://www.mpa.org)). Although a video tape is primarily the movie in another delivery system, the DVD has a set of enhancements that potentially make it a different product in consumers' minds. The growth in sales of DVDs (as compared to VHS cassettes) is consistent with the distinctive view. Moreover, the results for rentals and sales appear to differ. For example, there is virtually no overlap between the top 10 rentals of 2002 and the top 10 selling videos of 2002 in either the VHS or DVD market. Moreover, as we discuss more fully in the next paragraph, the relationship between the rental market and the box office market is no longer as strong as it formerly was. For the top 2001 movies we studied, we obtained a correlations of  $r=0.40$  between domestic box office and VHS rentals and  $r=0.24$  between domestic box office and DVD rentals. Data are

available from videobusiness.com for the 50 best selling VHS tapes and for the 50 best selling DVDs. Consequently, to analyze video sales, we started not with the leading box office figures, but with the 50 top VHS tapes and DVDs of 2002. Only 35 of these VHS tape best sellers are also on the domestic box office list of 100 leading movies; 42 of the DVDs are (many of the missing titles were direct-to-video releases.) Using this as a base, we find correlations of  $r=0.55$  and  $r=0.81$  between domestic box office and VHS and DVD sales respectively.

As the leading rental video of 2002 *Don't Say a Word* would indicate, the relationship between the box office and home viewing markets is far from automatic or given.

**(Tables 9 and 10)** The top renting 2002 video, *Don't Say a Word*, a thriller movie starring Michael Douglas, earned only \$55 million in box office revenues and received mixed reviews when it was released. While speculation about the reason for this particular video's success is beyond the scope of this paper, there appear to be systematic differences in box office and video performance, and management actions make a difference. As noted earlier, LW show that the time between video and movie release affects the rentals of a movie. Moreover, the use of sell-through pricing influences the stocking policy of retailers, which indirectly influences video rentals. According to LW, sell-through videos tend to open more strongly and decay more rapidly.

Mortimer (2002) conducts a more systematic test of the effect of contract terms on video retailer performance. Prior to 1998, home video retailers paid distributors approximately \$70 per video tape and retained all receipts. Starting in 1998, many distributors offered a new contract in which the retailer paid an upfront fee of \$3 to \$8 per movie and retained about 45% of revenues. This change allowed retailers to stock many more copies of new videos, with a consequent increase in consumer satisfaction and a change in advertising strategy of emphasizing movie

availability. According to Mortimer's analysis, total distributor and retailer profits increased by 3 to 6%, and consumers were better off.

Management action, as indicated above and unsurprisingly, influences a video's performance. Management action also leads to the deviation between box office performance and video performance. Management designs DVDs with enhanced features that may appeal both to a gift buying market and to people who may want to collect a large or a small set of DVDs. Such markets may have different evaluative criteria than the box office market, so that titles that perform well in one market may not perform well in another.

Consumer behavior may explain why some of the most successful video rentals are not box office successes. With movie admissions averaging \$5.81 per ticket (MPAA) in 2002 and video rentals at about \$3 (\$3.20 for DVD, \$2.70 for VHS) (www.vnda.org, January 9, 2003), people assign movies to theater and home video categories. Viewers eager to see Oscar-nominated and award-winning movies may be too late to see them in theaters. Additionally, people may wish to view certain movies in the privacy of their homes.<sup>9</sup>

### ***Analyze This: Research Issues***

The movie industry in general and the auxiliary market in particular provide a number of interesting research challenges. In this paper, we will highlight two main issues, and then discuss some other topics. The first issue—the timing game—examines the relationship between the movie and the video markets, especially the issue of how long the distributor should wait between releasing the movie and the video (the video window). In this section, the primary research approach will involve mainly analytical marketing models. The second issue—the purchase experience—considers what happens in the video store. Videos are an unusual product

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<sup>9</sup> Adult videos, which are primarily released as direct to video or pay per view markets, rarely obtain widespread release in theatres and consequently are not studied in this paper.

in that most consumers enter a video store definitely knowing that they will be renting a video, but not knowing what video they will rent. In addition, most renters are renting for multiple viewers, but not all are in the store simultaneously. Consequently, there are problems of multiple buyers and agency.

### THE TIMING GAME

We now examine the problem formulated in LW and rely on their article for the formulation of the model in this section. Consider the following sequential distribution problem: A Hollywood studio or distributor (we use the terms interchangeably for expositional ease in this section) must determine the optimal time to introduce a specific title to the video market. **(Figure 3)** Further, assume that there are only two distribution channels and that industry practice determines which is the prior channel (e.g., theater release before video release).

#### General Structure

Let  $\Pi_1^B(t)$  be the profit rate at time  $t$  from the first channel (e.g., movie theaters) before the second channel is opened (e.g., video) and let  $\Pi_1^A(t)$  be profit rate at time of  $t$  from the first channel after the second channel is opened, at time  $t_2$ . (Setting  $\Pi_1^A(t) = 0$  for  $t \geq t_2$  allows for the case where opening the second channel completely eliminates sales and, consequently, profit in the first channel.) Let  $\Pi_2(t, t_2)$  for  $t \geq t_2$  be the profit rate from the second channel. Using a continuous model, the distributor's problem, assuming a discount rate  $\rho$ , is to maximize cumulative profit by choosing the optimal time ( $t_2^*$ ) to open the second channel.

$$P(t_2) = \int_0^{t_2} \Pi_1^B(t) e^{-\rho t} dt + \int_{t_2}^{\infty} \Pi_1^A(t) e^{-\rho t} dt + \int_{t_2}^{\infty} \Pi_2(t, t_2) e^{-\rho t} dt \quad (1)$$

A further generalization of this structure involves incorporating other decision variables explicitly in the profit objective. Advertising strategies and price are two examples.

Maximization of (1) with respect to  $t_2$  can lead to an implicit expression of the optimal time to open the second channel. Next, the analysis is customized for the movie industry.

### **Movie and Video Demand**

Consistent with Krider and Weinberg (1998), LW model a movie's revenue in the first channel as an exponential function:

$$M^B ( t ) = m_1^B e^{-m_2 t} \quad 0 \leq t < t_2 \quad (2A)$$

$$M^A ( t ) = m_1^A e^{-m_2 t} \quad t \geq t_2 \quad (2B)$$

where  $m_1^B > m_1^A \geq 0$  and  $m_2 > 0$

In other words, a movie opens with a box office sales rate of  $m_1^B$  (at  $t = 0$ ) and then declines at a rate of  $m_2$ . The effect of releasing a video is to decrease the market potential for the movie so that  $0 \leq m_1^A < m_1^B$ , but LW assume the decay in revenue persists at the same rate,  $m_2$ .<sup>10</sup> (Figure 4) In practice, theater sales generally drop to approximately zero when a movie is released to video. For the movies studied in LW, box office revenues when the video was released never exceeded 3% of first week's revenue. Therefore, LW set  $M^A ( t ) = 0$ .

Video rental demand is also assumed (and shown empirically in LW) to follow a similar exponential decline, so that  $V ( t, t_2 )$  represents the video rental rate at time  $t$  for a video released at  $t_2$ .

$$V ( t, t_2 ) = v_1 ( t_2 ) e^{-v_2^A ( t - t_2 )} \quad t \geq t_2 \quad (3)$$

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10 The first channel's sales rate is assumed to drop from  $M^B ( t_2 )$  to  $M^A ( t_2 )$  exactly when sales in the second channel begin. Other formulations, could be developed that allow for sales to drop earlier, in anticipation of the second channel being opened, or later, allowing for a delay in the second channel's effect. The immediate decay appears to be most appropriate, given the wide availability of video stores.

The video opens with rentals of  $v_1 ( t_2 )$ , where  $\frac{dv_1}{dt_2} < 0$  . In other words, the longer the video release is delayed, the lower the potential video rentals. This occurs largely because potential customers have either "purchased it" (seen the movie) in the first channel (theaters) or forgotten the intensive communication effort surrounding the movie's introduction.<sup>11</sup> To reflect this compactly,

$$v_1 ( t_2 ) = v_1 e^{-v_2^B t_2} \quad (4)$$

where  $v_1$  is the (implicit) rental potential of the video if it had been released simultaneously with the movie.

Since video retailers are independent of distributors, equation (1) needs to be modified as it assumes the distributor controls the decisions for both channels. An independent retailer has to decide how many units to order of a re-usable (i.e., rentable) product whose demand (generally) declines over time. In addition, while in some cases the movie distributor shares the rental revenue with the video retailer, LW model the dominant case of the mid-90s in which the movie distributor does not get a share of the rental revenue, unlike the case in the theater channel, but instead earns income from the videos purchased by the retailer.<sup>12</sup> However, the number of units the retailer orders should depend upon the estimated demand for video rentals (equation 3). Thus, determining an optimal release strategy first involves determining an optimal ordering policy for the retailer.

The analytical approach followed is thus a "backwards" analysis. That is, begin with the decisions made by the second channel (i.e., video stores) with respect to purchases. Importantly, this demand (a) is assumed to be predictable based on demand in the first channel (i.e., box office attendance) and (b) depends on entry timing. Once the second channel's optimal behavior is specified, the optimal time for the movie distributor to enter the second channel is then solved analytically.

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11 Advertising by the movie producer could, in fact, increase the potential for the video.

12 Starting about 1997, this practice began to change and some video chains share rental revenues with at least some movie distributors (Mortimer 2002). The profit function could be readily modified to account for this.

LW's model, of course, captures just some aspects of the decision problem. Movie producers' multiple concerns include tie-in promotional merchandise sales, relations with independently owned theaters and timing vis-a-vis other releases as well as relations with video stores. Further, the model does not capture the likely gradual but important adaptation by consumers to release strategies through expectation setting and its consequences.

### **Retailer's Optimal Order Quantity**

At the margin, the profit maximizing video store has to trade-off, on the one hand, the marginal revenue foregone and the impact on customers of being out of stock and, on the other hand, the additional purchase and holding costs of stocking an additional unit. While a retailer may in principle re-order at any time, in the face of declining (and deterministic) demand it is optimal to order a video only once, as soon as the video is available. Also note that, with decreasing demand, a retailer is not likely to order enough videos to satisfy demand in the initial period(s). Thus the model allows for under-capacity for several periods ( $\tau$ ), as well as out-of-stock cost per period.

More formally, for each video,

$$\begin{aligned}
 V(u) &= \text{rental demand rate per video store at time } u = (t-t_2) \text{ after the video's release} \\
 &= v_1 e^{-v_2^B t_2} e^{-v_2^A u}
 \end{aligned}$$

$p$  = price to retailer per video

$r$  = rental fee per copy (assumed to be constant)

$n$  = number of rental turns per copy by the time period, e.g., 3 per week

$h$  = holding cost per period per unit

$l$  = out-of-stock lost sales cost per period

$q$  = number of video tapes ordered

$\tau$  = time after video's release at which video rental demand equals rental capacity of the store

$T$  = time horizon for which videos are held, at the end of which they have no salvage value

The time  $\tau$  after the video's release when demand  $[V(\tau)]$  equals the rental capacity,  $nq$ , can be found by solving the following equation for  $\tau$ :

$$\begin{aligned} nq &= V(\tau) = v_1 e^{-v_2^B t_2} e^{-v_2^A \tau} \\ &= k_1 e^{-v_2^A \tau} \end{aligned}$$

$$\text{where } k_1 = v_1 e^{-v_2^B t_2}$$

This yields

$$\tau = \frac{1}{v_2^A} \ln \frac{k_1}{nq}$$

The video retailer's cumulative profits from ordering  $q$  copies of a video (when the video is released) are defined as follows:

$$\begin{aligned} P_R = r & \left[ \int_0^\tau nq \, du + \int_\tau^T k_1 e^{-v_2^A u} \, du \right] \\ & - pq - hqT - \ell \int_0^\tau (k_1 e^{-v_2^A u} - nq) \, du \end{aligned} \quad (5)$$

Notice this formulation assumes unsatisfied demand due to capacity constraints leads to lost sales.

Simplifying from LW in order to concentrate on the critical issues, assume that there is no holding cost ( $h=0$ ) nor lost sales cost ( $P=0$ ) beyond that of the lost sales revenue, so that the optimal solution (order quantity) to (5) becomes

$$q^* = \frac{k_1}{n} e^{-\frac{p}{rn} v_2^A} = \frac{v_1}{n} e^{-v_2^B t_2} e^{-\left(\frac{pv_2^A}{rn}\right)}$$

### **Manufacturer's (Film Distributor's) Optimal Release Time to the Retailer**

Knowing the video stores response to time of release in terms of order quantity, now turn to the issue of the movie distributor's optimal decision with respect to release time. **(Figure 5)** Assume that each sale achieves a constant gross margin for the distributor of  $M_T$  in the first (theater) channel and  $M_V$  in the second video channel.  $M_V$  depends upon the price at which the movie distributor sells

videos to the retailer and the number ( $N$ ) of video stores.

Combining the above equations, the cumulative discounted (at rate  $\rho$ ) profit function for the movie distributor is:

$$\begin{aligned}
 P(t_2) = & \int_0^{t_2} M_T m_l^B e^{-m_2 t} e^{-\rho t} dt \\
 & + \int_{t_2}^{\infty} M_T m_l^A e^{-m_2 t} e^{-\rho t} dt \\
 & + M_V q^*(t_2, p) e^{-\rho t_2}
 \end{aligned} \tag{6}$$

Setting the discount rate  $\rho=0$  for expositional convenience (since it has minimal impact on the results) and recalling that  $m_l^A = 0$ , the cumulative profit function can be rewritten as

$$P(t_2) = \left( M_T \frac{m_l^B}{m_2} \right) (1 - e^{-m_2 t_2}) + M_V \frac{v_l}{n} e^{-v_2^B t_2} e^{-\left(\frac{p v_2^A}{r n}\right)} \tag{7}$$

Profit from  
Movie Market

Profit from  
Video Market

Solving yields the optimal time to release as

$$t_2^* = \frac{1}{(m_2 - v_2^B)} \left\{ \ln \left[ \frac{m_l^B n M_T}{v_2^B v_l M_V} \right] + \left( \frac{p v_2^A}{r n} \right) \right\} \tag{8}$$

The effect of the parameters on the time to introduce the video follows an intuitive pattern. The bigger and more profitable the movie market is relative to the video market,  $\left[ (m_l^B M_T) / (v_l M_V) \right]$  the greater the optimal delay in the video's release. The more rapid the video's implicit decay before the release ( $v_2^B$ ), the earlier the optimal opening time. Further, the more the decay of the movie exceeds the (implicit) decay of the video ( $m_2 - v_2^B$ ), the earlier the video should be released.

The effect of price on the optimal release time is complex. On the one hand, increasing the price makes the video market more profitable per video sold (recalling that  $M_v$  increases with  $p$ ), decreasing the time to release the video. On the other hand, the video stores order fewer videos with higher price, increasing the optimal time to release the video. The video store's ability to increase its rental fee ( $r$ ) unambiguously leads to more profits for it, higher orders, and an earlier release date.

### **Data**

LW compiled data for a convenience sample of 35 movies released from January 1994 through August 1995 and obtained strong empirical support for the exponential models discussed above, with average  $R^2$ s of 0.90 and 0.86 respectively for movies and videos.

### **Marketing Variables and Video Rentals**

The impact of decision variables can be captured by allowing  $m_1^B$  and  $m_2$  to be functions of these variables ( $X$ ) in a varying - parameter framework.

$$m_1^B = m_{10} + m_{11} X_1 \quad (9)$$

$$\text{and } m_2 = m_{20} + m_{21} X_1 \quad (10)$$

Since the vast majority of marketing expenditures occur before a movie is released,  $X_1$  is assumed to be a one time pre-launch advertising expenditure.

The "carryover" effect from sales in the first channel to sales via the second is captured by allowing  $v_1$  and  $v_2^A$  to depend on decision variable  $X_2$ , as well as  $m_1^B$  and  $m_2$ .

$$v_1 = v_{10} + v_{11} m_1^B + v_{12} m_2 + v_{13} t_2 + v_{14} X_2 \quad (11)$$

$$\text{and } v_2^A = v_{20} + v_{21} m_1^B + v_{22} m_2 + v_{23} t_2 + v_{24} X_2 \quad (12)$$

Once the movie's run commences, a number of strategies can be employed to extend the movie's run. LW examine two marketing decisions concerning the release of a film on video. The first is the time between the movie's release and the video's release. As discussed earlier, a longer delay until the video's release reduces the likelihood that the

movie's sales will be cannibalized by the video. Pressure for delay is mirrored by the common practice in the book industry of delaying the paperback's release until the hard cover version has relatively small sales. On the other hand, when sequential product entry is delayed substantially from the release of the original product, advertising and publicity effects which surrounded the release of the movie will have largely dissipated.

Despite the potentially strong effects of a delay in a video's release on video rentals, LW find relatively limited variation in the length of time between the movie's release and the video's release. The average for the 35 movies in the study was 23.8 weeks with a standard deviation of 3.5 weeks, resulting in a coefficient of variation much lower than that for any of the other variables studied.<sup>13</sup> Moreover, the lag is minimally correlated with either  $m_1^B$  ( $r = 0.07, p > .10$ ) or  $m_2$  ( $r = -0.16, p > .10$ ), which suggests that movie studios do not change their release strategy for videos even after they have knowledge of the sales pattern of their movies. Most importantly, perhaps due to the attenuation in range, release time is significantly related to neither  $v_1$  ( $r = -0.05, p > 0.10$ ) nor  $v_2^A$  ( $r = -0.07, p > 0.10$ ).

A second variable of interest when a video is released is pricing. Two price points appear to be used in practice. One, a wholesale price of \$60 or more to video stores, is designed with the expectation that the primary market for the video will be rentals. The second, however, a wholesale price of \$20 or less, is designed to encourage the *sell-through* market.

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13 In a more extensive analysis of 1429 movies released between 1988 and 1997, Waterman and Lee (2002b) report a mean (and median) "window" of 180 days with a slight down trend over time. While there is variation in the length of the window, 68.5% of videos are released within  $\pm 18$  days (10%) of the median window. The variance of length of window is 1930 days compared with a mean window of 184 days. The standard deviation for the total box office is \$34.7 million compared to a mean of \$27.2 million. For the top 100 movies studied in this paper, the mean video window was 168 days (24 weeks) with a standard deviation of 37. There is far more variation in box office strength than there is in length of the video window.

In LW's data, the opening strength of a movie,  $m_1$ , is significantly related ( $r = 0.42$ ,  $p < .05$ ) to the use of a sell-through video price; decay rate ( $m_2$ ) is not ( $r = -0.04$ ,  $p > .10$ ). Movies that have high opening box offices are more likely to employ a sell-through strategy. Not surprisingly, the use of a sell-through strategy is significantly correlated with  $v_1$  ( $r = 0.64$ ,  $p < .01$ ) and  $v_2^A$  ( $r = 0.67$ ,  $p < .01$ ).

### **Optimal Release Policy for Individual Movies**

Equation (8) provides the optimal time to release a video. LW obtain the following regression equations (omitting error terms) to estimate the video's opening strength and decay rate:

$$v_1 = 24.46 + 0.556 m_1^B + 19.86 m_2$$

$$v_2 = 0.04 + .000557 m_1^B + 0.01 m_2$$

Based on a series of assumptions to estimate market size and profitability parameters, LW derive optimal release times for the 25 videos that were released for the non-sell through market. To illustrate, *Cool Runnings* had a relatively weak opening (as compared to other movies) but a slow decay in the movies. On the other hand, its performance in the video market was typical of that for the non-sell through movies in the sample. LW estimate that the optimal time to release *Cool Runnings* would be 10 weeks after its movie release, 11 weeks earlier than its actual release time of 21 weeks. This could have potentially increased the studio's profit by an estimated 8%. Overall, LW's analysis general recommendation is to release videos earlier, and also to allow for variation in video release times of between 3 and 10 weeks. The particular parameter values for each movie determine the appropriate release date. Institutional restrictions, legal constraints, competitive considerations and consumer

expectations may limit the feasibility and reasonableness of decreasing the time to video release as fully as suggested in the analysis, but the directional implications are quite strong.

### **Research Questions and Issues**

As argued earlier, in the movie/video business, time is of the essence. The above analysis not only indicates the importance of time itself, but also the time of decision-making. While many research issues and questions follow from the above analysis, we will focus on what Hollywood might call the *Magnificent Seven*.

#### **1. Simultaneous versus Sequential (Which Comes First)) Decision Making.**

The above models assume that the time of theatre release is fixed and that the video release timing decision can be made sequentially. An alternative approach, especially important given that the video market is twice as large as the domestic box office, is to decide first on the time of the video release, and then work forwards to determine the time of the movie's release. Krider and Weinberg (1998) extensively analyse the competitive movie timing game for movie releases, and the trade press frequently reports on this, but perhaps the more critical timing game concerns video release. Such a view would require different types of parameter estimation approaches than those used by LW. An even more comprehensive extension would simultaneously consider the optimal timing of release in the theatre and the video channels. One complexity to include would be the potential value of information from sales in one channel for determining sales in other channels. The role of marketing variables in influencing sales patterns directly or indirectly would be particularly interesting. Elberse and Eliashberg (2002), for example, study the effect of distribution intensity (number of screens) on the box office results in domestic and foreign markets.

#### **2. Great (Customer) Expectations**

If the timing of release of products to sequential markets changes radically, then the issue of customer expectations needs to be considered. If a potential moviegoer knows a movie is likely to be released only 5 weeks after its theatre release, then the likelihood of going to a theatre to see the movie may be decreased.

From another perspective, Prasad, Mahajan, and Bronnenberg's (1998) game theoretic analysis suggests that one reason for the relatively uniform release time for videos is to avoid strategic behavior where competing firms, anticipating consumer response, move up release times so that movie and video release times eventually become simultaneous. Waterman and Lee (2002b) note that the relatively long window between a movie's release and a video's release suggests "the plausibility of some form of co-ordinated video window setting behavior among U.S. distributors as a means of coping with the time consistency problem." (page 5)

Interestingly, industry practice in the movie industry appears to be changing. In the summer of 2001, in contrast to historical practice and likely motivated by the recent expansion of theatre capacity, movies were released with a much larger number of initial screens (sometimes totalling more than 3500) -- resulting in relatively high opening weekends but fast decay rates and less time in theatres. If such policies persist, different sequential distribution strategies will be needed. As indicated earlier, the average time between movie release and video release is declining.

### **3. Role of Intermediate Products**

As the examples of the two Disney movies at the start of the paper indicate, movies often lend themselves to the generation of a wide range of products. A narrow view would be that each product is a profit generator in its own right, obviously drawing on the appeal of the originating element--typically the movie but ranging from video games to song titles to

books. However, a product line view might be more appropriate with an attempt to understand to what extent one product form is a substitute for the other and to what extent it is a complement. Moreover, certain products may serve indirectly as part of the marketing communication mix for a movie, its sequel, or the video. Thus, a video game released between the movie and video may serve as a reminder and preserve awareness of the movie title. Just as managers in the music industry need to decide whether or not to release a single to promote an album's sales, movie management needs to determine what and how many intermediate products to release and when to release them. Models from the advertising literature concerning continuous versus pulsed advertising strategies may be relevant here.

#### **4. *Risky Business*-- Model Uncertainty Directly**

The movie industry, if nothing else, is a *Risky Business*. More generally, incorporating uncertainty explicitly in the demand functions and allowing for heterogeneity across retailers (e.g., a "ma and pa" vs mega store segmentation) may also prove interesting. In the area of scheduling movies into theaters, Swami, Puterman, and Weinberg (2001) show the effect of uncertainty on optimal scheduling policies using a Markov Decision Process approach.

#### **5. Forecasting issues**

One key implication of the high correlations between the theater and video parameters is that good estimates of the video's two parameters are possible early in the sales curve for theaters. These estimates would likely be even more accurate if a meta-analysis of parameters for other movies were incorporated into the forecasting routine. Examining the issue dynamically, parameter estimates could be updated with weekly or daily box office results. Hence, an interesting research (and managerial) question concerns deciding whether to postpone releasing a video until more information about theater revenues becomes available. That is, in order to decide whether to introduce the product to the second channel

after each period of data, we need to compute the expected profits of staying in theaters and moving to videos. The profits in turn, are a direct function of the parameters. Further departing from a strict forecasting view, marketing decisions can influence the parameter values.

Incorporation of primary market research data into the estimation would be useful, as Eliashberg et al (2000) have demonstrated. However, a challenge in this area, as discussed in the next section of this paper, is that consumers frequently select and view videos in groups, so that an understanding of how to combine individual preferences to obtain a joint preference is required. One speculation is that people renting in groups are more likely to select less popular box office movies in order to minimize the likelihood of a group member having seen the movie.

## **6. Number of channel members**

LW only analyze two sequential channels and assume the sequence is known and that the channels are independent. The issue of degree of vertical integration is very controversial and worthy of investigation. Although some issues could be answered in LW's framework (e.g., what if the distributors also owned the video retailers?), others require a different approach. While adding more channels to the model is relatively straightforward, the problem of determining the appropriate sequence of channels is more complex, especially with regard to different patterns of cannibalization across channels. In addition, structural constraints such as contractual obligations and channel relationships need investigation.

## **7. Channel Management Issues**

Mortimer (2002) has shown how the changing contract terms between the distributors and retailers have had a substantial impact on revenues and profits. With the growing importance of video sales through new channels, substantial opportunities for research are available. These areas are particularly intriguing as quite often the objective function for the

channel members may not be profit maximization for the movies. For example, mass merchandisers may offer deep discounts on DVDs to drive store traffic. With many major studios now owned by global conglomerates, perhaps it could be argued that few businesses in the supply chain actually derive their main profits from the movie itself.

### **THE VIDEO STORE EXPERIENCE**

There are many ways in which a person or group of persons can acquire access to a film. These include:

Going to a movie theater

Renting a video at a video store

Purchasing a video at a video store

Purchasing a video at a non-specialist retailer

Watching it on television (pay-per-view, premium cable, or broadcast)

The focus here will be on renting a video, although all the areas have particular points of interest. In some ways going to a theater and renting a video are similar experiences as they both involve primarily the short-term experience of seeing a movie and are usually done not individually but in groups of two or more—requiring a balancing of individual preferences. However, they also differ in important ways. As we discuss below, while people generally go to a movie theater knowing the specific movie that they intend to see, the majority of renters do not know what specific movie they will rent as they enter the video store. Moreover, typically the people who actually go to the video store are acting as “agents” for the people who will be viewing the video tape.

To provide some preliminary data on the video store, a market research survey was conducted on Saturday night, February 15, 2003, the first Saturday on which the

widely anticipated *My Big Fat Greek Wedding* was available on video. (**Table 11**) The survey was conducted as people entered and left a local affiliate of a major national chain of video stores in a residential neighborhood in Vancouver, Canada. There were 49 completed surveys, with 52% male and an average age of 33 years.

While 28% of the store's customers visited the video store alone, only 12% intended to watch alone. Alternatively viewed, 35% of renters were making choices for people who were not in the store with them. This problem of agency would not be a serious one if renters had beforehand decided on what video to rent. Even on a night when *My Big Fat Greek Wedding* debuted (25% of customers who entered store already intended to rent it), 50% of renters did not have a specific title in mind when they entered the store. Most renters intended to rent only one video and, on the exit poll, they did so. Everyone intending to rent a video as they entered the store, did so, although of the 40% intending to rent a DVD, only 34% actually left with a DVD. About 30% of respondents rented more videos than they originally intended. Satisfaction with the retail experience was 4.3 out of 5 based on responses at the exit interview.

While at the aggregate level, overall video rental demand can be fairly well-predicted near the time of video release, the individual or group behavior decision is not well-understood. Moreover, even with the revenue sharing agreements now in place between video distributors and video retailers, the newest videos are unlikely to be held in sufficient supply to meet demand. To provide contrast with the first research section on the Timing Game, this section will focus on questions at the individual level:

### **1. When are preferences formed?**

At some stage, potential viewers have made a definite commitment to rent a video. No one in our sample went to the video store just to browse. However, the specificity of that commitment may be gradually narrowed over time, or it may be postponed until the video store is entered. Clearly, given that most people entering the store do not have a specific movie in mind, the environment of the video store will have a strong influence on preferences and choice.

### **2. What is the role of recognition, recall, attitude, and preference and how do they decay over time?**

A video store is nothing if not a vast display of movie billboards in miniature. Since recognition, or the processes underlying it, decay more slowly than that of recall, for example, understanding the role of each of these constructs in the video choice decision is important.

### **3. How are individual preferences or utilities established?**

There are well-established models of utility for hedonic products. Probably the novel aspects of this environment are the issues of how individual utilities are adjusted, if at all, for the presumed utilities of others and the updating of utilities as new information is obtained in the video store itself.

The video store would be an interesting test laboratory for the study of the effects of word-of-mouth and of peer pressure on consumer behavior. Combining in-store experiments with entry and exit polls, as was reported above, provides a fruitful real world laboratory for the study of effects important both to the movie market in particular and consumer research more generally.

Another aspect concerns whether people who had seen the movie previously are more or less likely to want to see the video. This relationship, of course, would be mediated by the movie itself; fans of *The Matrix*, for example, eagerly awaited the DVD's release. In certain "franchise films," fans may want to experience the film's effects in a variety of different product forms. Disney's *The Lion King*, as discussed earlier, exemplifies this phenomena and a product line designed to meet this need.

#### **4. How are joint decisions made?**

Whether in the theater or at home, few people (attend or) rent a movie to view it alone. As compared to the vast body of research on individual decision-making, relatively little is known about how joint decisions are made. One argument, at least in this environment, would be an adaptation of an elimination rule. At the extreme, if anyone in the group has seen the movie, then the video is not rented. This would tend to support, as discussed earlier, the notion of "second-chance" movies—some "Film flops flourish on DVD, VHS." (www.cnn.com, March 11, 2003) Also, newer videos are less likely to be seen by group members.

At the level of the joint-decision, if previous viewing does not eliminate a movie, does the individual who has seen the movie carry more weight in the joint decision process? Is this, in a sense, the ultimate in word-of-mouth? What weight do others place on the individual's opinion, the need not to see a video again (see above), and the availability of other alternatives?

One moderating influence is the composition of the group. Couples and close friends who regularly view movies together may have a more long-term perspective and

know the preferences of other group members better than do groups comprising people who only seldom view movies together.

In summary, if we knew the individual utility functions of the group members, what additional processes would need to be understood in order to know the group's joint utility function? And, how would this relate to choice?

### **5. What is the effect of agency?**

As the data above illustrate, only some of the people who are going to view the video go to the store to rent the video. Since typically only one video is rented and the product is consumed almost immediately, the renters act as agents for the viewers. While the dollar and time commitments involved in this behavior are relatively low, the impact of such agency behavior would be interesting to study. The agents may be operating under constraints (e.g., rent anything but a horror film) either explicit or implicit. Are the agency effects similar to those involved in going from an individual to a joint decision, or does the agency issue add further complexity to the choice process?

### **Other Research Issues**

There are many other research issues raised with regard to the auxiliary market for movies. We will briefly introduce a few such issues here.

#### ***Adaptation: How different are DVDs from movies? From VHS tapes?***

As compared to the differences between video tapes and movies, it is hypothesized that DVDs are much less similar to movies than video tapes are. It is undoubtedly true that for some people at some times, there is very little to differentiate

renting a video tape from renting a DVD (although the visual and audio quality of the DVD may be higher). Nevertheless, many DVDs are designed to be products that differ from the movie and that are marketed to be sold to consumers. With added features and random access to DVD chapters plus marketing programs designed to sell (through distribution, pricing, and communication) the DVD, it would be surprising if consumers did not regard DVDs as differing from video tapes.

There are many issues to be raised. Here is a sampling. To what extent are different forecasting approaches required, and to what extent will the various movie and video products act as complements and substitutes for each other? How should the DVD product be designed, should there be a product line of DVD products for each title, and how should they be released over time? Traditionally, Hollywood studios have distributed their products through theaters and video retailers where the movie is the critical product. However, as DVDs become just another product sold by mass merchandisers and multi-line retailers, how will distribution channel arrangements change? If DVD sales become the dominant revenue stream, should Hollywood studios optimize their marketing for the DVD market (e.g., release that romantic comedy DVD for Valentine's Day and then determine the movie release date, attempt to engage the stars in intensive publicity campaigns around when a DVD is released?).

### **Price Discrimination**

To the frustration of economists and marketers, but not necessarily Hollywood executives, "in any given movie theater, all movies are priced the same regardless of their success and potential and regardless of the general demand conditions." (Orbach and

Einav, 2001, abstract)<sup>14</sup> This lack of price discrimination has deep roots in the industry and may reflect important strategic considerations.

Video retailers have practiced some limited forms of price discrimination, largely on the basis of time—new movies typically rent for a higher price or shorter time period than do older ones. While the DVD market is still in its early stages, there appears to be far more price dispersion, and future research questions surround the pricing strategies for DVDs. Will the combination of product line differentiation among DVDs of the same title and DVDs based on movies, television shows, and live performances accelerate this process? An important issue in price discrimination strategies is whether consumers perceive it as fair. Recent attempts, as exemplified by Amazon.com's effort to charge different prices to new and established customers, suggest that consumers will accept some but not all approaches to price discrimination as being fair. Moreover, as DVDs are sold through mass merchants with different objectives, the ability of Hollywood studios to anticipate the retail pricing will likely be diminished. Further, if DVD prices continue to decline (according to MPAA from an average of \$25.31 in 1998 to \$20.78 in 2002), the DVD if nothing else could become a competitor to CDs, at least for the original sound track of movies!<sup>15</sup> In summary, there appear to be a number of intriguing research questions to be studied in the area of product line pricing.

## **Piracy**

This paper started by noting that in the movie industry, time is of the essence.

Piracy makes it more so, with pirated copies of movies appearing at various quality levels

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14 It should be noted that the wholesale price at which studios rent their movies to theaters varies considerably by appeal of the movie and time since release.

15 For example on April 4, 2003 the CD for the soundtrack of *8 Mile* was advertised on Amazon.com at \$13.49 (or \$15.99 for the version with explicit lyrics) and the DVD, at \$17.99 (or \$20.23 for the edition with censored bonus features).

soon after a movie's (or a DVD's) release. In the timing game section of this paper, we examined how the introduction of a video can drive theater attendance to zero. Adding the effect of piracy to the timing game model would seem to be quite interesting. Since not all consumers are willing to purchase or view pirated copies of movies, or have access to them, an interesting model could be built based on assessing the impact on revenues for different forms of piracy. Other interesting questions are how much should be invested in technology to prevent piracy and how inconvenient is that technology to consumers. At what stage is the cost of deterring piracy offset by the disutility to consumers of dealing with piracy protection procedures? Alternatively, could consumers be convinced that it is unfair to enjoy pirated versions of movies? With models of fairness and equity being reported in the consumer behavior literature, interesting research questions can be raised in this domain as well.

## **Conclusion**

Videos, foreign box office, television, consumer products, and myriad other tangible and intangible products are linked to the movies. In total, these ancillary products account for more revenue than the movie itself. Does this mean that the movie should follow the other markets, or that the movie should lead the other markets? Such a question defies a simple answer.

This paper has highlighted a number of research questions about the ancillary products, but has focused on the video (tape and DVD) rental and sales industry, as this is the major source of income. Hopefully these questions will stimulate interest in further research into the ever-entertaining entertainment industry.

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Table 1

**2002 Average Revenues and Costs**

<b>Average Box Office</b>	
MPAA New Releases (220)	<b>\$32.5 Million</b>
All New Releases (449)	<b>21.2 Million</b>
<b>Costs</b>	
MPAA New Releases (\$58.8 negative, \$30.6 marketing)	<b>89.4 Million</b>
MPAA Subsidiary/Affiliate (\$34.0, \$11.2)	<b>45.2 Million</b>

Source: 2002 MPAA Economic Report

Table 2

**Two Disney Movies**

	<i><b>Pocahontas</b></i>	<i><b>The Lion King</b></i>
Production Cost	<b>\$60 Million</b>	<b>\$60 Million</b>
Domestic Box Office	142	313
International Box Office	200	438
<b>TOTAL BOX OFFICE</b>	342	751
Disney Box Office Share (50%)	\$171	\$376
Production & Marketing Cost	40	90
<b>Box Office Contribution</b>	131	286
<b>Domestic Video Contribution</b>	145	300
<b>International Video</b>	85	200
<b>Consumer Products</b>	198	225
<b>Direct-to-Video Contribution</b>	56	96
<b>TOTAL CONTRIBUTION:</b>	<b>\$555</b>	<b>\$1,047</b>

Source: Reavis (1998)

Table 3

**US vs. Overseas Box Office Results**

<b>Movie Revenues (millions):</b>		
	<b>Total (Domestic)</b>	
2002: <i>Lord of the Rings: TTT</i>	\$873	(\$334)
2001: <i>Harry Potter: Sorcerer's Stone</i>	\$966	(\$318)
2000: <i>Mission Impossible II</i>	\$545	(\$215)
1999: <i>Phantom Menace</i>	\$922	(\$431)
1998: <i>Saving Private Ryan</i>	\$480	(\$216)
1997: <i>Titanic</i>	\$1835	(\$600)

Table 4

**Top 10 Domestic Box Office Movies in 2001**

<b>Movie Title</b>	<b>Release Date</b>	<b>Domestic Box Office</b>	<b>Foreign Box Office</b>
<i>Harry Potter: Sorcerer's Stone</i>	11/16/01	\$317.6	\$649.4
<i>Lord of the Rings: Fellowship</i>	12/19/01	\$313.3	\$547.2
<i>Shrek</i>	5/16/01	\$267.7	\$209.3
<i>Monsters, Inc.</i>	11/2/01	\$255.9	\$273.1
<i>Rush Hour 2</i>	8/3/01	\$226.2	\$102.7
<i>The Mummy Returns</i>	5/4/01	\$202.0	\$224.8
<i>Pearl Harbor</i>	5/25/01	\$198.5	\$251.5
<i>Jurassic Park 3</i>	7/8/01	\$181.2	\$184.7
<i>Planet of the Apes</i>	7/27/01	\$180.0	\$179.3
<i>Hannibal</i>	2/9/01	\$165.1	\$184.2

Table 5

**2002 Domestic Revenue Results**

<b>Venue</b>	<b>Billion \$</b>	<b>(vs. 2001)</b>
Domestic Box Office	\$9.5	(+13%)
DVD – Sales	\$8.7	(+53%)
DVD – Rentals	\$2.9	(+106%)
VHS – Sales	\$3.4	(-17%)
VHS – Rentals	\$5.3	(-25%)

Source: 2002 MPAA Economic Report

Table 6

**Media Consumption - Hours per Person**

<b>Filmed Entertainment</b>	<b>2002</b>	<b>2002/1998</b>
Cable +Satellite TV	851	1.28
Broadcast TV	810	.92
Internet	157	2.90
Home Video	77	2.14
Box Office	13	1.00
<b>Other Electronic Entertainment</b>		
Radio	1001	1.07
Recorded Music	228	.81
Video Games	84	1.95

Source: 2002 MPAA Economic Report

Table 7

**Domestic Box Office and Foreign Box Office**

Source	Result
1991 – 1993 n = 175 Ravid & Basuroy (2003)	r = 0.86 for Total Box Office
1999 n = 156 films released in US and Europe Elberse & Eliashberg (2003)	Foreign opening week box office significantly related to (+) US performance (-) Time Lag * US performance
2001 Top 100 Movies (Domestic Box Office) n=86	r = 0.88 for Total Box Office

Table 8

**Domestic Box Office and Video Market**

Source	Result
1991 – 1993 n = 175 Ravid & Basuroy (2003)	r = 0.70 for Box Office and Total Video Revenues
1994 – 1995 n = 35 Lehmann & Weinberg (2000)	Weekly Revenues = $A * \exp(-Bt)$ Video Opening significantly related to (+) movie opening (-) * movie decay Video Decay Rate significantly related to (+) movie opening
2001 n= 86 of Top 100 Movies	Domestic Box Office and r = 0.40 Video Tape Rental r = 0.24 DVD Rental
2002 n= 35 of Top 50 Video Sellers n= 42 of Top 50 Video Sellers	Domestic Box Office and r = 0.55 Video Tape Sales r = 0.81 DVD Sales

Table 9

**Top Rental Titles of 2002**

<b>Movie Title</b>	<b>Combined Revenue \$ Mil</b>	<b>DVD Revenue \$ Mil</b>	<b>VHS Revenue \$ Mil</b>	<b>Release Date</b>	<b>Domestic Box Office</b>
<i>Don't Say A Word</i>	\$83.97	\$28.54	\$55.44	02/19/02	\$55.0
<i>Ocean's Eleven</i>	\$82.20	\$33.39	\$48.81	05/07/02	\$183.4
<i>Training Day</i>	\$79.52	\$30.32	\$49.20	03/19/02	\$76.3
<i>The Fast &amp; the Furious</i>	\$70.71	\$22.22	\$48.49	01/02/02	\$144.5
<i>The Others</i>	\$64.46	\$25.35	\$39.11	05/14/02	\$96.5

Table 10

**Top Selling Titles of 2002**

<b>Movie Title</b>	<b>Combined Revenue</b>	<b>DVD Revenue \$ Mil</b>	<b>VHS Revenue \$ Mil</b>	<b>Release Date</b>	<b>Domestic Box Office</b>
<i>Monsters, Inc.</i>	\$347	\$202.0	\$145.2	09/17/02	\$255.9
<i>The Lord of the Rings: Fellowship</i>	\$330	\$257.3	\$72.8	08/06/02	\$313.3
<i>Spider-Man</i>	\$299	\$215.3	\$84.0	11/01/02	\$403.7
<i>Harry Potter &amp; the Sorcerer's Stone</i>	\$298	\$166.7	\$81.7	12/03/02	\$145.8
<i>Ice Age</i>	\$203	\$124.8	\$78.1	11/26/02	\$176.4

Table 11

## **The Video Store Experience**

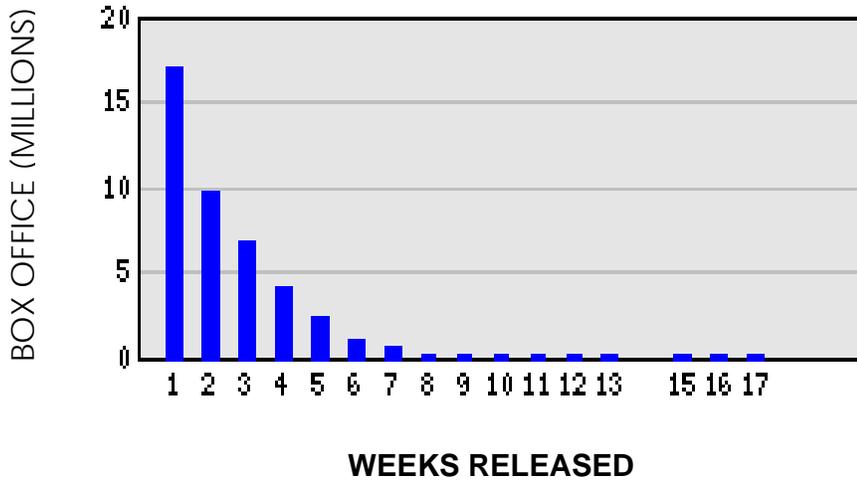
Survey: Saturday, Feb 15, 2003  
Entry/Exit (n=50)  
Percentage of People

	<u>Renting</u>	<u>Viewing</u>
Alone	28%	12%
With 1 person	38%	36%
With 2 persons	18%	24%
With 3 persons	14%	28%
Intentions Entering the Store		
Rent <i>My Big Fat Greek Wedding</i> :	25%	
Rent Another Specific Title	25%	
Rent, But No Specific Title	50%	

Figure 1

### Box Office Pattern for a Major Movie

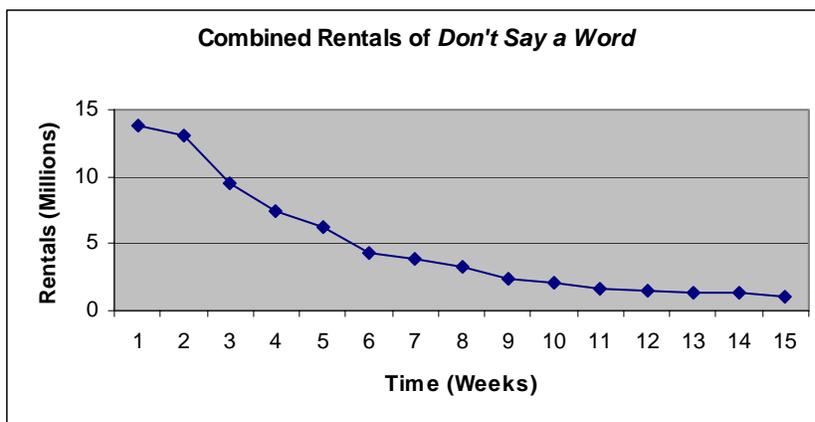
#### WEEKLY REVENUES OF *DON'T SAY A WORD*



*Don't Say a Word*, opening September 28, 2001 shows the typical declining pattern of major movie releases.

Figure 2

### Rental Pattern for *Don't Say a Word*



\* Video/DVD release date of February 18, 2002

Figure 3  
Simplified Movie/Video Structure

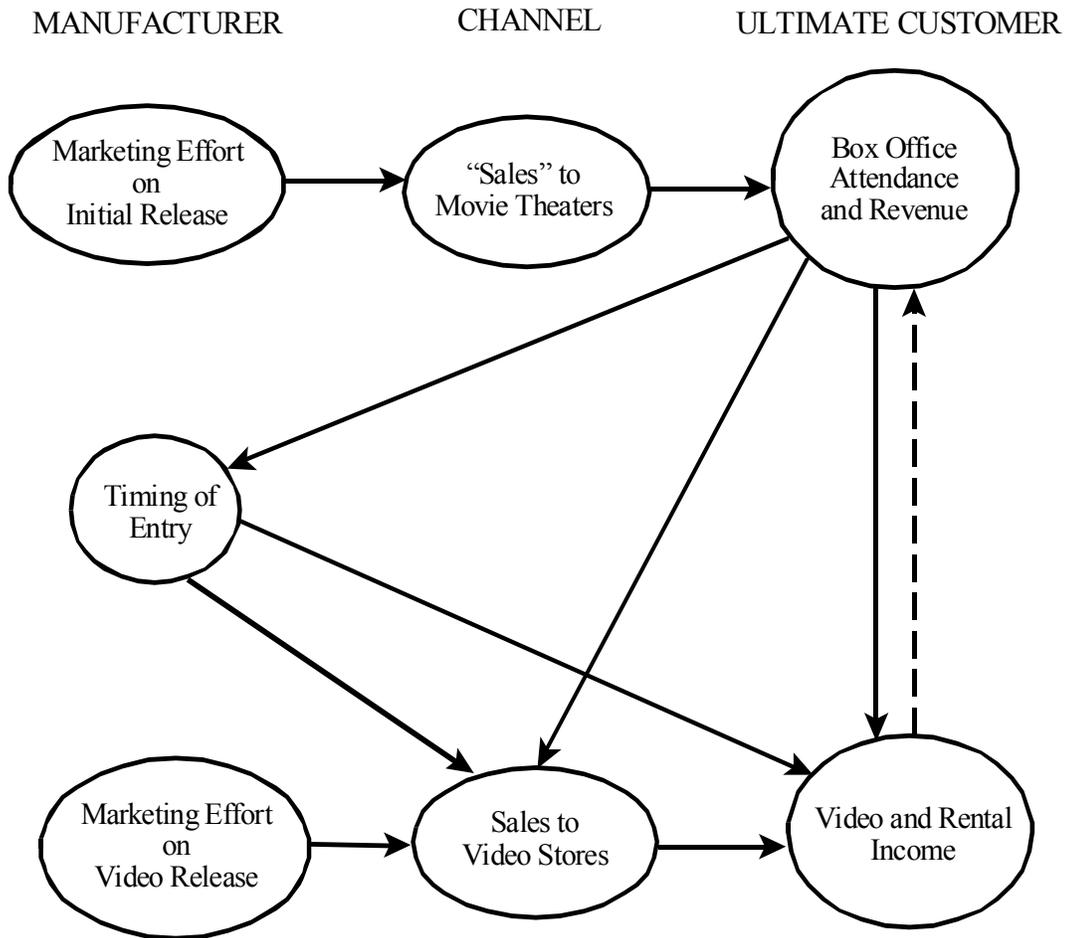


Figure 4

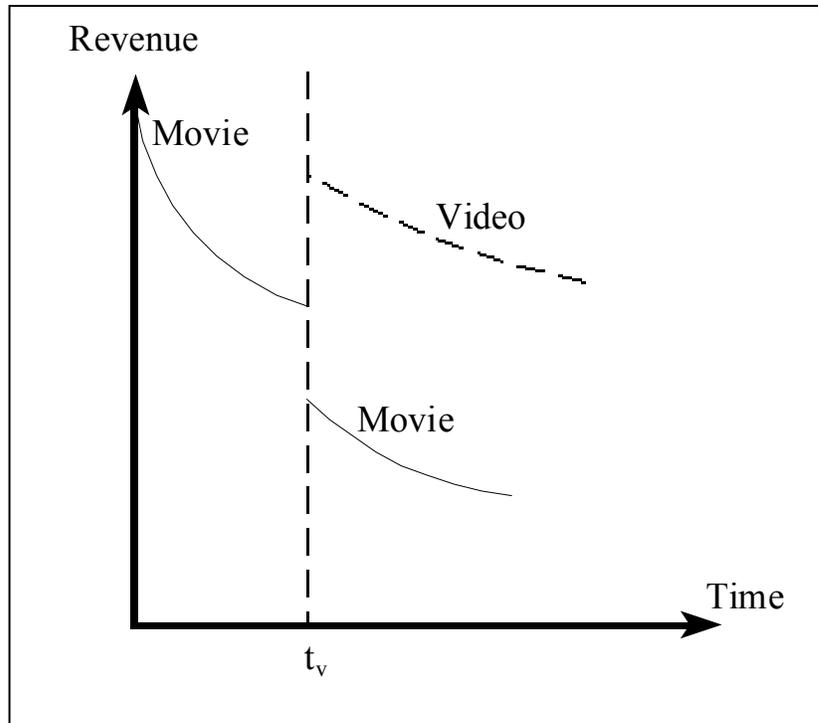
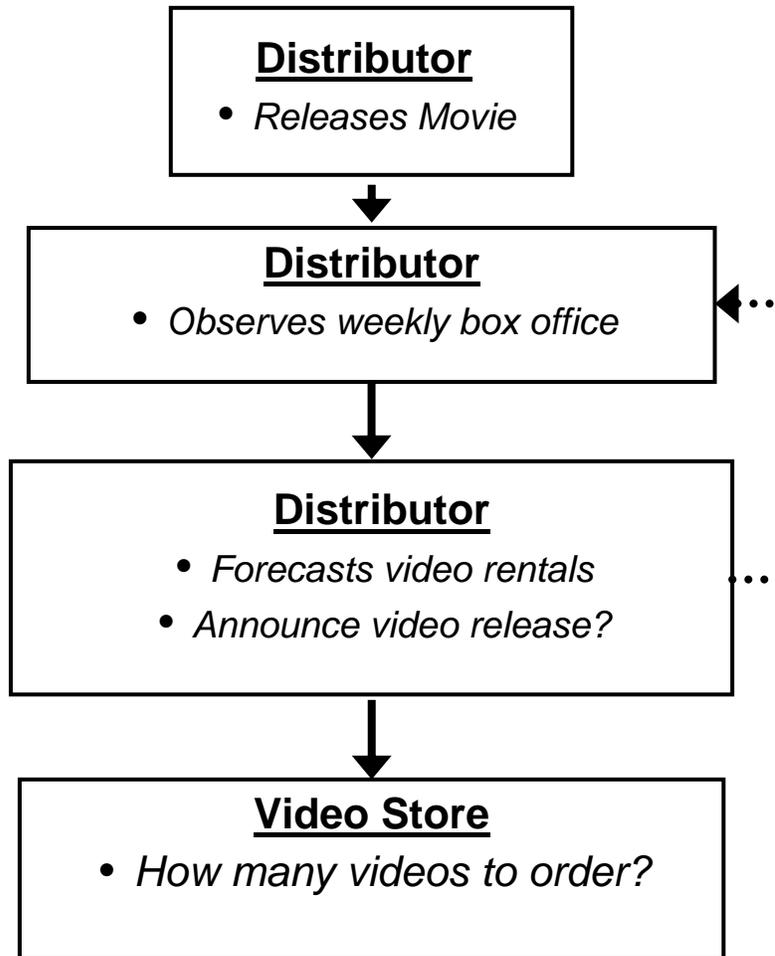


Figure 5

### Decision Structure



Note: Omitted

- Other sequential channels
- Sales of video