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2008

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Recommended Citation

Mann, Florian; Ahrens, Sophie; Benlian, Alexander; and Hess, Thomas, "Timing is Money - Evaluating the Effects of Early Availability of Feature Films via Video on Demand" (2008). *ICIS 2008 Proceedings*. 155.

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TIMING IS MONEY - EVALUATING THE EFFECTS OF EARLY AVAILABILITY OF FEATURE FILMS VIA VIDEO ON DEMAND

Le timing c'est de l'argent - une analyse des effets d'une disponibilité anticipée de films en vidéo à la demande

Completed Research Paper

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Abstract

Based on survey data from 489 German potential Video On Demand users this research explores effects of early movie availability on consumers' utility, their willingness to pay, and copyright violations. Using a triangulation approach, we employed adaptive conjoint analysis and contingent valuation methodologies. Our results show substantially increased utility levels and greater willingness to pay for Video On Demand services that offer movies simultaneously with or shortly before the first official theatrical release. Our findings bear similarities to results from experiments on hyperbolic discounting, a concept from the field of behavioral economics. Diverging from classic microeconomic theory, immediate consumption seems to be valued irrationally high. This effect is even stronger for copyright violators. Implications both for future academic research and for the motion picture industry are drawn.

Keywords: motion picture industry, video on demand, digital distribution, time of availability, behavioral economics, hyperbolic discounting, copyright, conjoint analysis, contingent valuation

Résumé

Grâce à deux approches (« analyse conjointe adaptative » et « l'évaluation contingente »), nous explorons les effets d'une disponibilité anticipée de films en vidéo à la demande. En particulier, nous étudions l'influence sur l'utilité perçue des consommateurs et sur leur disposition à l'achat. Nos résultats montrent que les consommateurs associent une valeur irrationnellement élevée à une disponibilité anticipée (cette conclusion ressemble à celles trouvées en économie comportementale et plus particulièrement à l'escompte hyperbolique, «hyperbolic discounting»). Les résultats sont même plus accentués chez les consommateurs qui téléchargent du contenu piraté.

Abstract in German

Mittels eines triangulären Ansatzes aus adaptiver Conjoint-Analyse und direkter Befragung untersucht der vorliegende Beitrag den Einfluss des Verfügbarkeitszeitpunkts von Video On Demand Angeboten auf den Nutzen und die Zahlungsbereitschaft potentieller Konsumenten. Die Ergebnisse kommen solchen aus Studien zur hyperbolischen Diskontierung aus dem Feld der Verhaltensökonomie nahe. Konsumenten bewerten sofortigen Konsum irrational hoch. Bei Urheberrechtsverletzern ist dieser Effekt noch ausgeprägter.

Introduction: Utility of Video On Demand

The motion picture industry is currently experiencing turbulent times. Digitization of the whole value chain – from production to viewing – offers manifold new options, but also demands for thorough reassessment of processes and business models. While film *editing* has been performed digitally for over a decade, *recording* and *projection* are still mostly analog operations (Eliashberg et al. 2006). This research focuses on the later stages of the content lifecycle – the *distribution* of movies.

Video On Demand (VOD) services are a type of distribution that enables studios and distributors to deliver movies to audiences' homes, instantaneously and without intermediaries. A large body of research has explored technical issues surrounding VOD such as compression algorithms and quality-of-service for online delivery (Degrande et al. 2008; Ding et al. 2008; Kalvenes and Keon 2008). Business and management researchers have explored how this innovative distribution channel can be incorporated into existing business models to maximize revenues (Hennig-Thurau et al. 2007b). Recurring themes include the use of so-called *windowing strategies* to develop optimal movie release strategies across multiple channels over time. Such strategies also examine release sequencing across channels. For example, virtually all first releases are currently “bundled” to the channel *movie theater*, while further releases may include DVD and network television broadcasting options.

In an effort to develop distribution strategies for the digitized movie industry of the future, however, it is meaningful to relax this bundling constraint. From a more audience-focused perspective an important question is how *consumer utility* and *willingness to pay* within one specific channel may be correlated with *time of availability*. Therefore, one of the main goals of this research is to investigate the role of the *time of a movie's availability* on the VOD channel from a consumer's point of view. Specifically, we explore

- the relation between *time of availability* and consumers' perceived *utility*,
- the relation between *time of availability* and consumers' *willingness to pay*,
- whether earlier content availability through VOD could be helpful as part of a broader effort to deter copyright violations.

Background: The Business Case for Earlier Movie Availability

The windowing concept that is currently in broad use across the motion picture industry requires channel-specific sequencing of releases as follows: *movie theater* → *DVD/Blu-ray (purchase)* → *DVD/Blu-ray (rental)* → *Pay-TV* → *Free-TV* (Eliashberg et al. 2006). VOD does not necessarily appear in the chain; if it is offered, then it generally appears simultaneously with DVD/Blu-ray rentals, i.e. usually about 6 months after the first release in movie

theaters. Recently however, we have observed a general trend towards increased flexibility in respect of sequencing. In collaboration with most of the major studios, Comcast and Time Warner cable conducted a number of tests in 2007 to see whether a simultaneous DVD and VOD release schedule would cannibalize DVD sales or would lead to higher total revenues (Donohue 2007). Along similar lines Warner Bros.' CEO Jeff Bewkes recently announced that he intends to offer all titles through DVD and VOD simultaneously (Gruenwedel 2008). Also, Apple Inc. just advertised to offer movie new releases from major film studios for purchase on their US iTunes Store on the same day as their DVD releases (Apple 2008). Similar developments will undoubtedly be seen in the future. Eliashberg et al. point out possible future directions for VOD services: "... once these technologies are well established, it is not inconceivable that new movies released on [...] VOD channels prior to their theatrical release, and priced adequately, could be sold to millions of viewers, generating revenues on par with a regular theatrical release" (Eliashberg et al. 2006).

This trend is driven by new developments in *information technology* and in *consumer behavior*. With ubiquitous broadband Internet access and regular hardware upgrades in consumers' homes, the infrastructure for convenient online delivery and high-quality presentation of movies is widely available. As a result, consumer behavior and expectations are changing. Just as nowadays most information is available immediately, consumers are increasingly expecting immediate availability of movies. The same phenomenon has been described in other industries as a growing desire for "instant gratification" (Laibson 2005). These technological and behavioral advancements create a demand-side pull for new delivery processes. In light of these developments, an overhaul of current timing and release strategies for movie content is now necessary. VOD – if used to its full capacity – could potentially meet these new requirements and thus should be evaluated with release time flexibility in mind.

There exist two phenotypes of VOD services. So-called *download-to-own* services allow customers to purchase digital movies at prices similar to DVDs. Users acquire the right to store the data locally and to watch the film as often as desired. In contrast, VOD *streaming* services provide customers with direct access to content on the provider's server for a limited period of time. With streaming architecture, content is only *buffered* but not *stored* on the end-users' hardware. Currently, prices for VOD streaming services are competitive with DVD rentals. Our study aimed to evaluate commercial VOD streaming services that provide 24 hours' worth of access to full-length theatrical motion pictures.

The following section presents a short review of the relevant literature and lays the foundation for the development of our research framework. We then proceed by elaborating the methodological approach to measure *consumer utility* and *willingness to pay*. Thereafter, we present our results and suggest implications for other researchers in this field and the motion picture industry. The paper closes with an assessment of the limitations of our study and a set of recommendations for future work.

Literature Review

The importance of *customer utility* as well as relative revenue streams and the bargaining power of the various channels has already been highlighted by Chang et al. (2007). *Customer utility* is the aggregated value of all product attributes. Earlier research (Doyle 1984; Jacoby and Olson 1985) identified *price* and *quality* as important product attributes. Zeithaml (1988) proposes and validates a model using only these two attributes as direct predictors of *product value* or *customer utility*.

From the consumer's perspective, *price* can be defined as that which must be given up or sacrificed in order to receive a product (Monroe and Krishnan 1985). Research suggests that it is appropriate to differentiate between *objective* and *perceived prices*. Consumers have difficulty remembering actual or objective prices. To find an expression that is meaningful to them they often code prices simply as being *cheap* or *expensive* instead (Zeithaml 1982). We took this fact into account when selecting methods to measure willingness to pay for VOD in our survey.

Quality is broadly understood as superiority or excellence. By extension, the consumer's judgment about a product's overall excellence or superiority can be defined as *perceived quality*. Personal preferences for certain actors, genres, settings or special effects could be among the attributes that determine an individual's perceived quality of motion pictures. *Objective quality* on the other hand is closely related to the technical superiority or excellence of a product (e.g., Hjorth-Anderson 1984; Monroe and Krishnan 1985). It is measurable and verifiable on some predetermined ideal standard. To describe the *objective* or *technical quality* of VOD, the image resolution is a commonly used indicator. Two examples of common resolution standards are *VGA* (640*480 px) or *High Definition 720p*

(1080*720 px). The latter is used exclusively in our research to avoid confounding factors caused by unobservable or subjective attributes.

In our context a third relevant predictor of *customer utility* is the *time of availability*. Its importance is stressed in the body of literature on *time-variant preferences* or *hyperbolic discounting* in the field of *behavioral economics* research (e.g. Rabin 1998). Classic microeconomic theory asserts that *customer utility* decreases over time at a *constant* discount rate (Samuelson 1937). However, when we look at more recent work in the field of behavioral economics, it becomes evident that *homo sapiens* acts differently from *homo oeconomicus* (Thaler 1981, Benzion et al. 1989, Pender 1996). Human preferences actually seem to be *inconsistent* over time. In essence this means that immediate consumption is valued much more highly than delayed consumption, and the degree to which it is higher is irrational (Laibson 1997). This behavioral pattern is also described in the literature as a desire for “instant gratification” (Ho et al. 2006). Analytically it can be modeled by including an additional factor, also called the “present bias”, in the discount function (Phelps and Pollack 1968; Laibson 1997). These theoretical underpinnings constitute evidence for the relevance of timing issues in movie distribution and raise the question of whether movie content is subject to *hyperbolic discounting*. If it were, instant availability could hold very high utility and revenue potential.

A second very important issue in the industry that might be affected by timing strategies is the question of how to develop strategies to minimize *copyright violations* in order to safeguard the motion picture industry from the widespread piracy that is more commonly associated with the music industry (The Economist 2002). Besides the desire for instant gratification, today’s consumers are increasingly tech-savvy and wish to consume digital goods wherever and whenever they please (Grover 2005). Research on the music industry shows no significant deterrent effects on file sharing behavior as a result of legal or educational campaigns (Gopal et al. 2004). Rather, illegal file sharing is now acknowledged to be a function of overall *product utility* (Rochelandet and Le Guel 2005). The overall utility from legitimate digital movies could rise significantly as a result of instant availability, thus making copyright violation less attractive. Another empirical study that assessed German file-sharing activity showed that (among other factors) total transaction costs are a significant predictor of file sharing behavior (Hennig-Thurau et al. 2007). In fact, including accompanying transaction costs, such as concessions, advertising, etc., a single theater visit can easily cost up to ten times the ticket price (Puig 2005). Again, this makes the distribution of illegal copies over the Internet relatively advantageous. By releasing movies early through VOD, studios and distributors could dramatically lower transaction costs, even while charging market-appropriate prices (Hennig-Thurau et al. 2007b).

Framework: Determinants of Customer Utility

In this section we explain the research model that supports our quantitative empirical study. We wished to explore factors that determine consumer utility in the context of VOD. Accordingly, we model *consumer utility*, a measure of relative desirability (Neumann and Morgenstern 1944; Zeithaml 1988), as our first dependent variable.

The first direct determinant of *consumer utility* is *time of availability*, which is also the central construct of interest in this research. It is a measure of the relative release date of a movie in VOD with respect to its initial theatrical release date. The relation between *time of availability* and *consumer utility* is assumed to be negative in nature: the shorter the time lag between the first theatrical release and the VOD release, the higher consumers’ utility. Various studies (implicitly) support this relation (Hennig-Thurau et al. 2007; Eliashberg et al. 2006).

In order to quantitatively test the relevance of the attribute *time of availability* of VOD movies, we juxtaposed this attribute with two other selected and established drivers of customer utility: *price* and *quality* (Zeithaml 1988).

We define *price* as the monetary expense that is required to view a movie through VOD. It is therefore objectively measurable (Jacoby and Olson 1977). Within our framework, the attribute *price* is necessary so that we can compare its relative importance to the importance of the *time of availability* construct. However, it is also essential to include *price* to facilitate subsequent calculations of consumer willingness to pay. Consistent with standard economic theory, when *prices* rise, *customer utility* diminishes. The result is the widely known negative-sloped price-demand-function. In the case of movies we neglect the special case of *conspicuous consumption*, which says that under certain circumstances price-demand functions can also have positive slopes (Veblen 1899).

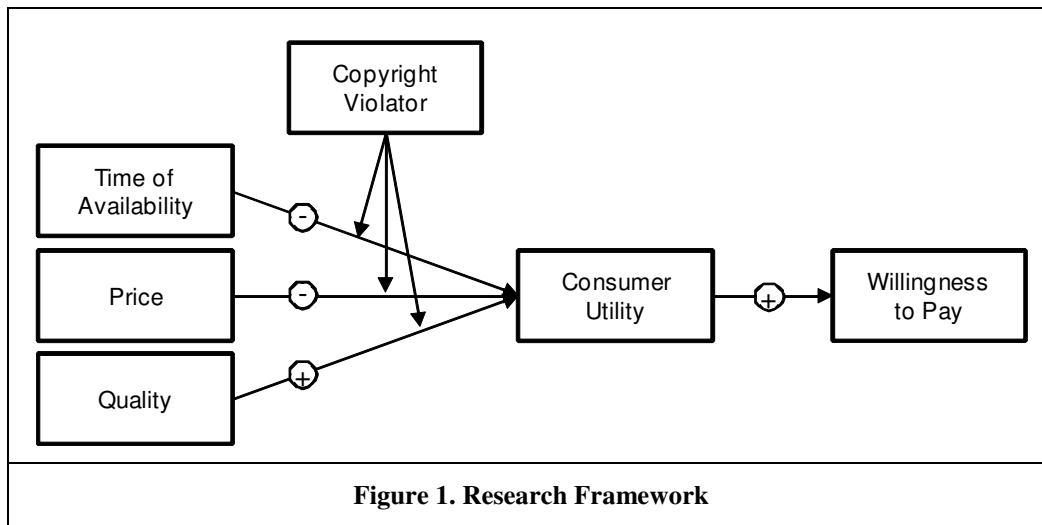
Thirdly, *quality* as a widely accepted direct determinant of *customer utility* is included in our framework (Davis 2001; Zeithaml 1988). For the purposes of this study we reduce the *quality* construct to the objectively measurable

parameter *technical quality* as defined by image resolution (a similar approach was employed by Chen and Seshadri 2007). With rising quality levels, *customer utility* is supposed to also increase.

In an effort to include *copyright infringement* issues within our framework, we model each respondent's statement of whether or not they are a *copyright violator*. This is included as a binary moderator between all three direct determinants and the first dependent variable *consumer utility*.

Lastly, consumer *willingness to pay* is modeled as a direct correlate of *consumer utility*. It serves as the second dependent variable in our framework. Our method for transforming *consumer utility* into *willingness to pay* is discussed in the next section.

Figure 1 illustrates the framework, which, from an economic point of view, turns out to be a trade-off problem for studios and distributors. To keep *utility* constant, higher *prices* will have to be balanced by earlier *availability* and/or higher *quality*.



On the basis of our framework, we formulated three research questions, each of which is connected with the issues discussed at the start of this paper. The first research question concerns the relative importance of *time of availability* as a direct determinant in customers' estimation of total *utility*. RQ1 thus aims at qualifying *time of availability* as a relevant construct.

RQ1. How important is the attribute *time of availability* relatively to the attributes *price* and *quality* in customers' estimation of total utility of VOD offers?

The second research question seeks to determine concrete figures for the effects of early VOD movie availability on consumers' *willingness to pay* and company revenues. We explore if customers' *willingness to pay* for VOD services are capped at current levels or *if and by how much* they might rise if release dates were to move closer to the first theatrical release.

RQ2. How much would customers' *willingness to pay* for VOD streaming services rise with release dates closer to the first theatrical release date?

Finally, we investigate if the relationships between independent variables and the first dependent variable, *consumer utility*, are moderated by whether or not respondents are *copyright violators*. We focus in particular on the relation between *time of availability* and *consumer utility*. As previous studies suggest, the desire for early content availability is currently one of the top motivating factors for copyright violations in the digital domain (Hill 2007). We therefore expect that the *time of availability* is of higher importance to *copyright violators* than to *non-violators*.

RQ3. Is the *time of availability* of movies through VOD services of relatively higher importance to *copyright violators* than to *non-violators*?

The following section contains a detailed presentation of our research methodology.

Methodological Triangulation: Conjoint Analysis and Contingent Valuation

Since *price* being the main driver of company profits, determining consumers' *willingness to pay* (or reservation prices) is an important topic in business research. However no single best method exists to do precisely that (Wertenbroch and Skiera 2002). The literature demonstrates a distinction between methods based on *revealed* or *stated* preference data (Ben-Akiva et al. 1994). While *revealed* data is collected from completed transactions, *stated* preferences are the result of direct or indirect survey data (Cameron and James 1987). Among the limitations of using revealed data are (a) *limited availability* of such data for future product variations and (b) *small variations* in relevant attributes (esp. *price* etc.). For reason (a) we had no other option than to use *stated* preference data for the purpose of this study. The two preferred methods to determine *willingness to pay* from *stated* preference data are *contingent valuation* (CV; synonymous term: *direct elicitation method*) and *conjoint analysis* (CA) (Backhaus et al. 2005). While CA has been found to be superior with regards to the *hypothetical bias* (Nape 2003), CV has the advantage of being simpler, easier to conduct and simpler to understand for participants. However the literature is ambiguous in its evaluation of both methods. Sattler and Voelckner (2002) for example found CV to be superior. In an effort to maximize validity, we used CV and CA in a *triangulation approach* (Denzin 1978) for our study.

Adaptive Conjoint Analysis

Conjoint analysis is a *decompositional* method to determine *consumer utility* and *preferences*. Contrary to *compositional* methods, one main advantage is that during the process of data collection consumers can evaluate complete product configurations rather than just individual attributes. The major drawback is that product configurations are only allowed to vary in a few attributes since otherwise the number of configurations to be evaluated would become too large (Vriens 1995). CA is only applicable for products for which it is assumed that the total *utility* is the sum of the *part worth utilities* of each of the attributes.

Adaptive conjoint analysis (ACA) is an advancement of the classical *full profile* CA (Johnson 1987), because it incorporates the advantages of letting respondents evaluate complete product configurations, but does not require every possible combination to be presented and thus significantly reduces complexity and drop-outs.

ACA is based on four assumptions (Johnson 1987):

- (a) Products are bundles of attributes. In this study we regard VOD streaming services as a combination of the attributes *time of availability*, *price* and *quality* each with a number of possible specifications. The attributes and exact specifications defined for this study are summarized in Table 1.

Table 1. Attributes and Specifications for Adaptive Conjoint Analysis		
Time of Availability	Price	Quality
6 months after first theatrical release	EUR 10.99	QVGA (320*240 px)
3 months after first theatrical release	EUR 8.99	DVD Quality (768*576 px)
1 month after first theatrical release	EUR 6.99	HD 720p (1280*720 px)
Simultaneous with first theatrical release	EUR 4.99	Full HD 1080p (1920*1080 px)
1 week before first theatrical release	EUR 2.99	

An individual's *total utility* from a product configuration is equal to the sum of the utilities he or she receives from each one of the specifications comprised therein. Formally, the total utility can be expressed as:

$$(1) \quad u_{it} = u_i(a_t) + u_i(p_t) + u_i(q_t).$$

Let u_{it} denote consumer i 's *total utility* from product configuration t . We assume the attributes to be compensatory in nature, thus justifying a simple addition approach. The *total utility* is a function of $u_i(k_t)$, consumer i 's *part worth utility* from the specification of the attribute $k \in \{\text{time of availability } a \mid \text{price } p \mid \text{quality } q\}$ in product configuration t (Johnson 1987).

- (b) Preferences for each of these options differ among respondents. These individual preferences on the attribute level are called *part worth utilities* (or *part worths*). The valuable information is reflected in differences between single attribute levels and not in their absolute values.
- (c) The *total utility* of a product configuration is the sum of its *part worths* as shown in equation (1). On the basis of *total utilities* it is possible to predict which product will be preferred.
- (d) Assumption (c) can be reversed: with data on *stated preferences* between multiple products it is possible to deduce underlying *part worths*. This is where the ACA approach comes in.

The procedure first described by Johnson (1987) has been implemented in a range of software packages with minor variations. For this study we used the Globalpark EFS Conjoint Module (Globalpark 2008). The approach we chose comprises three steps:

- (1) As a first step, preliminary information on individual perception of *attribute importance* is gathered. To this end, three questions were asked, with responses defined in terms of a 5-point Likert-type scale.

Example 1. Attribute Importances	
All other equal, how important would the following difference be for you?	
6 months after first theatrical release	Not important at all ○ ○ ○ ○ ○ Very important
vs.	
1 week before first theatrical release	

- (2) In the second step, participants were presented with a total of 18 trade-off *pair comparisons*. The product configurations were each described by two attributes. They were asked to use a 5-point bipolar scale to indicate their preferred product choice. The product configurations varied from question to question. The ACA algorithms allow the software to automatically choose the optimal product comparison during each iteration to maximize marginal information. Marginal information is highest for pairs that are as similar as possible in respect of total utility.

Example 2. Pair Comparisons	
Which of the two VOD services would you prefer?	
6 months after first theatrical release EUR 2.99	○ ○ ○ ○ ○
	Simultaneous with first theatrical release EUR 9.99

- (3) In the last step, the *calibration phase* three full-profile product configurations defined in terms of all three attributes were presented to the respondents. Participants were asked to estimate the probability that they would use this particular VOD service and enter the probability as a percentage.

Example 3. Calibration	
If the following VOD service were offered to you: how likely would it be that you ordered it? <i>(Please estimate your personal purchase probability for this particular product in values between 0 (definitely would not buy) and 100 (definitely would buy).</i>	
Simultaneous with first theatrical release EUR 9.99 DVD quality (768*576 px)	<input style="width: 40px; height: 20px;" type="text"/> %

Deriving Willingness to Pay from Conjoint Data

Because *price* is included as an attribute within our conjoint analysis, it is possible to deduce respondents’ individual *willingness to pay* or *reservation prices* for all product configurations from our data. Kohli and Mahajan (1999) have described a possible procedure (the same procedure was also applied by Strube et al. 2008). The basic idea is to compare the *total utility* of a certain product configuration with the *total utility* of a *reference product*. The *willingness to pay* is equal to the *price* at which the *total utility* of the product under review does not fall below the *total utility* of the *reference product*. The *reference product* can either be an individual’s *most strongly preferred* product or a *status quo* product. Analytically, the related utilities can be expressed as follows:

$$(2) \quad u_{it-p} + u_i(p) \geq u_i^* + \varepsilon$$

u_{it-p} is an individual i 's total utility of any product configuration t without the price attribute. $u_i(p)$ is the individual's part worth utility of the price attribute. u_i^* is the individual's total utility of the reference product, ε is any small positive number. If $p = p_{it}$, equation (2) is satisfied and p_{it} therefore reflects the individual's willingness to pay for product t .

In this study we used a product that is currently commercially available as the *status quo product* and the reference point for our calculations. The product is a VOD streaming service that offers movie rentals 6 months after the first theatrical release at a price of EUR 2.99 and at DVD quality (768*576 px).

Since conjoint analyses are strictly limited in terms of number of attributes and attribute levels, we were only able to offer five price points. However with the help of *linear interpolation* we could also calculate the utility values $u_i(p)$ for additional price points between 2.99 EUR and 10.99 EUR (Kohli and Mahajan 1991; Strube et al. 2008; see equation (3)).

$$(3) \quad u_i(p) = u_i(p_1) + \frac{(p - p_1)(u_i(p_2) - u_i(p_1))}{(p_2 - p_1)}$$

In order to estimate individuals' willingness to pay for different product configurations, we started with a price $p = 0$ for each product and subsequently raised it until equation (2) no longer held true. In accordance with Kohli and Mahajan (1999) we assumed that the price point immediately prior to that event was equal to the respondents' willingness to pay for product t .

Contingent Valuation Method

The contingent valuation method (CVM) was originally designed to determine *willingness to pay* for goods or resources for which no market prices exist, such as wildlife or clean air (Hanley 1989). CVM is a *direct* approach that lets consumers assign values *contingent* on product attributes. According to the *close-ended* or *discrete choice* variant of the CVM respondents are asked if they would buy a specific product at a given price. The *open-ended* CVM lets respondents place values on different product specifications (Halvorsen and Sølensminde 1998). We used the latter approach in our study. However, respondents were asked to choose their *willingness to pay* for VOD services from eight predefined options. The options were formulated as *additional willingness to pay* for improved versions relative to a *status quo product*. Since the primary objective of this study was to investigate the *effects of early motion picture availability through VOD*, the contingent variable was *time of availability*. The reference product was specified as a VOD streamed movie rental that was available 9 months after the first theatrical release for EUR 3.99. Table 2 shows the different product specifications (for the contingent variable *time of availability*) and the price variations offered.

Table 2. Attributes and Specifications for Contingent Valuation	
Time of Availability	Additional Willingness to Pay
6 months after first theatrical release	+ EUR 0.00 (final price = EUR 3.99)
3 months after first theatrical release	+ EUR 0.50 (final price = EUR 4.49)
Simultaneous with first theatrical release	+ EUR 1.00 (final price = EUR 4.99)
1 week before first theatrical release	+ EUR 1.50 (final price = EUR 5.49)
	+ EUR 2.00 (final price = EUR 5.99)
	+ EUR 3.00 (final price = EUR 6.99)
	+ EUR 4.00 (final price = EUR 7.99)
	+ EUR 5.00 (final price = EUR 8.99)

While CVM has distinct advantages such as an easy data collection process and a high degree of time and cost efficiency, the method is subject to three potential biases (Hanley 1989). The *strategic bias* accounts for the fact that respondents might strategically understate their *willingness to pay* in hopes of influencing pricing decisions toward a value that is more favorable for the consumer. The *design bias* refers to three potential sources of error: bias due to

the nature of selected reference points, bias in the way questions are asked, and bias that derives from the amount and quality of information that respondents are provided with. Finally, the *hypothetical bias* reflects the fact that hypothetical questions have a tendency to produce hypothetical answers (Scott 1965).

In addition to the CA and CVM items, we also included questions in the survey asking respondents if they (occasionally) use file-sharing networks such as eMule or BitTorrent to download the latest movies. The purpose of this question was to distinguish *copyright violators* from *non-violators*, which serves as a binary moderator in our framework. We also employed a projective measure to minimize the effects of *social desirability* (Fisher 1993). This term refers to bias which often influences survey items that treat awkward, socially inappropriate topics or illegal activities such as drug use or file-sharing.

Data Collection and Analyses

Our data was collected using a quantitative standardized online survey during the last two weeks of February 2008. We used Globalpark's EFS Survey Center 5.2 with the EFS Conjoint Module, which facilitated the software assisted *adaptive conjoint analysis*. The instrument was subjected to a pretest, after which the wording and structure of multiple questions were refined. The first page included a clear *definition* of Video On Demand as an *IP-based* distribution channel for feature films. Movies are transmitted via *streaming* technology and are only *buffered* on the recipient's computer or set-top-box, but *cannot be stored*. Access to one movie was stated to be limited to a *24-hour period*. Analyses of the exported data were performed using SPSS.

Sample Definition and Recruitment

The basic population for this study comprises Germans who have a general interest in movies and who have broadband Internet at home. The criteria are consistent with the basic customer requirements for IP-based VOD services. Invitations were transmitted to members of three popular *social networks* in Germany (kickpunkt.de, lokalisten.de and studivz.de) with the request to forward the invitation to their friends. The resulting set of respondents was therefore a passively recruited *convenience sample* that is subject to *self-selection bias* and therefore exhibits *limited external validity*. However, the sample was adjusted retroactively to match our sample definition by filtering on the basis of responses to two specific questions. Only respondents who stated that they had access to a *DSL Internet connection* or faster and who confirmed that they watch *at least one movie* per month (in any channel) were included in the subsequent analyses. Within the boundaries of our definition only this subsample meets the requirements to use VOD services. Table 3 shows the corresponding qualifier questions and answer options.

Table 3. Sample Specification					
What type of Internet connection do you use at home?					
None	56K modem	ISDN	DSL	Cable	Satellite
How many movies do you usually watch per month through the following channels:					
<i>Movie theater</i>	<i>DVD (purchase)</i>	<i>DVD (rental)</i>	<i>VOD</i>	<i>Pay-TV</i>	<i>Free-TV</i>
Less than 1 per month	1 per month	2 per month	3 per month	4 per month	More than 4 per month
■ = Respondents who chose this option were excluded from the sample					

Study Results

Sample Description

A total of n=796 participants began answering our survey and, of those, n=626 finished the questionnaire. After selecting respondents in accordance with our sample specification (broadband Internet connection and sufficient level of movie interest) we included n=489 data sets in our subsequent analyses. Of these, 107 (22%) were female and 382 (78%) were male. Among those users who had broadband, DSL was by far the most popular Internet access technology, (94% of the sample).

Descriptive statistics on movie consumption across our data set show that free TV is the preferred channel. More than 50% of the respondents stated that they watch more than four movies per month on Free-TV. Surprisingly, movie theaters ranked second as the preferred channel to watch movies. Over 35% of the participants in our study stated that they visit movie theaters at least twice a month.

n=489	Movie theater	DVD (purchase)	DVD (rental)	VOD	Pay-TV	Free-TV
Mean	1.41	1.11	1.17	.38	1.23	3.66
Std.Dev.	1.62	1.45	1.46	1.01	1.85	1.62
Please note: mean values do not match absolute units of monthly movies consumed due to coding (0 = less than one movie per month / 1 = 1 movie per month / 2 = 2 movies per month / 3 = 3 movies per month / 4 = 4 movies per month / 5 = more than 4 movies per month)						

Of the 489 respondents only 30 (6%) revealed themselves to be *copyright violators*. 37 (7.6%) did not specify an answer and the remaining 422 stated that they never engage in file sharing. As expected, the proportion of people who admitted to using file sharing networks was very small.

Relative Importance of Time of Availability, Price and Quality

The relative importance of an attribute is determined by the ratio between the utility range of *one attribute* and the utility ranges of *all attributes*. However, statements on the absolute importance of one attribute can only be made on the basis of ACA phase 1 (questions that directly concern importance). Our data reveals that the highest relative importance is associated with *price* (.376), followed by *quality* (.319) and *time of availability* (.306). The average R² of the regressions on purchase probabilities is .585.

n=489	Time of Availability	Price	Quality	R2
Mean	.306	.376	.319	.585
Std.Dev.	.116	.125	.116	.351

To answer RQ1 we conducted a paired samples t-test on the mean differences between the importance of *time of availability*, *price* and *quality*. The results show significant differences between pairs 1 and 3 (*time of availability & price* and *price & quality*) but not in pair 2 (*time of availability & quality*).

n=489 df=488	Pair 1: Time of Availability & Price	Pair 2: Time of Availability & Quality	Pair 3: Price & Quality
Mean Difference	-.070	-.013	.056
Std.Dev. of Difference	.211	.195	.212
t (Sig. (2-tailed))	-7.340 (.000)	-1.485 (.138)	5.949 (.000)

To answer our first research question, we thus conclude that from a consumer point of view *price* is the most important attribute of VOD services by a substantial margin. However, it is interesting to note that the *time of*

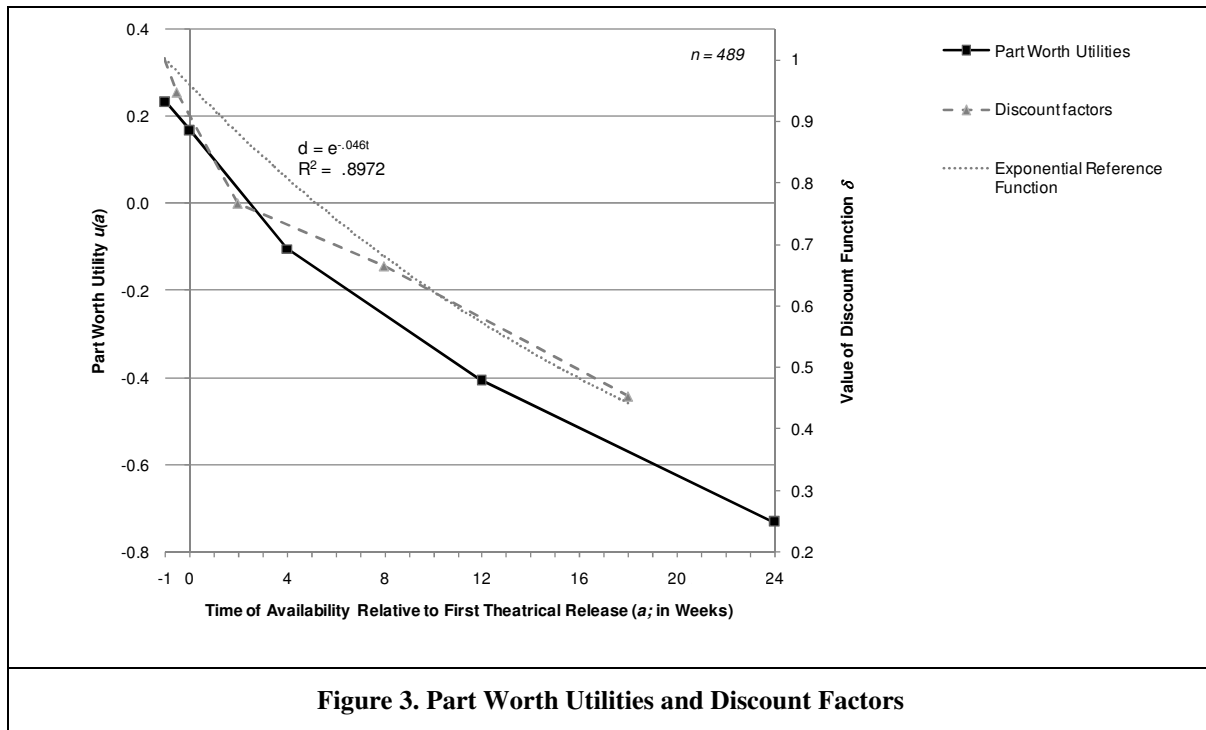
availability is as important as the quality of such offers. This result suggests that a more thorough consideration of the timing dimension should be given to the design of future distribution strategies within the movie industry. Katz (1998) offers another explanation for the particular role of timing: due to the integrative function of media and resulting follow-up communication, people with earlier content (or movie) access have an information advantage within their social networks.

As a basis for the subsequent calculation of the willingness to pay statistic, we estimated aggregate part worth utilities for the attributes from the conjoint data. Table 7 shows descriptive statistics for the calibrated part worths of attributes and individual levels.

Time of Availability	Mean	Std. Dev.	Price	Mean	Std. Dev.	Quality	Mean	Std. Dev.
6 months after*	-.730	.523	EUR 10.99	-.861	.572	QVGA (320*240 px)	-.838	.584
3 months after*	-.405	.471	EUR 8.99	-.485	.482	DVD Quality (768*576 px)	-.183	.512
1 month after*	-.104	.491	EUR 6.99	-.148	.470	HD 720p (1280*720 px)	.063	.544
Simultaneous*	.169	.633	EUR 4.99	.175	.600	Full HD 1080p (1920*1080 px)	.290	.677
1 week before*	.235	.656	EUR 2.99	.484	.760			

* relative to first theatrical release (n=489)

From the part worth utilities for different specifications of the timing attribute a , it is possible to derive the corresponding utility values $u(a)$. The result is illustrated in Figure 3. The graph illustrates the effect of the time of availability on users' utility function (black line). With earlier availability, the utility constantly rises.



Furthermore, part worth utilities as a function of the time of availability are the basis for calculating so-called discount factors, which reflect the rate at which utility declines with delayed movie availability (dashed grey line). To calculate discount factors from one observation to the next we used $d = u_t(a)/u_{t-1}(a)$ where $u(a)$ is the part worth utility of the time of availability, d = discount factor and t = period. The classic discounted-utility (DU) framework (Samuelson 1937) models intertemporal choice with a constant discount factor δ embedded into an exponential discount function $d(t) = \delta^t$ with $0 < \delta < 1$. However, research in the field of behavioral economics it has shown

repeatedly that the discount factor actually *varies* over time (Thaler 1981, Benzion et al. 1989, Pender 1996). The desire for *instant gratification* explains the empirical observation of strongly declining discount factors at time periods closest to the present, followed by a leveling-out of the curve. Analytically this characteristic of *homo sapiens* is reflected by a “present bias”, which is an additional parameter that converts the classic exponential discounted utility function into a *hyperbolic* discounted utility function. Higher or lower parameter values for the *present bias* allow for an analytical evaluation of more or less “irrational” consumer behavior. A similar pattern appears in our data. The comparably low R^2 of .897 for the exponential reference function (dotted grey line) reflects that our results are consistent with the latest experiments. Instant availability of movie downloads seems to be of very high value to consumers and this explains the sharp bend in the discount function between simultaneous release through VOD and in theaters and VOD release that is delayed by one month.

Willingness to Pay Contingent on the Time of Availability

In order to answer our second research question, we examined the *willingness to pay* for movies through VOD at different release dates. The resulting *willingness to pay* data was determined on the basis of the analyses from *ACA* and *CVM*. To calculate *willingness to pay* from the conjoint data, we employed the method proposed by Kohli and Mahajan (1999), as explained in the preceding section. The calculation was conducted in steps of EUR 0.50 from EUR 2.99 to EUR 10.99.

Since the CVM output consists of explicit values for *willingness to pay*, we directly report observed mean values for this method (Figure 4).

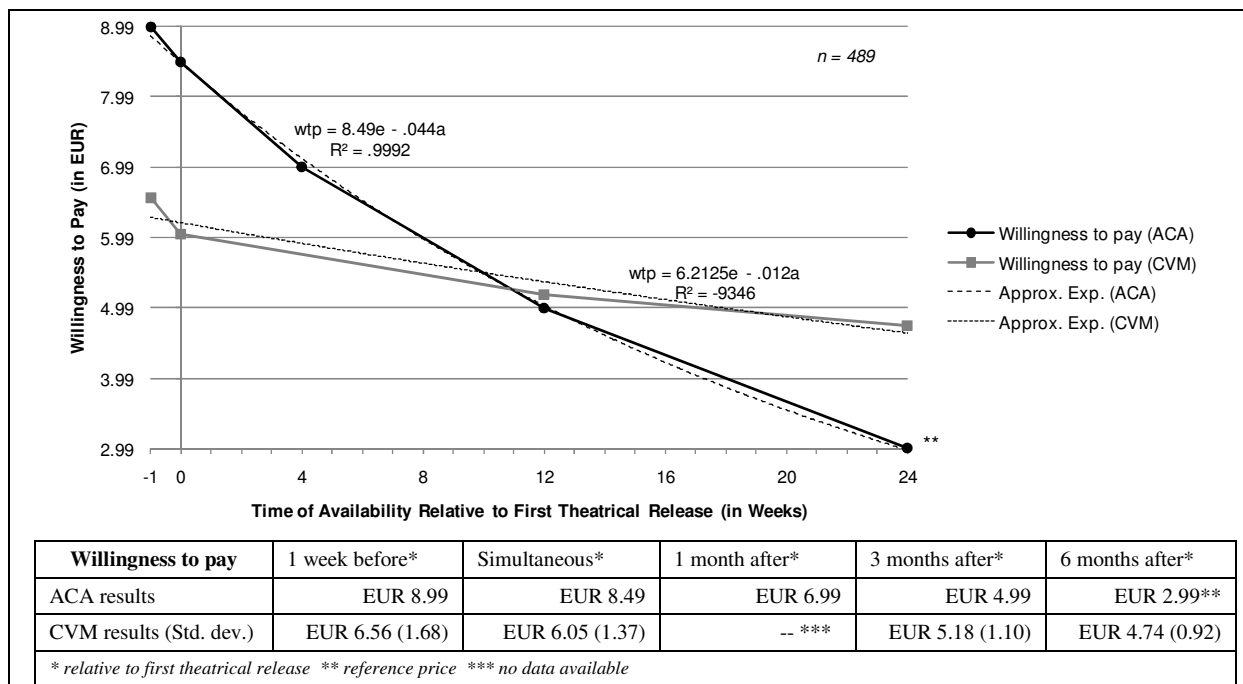


Figure 4. Willingness to Pay Contingent on the Time of Availability

As confirmed by both data sets and as shown in Figure 4, the willingness to pay rises significantly with earlier release dates and seems *not to be capped* at current price points, i.e. EUR 2.99 for a 24-hour streaming. Depending on the method, we determined values of EUR 8.49 (CA) or EUR 6.05 (CVM) for consumers’ *willingness to pay* for 24-hour VOD rentals that are made available *simultaneously* with the first theatrical release. We note that the values for the maximum *willingness to pay* from CVM are well below the equivalent prices as generated by CA. There are multiple explanations for this. Firstly the pattern of responses could be due to the *strategic bias* (Hanley 1989). Respondents, when directly asked, strategically understate their willingness to pay in the hope that they might influence pricing decisions in a direction that is more favorable to the consumer. A second explanation is offered by the concepts of *reference dependence* and *context effects*. In various experiments Simonson and Tversky (1992)

showed that different sets of options influence choices. If we had offered higher options for the additional willingness to pay (Table 2) the figures for willingness to pay might have been even higher.

If we compare the calculated willingness to pay from our sample with average box-office prices in Germany, which were at EUR 6.04 in 2007 (FFA 2008), it becomes evident that, regardless of the method, consumers are willing to spend even more for first releases through VOD than what they would pay for theatre tickets on average. An even higher willingness to pay could be evoked in the hypothetical case of VOD movies being available for download one week *before* the first theatrical release.

Results Concerning Copyright Violation Issues

The distinction between *copyright violators* and *non-violators* was an integral part of our framework (Figure 1). However the detection of such behavior poses a challenge to researchers. Due to the effect of *social desirability*, respondents tend not to admit behaviors that they expect their social network to view negatively (Fisher 1993). To control for *social desirability* while still allowing respondents to answer “honestly” we employed *direct* and *projective* measurements to identify *copyright violators*. However, during the data analysis we identified multiple cases where *projective* and *direct* answers contradicted one other. For this reason, we only categorized respondents as *copyright violators* if they *honestly answered* the corresponding *direct question* in the affirmative.

In order to answer RQ3 we split our sample into two groups: *copyright violators* (V; n=30) and *non-violators* (NV; n=422). 37 respondents chose not to answer the direct question and they were therefore excluded from the group statistics. At a p<.5-level, the t-test for independent samples only shows significant group differences for the importance of the attribute *time of availability* (t=2.232; df=450; p=.033; Table 9). This indicates that *price* and *quality* are of equal importance to *copyright violators* and *non-violators*. However, there is a significant difference in regards to the *time of availability*: *copyright violators* rate early movie availability as *significantly more important* as do *non-violators*.

n=452; df=450	Time of Availability		Price		Quality	
	V	NV	V	NV	V	NV
Mean	.368	.299	.334	.377	.298	.323
Std.Dev.	.167	.111	.147	.124	.124	.116
Mean diff.	.069		-.044		-.025	
t (sig. (2-tailed))	2.232 (.033)		-1.850 (.065)		-1.135 (.257)	

The results in Table 9 give a more detailed picture of the degree to which *copyright violators* prefer sooner availability compared to *non-violators*. The difference becomes especially salient when considering the extremes in *utility* values. Mean differences and significances are highest for *1 week before* and *6 months after* the first theatrical release. While *copyright violators* gain extraordinarily *high utility* from very early availability (.703 vs. .208), they experience *strong disutility* from late availability (-1.081 vs. -.704).

n=452; df=450	1 week before*		Simultaneous*		1 month after*		3 months after*		6 months after*	
	V	NV	V	NV	V	NV	V	NV	V	NV
Mean	.703	.208	.429	.159	-.077	-.105	-.611	-.391	-1.081	-.704
Std.Dev.	.951	.610	.110	.031	.068	.024	.082	.023	.128	.025
Mean diff.	.495		.270		.028		-.212		-.377	
t (sig. (2-tailed))	2.810 (.009)		2.288 (.023)		.299 (.765)		-2.468 (.014)		-3.831 (.000)	

* relative to first theatrical release

These results indicate that the *time of availability* is significantly more important to people who use file-sharing networks to download the latest movies. The *relative importance* reflects the portion of total product *utility* that can

be explained by a single attribute. Attributes with higher *relative importance* have a stronger influence on total *utility*. For movie *copyright violators* a larger percentage of their total *utility* can be explained by the *time of availability* of a movie. Rochelandet and Le Guel (2005) have unambiguously explained *copyright infringements* in terms of relative *customer utility*. Thus, our results are consistent with the reverse conclusion, namely that earlier movie availability through VOD could be an effective way to limit online copyright violations.

Summary and Implications

In this study we explored the impact of the *time of movie availability* through Video On Demand on *consumers' utility*, their *willingness to pay* and on *copyright violations*. Firstly, we were able to show that the attribute *time of availability* is just as important as the technical *quality* of the streamed movies, as measured in terms of image resolution. Secondly, with a *triangulation approach* (*adaptive conjoint analysis* and *contingent valuation method*) we showed that consumer *willingness to pay* rose significantly with earlier availability. For movies that are offered through VOD simultaneously with their first theatrical release, the *willingness to pay* exceeds the levels of current box-office prices in Germany. The identified *willingness to pay* values were different in the case of the two calculation methods. For simultaneous availability, the values from ACA were about 40% higher than those determined using CVM. The *strategic bias* as well as *context effects* offer explanations for this pattern of results. While CVM has the advantage of being simpler, easier to conduct and simpler to understand for participants, CA seems to yield less biased results.

Our data shows that audiences are willing to pay premium prices for early availability of movies through VOD streaming services. Depending on the method, respondents were willing to pay up to EUR 8.49 for a 24-hour VOD rental of a movie that is simultaneously released in theaters. As a result of these figures, studios and distributors should revisit their current *windowing strategies* which in fact resemble a model of *inter-channel* price discrimination. In order to embrace emerging technologies such as VOD and to address emerging customer needs, the superior solution could be a model of *intra-channel* price discrimination. Movies could be released through multiple channels simultaneously to implement *skimming-pricing*. Under such a strategy, prices in the first periods after a product or movie release are relatively high and they are subsequently lowered over time (Dean 1969). Despite the advantage of capturing consumer surplus and recouping the high first copy costs for movies, a possible disadvantage from the application of such a strategy could result from the fact that audience numbers in the first week after a movie release have a strong impact on subsequent licensing fees and on future revenues for the studios. If the initial price under the *skimming-pricing* strategy is set too high, consumers might wait until a later period and impair the important “buzz”-creating effect of the opening week (Hennig-Thurau et al. 2006).

The *copyright violators* in our sample were significantly more sensitive to the *time of movie availability* than other respondents. At the same time they showed gradually lower levels of *price sensitivity* (Table 9). Taken together, this suggests that earlier availability of movies through legal VOD services could improve the overall *utility* of those offerings for *copyright violators*, overcompensating for the *price* demanded for such services. In essence, adequately priced VOD movies, made available early, could successfully limit online copyright infringements.

By analyzing *utility* distributions over *time* and the subsequent calculation of *discount factors* (Figure 3) we found patterns in our data that resemble results from experiments on behavioral economics (Rabin 1998). While instantly available movies provide very high *utility*, *discount rates* are inconsistent over time. Similar distributions of utilities and discount rates have been described in other industries by the *hyperbolic discounting* framework (Laibson 1997), which challenges assumptions of the classic discounted-utility framework (Samuelson 1937).

Limitations and Further Research

Among the limitations of this research are its *exploratory character* and the *isolated focus* on VOD as a distribution channel without explicitly accounting for possible *cannibalization* of other distribution windows. Further limitations concern the *sample*, which was only recruited in Germany and has a *convenience* character. The *triangulation* approach allows for an initial picture of *utility* and *willingness to pay* in the case of potential VOD customers, however the results have *limited external validity* for the global Internet community. Local regulations and pricing policies can have a strong impact on business models and consumers' *willingness to pay*.

In addition to our findings regarding the irrationally high valuation of instantly available content, it would be valuable to thoroughly test if the economic models on *hyperbolic discounting* (Laibson 1997) are better suited to

estimating *customer utility* of media content. In an effort to achieve this, a field experiment could be conducted with a small selection of movie titles. An advantage of this approach would be the possibility to gain *revealed* instead of *stated* preference data, thereby reducing the *hypothetical bias*. Similarly, it would be interesting to dig deeper into the personalities of *copyright violators* and test whether they show patterns of weaker *self control*. Since *self-control* is theoretically closely related to the desire for *instant gratification* (O'Donoghue and Rabin 1999), this could lead to an explanation for the higher sensitivity of copyright violators in respect of *time of availability*.

Prominent authors from the field of *behavioral economics* have called for more real world applications of the concepts of behavioral economics (Laibson and Zeckhauser 1998). *Information Systems Research* as a field with an abundance of such real world applications could provide rich opportunities for such research and could potentially benefit from more consumer oriented and psychology-driven approaches.

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