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Consumer File Sharing of Motion Pictures

Thorsten Hennig-Thurau*
Department of Marketing and Media Research
Bauhaus-University of Weimar
Bauhausstrasse 11, 99423 Weimar, Germany
Phone +49 (0) 3643 58 3822
Fax +49 (0) 3643 58 3791
Email: tht@medien.uni-weimar.de

Victor Henning
Department of Marketing and Media Research
Bauhaus-University of Weimar
Bauhausstrasse 11, 99423 Weimar, Germany
Phone +49 (0) 3643 58 3736
Fax +49 (0) 3643 58 3791
Email: victor.henning@medien.uni-weimar.de

Henrik Sattler
Institute of Marketing and Media
University of Hamburg
Von-Melle-Park 5, 20146 Hamburg, Germany
Phone (+49) 40 42838 6401
Fax (+49) 40 42838 3650
Email: uni-hamburg@henriksattler.de

*corresponding author

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ABSTRACT

Illegal consumer file sharing of motion pictures is considered a major threat to the movie industry. Whereas industry advocates and some scholars postulate a cannibalistic effect on commercial forms of movie consumption, other researchers deny this effect, though sound evidence is lacking on both sides. Drawing on extant research and utility theory, the authors present hypotheses on the consequences and determinants of consumer file sharing and test them with data from a controlled longitudinal panel study of German consumers. The data contains information on the consumers' intentions and actual behavior toward consuming 25 new motion pictures, allowing the authors to study more than 10,000 individual file sharing opportunities. The authors test the effect of file sharing on commercial movie consumption using a series of ReLogit regression analyses and apply partial least squares structural equation modeling to identify the determinants of consumer file sharing. They find evidence of substantial cannibalization of theater visits, DVD rentals, and DVD purchases, responsible for annual revenue losses of $300 million in Germany. Five categories of file sharing behavior drive file sharing and have a significant impact on how consumers obtain and watch illegal movie copies.

Consumer File Sharing of Motion Pictures

Ever since the ascent of Internet file sharing services and the parallel sharp decline of the music industry's worldwide sales, movie executives have feared that their industry would be similarly affected by illegal file sharing (*Economist* 2002). Recent figures show that around 130,000 movies are downloaded each day through file sharing networks in the United States alone (MPAA 2004b), while movie theater admissions in 2005 fell by 9% in the U.S. and even more in other major markets. Against this backdrop, the Motion Picture Association of America (MPAA) claims that "illegal movie trafficking represents the greatest threat to the economic basis of moviemaking in its 110-year history" (MPAA 2004a) and has declared "war on piracy" (Fritz 2005).

However, sound evidence for the proclaimed effect of file sharing on movie consumption is lacking. A multitude of industry reports postulate a cannibalization effect of file sharing on movie industry revenues, but the results of academic studies are inconclusive. No peer-reviewed article has yet investigated the effects of movie file sharing on commercial distribution channels, and the limited work that reports a negative effect of music file sharing on legal music consumption uses highly abstract proxies such as "Internet penetration" to measure consumer file sharing (e.g., Liebowitz 2006). At the same time, some researchers argue that file sharing does not damage the (music) industry and provide empirical (Oberholzer-Gee and Strumpf 2005) and theoretical (Gopal, Bhattacharjee, and Sanders 2005) arguments supporting the absence of a cannibalization effect—or even the presence of a *positive* effect of file sharing on legal consumption.

We shed light on this controversial issue by employing controlled longitudinal panel data from 770 to 813 consumers which encompasses information on more than 10,000 movie file

sharing opportunities. We use this data to investigate whether illegal movie file sharing influences revenues generated through theatrical visits, DVD rentals, and DVD purchases and, if so, how strong the effects are. In addition, we present, for the first time, a comprehensive, theory-based model of the factors that drive consumers' movie file sharing activity. This model offers the movie industry a more thorough understanding of why consumers engage in file sharing, suggesting more effective antipiracy strategies.

The paper is structured as follows. After reviewing the relevant literature, we derive a set of hypotheses regarding the consequences and determinants of movie file sharing from extant research and utility theory. We then report our data set and use ReLogit regression analysis and partial least squares structural equation modeling to test the hypotheses. We conclude by discussing the results and implications.

MOTION PICTURE FILE SHARING LITERATURE

File Sharing Consequences

Industry representatives unanimously argue that illegal motion picture file sharing has a negative impact on other kinds of movie consumption, and industry-commissioned studies, such as FFA (2006a) and MPAA (2004c), support their claims. For example, in a study of movie piracy by the German Federal Film Board (FFA), respondents indicated how movie downloading or copying movies with a CD/DVD burner had influenced their consumption of motion pictures through other channels; 42% of the respondents reduced their number of movie theater visits (though 8% stated they went to the movies more often), 45% said they rented fewer DVDs, and 44% replied that they bought DVDs less often (FFA 2006a). Similarly, the findings of an eight-country study commissioned by the MPAA (2004c) indicate that "about one in four internet users (24%) have downloaded a movie" (MPAA 2004c, p. 1) and that, on a global level, 26% of

downloaders purchase movies "much less" or "a little less" often than in the past (excluding the outlier Korea lowers the unweighted mean from 26% to 14%). The insights generated by these and other industry studies are limited by their methodological approaches and lack of transparency. In all cases, the results rely on an ex-post "what-if" approach that asks consumers who have already seen movies as illegal copies (and therefore know the cinematic quality) to speculate if they would have paid for the movies if they had not been available as illegal copies.

To the best of our knowledge, no scholarly research addresses the effects of sharing illegal movie copies on commercial distribution channels. In the related context of music file sharing studies, researchers are split into two opposing groups. The first group reports a negative impact of music file sharing on industry sales (Liebowitz 2006; Michel 2006; Montero-Pons and Cuadrado-García 2006; Peitz and Waelbroeck 2004; Zentner 2006), but these studies all rely on aggregate household Internet penetration in a given city as a proxy for file sharing and do not monitor file sharing on an individual basis. Obviously, this approach raises serious questions regarding spurious correlations and paves the way for alternative explanations.

The second group of researchers question these findings and argue that file sharing has either no or a positive impact on industry revenues. Specifically, Gopal, Bhattacharjee, and Sanders (2005) propose a model of online music sharing economics and derive implications for consumer surplus and producer profits. Following the train of thought that consumer file sharing represents a form of "sampling" for experience goods, they conclude that file sharing networks lower the total costs of evaluating and acquiring experience goods, which increases purchases and industry profits. In other words, file sharing reduces consumers' risk in evaluating new music (an argument that easily extends to movies), a major obstacle in consumer decision making.

Using a different argument, Boldrin and Levine (2002) and Grgeta (2004) model competition with sunk costs and argue that, with certain assumptions, the decreasing costs of reproduction that result from file sharing make it easier, not harder, for the producer to recoup his or her investment and that as the rate of reproduction increases, competitive rents increase. Their conclusion is based on the concept of indirect appropriability, which assumes an original product attains greater consumer utility when it can be copied and that this utility increase can be captured by the producer through a price increase. However, like Gopal, Bhattacharjee, and Sanders (2005), they do not provide empirical findings to substantiate their conclusions.

Oberholzer-Gee and Strumpf (2005) present empirical results that show no negative impact of file sharing on traditional music distribution channels. Over the course of four months, they monitor 1.75 million file downloads on file sharing networks and then match the downloads to U.S. album sales data. Their empirical analysis shows that music file sharing has no significant impact on album sales. Again, however, the generalizability of their findings is somewhat limited as the authors use the "number of German school kids on vacation" as an instrumental variable for file sharing activity to bypass endogeneity problems caused by the simultaneity of downloading and purchasing activity in their aggregate level data.

To summarize, movie industry representatives argue that file sharing serves as a substitute for commercial movie consumption, while no peer-reviewed research has studied this relationship for movies, and the results from music file sharing research are inconclusive and limited by methodological constraints. Moreover, no existing study surveys actual consumer decision making on an individual level, and no study uses longitudinal data.

File Sharing Determinants: The Rochelandet–Le Guel Model

Related to the consequences of movie file sharing for commercial channels are the factors that drive consumer file sharing. Research into these factors is also rare; we are not aware of a single academic study that directly addresses this question. Again, some scholars have researched file sharing determinants in the related context of music. Most authors focus on the role of individual constructs for file sharing (ethical predispositions, Gopal et al. 2004; consumer expertise, social networking, and moral judgments, Huang 2005), while Rochelandet and Le Guel (2005) attempt to integrate different drivers of sharing illegal music copies in a comprehensive model.

Building on the Beckerian consumer utility framework, Rochelandet and Le Guel (2005) propose that consumers prefer illegal copies of music over the original product (i.e., a CD) when consuming the illegal copy offers greater utility. More specifically, they argue that three groups of factors influence consumers' utility perceptions of the original and the illegal copy: (1) the utility derived from buying an original (including both gross utility and costs), (2) the costs of the illegal copy (mainly transaction costs), and (3) the degree of substitution between an original and its illegal copies. Rochelandet and Le Guel (2005) find partial support for their model from a convenience sample of 2,500 French consumers. With an ordered logit approach, the factors in their model explain 10% of the music file sharing intensity.

CONSEQUENCES AND DETERMINANTS OF MOTION PICTURE FILE SHARING

Motion Picture File Sharing as the Focal Construct

We define the file sharing of motion pictures as consumers' consumption of illegal copies of full-length motion pictures. This definition considers not only watching but also the mere act of obtaining illegal movie copies as forms of consumption. Although these two behaviors are

closely related, they are conceptually distinct because consumers do not necessarily watch every illegal copy they obtain. Our use of the phrase "illegal copies" excludes original movies that consumers have the legal right to watch, such as those made available by their copyright owners to file sharing networks or Internet video forums such as *YouTube.com*, as well as commercial video-on-demand services such as *Movielink.com*. Finally, our conceptualization of file sharing involves not only accessing illegal movie copies from file sharing networks ("Internet piracy") but also the personal exchange of illegal movie copies among consumers (e.g., on CD-Rs and DVD-Rs; "hard goods piracy"), consistent with the conceptualization of movie file sharing used by the movie industry (MPAA 2006).

The Effects of Motion Picture File Sharing on Commercial Channels

Consistent with a consumer utility perspective of file sharing (Rochelandet and Le Guel 2005), we propose the existence of negative (i.e., cannibalistic) effects of movie file sharing on movie consumption in the three key commercial channels, namely, theater visits, DVD rentals, and DVD sales (e.g., Liebowitz 2006; MPAA 2004c). In all three channels, we distinguish between three related but distinct potential cannibalization effects.

The first hypothesized effect refers to consumers' intentions to watch an illegal copy of a movie. We propose that when a consumer has such intentions, he or she is less susceptible to offers from theaters, DVD rental outlets, and DVD retailers, because the customer's intention to watch an illegal copy usually entails the expectation to obtain a copy of the movie for free instead of paying for legal channels. As a consequence, the consumer will refrain from using those commercial channels. This should be the case regardless of whether the consumer actually obtains an illegal copy of the movie.

H1: A consumer's intentions to watch an illegal movie copy reduce the probability that the consumer (a) watches the movie in a movie theater, (b) rents the movie on DVD, or (c) purchases the movie on DVD.

The second hypothesized effect refers to a consumer's actual obtainment of illegal movie copies. Here we argue that consumers who have gained access to an illegal copy of a movie have a lesser probability of seeing the movie in a theater or on DVD, regardless of (a) their original intentions toward watching an illegal copy of the movie, and (b) whether they actually watch the illegal copy. Distinguishing between consumers' intentions and their actual behavior is important from a managerial perspective, because if intentions influence commercial channel usage, the movie industry should focus its antipiracy activities on consumers who intend to watch a copy. If by contrast, actually obtaining illegal copies harms movie theaters and other channels, it is the copies that should be at the core of the industry's antipiracy actions, because any obtained copy would cannibalize commercial channels regardless of the consumers' intentions.

H2: For a given level of file sharing intentions, a consumer's obtainment of an illegal movie copy reduces the probability that the consumer (a) watches the movie in a movie theater, (b) rents the movie on DVD, or (c) purchases the movie on DVD.

The third hypothesized effect relates to the consumer's watching of illegal copies. We postulate that consumers who watch an illegal movie copy have a lesser probability of seeing that movie in a theater or on DVD, regardless of their original intentions toward watching an illegal copy of the movie. Whereas our second hypothesis factors out what happens after the consumer obtains a copy, this third hypothesis posits that the specific act of watching the copy cannibalizes revenues. The relevance of this hypothesis stems from its associated managerial implications; it would suggest that antipiracy actions should be directed toward preventing consumers from watching illegally obtained movie copies.

H3: For a given level of file sharing intentions, a consumer's watching of an illegal movie copy reduces the probability that the consumer (a) watches the movie in a movie theater, (b) rents the movie on DVD, or (c) purchases the movie on DVD.

Determinants of Motion Picture File Sharing

When modeling the determinants of movie file sharing, we build on the utility-theory approach described by Rochelandet and Le Guel (2005) but substantially refine and extend this approach in several ways. Generally, we distinguish between five categories of factors that we expect to drive consumers' movie file sharing behavior: perceived degree of substitution between an original movie and its illegal copies, utility of the original, (transaction) costs of the illegal copy, specific utility of the copy, and consumer's file sharing knowledge. The former three categories come from Rochelandet and Le Guel (2005), while we add the latter two. We discuss the categories and the individual drivers they encompass next and summarize them in Figure 1.

-- Insert Figure 1 approx. here --

Degree of substitution. A direct implication of the utility-theory approach is that the degree to which a consumer perceives illegal movie copies to provide the same utility as watching the original movie in a theater or on DVD determines the intensity of consumer file sharing. This perceived degree of substitution influences the utility of the illegal copy (Rochelandet and Le Guel 2005) and therefore should have a positive effect on the intensity with which consumers obtain and watch illegal movie copies.

H4: The degree to which a consumer judges illegal movie copies as substitutes for movies in commercial channels correlates positively with the number of illegal movie copies a consumer obtains and the number of illegal copies she or he watches.

Utility of the original. A consumer's demand for illegal movie copies as substitutes of original entertainment offers is a function of the gross utility that the consumer expects to receive from watching a movie original in a theater or on DVD. Specifically, for a given degree of

substitution, the original's higher gross utility will result in more illegal movie copies being obtained and watched by consumers (Rochelandet and Le Guel 2005).

Furthermore, the utility-theory approach implies that the costs associated with consuming a movie original also determine the original's net utility (Rochelandet and Le Guel 2005). These costs consist of the perceived price of the original and the perceived transaction costs associated with its consumption (e.g., pay for a babysitter when going to the theater). Because these costs decrease the relative attractiveness of the original compared with the illegal copy, they should correlate positively with the number of illegal movie copies obtained and watched by the consumer for a given degree of substitution.

H5a: The perceived gross utility of the original correlates positively with the number of illegal movie copies a consumer obtains and the number of illegal copies she or he watches.
H5b: The perceived costs of the original correlate positively with the number of illegal movie copies a consumer obtains and the number of illegal copies she or he watches.

Costs of the illegal copy. Because consumers usually acquire illegal copies without paying a fee, the costs of obtaining and/or watching an illegal movie copy mainly consist of transaction costs. These transaction costs comprise moral costs (e.g., ethical concerns about stealing copyrighted material; Holm 2003), legal costs (e.g., fear of sanctions; Chiang and Assane 2002), technical costs (e.g., potential file misspecifications or viruses that could harm the consumer's computer), and search costs (e.g., time spent looking for an illegal copy) (Rochelandet and Le Guel 2005). Transaction costs reduce the attractiveness of the illegal copy compared with the original and should have a negative effect on obtaining and watching illegal movie copies.

H6: The perceived transaction costs of the illegal copy correlate negatively with the number of illegal movie copies a consumer obtains and the number of illegal copies she or he watches.

Specific utility of the illegal copy. We expand the utility-theoretic approach and argue that consumers sometimes prefer an illegal movie copy, because copies can provide consumers with specific utilities that can not be gained by consuming the movie original. In other words, we expect some consumers to obtain and/or watch an illegal movie copy to gain a specific utility they cannot access by watching the movie in a theater or on DVD.

To develop a more thorough understanding of the specific utilities of illegal movie copies, we conducted eight qualitative, largely unstructured, in-depth interviews with experienced movie file sharers. The interviews lasted 25–45 minutes and suggested six specific file sharing utilities, which we propose positively influence consumers' movie file sharing activity:

- *Transaction utility*. Illegal movie copies allow consumers to "make a deal" and save money compared with consuming the same movie via commercial channels. According to Thaler (1985, p. 205), such a deal can result in a transaction utility that refers not to the value of the consumed good (i.e., the movie) but to "the perceived merits of the 'deal'," or in other words, the customer's satisfaction and pleasure of obtaining the financial advantage associated with the copy (Grewal, Monroe, and Krishnan 1998).
- *Mobility utility*. Illegal copies enhance consumers' mobility, because they can be stored on mobile devices (e.g., laptop computers, video iPods, PDAs), which enables consumers to carry extensive movie libraries in minimal space when traveling. Because this mobility is not possible with regular DVDs, it represents a specific utility of the copy to consumers.
- *Storage utility*. Related, due to their non-physical character, illegal copies require less physical storage space in the consumer's domicile than purchased DVDs, which can represent a benefit for consumers.

- *Anti-industry utility*. The movie industry receives frequent consumer criticism for its treatment of movies as mere commercial products rather than art, as well as for the prices it charges for movies in legal channels (e.g., Graham 2004)—an attitude which is shared by certain industry insiders (e.g., director M. Night Shyamalan calls studios "greedy, heartless, soulless, and disrespectful"; *Guardian* 2005). Consumers might consider "stealing" a movie by watching an illegal copy a legitimate kind of revenge on the industry and derive a benefit from this.
- *Social utility*. Accumulating illegal movie copies enables consumers to establish social links with relevant others. Consumers can interact with their peers about illegal movie copies and related technology and thereby become part of a "social copying network." This allows the consumers to demonstrate their expertise and receive social rewards for that expertise from others. Huang (2005) provides initial empirical support for such social utility.
- *Collection utility*. The availability of illegal movie copies enables consumers to collect large numbers of movies, regardless of their financial resources. Consumer behavior literature reports that consumers derive a utility from such collecting behavior beyond the products' functional value, and this collection utility has the potential to influence behavior (Belk 1995).

H7: The specific utility a consumer derives from an illegal movie copy correlates positively with the number of illegal movie copies the consumer obtains and the number of illegal copies she or he watches.

Consumer file sharing knowledge. In some situations, consumers are not interested in utility maximization but instead strive to "make a satisfactory choice while minimizing cognitive effort" (Hoyer 1984, p. 823). If so, the consumer's knowledge of a product category allows him or her to minimize decision-making effort yet still derive a satisfactory amount of consumption utility.

Greater knowledge can reduce the consumer's cognitive effort to the degree that the task "is performed automatically" (Alba and Hutchinson 1987, p. 412). Accordingly, a high amount of file sharing knowledge should allow consumers to obtain and watch illegal copies with limited cognitive effort. In addition, consumer file sharing knowledge relates negatively to search costs (part of transaction costs), because knowledge reduces the time and psychological effort needed to locate an illegal movie copy.

H8a: The consumer's file sharing knowledge correlates positively with the number of illegal movie copies a consumer obtains and the number of illegal copies she or he watches.

H8b: The consumer's file sharing knowledge correlates negatively with the search costs of the illegal copy.

TESTING FILE SHARING CONSEQUENCES

In this section, we test the hypotheses that address the consequences of movie file sharing (i.e., H1–H3) using data from a controlled longitudinal sample and ReLogit logistic regression.

Data Collection and Sample

Understanding the effect that movie file sharing has on commercial channel usage requires a controlled longitudinal study design, which avoids biases from a priori differences in movie consumption intentions between file sharers and non-file sharers as well as speculative ex-post "what-if" questions. We collected information from a quota sample of 1,075 German consumers, using gender, age, and occupation as quota criteria. The sample mirrors the German movie-going population in terms of key demographic variables and movie consumption (see Table 1). Respondents filled out three different Internet questionnaires over the course of eight months, for which they used personalized identification numbers, so that we could connect the information provided by a respondent at different points in time and avoid multiple responses on the same

questionnaire from the same respondent. Respondents received a €10 present for completing all three questionnaires, and we also raffled off additional prices to participants.

-- Insert Table 1 approx. here --

We first contacted participants in February 2006 and asked them about their intentions to watch between 10 and 15 new motion pictures in a movie theater or as an illegal copy. The movies were a subset of a total of 25 movie titles covering all major studio releases in Germany in the following months, with none of the movies having been available in theaters or on DVD at that point. Five of the movies were action films, five comedies, five dramas, five children's movies, and five thrillers (the individual titles appear in Appendix A). Each respondent began by indicating his or her preferred genres and then answered questions with regard to the movies assigned to those genres. The maximum of 15 movies (i.e., three genres) per respondent prevents cognitive overload; we also set a minimum condition of 10 movies (i.e., two genres). Participants viewed a poster of each movie, information about the director and cast, and a short synopsis of the movie's content.

We contacted the respondents for the second time in May 2006, after each surveyed movie had been released in movie theaters but before they were available on DVD for either purchase or rental. In the second questionnaire, we collected information about whether respondents had seen the surveyed movies in theaters and whether they had obtained and/or watched illegal copies of the movies. Respondents also indicated whether they intended to rent and/or buy certain movie titles on DVD after these DVDs became available, and whether they intended to watch illegal copies of the movies. For the second questionnaire, 813 panel members responded, a satisfactory retention rate of 76%.

Finally, the third questionnaire followed in October 2006, when 18 of the 25 surveyed movies had been available on DVD for at least four weeks, which reflects the period when studios collect approximately two-thirds of a movie's eventual total DVD rental and sales revenues.[1] This questionnaire consisted mainly of questions regarding the respondents' rentals and purchases of the surveyed movies on DVD, and respondents again indicated whether they had obtained and/or watched illegal copies. For this third wave, 770 respondents completed the questionnaire, a response rate, compared with the second questionnaire, of 94.7%.

Measures of File Sharing and Commercial Consumption

Because file sharing can be a delicate topic, we took thorough actions to ensure respondents provided valid information about their behavior. We personally promised and gave our word as university professors that all information would be treated strictly confidentially and not given to third parties. Moreover, we paid careful attention to the wording of the file sharing items and strictly avoided describing file sharing as an illegal or immoral activity.

To measure actual file sharing behavior, we asked each respondent in all three questionnaires whether he or she had (1) obtained a copy of the movie ("Have you obtained this movie as a free copy (either downloaded from file sharing networks or gained from friends or others)?") and (2) watched the copy ("Have you watched this movie as a free copy (either downloaded from file sharing networks or gained from friends or others)?").[2] Responses were coded 0 = "no" and 1 = "yes" in both cases. Because each of the 813 respondents to the second questionnaire reported his

[1] This estimate is based on proprietary information on the weekly revenue distribution of studio movies, which we collected from *Video Business Magazine* (weekly DVD rental revenues) and *Nielsen VideoScan* (DVD purchase revenues).

[2] None of the surveyed movies was available free of charge in a *legal* channel when the data was collected.

or her file sharing behavior for 10–15 movie titles (average number of movies per respondent = 12.65), this sample contains information about 12.65 × 813 = 10,285 individual file sharing opportunities. Respondents' intentions to watch an illegal copy of a movie were measured by asking the question "Do you plan to watch this movie as a free copy (either downloaded from file sharing networks or gained from friends or others)?" using a six-point probability scale (1 = "definitely not," 6 = "definitely").

Consumers' intentions to watch a movie in a theater (first questionnaire), rent it on DVD, or buy it on DVD (both second questionnaire) employed the same six-point scale as consumers' file sharing intentions. Questions were "Do you plan to watch this movie in a movie theater?" "Do you plan to rent this movie on DVD?" and "Do you plan to buy this movie on DVD?" Finally, we asked respondents about their actual consumption of the surveyed movies in theaters, on rental DVD, and on retail DVD, which generated three binary variables (0 = "not consumed," 1 = "consumed").

Descriptive File Sharing Statistics

Of the 25 movies in our sample, 136 respondents (17%) had obtained at least one illegal copy before the movies were released on DVD, with 242 illegal movie copies having been obtained by that time (2.4% of all file sharing opportunities). Respondents had watched 165 (68%) of these copies. The maximum number of illegal movie copies obtained by a respondent before their DVD release was 8 (out of 15 surveyed movies). Respondents intended to watch an illegal copy in 21.1% of cases before the movie's theatrical release and in 13.1% of cases before the movie's DVD release (≥4 on the six-point file sharing intention scale).

After the movies had been released on DVD, 141 respondents (18.5%) had obtained at least one copy of a surveyed movie; overall, a total of 342 illegal movie copies had been obtained by

the time of the third survey (4.8% of the 7,146 file sharing opportunities), with 66% of those illegal copies having been watched. At this point, the maximum number of illegal movie copies obtained by individual respondents was 11.

Method

We take a binary logistic regression approach to test whether movie file sharing affects theater visits, DVD rentals, and DVD sales. In binary logistic regression, a dichotomous outcome variable Y (= the respondents' decision to see a movie via commercial channels) follows a Bernoulli probability function that takes a value of 1 with probability π and 0 with probability $1-\pi$, with π varying over the observations as an inverse logistic function of a constant and a set of explanatory variables. An often overlooked characteristic of logistic regression is that it is not invariant to the relative frequency of events in the data (i.e., cases in which $Y = 1$). This is particularly relevant when the number of 1s is small compared with the number of 0s. In this situation, the logistic regression function produces biased logit coefficients that underestimate rare events (i.e., the probability that $Y = 1$; King and Zeng 2001a). Because the number of cases in which consumers see a movie in a commercial channel clearly is smaller than the number of cases in which consumers do not, we apply ReLogit regression (King and Zeng 2001a; King and Zeng 2001b). ReLogit regression estimates the same model as a standard logistic regression but corrects for logit coefficient bias and therefore does not underestimate rare event probabilities (Imai, King, and Lau 2006). As an additional benefit, ReLogit also uses "prior correction," meaning that it corrects the estimates on the basis of existing information about the fraction of 1s in the population (τ) as part of the maximum likelihood estimation process (King and Zeng 2001a). Prior correction is appropriate for our data, because we asked consumers about movies in their preferred genres (instead of all movies), and the surveyed movies are primarily major studio

releases, so that $\pi > \tau$. We calculate the τ parameters on the basis of publicly available information, with $\tau_{Theater} = .0126$, $\tau_{Rental} = .0103$, and $\tau_{Purchase} = .0040$.[3]

Theater-Related Results

To account for potential differences between consumers' obtaining and watching of illegal copies, we run three ReLogit models to test the impact of illegal file sharing on movie theater visits. In each model, we include the respondents' intentions to watch an illegal copy of a movie (measured in the first questionnaire) and their actual file sharing behavior (dichotomous factor, measured in the second questionnaire) as regressors and actual theater-going behavior as the binary dependent variable. To prevent potential endogenous effects which have troubled previous research on file sharing, we exclude those cases in which theatrical consumption precedes file sharing (n = 10), taking advantage of our individual-level longitudinal empirical design (in contrast to the aggregate level, cross-sectional design of previous studies). As a result, the independent variables in our ReLogit analyses can be considered unaffected by the dependent variable (i.e., the consumer's theater visit).[4] In the first model (the "overall model"), we set file

[3] We calculate $\tau_{Theater}$ by dividing the number of theater visits in Germany in 2005 (127.3 million) by the product of the number of movies released in Germany (372) and the number of German movie consumers (27.2 million). This calculation provides the percentage of all movie-going decisions that lead to a theater visit. Analogously, we calculate τ_{Rental} based on 102.9 million rentals of current feature film DVDs and $\tau_{Purchase}$ based on 39.8 million new feature film DVDs sold, with 369 new feature film DVD releases in 2005. We obtain all data used to calculate the τ parameters from SPIO (2006) and BAM (2006). $\pi_{Theater}$ is .083, π_{Rental}.063, and $\pi_{Purchase}$.013. In addition, we apply the Zelig version of ReLogit, which offers minor advantages over other versions.

[4] To provide empirical evidence for the absence of endogenous effects, we conduct the Durbin-Wu-Hausman augmented regression test for endogeneity (Davidson and MacKinnon 1993). Consistent with our theoretical argument, we find the error term of the file sharing regression to be clearly non-significant in the theater visits regression equations, which implies that file sharing is indeed an exogenous variable as specified and that the results

sharing behavior to equal 1 when the respondent has obtained an illegal copy, regardless of whether he or she has watched the copy. In the second model, file sharing behavior is 1 only when the respondent has watched the copy ("watcher model"); in the third model, file sharing behavior equals 1 when the respondent has obtained but *not* watched the copy ("non-watcher model").

In each model, we control for the impact of the respondents' "true" intentions to watch the movie in a theater, that is, their theater-going intentions unaffected by file sharing. We correct theater-going intentions for a potential effect of file sharing by asking respondents who indicated at least a minimum of file sharing intentions (i.e., >1 on the six-point probability scale) about their movie-going intention if a copy were not to become available. We asked this question *before* the respondents had obtained a specific copy, so respondents were able to consider the situation realistically and make valid predictions. We use the original movie-going intention score when file sharing intentions were 1 (i.e., nonexistent).

We also control for several movie characteristics, namely, the number of screens on which a movie was released (a proxy for the studio's marketing efforts; Hennig-Thurau, Houston, and Sridhar 2006), attendance in German theaters (a proxy for word of mouth; Elberse and Eliashberg 2003), and average user rating on the Internet Movie Database (IMDb; a proxy for the valence of word of mouth; Hennig-Thurau, Houston, and Sridhar 2006). We gathered the information for these variables for the surveyed movies from *Variety* magazine and IMDb, respectively.

We report the ReLogit results for the three theater models in Table 2. All models are highly significant and shed substantial light on consumers' theater-going decisions (Nagelkerke R^2 =

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are unbiased by endogeneity. We conduct the same test for the DVD rental and DVD purchase equation and again find file sharing to be exogenous.

.24). With regard to file sharing intentions, we find a negative effect on theater visits (βs between -.09 and -.10, exp[β] around .91), which is significant at $p < .001$ in all three models. That is, an increase in file sharing intentions reduces the probability that consumers see a movie in a theater and therefore cannibalizes industry revenues.

-- Insert Table 2 approx. here --

With regard to consumers' actual file sharing behavior, the results are less clear. In the overall model, the null hypothesis that obtaining an illegal copy does not affect the probability that a consumer watches a movie in a theater cannot be rejected at the conventional $p = .05$ level. However, at $p = .053$, the risk of wrongly rejecting the null hypothesis is only slightly higher than the traditional cutoff. In the watcher model, the impact of actual file sharing behavior is significant, i.e., we find a negative effect of actual file sharing behavior on theater visits ($\beta = -.82$, $\exp[\beta] = .44$). Therefore, when a consumer watches an illegal copy, the probability that he or she will watch the same movie in a theater declines for a given level of file sharing intentions. Finally, in the non-watcher model, the impact of actual file sharing behavior (i.e., obtaining, but not watching a copy) is insignificant ($p = .91$), with an exp[β] very close to 1.

These findings suggest that, in addition to the consumer's intention to watch an illegal copy, the act of watching the copy is crucial for the impact of file sharing behavior. Altogether, our data support H1a (which proposes a negative effect of file sharing intentions on theater visits) and H3a (which proposes the same effect for watching illegal copies), and the error associated with not rejecting H2a (which suspects theater visits will be negatively affected by consumers' obtainment of illegal copies) is only slightly greater than .05. On a sidenote, the corrected theater-going intentions and three movie characteristics all have the expected significant effects; they increase the probability that a consumer actually decides to see a movie in a theater.

The ReLogit results enable us to speculate about the strength of the effect that file sharing has on theater visits at an overall industry level. In a fictitious situation in which no actual file sharing takes place (though consumers still have file sharing intentions), the number of theater visits would increase by 1.2% (from 127.5 million to 129 million visits), generating $11.7 million in additional revenues.[5] When actual file sharing is absent and file sharing intentions are minimal, revenues would increase by 12.6% or $123.1 million compared with the current situation.[6] Although these predictions are restricted by some methodological assumptions, the estimated losses are, by any measure, substantial.

DVD-Related Results

Our approach with regard to DVD rentals and sales is similar to that for theater visits. For each DVD channel, we run three ReLogit models that include respondents' intentions to watch an illegal copy of a movie (second questionnaire) and actual file sharing behavior (binary variable, third questionnaire) as regressors and actual DVD rental or purchase behavior as the binary dependent variable. Again, we exclude those cases in which respondents had consumed a movie on DVD prior to having obtained the illegal copy to avoid a potential endogeneity bias. We again distinguish an overall model, a watcher model, and a non-watcher model for both DVD channels.

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[5] Specifically, we calculate the change in channel revenues $\Delta REV_{theaters}$ as $\Delta REV_{theaters} = (\tau^{est}_{theaters} \cdot mov_{theaters} \cdot mc) - (\tau^{actual}_{theaters} \cdot mov_{theaters} \cdot mc)$, where $\tau^{actual}_{theaters}$ is the actual event probability of a consumer seeing a movie in a theater, $mov_{theaters}$ is the number of movies released in theaters in a specific year, *mc* is the number of movie consumers in a population, and $\tau^{est}_{theaters}$ is the event probability calculated by the ReLogit function for actual file sharing behavior (= 0). To apply monetary values to industry losses, we use the average 2005 ticket price in Germany.

[6] We use the same equation as in footnote 5, with file sharing intentions set to 1.

In each model, we control for the impact of the respondents' intentions to rent a specific movie on DVD (in the model with DVD rental as dependent variable) or to buy a specific movie on DVD (in the model with DVD purchase as dependent variable), respectively. We correct these variables for the potential effect of file sharing with the same approach as we used for theater visits. In addition, we again control for the movie characteristics of screens, attendance, and user ratings, as well as for whether the respondents had seen the movie in a theater (binary variable).

The ReLogit results for all DVD rentals and purchase models appear in Table 2. As with theater visits, all DVD models are highly significant. The explained variance is slightly lower for DVD rentals (Nagelkerke R^2 = .16/.17) than for DVD purchases (Nagelkerke R^2 = .21), consistent with the lower cognitive preparation usually associated with rental decisions (Weinberg 2003).[7] For file sharing intentions, we find significant negative effects on both DVD rentals and purchases in all models, with βs between -.12 and -.13 for rentals (exp[β] approximately .89) and between -.19 and -.22 for purchases (exp[β] approximately.81).

The results are less straightforward for actual file sharing behavior. Specifically, file sharing behavior exerts *no* significant effect on DVD rentals in all three DVD rental models. However, we find a significant impact on DVD purchases in both the overall model and the non-watcher model, though not in the watcher model. This significant impact is positive, such that greater file sharing behavior increases the number of DVDs purchased. These findings suggest that when consumers gain access to a movie copy (with a control for file sharing intentions) but do not watch it, their probability of purchasing the DVD is higher than it is for consumers who have not

[7] Weinberg (2003, p. 24) reports that 50% of video renters in his sample "did not have a specific title in mind when they entered the store."

obtained an illegal copy. In such cases, the copy does not serve as a substitute for the DVD but rather stimulates consumers' desire to see the movie in a legal channel.

In summary, we find support for H1b and H1c (which state that file sharing intentions diminish DVD rentals and purchases), but not for H2b and H2c, (which posit a negative effect of obtaining illegal copies on the two DVD channels) or for H3b, or H3c (which argue that the watching of copies cannibalizes DVD rentals and purchases). In the case of H2c, we even find a significant positive effect instead of the proposed negative effect. As an aside, the three movie characteristics play lesser roles for DVD consumption than in the theater channel. Although in the DVD rental context, the user rating positively influences decisions to rent a specific movie on DVD, screens and theater attendance are not significant; for DVD purchase decisions, none of the movie characteristics is significant. A likely explanation is that once movies have appeared in theaters, extensive quality-related information becomes available, which is then incorporated into the consumers' intention to rent or purchase the movie on DVD.

As in the case of theater visits, we use the ReLogit estimations to speculate about the strength of the industry-wide effect of movie file sharing on DVD rentals and purchases.[8] In a fictitious constellation without any illegal movie copies (but file sharing intentions remaining unchanged), DVD rentals would increase by only 0.1% (from 103.4 million to 103.5 million transactions), producing approximately $0.5 million of additional revenue. The positive effect of actual file sharing on DVD purchases means purchases would be 2.9% lower in such an environment (from 40.1 million to 38.9 million), resulting in industry losses of $27.6 million. However, and more important, when file sharing behavior and intentions do not exist or are minimal, DVD rental

[8] When calculating the industry-wide effect of file sharing on DVD rentals and purchases, we use the same approach as in the case of theater visits (see footnotes 5 and 6).

transactions grow by 10.5%, generating additional revenues of $36.9 million for the industry, and DVD purchase revenues would be boosted by $139.5 million, or 14.7%. Accordingly, these numbers indicate that the losses caused by movie file sharing are even greater for the home entertainment channels than for the movie theater channel. Altogether, our calculations suggest that the German movie industry loses $300 million per year due to consumer file sharing.

TESTING FILE SHARING DETERMINANTS

Data, Method, and Measures

In this section, we test the hypotheses that address the determinants of consumer file sharing (i.e., H4–H8) using data collected from our quota panel sample. Specifically, the second questionnaire contained several questions pertaining to the constructs that we propose influence consumer file sharing. In addition, we collect information about respondents' general file sharing behavior (i.e., not limited to the 25 movies in our sample) by asking them to state the absolute number of illegal movie copies they had obtained and watched during the preceding 12 months in both the first and second questionnaires.

We apply partial least squares structural equation modeling (PLS; Fornell and Cha 1994) to test the hypotheses on file sharing determinants. Specifically, we employ SmartPLS (Ringle, Wende, and Will 2005), which allows the simultaneous testing of hypotheses while enabling single- and multi-item measurement and the use of both reflective and formative scales (Fornell and Bookstein 1982). The structural model shown in Figure 1 contains three latent variables for the different facets of the original movie's utility (gross utility, price, and transaction costs), four latent variables to address the different kinds of transaction costs associated with the copy (search, moral, legal, and technical costs), and one latent variable for each of the six specific utilities of the copy (transaction, mobility, storage, collecting, anti-industry, and social utility).

The model also contains the degree of substitution and the consumer's file sharing knowledge as determinants of watching and obtaining illegal copies, and links from obtaining to watching illegal copies and from file sharing knowledge to search costs.

We measure both obtaining and watching illegal copies with reflective, three-item scales that combine respondents' actual file sharing behavior with regard to the movies in our study with two further global measures. Specifically, we measured the obtainment of illegal movie copies as the number of copies of the movies surveyed that a respondent had actually obtained, the total number of illegal copies obtained within the year preceding the first questionnaire, and the answer to the same question from the second questionnaire. For measuring the watching of illegal movie copies, we used the number of the movies surveyed that a respondent watched as illegal copies and the total number of illegal copies watched altogether within the 12 months preceding the first and the second questionnaire, respectively. To measure file sharing determinants, we use existing scales when available and develop new scales for the rest, most of which take a formative nature. Except for the six specific utility variables, which we measure with one item each due to space restrictions, we use multiple items for all constructs (see Appendix B).

The reliability of the reflective scales is generally satisfactory. Obtainment and watching of illegal copies achieve alpha scores of .72 and .67, respectively, acceptable for a combination of surveyed and general past behavior, as well as the lack of established scales in the researched domain (Peter 1979). On the other reflective scales, the alpha scores are greater than .70 in all cases. The average variance extracted is greater than .60 and composite reliability greater than .75 for all constructs. Multicollinearity between the constructs is not an issue; all correlations among latent variables are less than or equal to .50. Table 3 lists the descriptive statistics and correlations.

-- Insert Table 3 approx. here --

Results

We list the path coefficients, *t*-values, and total effects in Table 4. The model explains 22.1% of obtainment and 79.6% of watching illegal movie copies. In each of the five general driver categories, at least one construct has a significant direct effect on obtainment ($p < .05$), in support of our hypotheses on file sharing determinants. In addition, except for gross utility of the movie original (which is negatively correlated with obtainment, instead of positively as hypothesized in H5a), all significant parameters are in the proposed directions, in general support of our hypotheses.

-- Insert Table 4 approx. here --

8 of the 15 determinant constructs in the model have significant impacts. Specifically, as we propose in H4, the degree of substitution between illegal copies and movie originals increases both obtainment and watching of illegal copies. Regarding the utility of the original, we find that the original's transaction costs raise the extent of obtainment, as proposed in H5b, in addition to the negative effect of the original's gross utility mentioned above. The latter effect might result from the lower reference point for the utility of the original for consumers who possess more file sharing knowledge. In other words, file sharing skills might reduce the utility that consumers derive from seeing a movie in a commercial channel, because they know how to get the same movie free of charge. In support of this argument, when we add a path from file sharing knowledge to gross utility, the path from gross utility to file sharing becomes insignificant.

With regard to the transaction costs of the copy, three individual drivers are significantly correlated with file sharing, in support of H6. Whereas both search and moral costs provide hurdles to the consumer obtaining illegal copies, technical costs directly reduce the probability

that a customer watches such copies. Two specific utilities of the copy enhance obtainment: perceptions of illegal movie copies as collectibles (the strongest direct effect of all determinants) and the consumer's anti-industry attitude, which makes file sharing a kind of revenge action. These findings support H7. The consumers' file sharing knowledge facilitates obtainment of illegal copies directly, as well as by lowering search costs, as we hypothesize in H8a and H8b.

As we expected, watching illegal movie copies correlates strongly with the extent of obtainment. Except for technical costs and degree of substitution, which also exhibit significant direct paths to watching illegal movie copies, all determinant constructs in the model influence illegal watching not directly but only through obtainment, which serves as a full mediator.

DISCUSSION, IMPLICATIONS, AND LIMITATIONS

Massive speculation about the potential impact of consumer file sharing of motion pictures abounds in the movie industry. Although industry representatives claim illegal movie copies cause revenue losses, no peer-reviewed study has yet tested these claims. Existing research findings from adjacent industries such as music have been inconclusive, with all previous studies either lacking empirical data or using questionable proxies for file sharing, such as consumers' Internet usage. Drawing on a longitudinal quota sample of German consumers, we use information about consumers' file sharing intentions and behavior toward a set of actual movie titles and thereby test for the impact of movie file sharing on movie consumption in commercial channels. The controlled longitudinal design avoids biases from a priori differences between file sharers and non–file sharers. It also enables us to correct our measures of legal movie consumption intentions for potential biases caused by the availability of illegal movie copies, so that our estimates are unbiased by potentially unreliable "hindsight measures." In addition, ours

is the first study to test a theory-based model of file sharing determinants in a motion picture context and significantly extends current knowledge about the drivers of consumer file sharing.

To determine the potential impact of file sharing on commercial channel consumption, we use ReLogit analysis, which corrects for logit coefficient bias, and find among our sample of 813 German consumers that illegal file sharing does impact on movie theater box office revenues. The consumers' intentions to view an illegal copy of a new movie reduces the consumers' propensity to attend theaters. This finding suggests that file sharing intentions (which imply the consumer's expectation of being able to obtain a copy of a certain movie for free) limit the consumer's interest in legal channel consumption, which then leads him or her to forego consumption in these channels regardless of whether the consumer actually obtains an illegal copy of the movie. We find that obtaining an illegal movie copy (controlling for file sharing intentions) significantly influences legal consumption only when the consumer has actually watched the copy. In addition, consumers' intentions to watch a movie copy significantly reduce the number of DVD rentals and purchases. Obtainment of illegal copies does not affect rental transactions and exerts a positive impact on DVD purchases when the consumer has not watched the copy. The latter effect suggests that an illegal movie copy can function as a cue for purchasing the DVD of a movie. In cases where the copy obtained by the consumer is broken or of a low quality, it can be argued that the consumer's positive anticipation of watching the movie is re-routed into a purchasing act. If the copy is working, the mere presence and resulting salience of the copy seems to heighten the consumer's emotional and intellectual involvement with the movie title, which subsequently stimulates the consumer to purchase the DVD of the movie (i.e., to "go for the original"). However, the positive impact of obtainment on DVD purchases is clearly less strong than the negative impact of file sharing intentions. We calculate an overall

annual industry loss of $300 million in Germany, which represents approximately 9.4% of the total industry revenues in 2005. Even when taking into account the assumptions of our method and sample, we consider these numbers substantial.

Three major implications arise from these results. First, the movie industry is right to proclaim that consumer file sharing destroys a significant amount of its revenues. Second, consumers' intentions to engage in file sharing cause them to forgo theater visits, legal DVD rentals, or legal DVD purchases. Therefore, decreasing consumers' intention to watch illegal movie copies may be the most powerful way to fight movie piracy. A reduction in the number of illegal copies would have a much lesser (or even no) impact on piracy, as long as intentions remain unaffected. Third, though our nationwide estimates represent bold numbers, they also demonstrate that recent industry claims exaggerate the true impact of file sharing. Some industry representatives argue that each illegal copy represents a lost theater visit (Valenti 2004)—an effect more than twice that of our ReLogit-based estimate. Similarly, the MPAA recently reported that industry losses due to piracy are $491 million in Germany per year (MPAA 2006), exceeding our controlled longitudinal estimate by 73%.

We also can offer insight into the role of file sharing by comparing our loss estimates with the industry's overall economic development. Specifically, German movie theater revenues declined by 16.6% in 2005, which exceeds our 12.6% loss estimate for theater revenues and thereby suggests other factors are contributing to the movie industry's crisis. This suggestion becomes even more persuasive when considering that movie file sharing grew by only 15.5% in 2005 (FFA 2006a), so it logically should be responsible for only a small portion of the 2005 revenue decline. Assigning file sharing the role of the leading culprit might mean overlooking other threats of similar or even larger proportions. The declared "war on movie piracy" might

limit the industry's ability to cope with, and draw its attention away from, societal developments, such as massive increases in consumer spending on video/computer games and cell phones. Consumers clearly have increased spending on home video titles; DVD sales grew by double-digit figures to record numbers (Snyder 2005), and a substitution effect is likely between theater visits and alternative kinds of movie consumption (Lehmann and Weinberg 2000). Therefore, movie studios might be contributing to shrinking attendance figures themselves by promoting other distribution channels such as DVD sales and legal online services.

With regard to the determinants of illegal consumer file sharing, we adapt the utility-theory approach of Rochelandet and Le Guel (2005) and identify five categories of potential influencers. This approach clarifies file sharing and moves beyond the simplistic explanation, "because it's free" (e.g., MPAA 2004c). With our quota sample of 813 consumers, we test the impact of these drivers and their associated variables simultaneously through PLS. Our model explains more than twice the amount of variance of obtaining illegal copies than that achieved by previous studies (Rochelandet and Le Guel 2005). The PLS results highlight that each driver category contributes to consumer file sharing, though to differing extents. The three drivers that exert the strongest direct impact are the collection utility of the copy, consumers' file sharing knowledge, and transaction costs of the original; we present the first two drivers for the first time here.

Our analysis also shows that file sharing occurs because of various factors, several of which offer anti-piracy organizations very specific starting points for counter-measures. Specifically, stressing the unethical element of appropriating copyrighted content without compensating the copyright owner in marketing campaigns could increase the moral costs of illegal file sharing and lower file sharing activities. Similarly, because the transaction costs of commercial channels motivate consumer file sharing, movie producers should think about ways to reduce them. When

watching a movie in theaters during its opening weekend is the only way to access a new movie legally, customers must pay the accompanying transaction costs that go far beyond the ticket price (e.g., babysitters and concession prices can make a single movie easily cost $50; Puig 2005) and therefore feel pushed toward illegal channels such as file sharing. Making movies available through new channels, such as video-on-demand, that involve lower transaction costs for the consumers and shortening the time gap between the theater and home entertainment channels might be an appropriate way to win back transaction-cost-sensitive consumers. However, this strategy could cause other problems, such as increased interchannel cannibalization (Lehmann and Weinberg 2000). Another starting point for reducing file sharing considers the degree of substitution perceived by the customer. Although substitutability lies in the eye of the beholder, studios may want to stress the uniqueness of legal movie consumption or add features and elements to legal movie consumption that can hardly be included in illegal copies. Such elements might include events in the theater that stress the social element of movie-going or attractive packaging of movies on DVD. The latter seems particularly relevant, because it would reduce the relative collectability value of illegal copies, the main single driver of movie file sharing.

However, other measures will be less effective for reducing movie piracy, particularly if they focus on legal costs (i.e., the consumer's fear of legal persecution). Such actions appear largely ineffective for limiting file sharing; we find no significant impact of legal costs on obtaining illegal copies in our PLS analysis, despite the intimidation studios have attempted to exert on file sharers in recent campaigns. In other words, the movie industry's initial reaction to the threat of movie file sharing—suing its own customers—appears to be misguided.

As with every study, our results are limited to a certain extent. First, our analysis uses a set of 25 movies from 2006 to test the effects of file sharing on commercial consumption and

investigate its drivers. Because this set represents a snapshot, it is unclear how the results might differ for different movies and a different time frame. However, our sample covers all major pictures released in the time period, which gives us confidence that the results are stable. Second, in terms of generalization, our sample covers respondents from Germany, a major international market, but we can only speculate about other markets, such as North America. Because Germany and North America are similar in terms of several facets of movie consumption (e.g., U.S. films achieve a market share of 80% in Germany, movies' successes are highly correlated in the two countries, comparable with Internet diffusion rates), we expect the findings to be similar for North America but cannot provide empirical evidence to substantiate this. Similarly, although we provide strong evidence of cannibalization resulting from illegal copies, and although the similarities between movies and other entertainment products suggest the same effects could take place in those industries, our study cannot ensure cross-industry generalizations. Third, though our sample systematically mirrors the German movie consumer population in demographics, we concede it is not a true random sample. However, post hoc comparisons show that other criteria, such as movie consumption patterns, are similar between the sample and the relevant population. Fourth, our measurement approach enables us to separate the effects of consumer file sharing intentions and behaviors on movie consumption on the basis of a controlled longitudinal study, but the survey method means we must rely on consumer self-reported data instead of on "objective" data. We believe this limitation does not strongly affect the results though, because we use actual movie titles, measure specific behavioral variables, and avoid any kind of moral bias in the questionnaires. Fifth, we acknowledge that the consumer x movie observations in our data are not completely independent, which, however, reflects the reality as some consumers will watch several movies in a given period while other consumers

will watch only one. Sixth and final, we had to develop several scales ourselves because of the limited extant research on movie file sharing. Although these scales indicate solid reliability and validity, further research into their quality would certainly be helpful. This recommendation is particularly applicable to those determinant variables that we measure using single items.

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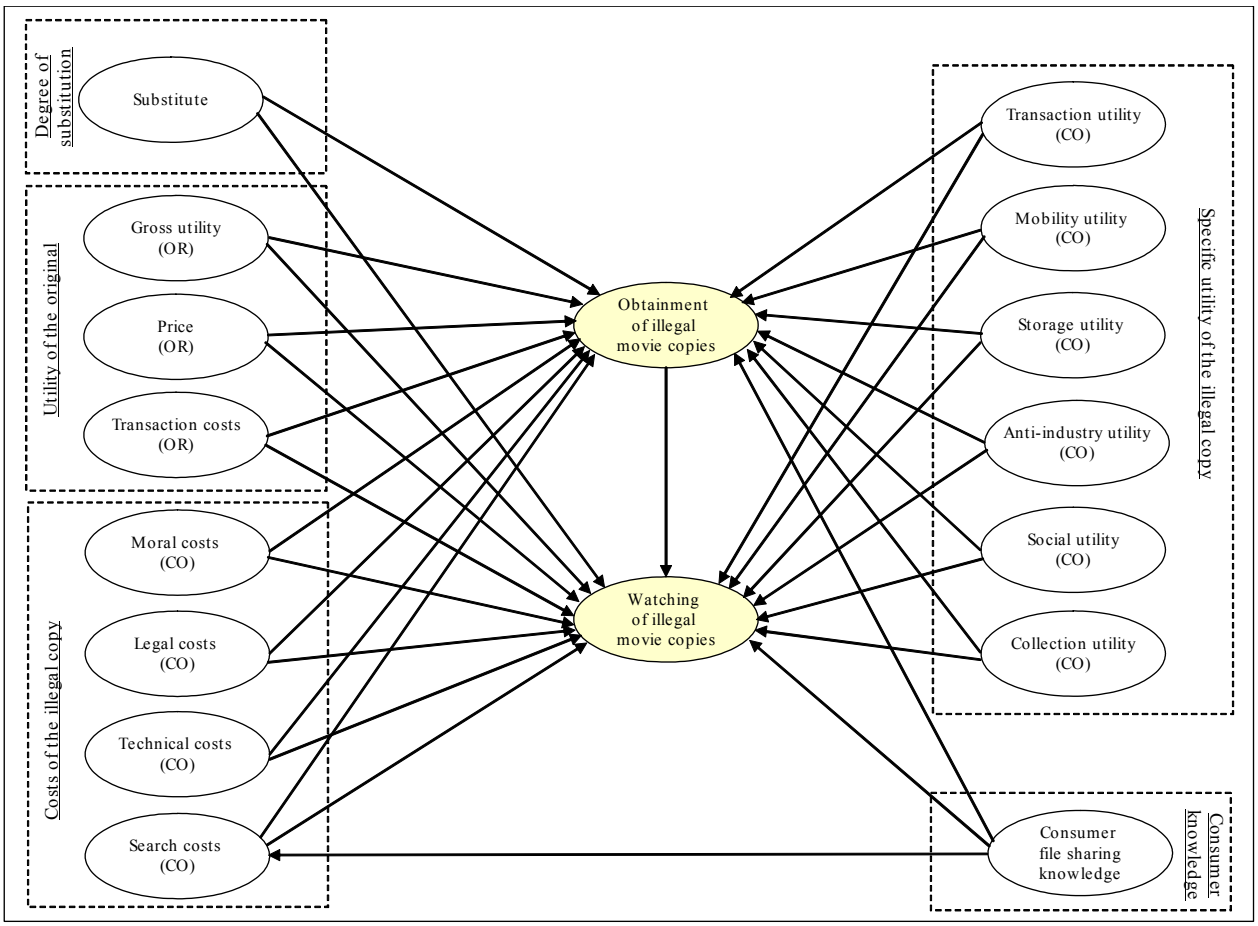
FIGURE 1

Structural Model of File Sharing Determinants



Notes: CO = illegal movie copy; OR = original movie.

TABLE 1

Sample Characteristics

Criterion	Sample	German Movie Consumer Population [b]
Gender (%)		
Female	52.7	51
Male	47.1	49
Age Groups (%)		
≤ 29	57.1	52
30-39	20.9	20
40-49	8.9	14
≥ 50	13.1	14
Occupation (%)		
Student/in education	40.8	35
Worker	.7	7
Employee	40.1	36
Civil servant	5.5	6
Self-employed	6.1	3
Homemaker	2.7	3
Pensioner	1.4	10
Other	2.6	-
Movie consumption (per year)		
Theater visits	8.2 (6)[a]	5.2
DVD purchases	4.1 (1)[a]	5.2
DVD rentals	10.3 (5)[a]	11.1

[a] Number in parentheses is the median.

[b] Percentages are for 2003 (FFA 2004); more recent data are not available for individual categories.

TABLE 2: ReLogit Results

	Movie Theater ReLogit Model (n = 10,285)*						DVD Rental ReLogit Model (n = 7,130)**						DVD Purchase ReLogit Model (n = 7,146)***					
	Overall Model[a]		Watcher Model[b]		Non-Watcher Model[c]		Overall Model[a]		Watcher Model[b]		Non-Watcher Model[c]		Overall Model[a]		Watcher Model[b]		Non-Watcher Model[c]	
	β (exp[β])	*z*-value (p)	β (exp[β])	*z*-value (p)	β (exp[β])	*z*-value (p)	β (exp[β])	*z*-value (p)	β (exp[β])	*z*-value (p)	β (exp[β])	*z*-value (p)	β (exp[β])	*z*-value (p)	β (exp[β])	*z*-value (p)	β (exp[β])	*z*-value (p)
Intercept	-9.57	-27.47 (<.001)	-9.56	-27.46 (<.001)	-9.55	-27.43 (<.001)	-8.02	-14.40 (<.001)	-.801	-14.38 (<.001)	-8.02	-14.38 (<.001)	-8.54	-7.82 (<.001)	-8.51	-7.80 (<.001)	-8.613	-7.88 (<.001)
File sharing intentions	-.0926 (.912)	-3.52 (<.001)	-.0935 (.911)	-3.57 (<.001)	-.0997 (.905)	-3.81 (<.001)	-.122 (.885)	-2.91 (<.01)	-.127 (.881)	-3.05 (<.01)	-.118 (.889)	-2.83 (<.01)	-.204 (.815)	-2.17 (<.05)	-.186 (.830)	-1.99 (<.05)	-.217 (.805)	-2.31 (<.05)
File sharing behavior	-.563 (.569)	-1.93 (.053)	-.815 (.443)	-2.09 (<.05)	-.0488 (.953)	-.11 (.911)	-.130 (.878)	-.36 (.720)	.465 (1.592)	1.11 (.268)	-.885 (.413)	-1.21 (.226)	1.15 (3.158)	2.42 (<.05)	.336 (1.399)	.43 (.667)	2.074 (7.957)	3.70 (<.001)
Screens (in 100)	.153 (1.165)	5.94 (<.001)	.152 (1.164)	5.90 (<.001)	.151 (1.163)	5.87 (<.001)	.073 (1.076)	1.06 (.290)	.073 (1.076)	1.06 (.291)	.070 (1.073)	1.02 (.309)	.289 (1.335)	1.90 (.057)	.280 (1.323)	1.85 (.065)	.281 (1.324)	1.86 (.063)
Attendance (in 1000)	.0001 (1.0001)	3.10 (<.01)	.0001 (1.0001)	3.14 (<.01)	.0001 (1.0001)	3.13 (<.01)	.00003 (1.000)	.13 (.893)	.00003 (1.000)	.12 (.903)	.00004 (1.000)	.19 (.852)	-.0009 (.999)	-1.79 (.074)	-.0009 (.999)	-1.71 (.087)	-.0009 (.999)	-1.72 (.086)
IMDb user rating	.347 (1.415)	7.95 (<.001)	.346 (1.413)	7.94 (<.001)	.346 (1.413)	7.94 (<.001)	.133 (1.142)	2.15 (<.05)	.132 (1.141)	2.14 (<.05)	.132 (1.141)	2.13 (<.05)	.078 (1.081)	.66 (.512)	.073 (1.076)	.62 (.536)	.082 (1.085)	.70 (.486)
Corrected theater intentions	.629 (1.88)	20.90 (<.001)	.629 (1.88)	20.90 (<.001)	.628 (1.87)	20.89 (<.001)	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.
Corrected DVD rental intentions	n.i.		n.i.		n.i.		.752 (2.121)	17.78 (<.001)	.752 (2.121)	17.78 (<.001)	.753 (2.123)	17.79 (<.001)	n.i.	n.i.	n.i.	n.i.	n.i.	n.i.
Corrected DVD purchase intentions	n.i.		n.i.		n.i.		n.i.	n.i.	n.i.	n.i.	n.i.	n.i.	1.004 (2.729)	12.12 (<.001)	1.012 (2.751)	12.17 (<.001)	1.027 (2.793)	12.29 (<.001)
Theater visit	n.i.		n.i.		n.i.		-.311 (.733)	-1.43 (.152)	-.298 (.742)	-1.38 (.169)	-.319 (.727)	-1.47 (.141)	.095 (1.100)	.28 (.780)	.055 (1.057)	.16 (.871)	.050 (1.051)	.15 (.882)
Log-Likelihood	4557.7		4556.2		4562.4		2454.1		2453.5		2451.1		652.5		656.7		648.5	
Chi-square (d.f.)	1089.2 (6), p <.001		1090.7 (6), p <.001		1084.5 (6), p <.001		387.3 (7), p <.001		397.9 (7), p <.001		400.3 (7), p <.001		171.2 (7), p <.001		167.0 (7), p <.001		175.1 (7), p <.001	
McFadden R^2	.193		.193		.192		.139		.140		.140		.208		.203		.213	
Nagelkerke R^2	.238		.238		.237		.164		.165		.166		.217		.212		.222	

* Dependent variable is actual movie theater visits (0 = no, 1 = yes). ** Dependent variable is actual DVD rental behavior (0 = no, 1 = yes). *** Dependent variable is actual DVD purchasing behavior (0 = no, 1 = yes). Notes: n.i. = variable not included in this model. [a] File sharing behavior = 1 for all cases in which the respondent obtained a copy, regardless of watching. [b] File sharing behavior = 1 when copy is obtained *and* watched. [c] File sharing behavior = 1 when copy is obtained but *not* watched.

TABLE 3
Descriptive Statistics and Correlations

		M[a]	SD[a]	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1	Obtainment of illegal movie copies	14.04	29.76	.72																
2	Substitute	11.40	3.85	.16	n.a.															
3	Gross utility (OR)	25.35	7.75	-.14	-.07	n.a.														
4	File sharing knowledge	16.14	10.68	.31	-.00	-.15	n.a.													
5	Watching illegal movie copies	11.82	21.43	.89	.19	-.11	.29	.67												
6	Price (OR)	24.79	9.26	.09	-.10	.13	.09	.09	n.a.											
7	Transaction costs (OR)	18.78	11.49	.12	.07	-.01	-.04	.11	.08	n.a.										
8	Moral costs (CO)	11.18	3.76	-.12	-.05	.07	-.06	-.12	.05	-.01	.84									
9	Legal costs (CO)	7.56	2.49	.03	.06	-.02	-.01	.01	.06	-.00	.28	.71								
10	Technical costs (CO)	6.34	2.93	-.11	-.02	.11	-.25	-.14	-.03	-.02	.32	.34	.86							
11	Search costs (CO)	8.22	6.57	-.16	-.00	.16	-.24	-.15	-.04	.05	.22	.12	.33	n.a.						
12	Transaction utility (CO)	3.15	1.77	.17	.29	-.03	.13	.19	.05	.09	-.07	.02	-.01	-.05	n.a.					
13	Collection utility (CO)	1.53	1.00	.32	.25	-.06	.26	.29	.02	.05	-.05	.01	-.08	-.12	.22	n.a.				
14	Anti-industry utility (CO)	1.53	1.07	.22	.02	-.12	.30	.21	.06	.06	-.04	.02	.05	-.06	.21	.18	n.a.			
15	Storage utility (CO)	2.09	1.51	.24	.13	-.08	.33	.25	.04	.03	-.02	.10	-.06	-.09	.30	.34	.28	n.a.		
16	Social utility (CO)	1.41	.87	.24	.10	-.01	.25	.21	.01	.06	.04	.10	.10	.01	.29	.28	.42	.39	n.a.	
17	Mobility utility (CO)	2.65	1.81	.21	.14	-.07	.31	.23	.04	.01	-.01	.06	-.05	-.17	.29	.33	.26	.50	.30	n.a.

Notes: Numbers on the diagonal are Cronbach's alpha scores. n.a. = no alpha score calculated because the construct is measured by a formative scale or single item. CO = illegal movie copy; OR = original movie.

[a] Means and standard deviations are calculated for the sum of construct items.

TABLE 4
Impact of Determinants of File Sharing Behavior

Effect of	On	Path Coefficient (*t*-Value)	Total Effect (*t*-Value)
Utility of the original			
Gross utility (OR)	Obtainment of illegal movie copies	-.071 (1.84)*	-.071 (1.84)*
Price (OR)	Obtainment of illegal movie copies	.075 (1.06)	.075 (1.06)
Transaction costs (OR)	Obtainment of illegal movie copies	.100 (2.03)**	.100 (2.03)**
Gross utility (OR)	Watching illegal movie copies	.012 (.82)	-.0503 (1.29)
Price (OR)	Watching illegal movie copies	.009 (.03)	.075 (1.02)
Transaction costs (OR)	Watching illegal movie copies	-.009 (.41)	.079 (1.68)*
Costs of the illegal copy			
Search costs (CO)	Obtainment of illegal movie copies	-.063 (1.79)*	-.063 (1.79)*
Moral costs (CO)	Obtainment of illegal movie copies	-.087 (2.62)**	-.087 (2.62)**
Legal costs (CO)	Obtainment of illegal movie copies	.044 (1.00)	.044 (1.00)
Technical costs (CO)	Obtainment of illegal movie copies	-.019 (.57)	-.019 (.57)
Search costs (CO)	Watching illegal movie copies	.015 (.82)	-.040 (1.15)
Moral costs (CO)	Watching illegal movie copies	.007 (.41)	-.069 (2.14)**
Legal costs (CO)	Watching illegal movie copies	-.016 (.80)	.022 (.50)
Technical costs (CO)	Watching illegal movie copies	-.040 (2.00)**	-.056 (1.78)*
Degree of substitution			
Substitute	Obtainment of illegal movie copies	.089 (2.66)**	.089 (2.66)**
Substitute	Watching illegal movie copies	.040 (2.16)**	.120 (4.01)**
Specific utility of the illegal copy			
Transaction utility (CO)	Obtainment of illegal movie copies	.012 (.34)	.012 (.34)
Collection utility (CO)	Obtainment of illegal movie copies	.178 (2.90)**	.178 (2.90)**
Mobility utility (CO)	Obtainment of illegal movie copies	-.002 (.04)	-.002 (.04)
Storage utility (CO)	Obtainment of illegal movie copies	.035 (.78)	.035 (.78)
Anti-industry utility (CO)	Obtainment of illegal movie copies	.064 (1.70)*	.064 (1.70)*
Social utility (CO)	Obtainment of illegal movie copies	.085 (1.46)	.085 (1.46)
Transaction utility (CO)	Watching illegal movie copies	.019 (.93)	.030 (.80)
Collection utility (CO)	Watching illegal movie copies	-.018 (.69)	.138 (2.07)**
Mobility utility (CO)	Watching illegal movie copies	.036 (1.56)	.035 (.92)
Storage utility (CO)	Watching illegal movie copies	.029 (1.39)	.060 (1.32)
Anti-industry utility (CO)	Watching illegal movie copies	.010 (.52)	.066 (1.73)*
Social utility (CO)	Watching illegal movie copies	-.022 (.90)	.053 (.97)
File sharing knowledge			
File sharing knowledge	Obtainment of illegal movie copies	.172 (4.83)**	.187 (5.28)**
File sharing knowledge	Watching illegal movie copies	-.003 (.17)	.156 (4.60)**
File sharing knowledge	Search costs (CO)	-.236 (2.12)**	-.236 (2.12)**
Additional path			
Obtainment of illegal movie copies	Watching illegal movie copies	.875 (26.27)**	.875 (26.27)**

Notes: OR = original commercial movie consumption, CO = illegal movie copy. *T*-values are calculated through a bootstrapping routine with 813 cases and 500 samples.
* $p < .05$ (one-sided).
** $p < .01$ (one-sided).

APPENDIX A
List of Movie Titles

Title	Description	Individual Responses for Theater [a]	Individual Responses for DVD [c]
Bambi 2	USA 2006, Family	111 (4)	110 (6; 4)
Basic Instinct 2	USA 2006, Thriller/Drama	561 (23)	497 (14; 7)
Brokeback Mountain	USA 2005, Drama/Romance	374 (81)	324 (18; 5)
Capote	USA 2005, Drama	375 (25)	324 (13; 2)
Casanova	USA 2005, Comedy/Romance	705 (33)	630 (31; 9)
Da Vinci Code	USA 2006, Thriller	559 (175)	- [d]
Die Wilden Hühner	GER 2006, Family	112 (7)	110 (3; 4)
Die wilden Kerle 3	GER 2006, Family	112 (7)	110 (5; 3)
Die Wolke	GER 2006, Drama/Romance	372 (7)	- [d]
Elementarteilchen	GER 2006, Drama/Romance	375 (51)	324 (14; 0)
Failure to Launch	USA 2006, Comedy/Romance	702 (49)	630 (42; 6)
Felix 2	GER 2006, Family	112 (4)	- [d]
Freedomland	USA 2006, Thriller	563 (0)[b]	- [d]
Good Night, and Good Luck	USA 2006, Thriller/Drama	559 (16)	- [d]
Ice Age 2	USA 2006, Family/Comedy	112 (53)	- [d]
Lord of War	USA 2005, Action/Thriller	451 (45)	394 (54; 5)
Mission: Impossible III	USA 2006, Action/Thriller	449 (66)	- [d]
Pink Panther	USA 2006, Comedy	702 (25)	630 (22; 3)
Saw II	USA 2006, Action/Horror	451 (26)	394 (23; 1)
Scary Movie 4	USA 2006, Comedy/Horror	698 (22)	630 (21; 4)
Syriana	USA 2006, Thriller/Drama	563 (53)	497 (53; 9)
The New World	USA 2005, Drama/Adventure	373 (2)	324 (8; 1)
The Weatherman	USA 2005, Comedy/Drama	703 (13)	630 (23; 6)
Underworld 2: Evolution	USA 2006, Action/Fantasy	451 (45)	394 (25; 11)
V for Vendetta	USA 2005, Action/Sci-Fi	450 (34)	394 (17; 9)

[a] Number in parentheses signifies positive theater-going decisions.

[b] German movie theater release canceled after disappointing U.S. box-office results.

[c] Number in parentheses signifies positive DVD rental and DVD purchase decisions.

[d] Movie not released on DVD at the time of the third survey.

APPENDIX B
Items for File Sharing Determinants

Construct	Measurement	Scale; Adapted From:
Gross utility of the movie original	(1) What are you usually willing to pay when watching a new movie at the theater? (2) What are you usually willing to pay when purchasing a new movie on DVD? (3) What are you usually willing to pay when renting a new movie on DVD?	Formative, metric; Rochelandet and Le Guel (2005)
Price of the movie original	(1) When you go to the movies: In your experience, what do you pay for a theater ticket? (2) When you purchase a movie on DVD: In your experience, what do you pay for a DVD? (3) When you rent a movie on DVD: In your experience, what do you pay for renting a movie?	Formative, metric; Rochelandet and Le Guel (2005)
Transaction costs of the movie original	(1) How cumbersome is it to watch a chosen movie in a movie theater? (2) How cumbersome is it to purchase a chosen movie on DVD? (3) How cumbersome is it to rent a chosen movie on DVD? (4) In your experience, how high are the additional costs (beyond the price of the theater ticket) when going to the movies? (5) In your experience, how high are the additional costs (beyond the price of the DVD) when purchasing a movie on DVD? (6) In your experience, how high are the additional costs (beyond the rental price) when renting a movie on DVD?	Formative, 6 point; Rochelandet and Le Guel (2005)
Moral costs of the copy	(1) Sharing movie copies with others via Internet file sharing networks is unfair to the filmmakers. (2) Sharing movie copies is unethical. (3) When you share movie copies, you do harm to someone.	Reflective, 6 point; Huang (2005)
Legal costs of the copy	(1) The danger of being punished for sharing movie copies is high. (2) Sharing movie copies is a legally risky thing.	Reflective, 6 point; Chiang and Assane (2002)
Technical costs of the copy	(1) The danger of my PC becoming infected with computer viruses when sharing movie copies is high. (2) Sharing movie copies can entail serious technical computer problems.	Reflective, 6 point
Search costs of the copy	(1) How cumbersome is it to download a chosen movie from file sharing networks? (2) How cumbersome is it to get a chosen movie as a copy from others?	Formative, 6 point; Rochelandet and Le Guel (2005)

Construct	Measurement	Scale; Adapted From:
Degree of substitution	(1) To what degree can a movie copy downloaded from file sharing networks or received from friends substitute viewing the movie in a theater? (2) To what degree can a movie copy downloaded from file sharing networks or received from friends substitute purchasing the movie on DVD? (3) To what degree can a movie copy downloaded from file sharing networks or received from friends substitute renting the movie on DVD?	Formative, 6 point; Rochelandet and Le Guel (2005)
Transaction utility	With movie copies you can make a real "deal"!	Single item, 6 point; new scale
Mobility utility	You can take movie copies with you on the go, e.g. on notebook computers or video iPods.	Single item, 6 point; new scale
Storage utility	With movie copies, you can save space in your flat compared to DVD video boxes.	Single item, 6 point; new scale
Anti-industry utility	By obtaining movie copies, you can 'get back' at the movie studios and media corporations.	Single item, 6 point; new scale
Social utility	By sharing movie copies, you belong to a group of like-minded people with similar interests.	Single item, 6 point; new scale
Collection utility	Movie copies have a high collector's value.	Single item, 6 point; new scale
File sharing knowledge	(1) I know several different file sharing networks. (2) I know how to find and download software for file sharing networks on the Internet. (3) I know how to set up file sharing software in order to download files from these networks. (4) I know how to configure firewalls in order to be able to access file sharing networks. (5) I know how to find and download codecs from the Internet. (6) I can judge from the video file format (e.g., avi, xvid-avi, divx-avi, wmv, mpeg) and the file size just about how good the image quality of the downloaded video file will be.	Formative, 6 point; new scale