Journal of the Academy of Marketing Science (2023) 51:245–265
https://doi.org/10.1007/s11747-022-00897-0

ORIGINAL EMPIRICAL RESEARCH

# Exclusivity strategies for digital products across digital and physical markets

**Rouven Seifert**[1] · **Cord Otten**[1] · **Michel Clement**[1] · **Sönke Albers**[2] · **Ole Kleinen**[1]

Received: 16 April 2021 / Accepted: 11 August 2022 / Published online: 9 September 2022


## Abstract

Digital technologies allow versioning a product (e.g., a movie) for different physical and digital sequential distribution channels to target heterogeneous consumer segments, thereby creating exclusive offers. Extant literature on sequential distribution for movies largely concentrates on the theater-to-home-video window length (e.g., DVD), thus, neglecting digital distribution channels, particularly the potential of *exclusive* digital offers when multiple subsequent home video channels are available. We empirically examine the impact of exclusive digital movie offers on demand in digital and physical distribution channels. We fit a system of equations to a unique sample of 260 movies distributed in theaters, digital purchases, digital rentals, and physical purchases channels. Overall, the results indicate substantial profits from exclusive offers. Rather than sales cannibalizations, we find positive cross-channel demand spillovers from exclusive digital offers to delayed physical purchases. Exclusive home video offers outperform mere reductions in the theatrical exclusivity period; thus, implementing exclusive digital home video releases is a promising alternative to avoid conflict-prone reductions of the overall theater-to-home-video release window. Our findings are also relevant to industries that use different online and offline release windows (book publishers) or give exclusive access across different platforms (game publishers).

**Keywords** New product release timing · Digital marketing · Exclusive offerings · Channel order · Entertainment industry

Sequential distribution describes a distribution strategy that uses sequential releases of a product in multiple digital and physical distribution channels to establish exclusive and non-exclusive release windows. The economic rationale is to target distinct consumer segments with a specific version to skim different levels of willingness to pay (Ahmed & Sinha, 2016). Exclusive release windows refer to exclusive distribution periods for a limited time in one of the distribution channels, while non-exclusive release windows are distribution periods with multiple consumption options. In the motion picture industry, sequential release schedules with exclusive release windows were traditionally implemented into an exclusive theatrical exhibition window before the start of DVD distribution, which we denote as the theater-to-home video window (Ahmed & Sinha, 2016; Lehmann & Weinberg, 2000). Due to the introduction of digital rights management systems, content providers can execute new sequential schedules by means of offering movie downloads from platforms, such as iTunes and Amazon.com, with either unlimited (digital purchase) or 48-h access within a 30-day period (digital rental). They also have the option of providing at least one version exclusively for a given period (e.g., 14 days) before the release in other home video channels (e.g., DVD, Blu-ray).

In contrast to the established industry's standard of a same-day home video release in all channels (i.e., digital purchase, digital rental, and DVD/Blu-ray), exclusive digital availability allows for reinforced temporal price discrimination with

Natasha Foutz served as Area Editor for this article.

✉ Michel Clement
michel.clement@uni-hamburg.de

Rouven Seifert
rouven.seifert@uni-hamburg.de

Cord Otten
cord.otten@uni-hamburg.de

Sönke Albers
soenke.albers@the-klu.org

Ole Kleinen
ole.kleinen@uni-hamburg.de

[1] Institute of Marketing, University of Hamburg, Moorweidenstraße 18, 20148 Hamburg, Germany

[2] Kühne Logistics University, Großer Grasbrook 17, 20457 Hamburg, Germany

high-margin digital purchase versions and avoids pricing-induced channel competition; thus, allowing for higher overall margins (Gielens et al., 2014). Digital rights management technologies increase the complexity of channel management and require consideration of channel properties and potential cross-channel spillover effects. Supply-side scarcity can directly increase demand for the exclusive channel. Buzz from the exclusive release, shadow diffusion, and multiple consumption can induce positive cross-channel demand spillovers from the exclusive channel. On the contrary, consumers switching behavior can lead to cross-channel cannibalization, which we denote as negative cross-channel demand spillovers.

To our knowledge, extant literature has only investigated the exclusivity of the physical purchase channel. Prior studies focused on the effect of temporary unavailability of digital channels on demand (thereby creating exclusivity for the physical purchase channel). They found that unavailability of digital purchase channels often has no significant influence on DVD sales, while additional digital rentals negatively affect physical purchases (Danaher et al., 2010; Hashim et al., 2019). Results from previous research on the exclusivity of physical purchase channels do not allow for inferences on the effects of digital channel exclusivity.

We address this research gap with an empirical study on the exclusivity of digital channels for movies. In terms of scope, we examine the effect of exclusive digital offers on demand in physical and digital distribution channels and analyze whether exclusivity of digital channels increases or decreases sales across all transactional home video channels (physical purchase, digital purchase, and digital rental[1]). Conceptually, we extend the sequential distribution framework from Hennig-Thurau et al. (2007) by adding the concept of providing exclusive offers. Building on this framework, we examine a multichannel distribution system with different physical and digital channels and consumers' heterogeneous preferences in their distribution channel choices. We focus on how exclusive digital offers directly affect demand in the exclusive channel and on how exclusive digital offers induce cross-channel demand spillover effects onto the non-exclusive channels. We build on heterogeneous intertemporal preferences with perishable demand and cover the concept of perceived supply-side scarcity to explain a potential direct increase in demand in the exclusive channel. We also consider shadow diffusion (Muller et al., 2009), latent consumer buzz, and herd behavior to motivate positive cross-channel demand spillovers or cross-channel cannibalization. We apply our framework to a unique sample of 260 movies distributed throughout different home video channels after their theatrical premiere. These data are unique because the movie distributor cooperating with us, who provided the field data, experimented with exclusive offers for the home video channels instead of the traditional simultaneous release in digital and physical home video channels (day-and-date strategy). Our data encompasses the strategy of providing exclusive digital offers shortly before other home video releases. Thus, we capitalize on data that include real sales in multiple channels with variation in exclusive releases in digital channels and variation in the theater-to-home-video window length. Given the cost input from the industry for physical products, as well as the almost zero marginal cost structure of a digital product, we can simulate the financial impact for movie distributors of exclusive offers and provide contingencies for optimal release schedules.

Rather than sales cannibalizations, we find a positive cross-channel demand spillover from exclusive digital home video sales to the delayed physical purchase channel. We argue that consumer segmentation and shadow diffusion (Muller et al., 2009) are the main drivers of the different cross-channel effects. While buyers of the physical version are motivated to extend their physical movie libraries or are stranded in the old technology, exclusive digital offers trigger buzz for the movie but do not cannibalize the physical offer. The increased buzz induces a success-breeds-success spiral and leads to a positive cross-channel demand spillover to the physical purchase version. Thus, managing sequential distribution with exclusive digital offers requires insight into the exclusivity effect and potential cross-channel demand spillover.

We run what-if scenario analyses of different exclusive strategies to illustrate how managers can implement exclusive digital offers into the existing release schedule and essentially capitalize on exclusive offers. The results (with assumptions on costs) suggest that a sequential home video release with exclusive digital purchase offers outperforms the simultaneous release to all home video channels in a non-exclusive way. Furthermore, we show that establishing home video exclusivity even increases profits compared to the reduction of theatrical exclusivity strategies propagated by other studies. The greatest increase in profits comes from combining a reduction in theatrical exclusivity with home video exclusivity.

Thus, our findings add to the research in the channel management field as many studies investigate retailing products in just one channel over the complete life cycle without testing exclusive periods in a multichannel distribution (e.g., Gielens et al., 2014).

Our insights should be generalizable for other types of distributors (e.g., independents) and other ecosystems (e.g., international movie markets), as well as other industries with sequential release patterns (e.g., book publishing) and products with similar characteristics (e.g., software products and services). Furthermore, exclusive offers can be implemented into a windowing strategy across different

[1] We do not include physical rental distribution as this type of distribution is no longer relevant in the German market.

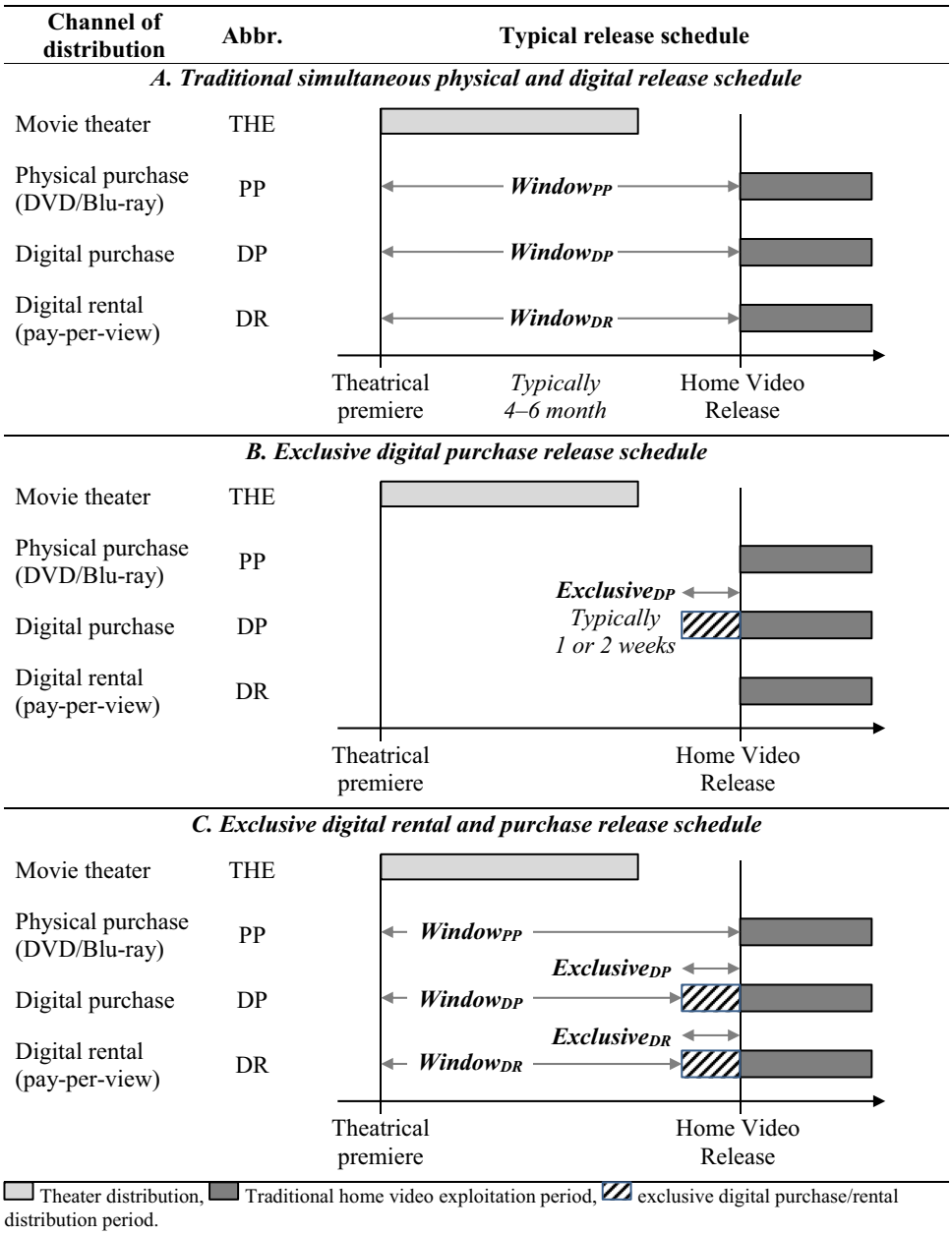


**Fig. 1** Typical movie release schedule in the German market

(digital) platforms. For example, Yang et al. (2021) refer to the mobile gaming market in which Electronic Arts offered Apple iOS a four-month exclusive deal for the well-known mobile game *Plants vs. Zombies 2*.

## Research background

### Sequential distribution in the movie industry

Figure 1 illustrates both a typical movie release schedule with sequential distribution and how exclusive offers are achieved. Movie distribution typically begins with the initial theatrical exhibition. Four to six months after the theatrical premiere, the movie is distributed via home video channels, which includes digital purchase, digital rental, and physical purchase versions. Panel A shows a traditional sequential release pattern with an exclusive theatrical release window of four to six months for movie theaters followed by the simultaneous release to all home video channels. In panel B, an exclusive digital purchase (download) channel is offered two weeks before the movie is made available as a physical purchase (e.g., DVD/Blu-ray) or a digital rental. Panel C shows the case when the movie is exclusively offered in both digital channels

(purchase and rental) before the movie is available for purchase as a DVD/Blu-ray.

Theatrical and home video distribution generate movie-specific revenues with each purchase or rental and thus represent a major stake of a movie's total revenue (Digital Entertainment Group, 2020).[2] Much of this revenue is realized in the first weeks after a movie release given the exponentially decreasing sales over time in the distribution channels (e.g., Sawhney & Eliashberg, 1996). Thus, even short periods of exclusivity may have a substantial effect on overall sales and profits.

## Extant research

Table 1 provides an overview of extant research that investigates the demand for subsequent distribution channels after theatrical screening. We divide the research into four groups: (1) optimal theater-to-home-video window, (2) impact of theater-to-home-video window on digital channels without exclusivity, (3) exclusivity of physical channels, and (4) exclusivity of digital channels. We define the theater-to-home-video distribution window as the number of days between theatrical and home video release in the respective distribution channel. We focus our discussion on the new aspect of exclusive offers and digital distribution channels.

Given that many studios in the movie industry used to release products sequentially, early research (group 1 in Table 1) was interested in investigating the optimal release window length between starting theatrical screenings and starting subsequent home video channel releases. This stream of research provides examples of analytical modeling approaches to determine the optimal length of the release window between theaters and home video channels (e.g., August et al., 2015; Lehmann & Weinberg, 2000). Later, empirical research focused on the impact of the window length on the demand for theaters and subsequent home video channels. For example, Chiou (2008), Mukherjee and Kadiyali (2011), and Ahmed and Sinha (2016) investigate the effect of the release window on theaters and physical DVD purchases and how they cannibalize each other. Their results indicate that shorter release windows increase home video demand until reaching an optimal length of the release window to maximize profit. While this research guides the modeling of the market response functions in the two sequential channels depending on the release windowing decisions, it addresses neither how to simultaneously deal with several digital and physical home video channels nor how to exclusively offer the movie in individual subsequent channels for a certain amount of time. Therefore, we review literature that deals with one of the aspects—namely, digital channels but without exclusivity (group 2)—and literature that deals with exclusivity but not with digital channels (group 3). As no research has examined exclusivity in digital channels altogether (which would create group 4), we provide a joint investigation of these two aspects.

In a general sense, research on selling across multiple channels at the same time shows strong competition between channels, leading to cannibalization effects (Gielens et al., 2014). Most articles listed under group 2 in Table 1 indicate that this is also true for the competition between physical and digital home video channels. Despite the important role of digital home video distribution channels with respect to profit, studies investigating this channel are scant.

Group 2 includes research on how sales in digital channels are affected when exclusivity is absent. These studies rely on market share models based on stated preference data from survey respondents, which allows the simulation of sales effects by including or excluding certain distribution channels. However, in a market share model, sales cannibalization among channels is implied by construction, thus, estimating true exclusivity effects is not possible. Hennig-Thurau et al. (2007) use choice-based conjoint to calculate the optimal window length between digital and physical purchase and rental channels. Their findings indicate that exclusive distribution can increase overall profits. Burmester et al. (2016) extend this to illegal consumption, which affects optimal windows and exclusive periods. McKenzie et al. (2019) analyze stated preferences for subscription-based streaming. Using estimates from their multinomial logit function, they find that the cannibalization effect was close to zero. In another conjoint study, Rao (2015) indirectly elicits time preferences for digital purchases versus digital rentals to derive optimal pricing across channels. She shows that purchase and rental markets serve different consumer segments with different rates of diminishing returns to consumption. However, these studies fall short in that they do not deal with several digital channels, refer to catalog titles (older titles) that only generate few sales and behave differently than new releases, or are based on stated preferences. Stated preferences often considerably vary from true choices (e.g., Milkman et al., 2009) and do not take advertising nor buzz spillover effects into account, which is only possible with market data.

We only found four articles that estimate the effect of exclusivity (see group 3 in Table 1). Danaher et al. (2010), Mukherjee and Kadiyali (2011), and Hashim et al. (2019)

[2] After purchase and rental home video distribution, movies are distributed as catalog titles through subscription-based pay-tv and streaming services (e.g., Netflix), and then in free TV or advertising-based streaming services. In our study, we disregard subscription-based streaming services (e.g., Netflix) because movie distributors are not paid for individual movies but for bundles of movies that are licensed to either TV stations or streaming platforms approximately two years after release. Moreover, prior research reports small dependencies between subscription-based streaming services and other channels (McKenzie et al., 2019).

**Table 1** Overview of relevant empirical studies investigating demand for subsequent digital distribution channels after theatrical screening

| Group | Study | Inclusion of digital channels | Exclusivity of digital channel | Approach | Data | Cannibalization or spillover effects among subsequent channels after theater |
|---|---|---|---|---|---|---|
| (1) Optimal theater-to-home-video window | Lehmann and Weinberg (2000) | No | No | Analytical | Convenience sample of 35 movies from 1994 and 1995 | Not investigated |
| | Chiou (2008) | No | No | Nested logit response function | Movies from 2000 to 2003 | Not investigated |
| | August et al. (2015) | No | No | Analytical | No data | Not investigated |
| | Ahmed and Sinha (2016) | No | No | Non-linear response function | 800 US movies released between 2005 and 2013 for the theater and home video channels | Not investigated |
| (2) Impact of theater-to-home-video window on digital channels without exclusivity | Hennig-Thurau et al. (2007) | *Yes* | Not empirically measured | Inferred from market shares based on stated preferences | Consumer survey (in Germany, US, and Japan) | Cannibalization among channels by model construction |
| | Rao (2015) | *Yes* | Not empirically measured | Inferred from market shares based on stated preferences | Consumer survey | Cannibalization among channels by model construction |
| | Burmester et al. (2016) | *Yes* | Not empirically measured | Inferred from market shares based on stated preferences | Consumer survey (in Germany) | Cannibalization among channels by model construction |
| | McKenzie et al. (2019) | *Yes* | Not empirically measured | Inferred from market shares based on stated preferences | Consumer survey | Cannibalization among channels by model construction |
| (3) Exclusivity of physical channels | Danaher et al. (2010) | *Yes* | No, only for physical purchases | Exponential response functions | Physical purchase (Amazon [DVD] and iTunes; 2007–2008) | No effect of exclusivity of physical purchase on digital purchase |
| | Mukherjee and Kadiyali (2011) | *Yes* | No, only for physical purchases and rentals | Multiplicative competitive interaction response function | 35 top revenue movies in rental and DVD purchase channels from 2000 to 2001 | Low cross-channel price and availability elasticity for both channels; exclusivity moderately reduces overall revenues |
| | Hashim et al. (2019) | *Yes* | No, only for physical purchases | Linear response functions | Physical purchase (Amazon and Barnes & Noble; 2008) | No effect of digital purchase availability on physical purchase but from availability of digital rental on digital purchase |
| | Yu et al. (2021) | *Yes* | No, only for physical purchases | Difference-in-differences response function | Netflix movies not on Hulu between 2014 and 2016 | Decline in streaming availability of Epix's content caused an increase of 36.07% for monthly DVD sales |
| (4) Exclusivity of digital channels | ***This study*** | ***Yes, digital purchase and rental*** | Yes, for digital purchase and rental | Non-linear response functions | Market data of new releases from distributor | Cross-channel demand spillover of exclusivity of digital purchase channel is positive for physical purchase but negative for digital rentals |

Most sales accumulate within the first few weeks. Release refers to studies focusing on these first weeks. Catalog refers to sales of products already in the market

analyze the influence of the availability of content from digital channels on physical DVD purchases. The temporary unavailability of the digital channel creates exclusivity for existing (i.e., catalog) DVD titles in physical channels for Danaher et al. (2010), though the authors detect no significant impact on sales in the physical purchase channel. However, the quasi-experimental design does not consider exclusivity for digital channels. Mukherjee and Kadiyali (2011) estimate a multiplicative competitive interaction model with data from 2000 and 2001 on physical purchase and physical, rental home viewing channels. Contrary to expectations, they find low cross-channel price and availability elasticities for both channels. To infer the effect of exclusivity, they simulate a 28-day window of a sequential release with either the purchase or rental channel going first, thereby creating temporary exclusivity for one of the channels. Although they find that exclusivity moderately reduces overall revenues across both channels given lost interest for the movie due to the late release, this can be offset by higher profits when the exclusive channel offers higher margins. Hashim et al. (2019) estimate physical sales depending on whether digital purchase or digital rental were available. Their 2008 data come from Amazon and Barnes & Noble. They find that there was no significant substitution between digital and physical sales but a significant substitution between rental and physical sales. All three studies investigate the exclusivity of the physical sales channel when digital sales channels were temporarily not available. Some research also deals with the impact of streaming services on home video channel sales. Although we do not consider streaming services in our analysis, Yu et al. (2021) investigate how a switch from Netflix to Hulu affects physical purchases of DVDs, thereby creating unavailability of some of the digital streaming content. Their difference-in-differences analysis shows that the switch to Hulu caused an increase of 36.07% in monthly DVD sales during the 15 months after the event. However, their results only refer to temporary exclusivity of physical purchases, not to digital purchases. Thus, to our knowledge, no research has investigated temporary exclusivity of digital channels before selling or renting DVDs or Blu-rays.

As digital channels have become more relevant with respect to sales and profits (due to lower distribution costs), we argue that a differentiated empirical test of exclusive offers in digital channels using market data is of high interest (group 4 in Table 1). We address the research gaps and investigate how temporary *exclusivity of digital channels* (either purchase or rental) may influence the other respective digital channel and the physical purchase channel.

## Conceptualization

We extend Hennig-Thurau et al.'s (2007) sequential distribution framework to contextualize the influence of exclusive digital offers on demand in physical and digital home video distribution channels. Building on this framework, we study a multichannel distribution system with different physical and digital channels, each offering one version of the movie. The distributor's objective is to maximize total profit across the distribution channels by addressing consumers' heterogeneous preferences for the versions. For example, theatrical exhibitions attract consumers with a high preference for an event experience, DVD or Blu-ray (physical purchase) versions serve consumers interested in physical collectables, and digital offers target consumers familiar with digital platforms who aim for immediate consumption, and who are interested in watching the movie either multiple times (digital purchase) or just once (digital rental). The distributor simultaneously offers the different versions of the product or in a sequence of releases, resulting in a movie release schedule. Sequential releases address differences in consumers' willingness to wait with a general pattern in which consumers prefer earlier access. Sequential releases translate into release windows and potentially into exclusive digital offers (Fig. 1).

The introduction of a product version in a channel is supported by marketing activities. These initiate buzz and induce consumer communication with the potential to influence demand within and across channels. Consumers observe the distributor's release pattern, process the intertemporal distribution signals, and adjust their utility expectations (Lehmann & Weinberg, 2000; Prasad et al., 2004). Thus, exclusive digital offers change the consumer's utility of the exclusive channel and the non-exclusive distribution channels, and influence demand throughout the distribution system.

With this framework in mind, we discuss the concept of exclusivity and contingencies under which exclusive digital offers increase demand in the exclusive channel and induce either positive or negative cross-channel demand spillovers to other distribution channels. Finally, we analyze relationships of the theater-to-home-video window when exclusive digital offers are implemented into the sequential release schedules.

**Impact of exclusivity on the exclusive channel** Consumers' reactions to exclusive digital offers depend on the signaling properties of the exclusive offer. Consumers who are aware of the limited access through only the exclusive distribution channel (e.g., digital purchase) see this supply-side scarcity as a value signal for the movie and express higher demand for the exclusive version (Yang et al., 2021). The influence of supply-side scarcity is amplified for hedonic products, such as movies, as consumption of these products is associated with social positioning (Berger & Ward, 2010). However, if the signaling properties are weak and consumers are not aware of the scarcity, exclusive digital offers fail to affect

their decisions (for an overview, see Hamilton et al., 2019). In the case of exclusive digital movie releases, consumers are informed with announcements shortly before the exclusive release so they can identify exclusive digital offers on the digital platforms. Thus, we expect a higher consumer demand for exclusive offers.

For consumers interested in home video consumption, the exclusive digital offer is the first available distribution channel, and thus desirable for time sensitive consumers who did not go to the movie theater. Consumers desire to watch a movie earlier could be further increased by success-breeds-success phenomena, particularly, consumer buzz (Houston et al., 2018). Muller et al. (2009) refer to this attention recovery as shadow diffusion in which already pre-release advertising activates consumers' decision to adopt the movie when it is available. However, channel preferences for an unavailable version, and against the exclusive version, may dilute the first-availability effect. Consumer research suggests that consumers' capacity to own a movie might explain divergent cross-channel demand spillover effects for the different home video versions. Consumers perceive a digital version of a movie as lower in psychological ownership than the DVD/Blu-ray version (Atasoy & Morewedge, 2018), and compared to the digital counterpart, a purchased version conveys a stronger perception of materialistic control and personal identification at the cost of the risk that the hedonic experience fails to meet expectations (e.g., watching a bad movie; Lamberton & Goldsmith, 2020). We expect many consumers to be receptive to an exclusive digital offer, while a small segment might be enthusiastic towards a specific version or unequipped to access digital movie streaming. Physical and digital purchase versions might share a similar perception of materialistic control but provide divergent perceptions of psychological ownership that may reduce the attractiveness of an exclusive digital version. Digital purchases provide, in contrast to rentals, long-term availability for repeated consumption. However, the associated higher prices pose a higher consumption risk which might deter consumers' switching from the digital rental to the digital purchase version. Both versions are accessible through the same devices and digital platforms, which lock-in consumers in the digital consumption ecosystem and provide a convenient way to switch from the digital rental to the digital purchase version.

**Impact of exclusivity on non-exclusive channels** Plausible effects of exclusive offers in one channel on the other non-exclusive channels range from no effect, negative spillover effects from customers switching from the non-exclusive channel to the exclusive channel (cannibalization), or loss of customers, to positive spillover effects.

Dependencies between channels are negligible if consumers are unaware of the exclusive offer and related buzz, choose the movie as an impulse buy (Iyer et al., 2020), or the digital and physical channel offers serve distinct consumer segments with high channel loyalty. For example, exclusive digital offers only attract a few consumers of physical versions (DVDs/Blu-rays) if these consumers prefer physical goods in general or are locked-in to the legacy technology. Indeed, studies using stated preference data (e.g., the conjoint analyses by Hennig-Thurau et al., 2007) have found either no or rather limited cannibalization between digital channels.

Negative spillover effects occur if consumers switch from the non-exclusive to the exclusive channel due to a preference for early access (Chiang & Jhang-Li, 2020). This cross-channel cannibalization of demand increases profit for the distributor if the exclusive channel provides a higher contribution margin (e.g., digital channel; Gielens et al., 2014). In addition, the exclusive offer may remind consumers of the movie but consumers may grow frustrated when they prefer a non-exclusive channel to which they do not have access yet. Following the notion of advertising wear-out and consumer reactance, they may forget to watch the movie at all. This translates into an unprofitable negative demand spillover effect.

Positive cross-channel demand spillover effects are plausible due to multiple consumption through the exclusive and non-exclusive channels (Ahmed & Sinha, 2016). For example, consumers may rent a digital copy of the movie and buy the physical version as a collectable. Moreover, the exclusive offer may inform or remind consumers about the existence of the movie, serving as additional advertising and initiate buzz effects (Hennig-Thurau & Houston, 2019; Houston et al., 2018). These communication phenomena can lead to a success-breeds-success cycle that spills over to other distribution channels and induces a positive cross-channel demand spillover (Bruce et al., 2012).

**Implementation into the sequential release schedule** Exclusive digital offers provide access to digital home video channels before the simultaneous release on other home video channels. For example, an exclusive digital purchase release is launched before a (simultaneous) home video release to digital rental and physical purchase channels. Periods of exclusive digital availability can be established in two ways, both of which have implications for the theater-to-home-video window. First, exclusive periods can start on the original home video release dates by keeping the theater-to-home-video window stable for the exclusive version but increasing the theater-to-home-video window for the other versions. Second, the period of exclusive digital availability starts earlier than the original home video release, decreasing the theater-to-home-video window for the exclusive distribution channel and leaving the release windows of the releases unchanged.

Perishability of content (Lehmann & Weinberg, 2000) and buzz wear-out (Houston et al., 2018), observed as the typical exponentially declining sales pattern (Clement et al., 2014), quickly diminish consumers' demand for new movies over time. This suggests that earlier releases in subsequent home video channels increase demand. Although Ahmed and Sinha (2016) argue that demand can be revitalized by repeat purchases if the time between theatrical and home video release is sufficiently long, the constant influx of heavily advertised competing product releases (Elberse & Eliashberg, 2003) dilutes preference for the movie. In the following section, we empirically quantify the exclusivity effect on each home video distribution channel. Additionally, we run what-if analyses to evaluate the profitability of strategies with different exclusivity period lengths, and established either at or before the original home video release.

## Model development

Following the distribution pattern of a movie (Fig. 1), we investigate the impact of exclusive digital purchase ($Exclusive_{DP}$) and/or rental ($Exclusive_{DR}$) offers on demand ($Sales_f$) in digital and physical distribution channels (channel subscript $f$). We specify a market response model using a system of four equations, one for each distribution channel, theater, digital purchases, digital rentals, and physical purchases, that we estimate using regression techniques. We estimate elasticities for the digital and physical purchase market and use sales as the dependent variable (not revenue). We also transfer the model results to profit implications in a what-if analysis in a subsequent section. In our system of Eqs. (1)-(4), β refer to parameters, $X$ are vectors of the independent control variables multiplied by their parameters (which we discuss in detail below), and $\varepsilon_f$ are the error terms. We use superscripts to mark groups of control variables. The subscript $f$ denotes channel-specific variables that capture information specific to the respective distribution channel. Analogous to the channel abbreviations, the subscript THE indicates the theater channel, DP the digital purchase channel, DR the digital rental channel, and PP the physical purchase (home video) channel.

$$\ln Sales_{THE} = \beta_{THE,0} + X_{THE}^{Distribution} + X_{THE}^{Communication} + X_{THE}^{Product} + X_{THE}^{Market} + \varepsilon_{THE} \quad (1)$$

$$\ln Sales_{DP} = \beta_{DP,0} + \beta_{DP,1} \cdot \ln Exclusive_{DP} + \beta_{DP,2} \cdot \ln Exclusive_{DR} + X_{DP}^{Distribution} + X_{DP}^{Communication} + \beta_{DP,3} \cdot \ln Price_{DP} + X_{DP}^{Product} + X_{DP}^{Market} + \varepsilon_{DP} \quad (2)$$

$$\ln Sales_{DR} = \beta_{DR,0} + \beta_{DR,1} \cdot \ln Exclusive_{DP} + \beta_{DR,2} \cdot \ln Exclusive_{DR} + X_{DR}^{Distribution} + X_{DR}^{Communication} + X_{DR}^{Product} + X_{DR}^{Market} + \varepsilon_{DR} \quad (3)$$

$$\ln Sales_{PP} = \beta_{PP,0} + \beta_{PP,1} \cdot \ln Exclusive_{DP} + \beta_{PP,2} \cdot \ln Exclusive_{DR} + X_{PP}^{Distribution} + X_{PP}^{Communication} + \beta_{PP,3} \cdot \ln Price_{PP} + X_{PP}^{Product} + X_{PP}^{Market} + \varepsilon_{PP} \quad (4)$$

We adopt a multiplicative (log–log) model specification for all four equations, transforming all non-binary independent and dependent variables into their natural logarithms. The "ln" indicates transformation to the natural logarithm. This log–log functional form offers elasticities as parameter values, appropriately captures the diminishing market response with increased exposure (compared to additive models), and produces reasonable optimal strategies (Albers, 2012). In addition, we inspect the distribution of the independent and dependent variables and find an exponential distribution for several independent and all dependent variables. Using logarithmic transformation, we achieve a close-to-normal distribution, fulfilling the requirements for linear regression approaches.

We relate the length of digital purchase and rental exclusivity periods ($Exclusive_{DP}$ and $Exclusive_{DR}$) to demand in the exclusive and non-exclusive home video channels (Eqs. 2–4). For each of the four distribution channels (Eqs. 1–4), we rely on previous empirical studies (e.g., Carrillat et al., 2018; Clement et al., 2014) to identify relevant control variables. We include a wide range of distribution ($X_f^{Distribution}$), communication ($X_f^{Communication}$), price ($Price_{DP}$ and $Price_{pp}$), product ($X_f^{Product}$), and market ($X_f^{Market}$) control variables multiplied by their parameter values in each distribution channel $f$ that cover all relevant marketing activities. In a system with different distribution channels, the release window determines the availability for home video consumption (Ahmed & Sinha, 2016), and the buzz spillover (Houston et al., 2018) from theatrical distribution, which affects demand for the respective home video channel. To address the supply and demand dependencies in the theatrical market illustrated by Elberse and Eliashberg (2003), we include the number of screens in Eq. 1.

Success at the box office is a strong predictor of a movie's overall success (Luan & Sudhir, 2010). A movie's theatrical release is accompanied by substantial advertising and public relations efforts that spur information cascades, such as consumer buzz and critical acclaim, along the movie's life cycle (Chiou, 2008; Houston et al., 2018; Lim & Li, 2018; Luan & Sudhir, 2010; Mukherjee & Kadiyali, 2011). We consider consumer buzz and success-breeds-success phenomena (Houston et al., 2018) for the sequential release schedule by including theatrical admissions, $Sales_{\mathrm{THE}}$, in each subsequent home video equation as an independent variable (Eqs. 2–4).

$$X_f^{Distribution} = \beta_{f,4} \cdot \ln Window_f + \beta_{f,5} \cdot \ln Screens + \beta_{f,6} \ln Sales_{THE} \quad (5)$$

In addition, management has marketing tools at its disposal, including advertising support (Bruce et al., 2012; Elberse &

Anand, 2007; Liu, 2006; Luan & Sudhir, 2010) and prices (Gong et al., 2015; Luan & Sudhir, 2010). We relate channel-specific advertising expenditures to demand for each distribution channel (Eqs. 1–4). We include prices for each version. Note that we omit price in the theatrical and digital rental channels because we observe no variance in box office tickets and digital rental prices. Prices in these channels are not movie specific and discounts exists for the rental version but are not offered in the first weeks of distribution when we collected our data. Consumer communication is captured by electronic word-of-mouth (eWOM) volume and valence, which reflect user-generated information flows and provide quality signals (Babić Rosario et al., 2020; De Matos & Rossi, 2008; Hennig-Thurau et al., 2015):

$$X_f^{Communication} = \beta_{f,7} \cdot \ln Advertising_f + \beta_{f,8} \cdot \ln eWOMvolume_f + \beta_{f,9} \cdot \ln eWOMvalence_f \quad (6)$$

We include an extensive set of product specifics, denoted by $X_f^{Product}$ (Eq. 7), related to demand. The star power of actors and directors is an important aspect of quality (Basuroy et al., 2003; Hofmann et al., 2017). Sequels and book adaptations serve as additional information about product quality as consumers have experienced previous versions (Hennig-Thurau et al., 2009; Joshi & Mao, 2012). Genre is also an important determinant of a movie's performance and target group (Desai & Basuroy, 2005). Finally, age restrictions convey information about the movie plot and narrow down the potential market size for the movie.

$$\begin{aligned} X_f^{Product} = {} & +\beta_{f,10} \cdot \ln PowerDirector + \beta_{f,11} \cdot \ln PowerActor \\ & +\beta_{f,12} \cdot MovieSequel + \beta_{f,13} \cdot MovieBook \\ & +\beta_{f,14} \cdot GenreAction + \beta_{f,15} \cdot GenreComdey + \beta_{f,16} \cdot GenreDocu \\ & +\beta_{f,17} \cdot GenreDrama + \beta_{f,18} \cdot GenreHorror + \beta_{f,19} \cdot GenreKids \\ & +\beta_{f,20} \cdot Age06 + \beta_{f,21} \cdot Age12 + \beta_{f,22} \cdot Age16 + \beta_{f,23} \cdot Age18 \end{aligned} \quad (7)$$

Furthermore, we capture market dynamics, such as seasonality, competition (Einav, 2007; Mukherjee & Kadiyali, 2018), and technology shifts (Van Eeden & Chow, 2018) with channel-specific measures of the number of competitive releases, market sizes, and a linear trend:

$$X_f^{Market} = \beta_{f,24} \cdot Trend_f + \beta_{f,25} \cdot \ln MarketReleases_f + \beta_{f,26} \cdot \ln MarketVolume_f + \beta_{f,27} \cdot MarketVolumeAug_f \quad (8)$$

Finally, other latent movie characteristics may drive movie-specific sales patterns. Therefore, we allow the error terms of the equations to covary, taking the interdependences between the distribution channels into account.

## Data and variable operationalization

Our empirical study relies on field data gathered in cooperation with a major movie distributor with a substantial market share. The distributor provided us with channel-specific data on exclusive and non-exclusive movie releases and a wide range of control variables that include all relevant marketing activities. The distributor was the first to experiment with changing the traditional distribution patterns, shifting from simultaneous releases in home video channels to exclusive digital release patterns. Fig. WA1 in the Web Appendix gives an overview of the release patterns observed in our data. The decision to provide exclusive offers in the digital home video channels was driven by the contribution margin, which is the highest in the digital purchase channel (according to the distributor).

Overall, the sample consists of a cross-sectional data set containing 260 movies released between fall 2009 and spring 2017, 133 of which had an exclusive release period of various lengths. Table 2 provides an overview of the descriptive statistics.

### Demand

The dependent variables in the system of equations are the sales volumes per distribution channel. Typically, sales rapidly decrease within the first few days after a release (Jedidi et al., 1998; Sawhney & Eliashberg, 1996). Our data set contains the total sales in the first eight weeks, covering a large share of sales (Hennig-Thurau et al., 2007). The descriptive statistics show that our data capture a wide range of movies (measured using admissions to German theaters) including both less popular movies (fewer than 1,500 visitors) and blockbusters (more than 6.2 million visitors). The data also indicate that a large share of home video demand is based on physical versions. Technological advancements have shifted physical purchase demand from DVD to Blu-ray versions; therefore, we indicate the movie-specific share of Blu-ray on total physical sales with an additional variable (PhyBR). GfK Germany provided data on physical sales and prices. We do not consider physical rentals in our model because most of the studios stopped distributing new releases to video rental stores. This distribution option is substituted by digital rentals which provide time-limited access to a specific movie.

### Exclusivity

The main variable of interest is the exclusive offer of some movies in the digital purchase home video channel. For the oldest titles in the sample, home video channels were simultaneously released using the traditional day-and-date strategy. In 2012, the distributor began with exclusive releases for some movies before rolling out exclusive strategies for all movies in 2015. In our sample, 133 movies had digital purchase releases before physical purchase releases, 32 of

which also had earlier digital rental releases. The most common exclusive digital purchase periods were 7 days with 26 movies and 14 days with 79 movies. The exclusivity variables are operationalized in days, and the observations peak twice (one and two weeks) so a quadratic relationship cannot be inferred. According to management interviews, the distributor did not follow a systematic strategy in selecting movies for exclusive releases. The sample contains all movies by the distributor except four, for which digital home video releases followed the physical purchase release. Four cases are not sufficient to obtain reliable estimates. We focus on exclusive digital purchase strategies because the distributor obtains the highest contribution margin in this channel. Furthermore, we statistically control for the exclusive digital rental strategy but acknowledge the small number of movies released with this strategy in our sample impeding further substantive statements.

### Control variables

Table 2 gives an overview of the distribution, communication, price, product, and market controls with their operationalization. To capture the theater-to-home-video distribution window, we use the number of days between theatrical and home video release in the respective distribution channel. Theater-to-home-video windows vary between 105 and 379 days, with an average window of around 160 days (5.3 months). We control for supply and demand dynamics in the theatrical distribution (Eq. 1) with the number of screens allocated to a movie on the release weekend based on data from Mediabiz. Screen allocation per movie ranges from five screens to theatrical releases with up to 930 screens.

We measure the distributor's communication activities by including the total pre- and post-release advertising spending (EUR) during both theater distribution and home video release. The data, which were provided by Nielsen, vary from zero advertising to more than €1.6 million per movie. We also collect buzz-related measures from Twitter (total pre- and post-theater or home video release tweet volume per movie) and the eWOM valence (mean rating on a 10-point scale in which 10 is the best) from Moviepilot.

We include the mean price of DVDs and Blu-rays in the release week from GfK and rely on the mean price information of digital purchases in the release week provided to us by the cooperating movie distributor. Note that the observed price for digital rentals is without variance so we do not include it in the estimations.

Regarding product specifics, we operationalize actor and director power by the cumulative sales (based on VdF Verband der Filmverleiher) from prior movies within 24 months before the focal movie release. Using this approach, we include the three main actors and the director(s) of the focal movie. We also control for genre effects and age restrictions that we received from the distributor. Binary variables such as genres and age restrictions are dummy coded. Genres are not mutually exclusive and the reference group for age restrictions is no restriction.

We control for market dynamics in each distribution channel. We specifically measure competition using the number of new releases in the same week of the respective channel. In addition, we include the total market size, provided by GfK Germany, during the eight weeks after the channel-specific release to address seasonal demand. Continuous variable values entered the model in their natural logarithm with + 1 for handling zero values.

## Empirical analysis

### Estimation and results

We estimate the system of equations using maximum likelihood, specifically using the STATA CMP module with robust standard errors to address potential heteroskedasticity (Roodman, 2021). Table 3 displays the results across the four channels (see Table WA1 in the Web Appendix for details on the covariance matrix).

We observe a positive influence of exclusive digital purchase releases on demand in the exclusive channel (0.326, $p = 0.0002$), which indicates that consumers are aware of the limited access in only the exclusive distribution channel and are receptive to an exclusive digital offer. They react to this supply-side scarcity with a higher level of demand for the exclusive version—this effect is consistent with our conceptualization that exclusive digital offers have effective signaling properties to stimulate hedonic consumption (Berger & Ward, 2010). The exclusivity effect on the exclusive channel provides empirical support for consumers' preference to consume a movie in the first available distribution channel after theatrical release. Furthermore, the results are consistent with the concepts of consumer buzz (Houston et al., 2018) and shadow diffusion (Muller et al., 2009) across subsequent distribution channels.

Exclusive digital purchase releases positively affect the physical purchase channel, illustrated by a positive cross-channel demand spillover (0.128, $p = 0.0274$). Exclusive availability in the digital purchase channel increases visibility of the movie. Consequently, consumers may initiate or renew movie-specific buzz and a success-breeds-success cycle, which attracts more consumers to the physical purchase channel. This herd behavior dominates a potential sales cannibalization and is coherent with the notion that exclusive digital offers do not compete with the physical purchase version because they serve different consumer segments (Rao, 2015). The positive cross-channel demand spillover may be especially strong for new movies as these

**Table 2** Descriptive statistics

| | Variable | Operationalization | Mean/ rate | SD | Min | Max | Trans |
|---|---|---|---|---|---|---|---|
| Demand | $Sales_{THE}$ (theater) | Total admissions first eight weeks | 549,297 | 1,059,112 | 1,181 | 6,226,001 | ln |
| | $Sales_{PP}$ (digital purchase) | Total unit digital purchases first eight weeks | 6,313 | 13,188 | 8 | 88,883 | ln |
| | $Sales_{DR}$ (digital rental) | Total unit digital rentals first eight weeks | 64,854 | 82,543 | 131 | 388,695 | ln |
| | $Sales_{PP}$ (DVD and Blu-ray) | Total units DVD and Blu-ray first eight weeks | 170,942 | 329,727 | 1,093 | 2,380,236 | ln |
| Distribution | $Window_{DP}$ | Days between theatrical premiere and digital purchase release | 156 | 43 | 105 | 379 | ln |
| | $Window_{DR}$ | Days between theatrical premiere and digital rental release | 161 | 43 | 105 | 379 | ln |
| | $Window_{PP}$ | Days between theatrical premiere and physical purchase release | 163 | 43 | 119 | 379 | ln |
| | $Exclusive_{DP}$ (N = 133) | Days between digital purchase release and physical purchase release | 14 | 13 | 2 | 127 | ln |
| | $Exclusive_{DR}$ (N = 32) | Days between digital rental release and physical purchase release | 15 | 22 | 1 | 127 | ln |
| | Screens | Number of screens at release weekend | 280 | 223 | 5 | 930 | ln |
| Communi-cation | $Advertising_{THE}$ | Pre- and post-theater release advertising spending (EUR) | 68,156 | 182,783 | 0 | 1,630,586 | ln |
| | $Advertising_{HV}$ | Pre- and post-home video release advertising spending (EUR) | 12,422 | 45,547 | 0 | 321,550 | ln |
| | eWOM $volume_{THE}$ | Pre- and post-theater release tweet volume | 652 | 1,492 | 0 | 13,351 | ln |
| | eWOM $volume_{HV}$ | Pre- and post-home video release tweet volume | 258 | 619 | 0 | 4,773 | ln |
| | eWOM valence | Mean Moviepilot WOM rating (1–10 scale, 10 is best) | 6.05 | 1.07 | 0.00 | 8.20 | ln |

**Table 2** (continued)

| | Variable | Operationalization | Mean/ rate | SD | Min | Max | | Trans |
|---|---|---|---|---|---|---|---|---|
| Price | $Price_{DP}$ | Mean price digital purchase release week | 10.60 | 1.41 | 7.45 | 13.63 | | ln |
| | $Price_{DR}$ | Constant | 4.00 | 0 | 4.00 | 4.00 | | |
| | $Price_{PP}$ | Mean price DVD and Blu-ray release week | 10.48 | 1.39 | 7.32 | 16.66 | | ln |
| Product | PowerDirector | Total box office director two years before theater premiere (EUR) | 8,164,802 | 28,645,350 | 0 | | 267,481,372 | ln |
| | PowerActor | Total box office top three actors two years before theater premiere (EUR) | 88,648,062 | 217,129,225 | 0 | | 2,771,525,478 | ln |
| | MovieSequel | 1 = movie is sequel, 0 = no sequel | 12% | | 0 | | 1 | |
| | MovieBook | 1 = movie is book adaptation, 0 = other | 18% | | 0 | | 1 | |
| | GenreAction | 1 = genre action, 0 = other | 29% | | 0 | | 1 | |
| | GenreComedy | 1 = genre action, 0 = other | 33% | | 0 | | 1 | |
| Product | GenreDocu | 1 = genre action, 0 = other | 2% | | 0 | | 1 | |
| | GenreDrama | 1 = genre action, 0 = other | 93% | | 0 | | 1 | |
| | GenreHorror | 1 = genre action, 0 = other | 4% | | 0 | | 1 | |
| | GenreKids | 1 = genre action, 0 = other | 6% | | 0 | | 1 | |
| | Age06 | 1 = Age restriction in Germany FSK6, 0 = other | 20% | | 0 | | 1 | |
| | Age12 | 1 = Age restriction in Germany FSK12, 0 = other | 47% | | 0 | | 1 | |
| | Age16 | 1 = Age restriction in Germany FSK16, 0 = other | 16% | | 0 | | 1 | |
| | Age18 | 1 = Age restriction in Germany FSK18, 0 = other | 2% | | 0 | | 1 | |
| | PhyBR | Share Blu-ray in physical purchase | 27% | | 0% | | 63% | |

**Table 2** (continued)

| | Variable | Operationalization | Mean/ rate | SD | Min | Max | Trans |
|---|---|---|---|---|---|---|---|
| Market | $MarketReleases_{THE}$ | Count competitive theater releases in theater premiere week | 9.26 | 2.34 | 4 | 17 | ln |
| | $MarketReleases_{DP}$ | Count competitive home video releases in digital purchase release week | 8.36 | 4.28 | 1 | 21 | ln |
| | $MarketReleases_{DR}$ | Count competitive home video releases in digital rental release week | 9.73 | 4.34 | 1 | 21 | ln |
| | $MarketReleases_{PP}$ | Count competitive home video releases in physical purchase release week | 9.90 | 4.35 | 1 | 21 | ln |
| | $MarketVolume_{THE}$ | Total market box office first eight weeks | 49,177,194 | 11,493,437 | 23,289,346 | 88,001,849 | ln, dt |
| | $MarketVolume_{DP}$* | Total market digital purchase sales value first eight weeks digital purchase release | 1,505,226 | 1,501,172 | 0 | 4,738,303 | ln, dt |
| | $MarketVolume_{DR}$* | Total market digital rental sales value first eight weeks digital rental release | 2,515,785 | 2,769,548 | 0 | 8,196,308 | ln, dt |
| | $MarketVolume_{PP}$ | Total market physical purchase sales value first eight weeks physical purchase release | 14,898,802 | 4,032,606 | 8,860,001 | 28,130,747 | ln, dt |
| | $MarketVolumeAug_{DP}$ | 1 = digital purchase release before 2011, 0 = digital purchase release after 2011 | 10% | | 0 | 1 | |
| | $MarketVolumeAug_{DR}$ | 1 = digital rental release before 2011, 0 = digital rental release after 2011 | 10% | | 0 | 1 | |

HV (home video) is relevant for digital purchase, digital rental, and physical purchase. ln denotes transformation to natural logarithm for statistical analysis; dt denotes removal of linear trend to reduce multicollinearity with linear trends in the model

*As we lack market volume for the digital channels before 2011, we extrapolate the available data backwards with a linear trend and dummies for calendar weeks. Two additional variables indicate the observations for which these market data are extrapolated (last two lines)

**Table 3** Estimation results on the influence of exclusive digital offers

| | Theater | Digital | | Physical |
|---|---|---|---|---|
| | | Purchase | Rental | Purchase |
| Distribution | | | | |
| $Window_f$ | | -1.601*** | -1.529*** | -.791*** |
| | | (.285) | (.254) | (.193) |
| $Exclusive_{DP}$ | | .326*** | .031 | .128** |
| | | (.089) | (.074) | (.058) |
| $Exclusive_{DR}$ | | -.254*** | -.042 | -.030 |
| | | (.069) | (.063) | (.055) |
| Screens | 1.524*** | | | |
| | (.096) | | | |
| Communication | | | | |
| Admissions | | .640*** | .625*** | .580*** |
| | | (.060) | (.050) | (.044) |
| $Advertising_f$ | .022* | .022* | .014 | .034*** |
| | (.013) | (.012) | (.010) | (.009) |
| eWOM $volume_f$ | .039* | .040 | .018 | .025 |
| | (.023) | (.029) | (.024) | (.021) |
| eWOM valence | 1.328*** | .681** | .606** | -.050 |
| | (.347) | (.280) | (.275) | (.210) |
| Price | | | | |
| $Price_f$ | | -1.610*** | | -1.489*** |
| | | (.328) | | (.392) |
| Product | | | | |
| PowerDirector | .024*** | -.003 | -.004 | .009* |
| | (.007) | (.008) | (.008) | (.005) |
| PowerActor | -.011 | .027* | .031** | .030** |
| | (.014) | (.016) | (.012) | (.012) |
| MovieSequel | .466*** | .157 | -.070 | .268** |
| | (.114) | (.140) | (.126) | (.111) |
| MovieBook | .035 | .136 | -.250* | .226** |
| | (.138) | (.154) | (.140) | (.098) |
| Product | | | | |
| GenreAction | -.235 | .372* | .459*** | .190 |
| | (.171) | (.200) | (.172) | (.127) |
| GenreComedy | -.157 | .075 | .303* | -.039 |
| | (.159) | (.165) | (.156) | (.109) |
| GenreDocu | .558 | 1.347*** | .340 | .553* |
| | (.707) | (.356) | (.423) | (.321) |
| GenreDrama | -.376* | -.418* | -.076 | -.019 |
| | (.203) | (.217) | (.239) | (.142) |
| GenreHorror | .605** | -.113 | -.014 | -.205 |
| | (.239) | (.314) | (.244) | (.220) |
| GenreKids | -.693*** | .196 | -.096 | .249 |
| | (.233) | (.291) | (.247) | (.229) |
| Age06 | -.334* | .180 | .118 | .076 |
| | (.190) | (.206) | (.198) | (.139) |
| Age12 | -.081 | .239 | .390* | -.023 |
| | (.188) | (.214) | (.202) | (.133) |
| Age16 | -.131 | .161 | .575** | -.098 |
| | (.242) | (.296) | (.244) | (.181) |
| Age18 | -.753** | .486* | .731*** | .171 |
| | (.324) | (.289) | (.272) | (.264) |
| PhyBR | | | | 2.550*** |
| | | | | (.377) |
| Market | | | | |

**Table 3** (continued)

| | Theater | Digital | | Physical |
|---|---|---|---|---|
| | | Purchase | Rental | Purchase |
| $Trend_f$ | -.108***<br>(.030) | .173***<br>(.054) | .105**<br>(.045) | -.145***<br>(.036) |
| $MarketReleases_f$ | -.384<br>(.236) | -.019<br>(.069) | -.066<br>(.079) | -.095<br>(.065) |
| $MarketVolume_f$ | .278<br>(.233) | .007<br>(.030) | .015<br>(.034) | .028<br>(.155) |
| $MarketVolumeAug_f$ | | -.154<br>(.165) | -.381***<br>(.137) | |
| Constant | 2.832**<br>(1.121) | 8.800***<br>(2.385) | 8.038***<br>(1.798) | 10.851***<br>(1.331) |

* $p < .10$, ** $p < .05$, *** $p < .01$. Standard errors are in parentheses

The multiplicative model is estimated using maximum likelihood

movies have the highest buzz and potential for social positioning, which might explain why Hashim et al. (2019) report no significant cross-channel demand spillover for older movies.

We find a small positive but statistically non-significant effect of exclusive digital purchase releases on the digital rental channel (0.031, $p = 0.6703$), indicating that such releases do not substantially affect digital rentals. Management interviews with the cooperating distributor indicate that digital purchase and rental versions share similar distribution costs; however, switching from the digital rental to purchase versions increases profit as a higher price for the digital purchase leads to a higher margin than with a rental. Restricting channel availability can thus increase overall profit despite no change in rental demand, providing empirical market-based evidence for the exclusive effect found in prior literature (Burmester et al., 2016; Hennig-Thurau et al., 2007). We address this issue in detail in the what-if scenario analysis below. Releasing both digital purchase and rental home videos at the same time cancels out the exclusivity effect of the earlier digital purchase release. We refrain from further interpretations of the coefficient for exclusive digital rental because of the small sample size.

Regarding the control variables, we find the effects in line with prior research. In general, we find negative elasticities of the windowing strategy on subsequent channels after theater release. The elasticities of the theater-to-home-video release window are between –1.601 and –1.529 for the digital home video channels and –0.791 for the physical purchase channel. Physical copies may provide longer-lasting benefits, such as allowing for multiple consumption or reselling in the aftermarket, which may somewhat explain the lower value. In contrast to McKenzie et al. (2019), who find almost no responsiveness to delay for subscription-based streaming services, the high effect sizes in our study highlight the importance of timing strategies for digital channels. Note that creating exclusivity by releasing the digital purchase channel earlier also entails shortening the theater-to-digital-purchase window.

Theatrical admissions are highly intertwined with the number of screens (Elberse & Eliashberg, 2003). Success at the box office has strong positive cross-channel demand spillover effects on all three subsequent channels with elasticities ranging from 0.580 (physical purchase) to 0.640 (digital purchase). The advertising elasticities are generally small, with values between 0.014 and 0.034, and are consistent with previous findings from the German market (Clement et al., 2014). We find that eWOM valence has the strongest link to theatrical admissions for which consumers are also most uncertain regarding quality. In the home video channels, eWOM valence is only associated with success in the digital channels.

Regarding digital and physical purchases, for which the channels have variations in price, price elasticities are approximately –1.5. Director power seems to play a larger role for theatrical success, whereas actor power plays a larger role in the home video channels.

Regarding sequels, we find a multiplier of 0.466 in the theater and 0.268 in the physical purchase offer but no significant effects for the digital home video channels. Thus, it seems that sequels serve as collector items for consumers of physical movie products. We also find that book adaptations only attract more purchases in the physical market (multiplier: 0.226).

The action genre is associated with more digital rentals (multiplier: 0.459), indicating single consumption motives. Documentaries have a strong positive association with digital purchases (multiplier: 1.347). Children's movies did not fare as well as other genres in theaters (multiplier: –0.693). Finally, higher age restrictions are associated with additional digital rentals.

Linear trend variables (coded as years) indicate growing digital markets (0.173 digital purchase, 0.105 digital rental) and shrinking theatrical (–0.108) and physical purchase (–0.145) markets. Competitive releases and overall market

volume show the expected signs but are not statistically significant. The only exception is the indicator for the oldest movies; the market volume for digital rentals is not available for this so we extrapolated it backwards.

## Model robustness and validation

**Endogeneity** Empirical studies analyzing market data are prone to endogeneity concerns (Ebbes et al., 2011). In the context of our study, management may have strategically self-selected the movies to consider for exclusive offers and decided on the duration of their exclusive availability, based on management beliefs rooted in work experience. We do not have information on these issues nor on how they affected the success of movies, but Hofmann-Stölting et al. (2017) show that statistical models based on observable variables outperform management predictions. In our sample of movies, management consideration of exclusivity is likely to be noisy as exclusivity is a novel phenomenon without historical precedent. In our analysis, the explanatory variables lead to an adjusted R-square of 75% and higher, indicating the large share of explained variance in the model. Thus, the inclusion of a broad range of covariates proposed in extant research reduces the likelihood of endogeneity biases (Rossi, 2014). We also test a potential self-selection endogeneity bias following the procedures described in Clougherty et al. (2016) based on ideas by Heckman (1976, 1979). We estimated a selection equation to explain the classification of movies as exclusive or non-exclusive with the available covariates using a probit model. We include the additional selection equation to our system of equations and simultaneously estimate the complete system using the full information maximum likelihood (FIML) estimator. In the selection equation, all distribution, communication (except advertising), price, and product-specific indicators remain non-significant, which indicates that the selection of movies for exclusivity strategies follows no systematic strategy. In the main equations, the results indicate that the exclusivity effect slightly increases in magnitude when controlling for self-selection of exclusive movies (Table WA3 in the Web Appendix). However, this simultaneous estimation approach is sensitive to collinearity between the independent variables of the selection and main equations. We follow Puhani (2000) and Clougherty et al. (2016) to address the collinearity concern and re-estimate the model using the two-step approach, also referred to as limited information maximum likelihood (LIML). We first estimate the selection equation with exclusivity (yes/no) as a dependent variable using a probit regression and calculate the inverse Mills ratio. We then include the inverse Mills ratio in each of the main home video equations of our system of equations and use bootstrapped standard errors. The inverse Mills ratio, which indicates potential selection of exclusive movies, is not significant and the exclusivity effect remains robust (Table WA4 in the Web Appendix). Overall, our robustness checks show that our results are not substantially influenced by endogeneity issues as all relevant and feasible approaches share the same key results.

Furthermore, management may have strategically decided on the release window length between theatrical exhibition and home video channels. We estimated a model that includes a dedicated equation for the window length instrumented with whether the movie received government subsidies (Table WA2 in the Web Appendix). Government subsidies unlikely directly influence consumer demand but are subject to minimum release windows. Controlling for potential endogeneity increases the impact of the theater-to-home video window on sales but the implications from the exclusive offers remain unchanged.

**Other issues** Two movies with extremely long exclusive digital purchase periods were released. We run a model excluding these two movies (see Table WA5 in the Web Appendix) and find that the two observations do not change the implications. We use cross-validation to compare out-of-sample predictions of the full model with alternative specifications, removing various predictors to detect potential overfitting (see Table WA6 in the Web Appendix for details). The full model has the highest out-of-sample prediction accuracy (measured by the mean absolute prediction error), thereby alleviating overfitting concerns.

Distributors typically introduce the product versions accompanied by advertising campaigns, which further stimulate demand in the distribution channels (Bruce et al., 2012) and potentially moderate the effect of exclusivity.[3] However, information flows in the success-breeds-success spiral are multidimensional and emerges (per our specification) in the form of theater admissions, advertising, eWOM, and as the correlated error terms. Valid tests for further interdependencies would require the introduction of multiple and higher order interaction terms. This is not feasible with the available data due to multicollinearity and insufficient degrees of freedom. Therefore, we leave this open for future research.

## What-if scenarios

We use a scenario analysis to facilitate the interpretation of the exclusivity effects and derive profit implications when exclusive digital offers are implemented into the release schedule. Table 4 shows the assumptions used to calculate profits. We illustrate the performance of exclusive digital offers relative to the current industry practice with the traditional simultaneous home video release in all three home video channels five months ($5 \times 30$ days $= 150$ days) after the theater release as the baseline. This implies that all home video versions have a uniform theater-to-home-video

[3] We thank one of the reviewers for raising this issue.

**Table 4** Scenario input

| | | Digital purchase | Digital rental | Physical purchase |
|---|---|---|---|---|
| Estimates | *Window* | -1.601 | -1.529 | -.791 |
| | $Exclusive_{DP}$ | .326 | .031 | .128 |
| Business model | *Price* | 10.60 | 4.00 | 10.45 |
| | *Unit cost* | 2.00 | 1.00 | 6.00 |
| | *German market (median sales)* | 1,412 | 28,098 | 59,743 |
| | *US market share (%)* | 24.34 | 49.00 | 45.26 |

window. Furthermore, we consider variations in exclusive digital purchase periods ($Exclusive_{DP}$) and theater-to-home-video windows ($Window_f$) and simulate overall profit contribution changes relative to the baseline. These changes in profit contribution are reported in Table 5.

We rely on the multiplicative specification of the response function to simulate the profit contributions. In this specification, changes to the baseline are given for the variables $\text{Exclusive}_{\text{DP}}$ and $\text{Window}_{\text{f}}$. To calculate the change, we take the ratio of the scenario values to their baseline values[4] and raise it, according to the multiplicative model, to the power of the respective elasticities estimated in the main model ($\widehat{\beta}_{f,1}$ and $\widehat{\beta}_{f,4}$). We then extrapolate these simulated demand effects for the channel $f$ to profit contributions by multiplying the change effects with their specific contribution margins $m_f$, defined by $Price_f - Unitcost_f$, and the national movie market $c$ specific channel shares $s_{cf}$ (i.e., either median sales from our sample or US market shares). The total profit contribution $P_c$ in the national movie market $c$ is the sum of the profit contributions from each distribution channel $f$ in market $c$. The complete specification is displayed in Eq. 9.

$$P_c = \sum_{f \in \{PP,DP,DR\}} m_f \cdot s_{cf} \cdot \left( \frac{ScenarioExclusive_{DP}}{BaselineExclusive_{DP}} \right)^{\widehat{\beta}_{f,1}} \cdot \left( \frac{ScenarioWindow_f}{BaselineWindow_f} \right)^{\widehat{\beta}_{f,4}} \tag{9}$$

## Exclusive digital offers with "stable window" and "window reduction"

We investigate digital home video exclusivity performance with different exclusive periods for the digital purchase offers by varying the period between 7 and 14 days ($Exclusive_{DP}$). Empirically, these are the most common values in our sample. Then we consider two strategic approaches, namely *stable window* (Table 5, rows 7 and 8) and *window reduction* (Table 5, rows 1, 2, 5, and 6), for how theater-to-home-video windows for the different versions ($Window_f$) can be changed to establish periods of exclusive digital availability ($Exclusive_{DP}$) in the release schedule. The *stable-window* strategy keeps the release of the exclusive channel on the original five-month home video release date while increasing the theater-to-home-video window for the non-exclusive versions (Table 5, rows 7 and 8). This strategy circumvents potential channel conflicts with movie exhibitors but postpones at least one home video version. In contrast, the *window-reduction* strategy refers to a shorter theater-to-home video window for the exclusive distribution channel and leaves the release windows of other versions unchanged (Table 5, rows 5 and 6). This strategy provides more timely consumption of the exclusive digital version but decreases the minimum window compared to the traditional simultaneous home video release. The results in Table 5 indicate that exclusive digital purchase offers increase profits by 28% (+€100,351) when combined with a window-reduction strategy in a 7-day exclusive scenario and 39% (+€139,689) in a 14-day exclusive scenario in comparison to the simultaneous release (€362,294).

## Digital home video exclusivity versus theatrical exclusivity performance

Perishability of content (Lehmann & Weinberg, 2000) and buzz wear-out (Houston et al., 2018) suggest that earlier releases in subsequent home video channels increase demand. We again consider the traditional simultaneous home video release in all three home video channels on the same day, but with a reduction in the theater-to-home-video window to benchmark digital home video exclusivity with theatrical exclusivity performance. In the "reduction of theatrical exclusivity" setting, all home video channels are released earlier by either seven or 14 days (Table 5, rows 1 and 2). By contrast, in the "increase of theatrical exclusivity" setting, all home video releases are postponed by either seven or 14 days (Table 5, rows 3 and 4). As Table 5 shows, exclusive digital purchase strategies are even more profitable than shortening the release windows for all home video channels. That is, postponing the release of the non-digital purchase channels by seven days is more promising (with a

[4] In parallel with our estimation procedure, we add + 1 to each of the exclusive digital purchase periods and the theater-to-home-video windows. Therefore, $\text{BaselineExclusive}_{\text{DP}}$ is equal to 0 + 1 = 1 and consequently drops out of the equation.

**Table 5** Scenario results: changes in profit contribution based on theatrical exclusivity versus home video exclusivity

| Scenario | Exclusivity for Digital Purchase [days] ($Exclusive_{DP}$) | Theater-to-… Window [days] | | Change in profit compared to baseline ($\Delta P_c$) | |
|---|---|---|---|---|---|
| | | Digital Purchase ($Window_{DP}$) | Digital Rental & Physical Purchase ($Window_{DR}$ & $Window_{PP}$) | Dominantly physical distribution German movie market, sample medians | Shift towards digital distribution U.S. movie market, channel shares |
| | *0* | *5 months ×30 days =150 days* | *5 months ×30 days =150 days* | *baseline* | *baseline* |
| 1 | 0 | 150 – **7** | 150 – **7** | +5% | +6% |
| 2 | 0 | 150 – **14** | 150 – **14** | +10% | +13% |
| 3 | 0 | 150 + **7** | 150 + **7** | – 4% | – 6% |
| 4 | 0 | 150 + **14** | 150 + **14** | – 8% | – 11% |
| 5 | 7 | 150 – **7** | 150 | +28% | +55% |
| 6 | 14 | 150 – **14** | 150 | +39% | +86% |
| 7 | 7 | 150 | 150 + **7** | +22% | +46% |
| 8 | 14 | 150 | 150 + **14** | +27% | +63% |

Change in profit = (scenario profit – baseline profit) / baseline profit. US market shares are derived from market sizes (in USD) according to the Digital Entertainment Group (2020) divided by the assumed channel prices

22% profit contribution increase compared to the baseline scenario) than releasing all home video channels two weeks earlier (with an increase of 10% compared to the baseline scenario). This result indicates that a 7- or 14-day change in theatrical exclusivity delivers less utility to consumers than a change in home video exclusivity.

### Shift to digital distribution

Finally, we consider the shift of movie consumption to digital channels by turning to the US market, where digital channels have larger market shares in comparison to our sample. We use data reported by the Digital Entertainment Group (2020) with channel shares $s_{cf}$ of 21% for digital purchase, 41% for digital rental, and 38% for physical purchase. Using these shares, we re-calculate profit contributions for the different strategic options (Table 5, last column). As Table 5 shows, shifting distribution to digital channels enhances performance of the exclusive digital purchase offers, which indicates that home video exclusivity might become more relevant for movie distributors.

## Implications and limitations

Digital channels give content rights holders more fine-grained control over the distribution process of versioned products than traditional physical channels. However, the interdependences of demand between digital and physical channels have been under-researched. For exclusive offers, research is not conclusive on whether movie distributors can expect a mere shift to the exclusive channel, a loss in net sales due to frustrated or lost consumers, or an increase in sales due to heightened awareness. Moreover, prior studies leave the case of exclusive digital offers unanswered. In this research, we empirically investigated sequential release strategies with a focus on exclusive digital offers. We relied on a quasi-field experiment conducted by a major movie distributor and had access to a wide array of control variables. This unique setting allowed us to base our study on actual market data reflecting demand effects resulting from different windowing and exclusivity decisions.

The estimation results showed that home video sales directly benefit from exclusive digital offers in the exclusive channel. We observed no sales cannibalization of the digital rental and physical purchase channels; instead, the empirical data suggested a positive cross-channel demand spillover from the exclusive digital purchase channel to the physical channel. A scenario analysis illustrated that an exclusive digital purchase offer outperforms the profits of a simultaneous release to all home video channels earlier in a non-exclusive way.

Sequential release patterns are a contentious issue among channel participants (Hennig-Thurau et al., 2007). Given the current industry structure, conflict is particularly pronounced between independent theater operators, who desire long exclusivity to protect their business, and the mostly studio-controlled distributors, who are pushing for shorter release windows to maximize the overall profitability of a movie. Our analysis of movies cannot quantify the potential sales cannibalization of theater admissions because consumers are not aware of movie-specific release schedules. However, our

findings indicate an opportunity to circumvent this channel conflict by implementing exclusive release strategies. McKenzie et al. (2019) note that consumers expect older catalog titles in subscription-based streaming services, whereas we show that demand in digital home video channels is highly responsive to timely availability. Furthermore, the attractiveness of exclusivity in combination with positive cross-channel demand spillover to other channels even results in scenarios in which postponing the digital rental and physical channels from a simultaneous release is more profitable than reducing the overall release window for all home video channels. We expect the highest increase in profits when combining a reduction in theatrical exclusivity with home video exclusivity. Therefore, managers should clearly implement exclusive digital purchase strategies. We varied the releases by increments of one or two weeks in our scenario analysis as this was the most common variation in the data. These increments are also realistic schedule adaptations from a management standpoint, particularly because the fine-grained control of the digital availability makes these adaptations feasible. Note that we controlled for seasonal and competitive influences in the empirical analysis but specific release recommendations should take these factors into account (Einav, 2007).

We observe exclusivity strategies from one major movie distributor in the German movie market. However, we are confident that our findings are generalizable towards other distributors and markets. First, major movie distributors have similar resources and conditions in most other international movie markets as the globalized product "movie" is similar across the most important geographic markets. Second, Germany is one of the largest motion picture markets in the world and has been examined in prior research (e.g., Clement et al., 2014; Elberse & Eliashberg, 2003; Hennig-Thurau et al., 2007). Third, our model formulation is flexible to other types of distributors (e.g., independent distributors). Fourth, our findings should also be of interest to other industries with sequential release patterns for different product versions. For example, media and entertainment products such as books are also exclusively distributed as different versions (e.g., hardcover followed by paperback). Managers may consider implementing a sequential distribution schedule for their product releases if products' versions serve heterogeneous preference for time and mode of consumption. In this case, which is often observed in the entertainment industry, consumers' awareness of the exclusive offer is important so that consumers react on the exclusivity signal with an increase in demand for the exclusive channel. Sequential release schedules with exclusive offers which induce success-breeds-success phenomena and WOM, as well as multiple consumption, can even stimulate demand in other distribution channels (spillover effect). Finally, our results are based on digital products sharing similar characteristics and market dynamics with software products and services.

Our study has two main limitations. First, although we collaborated with a major movie distributor that made all its data available to us, the sample size remains limited given the nature of this industry which releases roughly 600 movies per year in the United States alone (Box Office Mojo, 2021). This translates into limitations on the ability to test for complex communication diffusion patterns to explain the process resulting from the exclusivity effect. We suggest that future research explores the communication processes and channel interrelationships between digital and physical channels for other experience goods. Second, we did not consider the impact of exclusivity strategies on illegal consumption (Eisend, 2019; Ma et al., 2014). From content focused on catalog titles and series to extensive feature film productions, large subscription-based streaming services have been evolving within the motion picture industry. This entails novel release schedules as some movies no longer premiere in theaters. Against this background, future research could investigate channel relationships of subscription-based streaming services (e.g., Netflix). We hope that our new empirical insights help managers and researchers better understand the mechanisms of digital exclusivity in a sequential distribution system.

**Supplementary Information** The online version contains supplementary material available at https://doi.org/10.1007/s11747-022-00897-0.

**Funding** Open Access funding enabled and organized by Projekt DEAL.

## Declarations

**Conflict of interest** The authors declare that they have no conflict of interest.



## References

Ahmed, S., & Sinha, A. (2016). When it pays to wait: Optimizing release timing decisions for secondary channels in the film industry. *Journal of Marketing, 80*(4), 20–38.

Albers, S. (2012). Optimizable and implementable aggregate response modeling for marketing decision support. *International Journal of Research in Marketing, 29*(2), 111–122.

Atasoy, O., & Morewedge, C. K. (2018). Digital goods are valued less than physical goods. *Journal of Consumer Research, 44*(6), 1343–1357.
August, T., Dao, D., & Shin, H. (2015). Optimal timing of sequential distribution: The impact of congestion externalities and day-and-date strategies. *Marketing Science, 34*(5), 755–774.
Babić Rosario, A., de Valck, K., & Sotgiu, F. (2020). Conceptualizing the electronic word-of-mouth process: What we know and need to know about eWOM creation, exposure, and evaluation. *Journal of the Academy of Marketing Science, 48*(3), 422–448.
Basuroy, S., Chatterjee, S., & Ravid, S. A. (2003). How critical are critical reviews? The box office effects of film critics, star power, and budgets. *Journal of Marketing, 67*(4), 103–117.
Berger, J. A., & Ward, M. (2010). Subtle signals of inconspicuous consumption. *Journal of Consumer Research, 37*(4), 555–569.
Box Office Mojo. (2021). Number of movies released in the United States and Canada from 2000 to 2020. https://www.statista.com/statistics/187122/movie-releases-in-north-america-since-2001/
Bruce, N. I., Foutz, N. Z., & Kolsarici, C. (2012). Dynamic effectiveness of advertising and word of mouth in sequential distribution of new products. *Journal of Marketing Research, 49*(4), 469–486.
Burmester, A. B., Eggers, F., Clement, M., & Prostka, T. (2016). Accepting or fighting unlicensed usage: Can firms reduce unlicensed usage by optimizing their timing and pricing strategies? *International Journal of Research in Marketing, 33*(2), 343–356.
Carrillat, F. A., Legoux, R., & Hadida, A. L. (2018). Debates and assumptions about motion picture performance: A meta-analysis. *Journal of the Academy of Marketing Science, 46*(2), 273–299.
Chiang, I. R., & Jhang-Li, J.-H. (2020). Competition through exclusivity in digital content distribution. *Production and Operations Management, 29*(5), 1270–1286.
Chiou, L. (2008). The timing of movie releases: Evidence from the home video industry. *International Journal of Industrial Organization, 26*(5), 1059–1073.
Clement, M., Wu, S., & Fischer, M. (2014). Empirical generalizations of demand and supply dynamics for movies. *International Journal of Research in Marketing, 31*(2), 207–223.
Clougherty, J. A., Duso, T., & Muck, J. (2016). Correcting for self-selection based endogeneity in management research: Review, recommendations and simulations. *Organizational Research Methods, 19*(2), 286–347.
Danaher, B., Dhanasobhon, S., Smith, M. D., & Telang, R. (2010). Converting pirates without cannibalizing purchasers: The impact of digital distribution on physical sales and internet piracy. *Marketing Science, 29*(6), 1138–1151.
De Matos, C. A., & Rossi, C. A. V. (2008). Word-of-mouth communications in marketing: A meta-analytic review of the antecedents and moderators. *Journal of the Academy of Marketing Science, 36*(4), 578–596.
Desai, K. K., & Basuroy, S. (2005). Interactive influence of genre familiarity, star power, and critics' reviews in the cultural goods industry: The case of motion pictures. *Psychology & Marketing, 22*(3), 203–223.
Digital Entertainment Group. (2020). DEG Year-end 2019 digital media entertainment report. https://www.degonline.org/portfolio_page/deg-ye-2019-home-entertainment-report-2/
Ebbes, P., Papies, D., & van Heerde, H. J. (2011). The sense and nonsense of holdout sample validation in the presence of endogeneity. *Marketing Science, 30*(6), 1115–1122.
Van Eeden, E., & Chow, W. (2018). *Perspectives from the global entertainment & media outlook 2018–2022*. PwC.
Einav, L. (2007). Seasonality in the U.S. motion picture industry. *RAND Journal of Economics, 38*(1), 127–145.
Eisend, M. (2019). Explaining digital piracy: A meta-analysis. *Information Systems Research, 30*(2), 636–664.
Elberse, A., & Anand, B. (2007). The effectiveness of pre-release advertising for motion pictures: An empirical investigation using a simulated market. *Information Economics and Policy, 19*(3/4), 319–343.
Elberse, A., & Eliashberg, J. (2003). Demand and supply dynamics for sequentially released products in international markets: The case of motion pictures. *Marketing Science, 22*(3), 329–354.
Gielens, K., Gijsbrechts, E., & Dekimpe, M. G. (2014). Gains and losses of exclusivity in grocery retailing. *International Journal of Research in Marketing, 31*(3), 239–252.
Gong, J., Smith, M. D., & Telang, R. (2015). Substitution or promotion? The impact of price discounts on cross-channel sales of digital movies. *Journal of Retailing, 91*(2), 343–357.
Hamilton, R., Thompson, D., Bone, S., Chaplin, L. N., Griskevicius, V., Goldsmith, K., … & Zhu, M. (2019). The effects of scarcity on consumer decision journeys. *Journal of the Academy of Marketing Science, 47*(3), 532–550.
Hashim, M. J., Ram, S., & Tang, Z. (2019). Uncovering the effects of digital movie format availability on physical movie sales. *Decision Support Systems, 117*, 75–86.
Heckman, J. J. (1976). The common structure of statistical models of truncation, sample selection and limited dependent variables and a simple estimator for such models. *Annals of Economic Social Measurement, 5*, 475–492.
Heckman, J. J. (1979). Sample selection bias as a specification error. *Econometrica, 47*(1), 53–161.
Hennig-Thurau, T., & Houston, M. B. (2019). *Entertainment science*. Springer.
Hennig-Thurau, T., Henning, V., Sattler, H., Eggers, F., & Houston, M. B. (2007). The last picture show? Timing and order of movie distribution channels. *Journal of Marketing, 71*(4), 63–83.
Hennig-Thurau, T., Houston, M. B., & Heitjans, T. (2009). Conceptualizing and measuring the monetary value of brand extensions: The case of motion pictures. *Journal of Marketing, 73*(6), 167–183.
Hennig-Thurau, T., Wiertz, C., & Feldhaus, F. (2015). Does Twitter matter? The impact of microblogging word of mouth on consumers' adoption of new movies. *Journal of the Academy of Marketing Science, 43*(3), 375–394.
Hofmann, J., Clement, M., Völckner, M., & Hennig-Thurau, T. (2017). Empirical generalizations on the impact of stars on the economic success of movies. *International Journal of Research in Marketing, 34*(2), 442–461.
Hofmann-Stölting, C., Clement, M., Wu, S., & Albers, S. (2017). Sales forecasting of new entertainment media products. *Journal of Media Economics, 30*(3), 143–171.
Houston, M. B., Kupfer, A.-K., Hennig-Thurau, T., & Spann, M. (2018). Pre-release consumer buzz. *Journal of the Academy of Marketing Science, 46*(2), 338–360.
Iyer, G. R., Blut, M., Xiao, S. H., & Grewal, D. (2020). Impulse buying: A meta-analytic review. *Journal of the Academy of Marketing Science, 48*(3), 384–404.
Jedidi, K., Krider, R., & Weinberg, C. (1998). Clustering at the movies. *Marketing Letters, 9*(4), 393–405.
Joshi, A., & Mao, H. (2012). Adapting to succeed? Leveraging the brand equity of best sellers to succeed at the box office. *Journal of the Academy of Marketing Science, 40*(4), 558–571.
Lamberton, C., & Goldsmith, K. (2020). Ownership: A perennial prize or a fading goal? A curation, framework, and agenda for future research. *Journal of Consumer Research, 47*(2), 301–309.
Lehmann, D. R., & Weinberg, C. B. (2000). Sales through sequential distribution channels: An application to movies and videos. *Journal of Marketing, 64*(3), 18–33.
Lim, J., & Li, T. (2018). The optimal advertising-allocation rules for sequentially released products: The case of the motion picture industry. *Journal of Advertising Research, 58*(2), 228–239.
Liu, Y. (2006). Word of mouth for movies: Its dynamics and impact on box office revenue. *Journal of Marketing, 70*(3), 74–89.
Luan, Y. J., & Sudhir, K. (2010). Forecasting marketing-mix responsiveness for new products. *Journal of Marketing Research, 47*(3), 444–457.

Ma, L., Montgomery, A. L., Singh, P. V., & Smith, M. D. (2014). An empirical analysis of the impact of pre-release movie piracy on box office revenue. *Information Systems Research, 25*(3), 590–603.

McKenzie, J., Crosby, P., Cox, J., & Collins, A. (2019). Experimental evidence on demand for "on-demand" entertainment. *Journal of Economic Behavior & Organization, 161*, 98–113.

Milkman, K. L., Rogers, T., & Bazerman, M. H. (2009). Highbrow films gather dust: Time-inconsistent preferences and online DVD rentals. *Management Science, 55*(6), 1047–1059.

Mukherjee, A., & Kadiyali, V. (2011). Modeling multichannel home video demand in the U.S. motion picture industry. *Journal of Marketing Research, 48*(6), 985–995.

Mukherjee, A., & Kadiyali, V. (2018). The competitive dynamics of new DVD releases. *Management Science, 64*(8), 3536–3553.

Muller, E., Peres, R., & Mahajan, V. (2009). *Innovation diffusion and new product growth*. Marketing Science Institute.

Prasad, A., Bronnenberg, B., & Mahajan, V. (2004). Product entry timing in dual distribution channels: The case of the movie industry. *Review of Marketing Science, 2*, 83–102.

Puhani, P. (2000). The heckman correction for sample selection and its critique. *Journal of Economic Surveys, 14*(1), 53–68.

Rao, A. (2015). Online content pricing: Purchase and rental markets. *Marketing Science, 34*(3), 430–451.

Roodman, D. (2021). *CMP: Stata module to implement conditional (recursive) mixed process estimator.* Statistical Software Components S456882, Boston College Department of Economics.

Rossi, P. E. (2014). Invited paper: Even the rich can make themselves poor: A critical examination of IV methods in marketing applications. *Marketing Science, 33*(5), 655–672.

Sawhney, M. S., & Eliashberg, J. (1996). A parsimonious model for forecasting gross box-office revenues of motion pictures. *Marketing Science, 15*(2), 113–203.

Yang, Y.-C., Ying, H., Jin, Y., & Xu, X. (2021). To port or not to port? Availability of exclusivity in the digital service market. *Decision Support Systems, 148*, 113598.

Yu, Y., Chen, H., Peng, C.-H., & Chau, P. Y. K. (2021). The causal effect of subscription video streaming on DVD sales: Evidence from a natural experiment. *Decision Support Systems, 157*, 113767.