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The Rise of the Subscription Model in the Video Game Console Industry:

Unveiling the Commercial Consequences for Platform Owners and Video Game Sellers

Michiel Van Crombrugge*

Stefan Stremersch**

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* Corresponding author. Associate Professor of Marketing, Erasmus School of Economics, Erasmus University Rotterdam. Burgemeester Oudlaan 50, 3062 PA Rotterdam, The Netherlands. Email: vancrombrugge@ese.eur.nl

** Chaired Professor of Marketing, Erasmus School of Economics, Erasmus University Rotterdam. Burgemeester Oudlaan 50, 3062 PA Rotterdam, The Netherlands. Email: stefan.stremersch@mti2.eu

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ABSTRACT

Prior research in the video game console industry empirically examined the interdependence of hardware (i.e., console) sales, software (i.e., video game) sales and software supply. Recently, we have witnessed the rise of the subscription model (such as Microsoft's Xbox Game Pass and Sony's PlayStation Plus) as a new business model among platform owners. The impact of this new business model on platform owner revenues, video game seller revenues, and video game supply are unknown to date. Does this new model fuel growth for all sides of the market or does it come at the expense of console and/or video game sales revenue? We study the past launches of Microsoft's Xbox Game Pass and Sony's PlayStation Plus on which now the dust has settled enough to examine the commercial consequences thereof. Our research demonstrates that the introduction of the respective subscription models in proprietary video game console markets: (1) substantially enhanced console revenue, (2) had limited impact on video game revenue (contrary to the cannibalizing effects observed in the music, movie and TV industry), and (3) created a healthier video game supply, either by increasing the quantity of video game introductions (i.e., for PlayStation) or increasing their average quality (i.e., for Xbox and PlayStation).

Keywords: Subscription model, Two-Sided Market, Video Games, Hardware, Software

1. INTRODUCTION

Prior research in the video game console industry empirically examined the interdependence of hardware (i.e., console) sales, software (i.e., video game) sales and software supply (e.g., Allen et al. 2022; Binken & Stremersch 2009; Landsman & Stremersch 2011; Lee 2013). However, recently, we have witnessed the rise of the subscription model (such as Microsoft's Xbox Game Pass and Sony's PlayStation Plus) as a new business model among platform owners. A subscription model to a proprietary video game console grants users access to a curated and rotating catalog of video games, on their consoles or via cloud streaming, for a recurring subscription fee.[1] This new business model complements the traditional ownership-based model where consumers buy video games (physically or digitally) and perpetually own the games that they play (Zhang & Seidmann 2010).

Microsoft spearheaded this new business model with the 2017 launch of its Xbox Game Pass subscription service. PlayStation followed by introducing PlayStation Plus in 2022. Subscriber bases have since increased steadily and have now reached millions of subscribers. Industry observers believe this share will only grow and consider the subscription model the "*most important catalyst behind the changing commercial dynamics of the games industry*" (Severin and Gresham 2023). In a recent survey on consumers' Christmas wish lists, game subscriptions (39%) topped consumers' video game gift requests, while physical video games (22%) came in last (Kelly 2023).

Many factors explain the rising popularity of the subscription model. For consumers, subscription services lower the cost of video game ownership and offer convenient access to a curated selection of games that otherwise would have taken considerable budget and search

[1] Within video gaming, we distinguish these video game catalog subscriptions from in-game subscriptions within individual games (e.g., World of Warcraft) or platform access subscriptions that primarily give access to online features (e.g., Nintendo Online). Within retailing at large, we distinguish them from paid membership programs that provide members exclusive benefits such as free shipping (e.g., Amazon Prime) or stand-alone subscription services that provide subscribers new items or personalized experiences periodically (e.g., Birchbox, Blue Apron).

effort to play (Zhang & Seidmann 2010). For video game sellers, subscription services are a form of selective promotion and platform endorsement that draws eyeballs to games that otherwise may go unnoticed or disappear more quickly from consumers' consideration set (Rietveld, Schilling, & Bellavitis 2019). For platform owners, subscription services guarantee predetermined revenue and activate a user base that is encouraged to continuously engage with the platform and its games (Datta, Knox, & Bronnenberg 2018).

However, the disruptive nature of subscription models, as seen in other two-sided entertainment markets such as the music (e.g., Spotify) and movie and TV industry (e.g., Netflix), poses major challenges to existing revenue streams, often leading to cannibalization and devaluation of the incumbent business models of selling hardware and software (e.g., Schauerte et al. 2023; Wlömert & Papies 2016; Yu et al. 2022). The subscription model in the video game console industry raises similar concerns. Some video game sellers, for instance, refuse to license their latest games to subscription services because it may hurt video game sales in the ownership model (Makuch 2021; Warren 2023). Others believe it is a way for platform owners to monopolize access to the consumer and shift power in the supply chain further towards the platform owner (Batchelor 2018; Tassi 2024). Platform owners generally downplay these concerns and claim that the subscription model complements the ownership model. They believe the key differentiator between subscription services in gaming versus other entertainment industries is the longer monetization cycle in video games, where games have replay value and constitute an emotional connection that warrants perpetual ownership or carries over to other entries in a franchise or genre. In their view, subscription services offer exposure that spills over into sales, if not immediately, then eventually (Thier 2021).

Despite these opposing perspectives, no prior research has investigated the potential changes that subscription models have brought about in the market dynamics of the proprietary video game console industry. Since console video game platforms serve as the canonical

empirical setting in two-sided market literature (Clements & Ohashi 2005; Shankar & Bayus 2003), this gap in that literature is an important one to address.

Our paper is the first to study the consequences of the launch of a subscription model within the proprietary video game console industry, via the following research questions:

- To what extent do subscription models affect console sales revenue of video game platform owners?
- To what extent do subscription models affect video game sales revenue of (first-party and third-party) video game sellers?
- To what extent do subscription models affect (first-party and third-party) video game supply?

To investigate these questions, we focus on the launch of Microsoft's Xbox Game Pass subscription service and Sony's PlayStation Plus subscription service in the, respectively, eighth and ninth generation of video game consoles as two key subscription entries in the video game console industry. For both subscription models, we rely on structural break unit-root analyses to study to what extent their entry created a structural change in the level and growth path of console revenue, video game revenue, and video game supply. We contrast this impact with the subscription revenue that subscription models generated for the platform.

Our results show that the introduction of the subscription model in the video game console industry has a largely positive impact. Both major subscription models under study generated a considerable stream of subscription revenue without substantially cannibalizing the existing revenue streams. In contrast, the subscription services substantially enhanced platform performance, increasing console revenue by 65.9% in the case of Xbox and 121.5% in the case of PlayStation. We also found limited evidence of the cannibalizing impact of subscription models on (physical) video game revenue. While PlayStation's video game revenue decreased initially, this was mostly driven by first-party video game revenue. Video game sellers' third-party revenue was impacted much less and recovered fast.

The subscription model also positively impacted platforms' video game supply in the case of PlayStation; both the quantity and quality of its video game supply increased when the subscription service launched. Xbox experienced a drop in video game introductions after their subscription model entry, yet mostly in lower-quality games, thereby increasing the average quality of their video game supply. Therefore, this study demonstrates that subscription models to platforms in the video game industry are vehicles to gain higher revenue and a healthier software ecology, without compromising the existing business model of selling consoles and video games. This result contrasts with prior findings of the cannibalizing impact of subscriptions on incumbent revenue streams in other two-sided markets such as the music, movie and TV industry (e.g., Schauerte et al. 2023; Wlömert & Papies 2016; Yu et al. 2022).

This paper makes substantive and theoretical contributions to the literature. First, we delineate the necessity of studying the video game subscription model within the literature on platform markets. Second, we conceptualize the context-specific opportunities and threats of subscription models to the video game industry through its potential for both increased platform growth and increased platform power. We then exemplify the decomposed impact of the subscription model through a quasi-natural experiment that studies the launch of Microsoft's Xbox Game Pass and Sony's PlayStation Plus subscription models. Our results offer valuable insights to industry observers that have questioned the destructive nature of the subscription model. It also serves as a broader call on the platform market literature to incorporate the subscription model in future studies on its indirect network effects.

2. CONCEPTUAL DEVELOPMENT

2.1. Conceptual background

The video game console industry, like many platform markets, is subject to indirect network effects (Lee 2013; Katz & Shapiro 1985; Stremersch et al. 2007), which causes consumer utility

and demand for console hardware to depend on the supply of video game software, and vice versa. This leads to a "chicken-and-egg" coordination problem, i.e., consumers wait to adopt a console until enough video games are available, and video game sellers delay releasing video games until enough consumers have adopted the console. Prior studies have empirically documented the existence of such indirect network effects between the hardware and software sides of such markets. They also identified mechanisms that video game platforms employ to solve this problem. For example, releasing exclusive titles (e.g., Hagiu & Spulbar; Lee 2013) or superstar titles (e.g., Allen et al. 2022; Binken & Stremersch 2009) may convince consumers to adopt a platform, often independently of the availability of many other sellers' video games.

The recent introduction of subscription services by video game platform owners can be seen as the most recent attempt of platform owners to popularize their platform to both sides. To consumers, a subscription service means low-cost access to a limited but curated and rotating selection of video games. To video game sellers, a subscription service means a spotlight to an engaged consumer audience and a guaranteed licensing fee. As a new business model, the subscription model is therefore interesting from a two-sided market perspective. Yet, its effect on the video game console industry has not been documented. And compared to mechanisms of the past, subscription services entail an entirely new business model that possibly threatens the incumbent business model of selling consoles and video games.

Empirical research on the impact of subscription models on incumbent business models in entertainment is limited (see Table 1). Most prior research focuses on the impact of the on-demand streaming model on software sales or consumption in the music or movie and TV industry, and finds it to be decidedly negative (e.g., Aguiar & Waldfogel 2017; Schauerte et al. 2023; Wlömert & Papies 2016; Yu et al. 2022). In the music industry, for instance, Wlömert and Papies (2016) find that consumers' adoption of a paid subscription service cannibalizes the sales revenue from consumers' music purchases in the ownership-based model by 23.9%.

Table 1. Empirical Literature on Subscription Models in Entertainment Platform Markets

	Entertainment Industry			Subscription Service(s) under Study	Subscription Service Event under Study			Measure(s) of Incumbent Performance				Impact on Incumbent Performance
	Music	Movie & TV	Video Games		Market Entry/Exit	Consumer Adoption	Consumer Usage	Hardware Demand	Software Demand	Software Supply	Software Consumption	
Wlömert & Papies (2016)	✓			Spotify		✓			✓			Negative
Aguiar & Waldfogel (2017)	✓			Spotify			✓		✓			Negative
Datta et al. (2018)	✓			Spotify		✓					✓	Negative
Lee et al. (2020)	✓			Melon.com Bugs! Unknown others			✓		✓			Positive
Yu et al. (2022)		✓		Netflix Hulu	✓				✓			Negative
Schauerte et al. (2023)		✓		Disney+	✓						✓	Negative
Fang et al. (2024)		✓		Netflix		✓			✓		✓	Positive
This Study			✓	**Xbox Game Pass PlayStation Plus**	✓			✓	✓	✓		**Positive**

In the movie industry, Yu et al. (2022) show that movie titles on a subscription service sell 36% less in DVD sales. The only exceptions are Lee et al. (2020) and Fang et al. (2024) who find subscription services can be positively associated with an increase in, respectively, physical album sales revenue and movie theater ticket sales revenue.

The results obtained in the music or movie industry, however, may not necessarily translate to the video game industry (see Table 2). Contrary to music or movie and TV subscription services, video game platforms still integrate the storefront of their ownership-based purchase model in their subscription services. Any content consumed on the subscription service can still be bought seamlessly for perpetual ownership in ways that, for instance, Spotify or Netflix do not allow (Amazon Prime Video is the exception and allows purchases of a limited number of titles). This integration also incentivizes subscribing consumers to purchase additional content, which can be anything from cosmetic items over new chapters of gameplay to sequels or other entries in a franchise or genre (Amenabar 2022).

Table 2. Differences in Subscription Services across Media Platforms

	Examples	Content Suppliers	Catalog Size	Content Replay Value	Content Time on Sub-scription	Option to Purchase Content for Ownership	Opportunity for Positive Spillover
Video Games	Xbox Game Pass, PlayStation Plus	First Party & Third Party	Small	High	Short	Yes	*Substantial*: Small catalog of high-repeat content with a relatively fast rotation cycle that consumers can directly purchase incentivizes discoverability and purchases beyond the subscription.
Movie & TV	Netflix, Amazon Prime Video, Disney+	First Party & Third Party	Large	Low	Long	Limited	*Limited*: Large catalog of low-repeat content with a relatively slow rotation cycle that consumers cannot always directly purchase results in limited opportunities for spillover purchases.
Music	Spotify, Apple Music	Third Party	Extremely Large	High	Perpetually	No	*Limited*: Highly commodified content that perpetually stays on service that consumers cannot directly purchase results in limited opportunities for spillover purchases.

The catalogs of video game subscription services are also notably smaller compared to other entertainment industries. Titles that otherwise may go unnoticed therefore rise to consumers' attention more easily and may benefit from the aforementioned spillover. Video game titles also cycle in and out of subscription services relatively fast compared to their replay value. The time to play a game in the subscription model is thus relatively short, and purchasing the game for perpetual ownership remains an attractive option for those who wish to continue playing. These features suggest that the subscription-based model may be more in sync with the ownership-based model compared to the music or movie and TV industry, and warrants context-specific research (Stremersch et al. 2023).

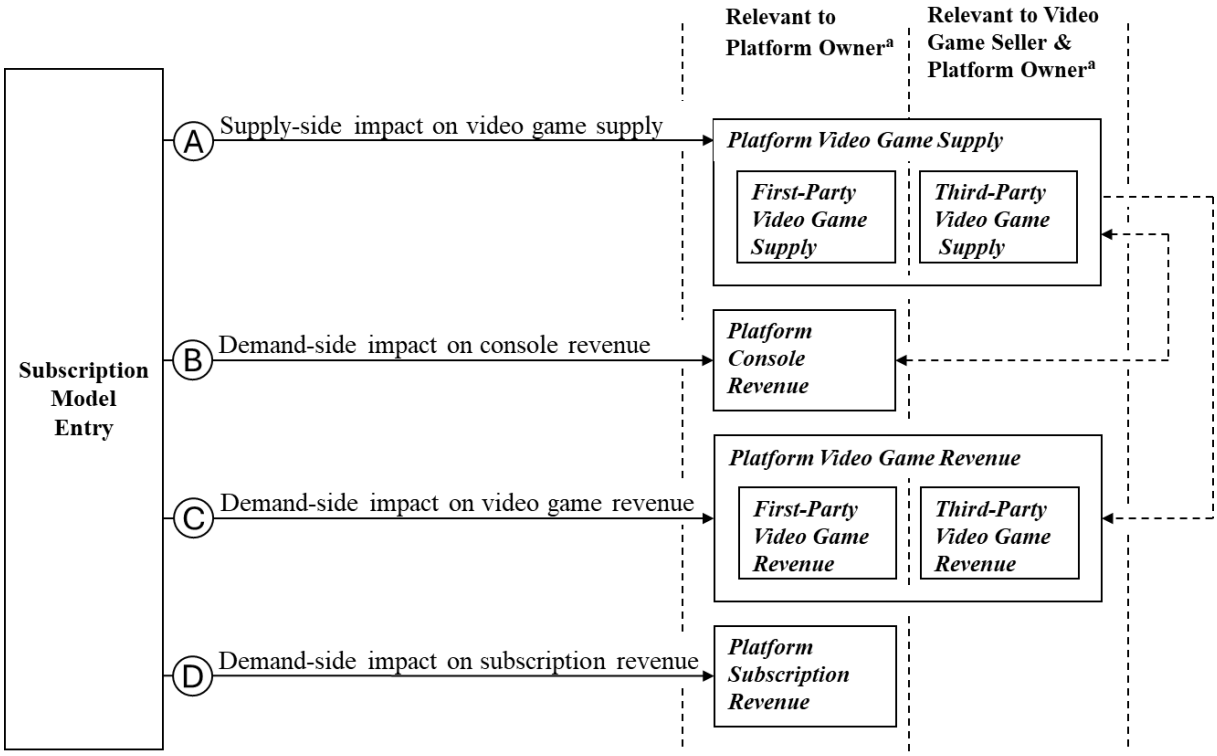
We additionally contribute to the platform market literature by studying the impact of the subscription model on sellers' video game supply to the affected platforms. Prior literature did not study the supply-side consequences of the subscription model. For instance, while Schauerte et al. (2023) mention that subscription service entry may affect the supply of platform content (negatively and positively), their empirical analyses focus only on the demand-side effects of a subscription model entry.

2.2. Conceptual framework

Figure 1 depicts our conceptual framework on the mutual interdependencies that exist between the supply- and demand-side of the video game console industry. We focus on the impact of the subscription model on platforms' video game supply, console revenue, video game revenue, and subscription revenue. Next, we discuss each of these effects in Figure 1 marked by the letters A-D. Underlying these effects are two dominant logics: growth and power. Platform owners and video game sellers may grow or shrink because of the entry of a subscription model, and platform owners and video game sellers may see shifts in power between them because of the entry of a subscription model. The ultimate effects of a subscription model on growth and

power of platform owners and video game sellers will reflect whether the entry of the subscription model has a positive or negative impact on platform's video game supply, console revenue, video game revenue, and subscription revenue. Because subscription models may affect platform owners (and their own first-party titles) differently from video game sellers (and their third-party titles), we decompose the effects of the subscription model according to both parties.

Figure 1. Conceptual Framework: The Implications of Subscription Model Entry for Platform Owners and Video Game Sellers



[a] Video game sellers are directly affected only through the supply and sales revenue of (their own) third-party video games, while platform owners are directly affected through the supply and sales revenue of both third-party video games and (their own) first-party video games, as well as through the console and subscription sales revenue.
Note: Bold arrows represent the focal relationships we study. Dotted arrows represent additional relationships we control for.

2.2.1. Supply-Side Impact of Subscription Models on Video Game Supply (Effect A in Figure 1)

Subscriptions models may lead both platform owners and video game sellers to change their, respectively, first-party and third-party video game supply to a platform. Changes to the third-party supply impact both the video game seller and the platform owner. Changes to the first-party video game supply impact only the platform owner. We discuss the perspectives of both.

Video Game Seller Perspective. Consumers' adoption of the subscription service depends on the available games on the service (Stremersch et al. 2007). Therefore, if a platform seeks to use its subscription model for *platform growth*, platform owners may actively seek out third-party sellers to supply their subscription services.[2] Video game sellers may agree to do so because a platform's subscription service increases the exposure of the games they sell. When sellers license their games to the subscription catalog, their games get spotlighted to millions of subscribers and they receive a compensation from the platform owner. As a result, subscription model entry may lead to more third-party video games on the platform.

However, if a platform seeks to use its subscription model to gain *platform power*, subscription models pose a risk to third-party video game sellers. Subscription models are a form of vertical integration that increases platform power (Lee 2013); it is the platform owner who manages and markets the curated subscription catalog. As a result, video game sellers that license their games to the service risk being reduced to mere suppliers of the platform's flagship subscription service (Wichmann, Wiegand, & Reinartz 2022), while sellers that do not license their games risk being overlooked by consumers. This may dilute a video game seller's position. Some sellers indeed oppose the subscription model for this reason (Makuch 2021; Warren 2023). As a result, subscription model entry may lead software sellers to reconsider releasing their games on the platform altogether, which may lead to a lower third-party supply.

Platform Owner Perspective. For platform owners, changes in the third-party video game supply to their platforms affect them as well. On the one hand, they would welcome more third-party releases on their platform. A larger third-party supply means more revenue (platforms typically take a 30% cut on each third-party sale [Batchelor 2023a]). On the other

[2] Both platforms owners and (third-party) video game sellers can initiate, terminate or refuse negotiations to license a seller's video game to a platform's subscription catalog. When a seller licenses a video game to the subscription catalog, platform owners compensate the seller through up-front lump sums, payments based on subscription downloads, or coverage of development costs (Patel 2020). These licensing agreements are specific to each individual deal and undocumented. We do not observe these payments; they are not part of our analyses.

hand, platform owners need to make sure that the quality and variety of their catalog remains high (Binken & Stremersch 2009; Sun, Rajiv, & Chu 2016). An increase in poor-quality third-party video games is what caused the infamous video game crash of 1983. Platforms may thus not necessarily mind a lower third-party supply if their remaining catalog contains sufficient quality. This is especially true because they have first-party video games that they can manage on their own, which we discuss next.

In line with the reasoning above, if a platform seeks to use its subscription model for platform growth, it makes sense for platform owners to strategically increase their own first-party supply to populate and popularize their subscription services (Hagiu & Spulber 2013). Because platforms own the first-party sellers, this is easier than attracting third-party sellers. Xbox and PlayStation's recent acquisitions of video game studios have indeed been understood as a means to fill their subscription catalogs (Schreier 2022).

However, from a platform power logic, subscription models allow platforms to rely less on individual video game titles to engage their user base. Their rotating and curated catalogs are meant to serve consumers sufficient gaming experiences to retain users even in the absence of new video game introductions. All major video game subscription services, for instance, have made the availability of video games from previous console generations a prime selling point. In that power logic, the subscription service can substitute the release of first-party titles that are expensive and time intensive to develop. If a platform seeks to gain power through the subscription model, it may thus decrease its first-party video game supply and devote resources to enhance the gaming experience within the subscription catalog.

2.2.2. Demand-Side Impact of Subscription Models on Console Revenue (Effect B in Figure 1)

Platform Owner Perspective. The attractiveness of the subscription model provides opportunities to platform owners to increase their console revenue. This can be through market

expansion, where consumers that did not buy the console before now do so because of the subscription service's cost-effectiveness and convenience. Alternatively, consumers may switch consoles, because one outperforms the other on the experience that its subscription service offers.

While the above implies that subscription services secure growth in console revenue, their digital nature may also cause console revenue to shrink. Subscription models typically decouple the software from the hardware. For example, subscription models in the music or movie and TV industry moved software consumption from, respectively, CD and DVD players to smart devices such as smartphones, laptops, and smart TVs. Also in the video game console industry, accessing subscription libraries no longer requires dedicated gaming consoles. Their content can similarly be played via cloud streaming on smart devices. When a platform's most popular feature no longer requires console hardware, sales revenue of the latter may decrease.

2.2.3. Demand-Side Impact of Subscription Models on Video Game Revenue (Effect C in Figure 1)

Subscription models pose opportunities and threats to video game revenue, above and beyond their impact on video game supply (see Effect A above). While their impact on first-party video game revenue only affects the platform owner, their impact on third-party video game revenue affects both the video game seller and the platform owner.

Video Game Seller Perspective. From a platform growth perspective, the attractiveness of the subscription model may grow sellers' video game revenue. For third-party games, being featured in the subscription catalog is a form of promotion and platform endorsement (Huang, Lyu, & Xu 2022; Liang, Shi, & Raghu 2019; Rietveld et al. 2019). Subscription services may bring selective third-party games to consumers' attention that otherwise may go unnoticed. Such attention may turn into sales. Moreover, playing a game in a subscription can also drive

an emotional connection that carries over to other entries in a franchise or genre, even to those not included in the subscription catalog. As such, subscription model entry may increase third-party video game revenue.

However, the risk for third-party video game sellers is that subscription models shift the power position in the market from the game sellers to the platform owner (Schauerte et al. 2023). Since not all games are featured in the subscription catalog, this still leaves many game titles at risk of low interest and low sales (Aguiar & Waldfogel 2018; Yu et al. 2022). Moreover, games that are featured on the subscription service may not be able to hold on to their audience when they exit the subscription catalog. Subscription services' unlimited access to multiple titles at once may trigger increased sampling and variety seeking among users and therefore decrease user loyalty (Datta et al. 2018; Fleder & Hosanagar 2009). While platforms may benefit from such increased platform engagement, individual video game sellers may suffer. As such, subscription model entry may decrease third-party video game revenue.

Platform Owner Perspective. Because platforms take a cut on each third-party sale (Batchelor 2023a), any changes in third-party video game revenue affect platform owners on top of changes to their first-party video game revenue. Like third-party revenue, this first-party revenue may increase or decrease following subscription model entry. From a platform power perspective, especially first-party games risk being cannibalized. After all, platforms typically use their own first-party games to populate and popularize their subscription services (Schreier 2022). In contrast to video game sellers, however, platform owners do not mind such cannibalization as long as the subscription revenue makes up for this decrease.

If the subscription model instead leads to platform growth, platforms are even better off. In that scenario, the subscription model may lead to in-game purchases or sales of related first-party games on top of the platform's subscription revenue.

2.2.4. Demand-Side Impact of Subscription Models on Subscription Revenue (Effect D in Figure 1)

Platform Owner Perspective. Subscription services lower consumers' cost of video game ownership and offer convenient access to a curated selection of video games that otherwise would have taken considerable budget and search effort to play (Zhang & Seidmann 2010). As a result, many consumers are willing to subscribe to a platform's subscription service for a monthly fee. This generates platform growth and a new revenue stream for the platform owner.

2.2.5. Net Impact and Summary of Effects

In summary, growth-based arguments suggest that a platform's subscription model could exert a mainly positive impact on the platform's video game supply, console revenue, video game revenue, and subscription revenue, whereas power-based arguments suggest that a subscription model may decrease video game revenue and video game supply. The former is beneficial to both platform owners and video game sellers. The latter is problematic for video game sellers, yet for platform owners, it depends on the revenue that the subscription model itself generates and whether it makes up for any negative impact on their incumbent revenue streams. We summarize all growth- and power-based mechanisms and their positive and/or negative impact on both parties in Table 3. We rely on our empirical model to provide clarification on the validity of each logic.

Table 3. Mechanisms and Impact of the Subscription Model on Video Game Supply, Console Revenue, Video Game Revenue, and Subscription Revenue

		Relevant to Platform Owner[a]	**Relevant to Video Game Seller & Platform Owner[a]**
Performance Metric	**Logic**	**Mechanisms and Impact (+/-)**	
Video Game Supply Effect A	Growth:	**(+)** Platforms use first-party video games to populate the subscription model.	**(+)** Platforms seek third-party video games to populate the subscription model. **(+)** Subscription model increases platform attractiveness to video game sellers.
	Power:	**(-)** Subscription model replaces first-party video games as platform selling point.	**(-)** Subscription model devalues third-party video games.

Console Revenue Effect B	Growth:	**(+)** Subscription model increases console attractiveness to consumers. **(-)** Accessing subscription model catalog does not require a video game console.	
Video Game Revenue Effect C	Growth:	**(+)** Subscription model promotes first-party video games.	**(+)** Subscription model endorses and promotes third-party video games.
	Power:	**(-)** Subscription model displaces revenue from first-party video game purchases to subscription payments.	**(-)** Subscription model displaces revenue from third-party video game purchases to subscription payments.
Subscription Revenue Effect D	Growth:	**(+)** Subscription models lower consumers' cost of ownership and offer convenient access to a curated library of games.	

[a]The video game seller is directly affected only through the supply and sales revenue of (their own) third-party video games, while the platform owner is directly affected through the supply and sales revenue of both third-party video games and (their own) first-party video games.

3. DATA AND MODEL

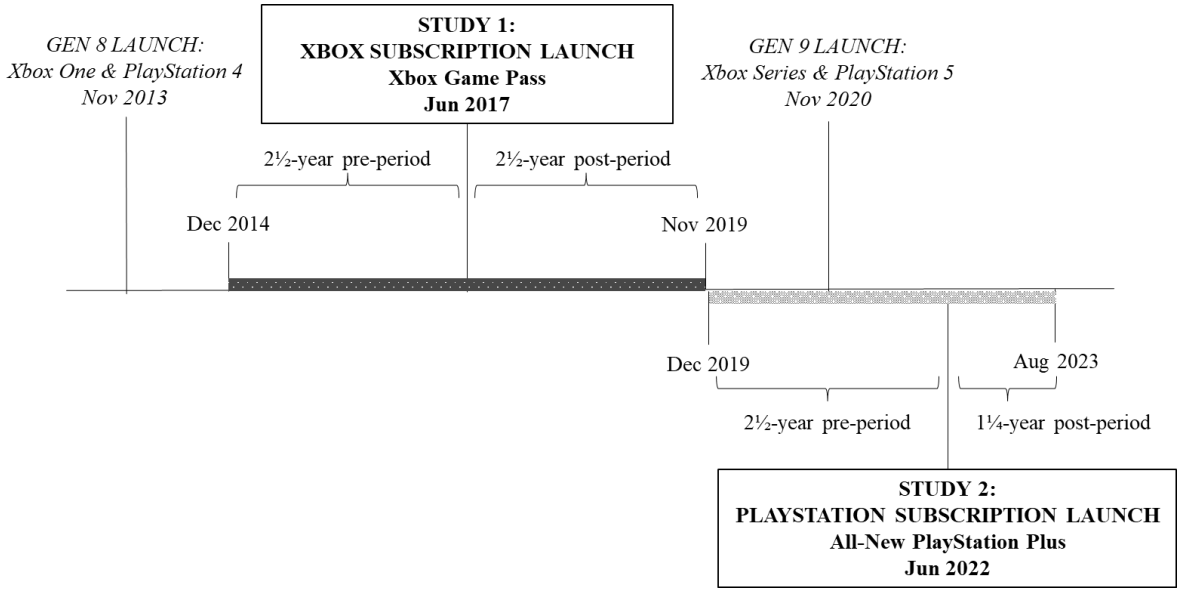
We apply our framework using data from the U.S. video game console industry. In this section, we first describe the research context and the operationalization and description of the measures we use. Then, we introduce our empirical model in which we apply a structural break analysis to the console revenue, video game revenue, and video game supply.

3.1. Research Context and Measures

Our empirical analysis focuses on two key subscription entries in the video game industry (see Figure 2): (1) the 2017 launch of Microsoft's Xbox Game Pass subscription service in the eighth generation of video game consoles, (2) the 2022 launch of Sony's All-New PlayStation Plus subscription service in the ninth generation of video game consoles. For Microsoft's subscription model entry, we consider an estimation period of 2 and ½ years before the entry and 2 and ½ years after (while our observation window dates back to the launch of the 8th generation of video game consoles in 2013). For Sony's subscription model entry, we consider

an estimation period of 2 and ½ years before the entry and 1 and ¼ years after due to data availability.

Figure 2. Event Timeline



We have data on all consoles and video game titles released for these platforms in the U.S. video game market during these periods, and obtained the monthly average price (in dollars), unit sales, and sales revenue (in dollars) for the consoles and video game titles, as well as each video game title's introduction date and review score, from market research company Circana. Table 4 summarizes the variable descriptives and operationalizations (see Appendix A for a plot of the outcome variables over time, and Web Appendix A for the correlations).

Console revenue is operationalized as the monthly sales revenue of the video game consoles of the platform of interest.[3] Console price is the monthly average price of the video game consoles of the platform of interest. We infer prices from sales revenue, so our measure includes price promotions. On the video game software side, video game revenue is operationalized as the monthly sales revenue of all video game titles available on the platform of interest. Video game introductions is operationalized as the monthly count of new video

[3] Video game platforms typically consist of multiple consoles; platforms may introduce higher- and lower-end editions of the same console (e.g., Xbox Series X versus Xbox Series S), release mid-generation upgrades of the same console (e.g., Xbox One S, Xbox One X versus Xbox One), or continue to support a previous generation of consoles after launching the next generation (e.g., Xbox One versus Xbox Series).

game titles introduced on the platform of interest. Video game price is the monthly average price of all video games available across all consoles of the platform of interest. These variable operationalizations follow prior work (e.g., Allen et al. 2022; Binken & Stremersch 2009).

Table 4. Variable operationalization and descriptives

Variable	Operationalization	Study 1		Study 2	
		M	SD	M	SD
Outcome Variables					
Console Revenue$_t$	Sales revenue of the consoles of the platform in month t, in millions of dollar.	112.62	122.27	196.45	163.63
Video Game Revenue$_t$	Sales revenue of all video games available on the platform in month t, in millions of dollar.	103.19	90.67	86.97	58.01
Video Game Introductions$_t$	Count of all video games introduced on the platform in month t.	48.48	17.60	159.22	70.62
Structural Break					
SubscriptionEntryStep$_t$	Step dummy variable that equals 1 if month t is equal to or after the month of the subscription model entry (t_{entry}) on the platform, and 0 otherwise.				
SubscriptionEntryTrend$_t$	Trend break variable that equals t + 1- t_{entry} if month t is equal to or after the month of the subscription model entry (t_{entry}) on the platform, and 0 otherwise.				
Additional Variables					
Installed Base$_t$	Cumulative unit sales of the consoles of the platform in month t, in millions.	16.66	6.46	33.35	5.64
Console Price$_t$	Average price of the consoles of the platform in dollar in month t.	324.06	52.58	497.41	128.21
Video Game Price$_t$	Average price of all video games available on the platform in dollar in month t.	27.11	5.35	11.01	2.09
Holiday$_t$	Dummy variable that equals 1 if month t equals November or December, and 0 otherwise.				
Next Gen$_t$	Dummy variable that equals 1 if month t is equal to or after the month of a new console generation launch, and 0 otherwise.				
Trend$_t$	Monthly time trend increasing by one for each month t.				

3.2. Empirical Model

To investigate the performance implications of the subscription service entry, we perform a structural break unit-root analysis as introduced by Perron (1989, 1994). Relying on structural break analyses to quantify the impact of competitive entry on incumbents' performance is well established in marketing literature (e.g., Deleersnyder et al. 2002, Gielens 2008, Kornelis, Dekimpe, & Leeflang 2008). In our setting, specifically, we assess to what extent a subscription model entry creates a (structural) change to the level and growth path of console revenue, video

game revenue, and video game supply. We include such structural breaks in the following indirect network effect models (e.g., Stremersch et al. 2007):

$$
\begin{aligned}
(1)\ \ & \mathrm{lnConsoleRevenue}_t \\
&= \alpha_0 + \alpha_1 * \mathrm{SubscriptionEntryStep}_t + \alpha_2 * \mathrm{SubscriptionEntryTrend}_t \\
&+ \alpha_3 * \mathrm{lnConsoleRevenue}_{t-1} + \sum_{n=1}^{3} \alpha_{3+n} * \Delta\mathrm{lnConsoleRevenue}_{t-n} \\
&+ \alpha_7 * \mathrm{lnVideoGameIntroductions}_t + \alpha_8 * \mathrm{lnVideoGameIntroductions}_{t-1} \\
&+ \alpha_9 * \mathrm{lnConsolePrice}_{t-1} + \alpha_{10} * \mathrm{Trend}_t + \alpha_{11} * \mathrm{Holiday}_t + \alpha_{12} * \mathrm{NextGen}_t \\
&+ \varepsilon_t^{Console} \\
(2)\ \ & \mathrm{lnVideoGameRevenue}_t \\
&= \beta_0 + \beta_1 * \mathrm{SubscriptionEntryStep}_t + \beta_2 * \mathrm{SubscriptionEntryTrend}_t \\
&+ \beta_3 * \mathrm{lnVideoGameRevenue}_{t-1} + \sum_{n=1}^{3} \beta_{3+n} * \Delta\mathrm{lnVideoGameRevenue}_{t-n} \\
&+ \beta_7 * \mathrm{lnVideoGameIntroductions}_t + \beta_8 * \mathrm{lnVideoGameIntroductions}_{t-1} \\
&+ \beta_9 * \mathrm{lnVideoGamePrice}_{t-1} + \beta_{10} * \mathrm{Trend}_t + \beta_{11} * \mathrm{Holiday}_t \\
&+ \beta_{12} * \mathrm{NextGen}_t + \varepsilon_t^{VideoGame} \\
(3)\ \ & \mathrm{lnVideoGameIntroductions}_t \\
&= \gamma_0 + \gamma_1 * \mathrm{SubscriptionEntryStep}_t + \gamma_2 * \mathrm{SubscriptionEntryTrend}_t \\
&+ \gamma_3 * \mathrm{lnVideoGameIntroductions}_{t-1} \\
&+ \sum_{n=1}^{3} \gamma_{3+n} * \Delta\mathrm{lnVideoGameIntroductions}_{t-n} + \gamma_7 * \mathrm{lnInstalledBase}_{t-6} \\
&+ \gamma_8 * \mathrm{Trend}_t + \gamma_9 * \mathrm{Holiday}_t + \gamma_{10} * \mathrm{NextGen}_t + \varepsilon_t^{Supply}
\end{aligned}
$$

where $\mathrm{lnConsoleRevenue}_t$ and $\mathrm{lnVideoGameRevenue}_t$ are the (log-transformed) console revenue and video game revenue at time t, and $\mathrm{lnVideoGameIntroductions}_t$ is the (log-transformed) number of new video game titles introduced at time t. We use a log-transformation as nonlinearities may be expected in performance in the video game industry (e.g., Allen et al. 2022, Stremersch et al. 2007, Landsman & Stremersch 2011).

The right-hand sides of Eq.1 to Eq.3 consist of three parts. The first part includes two focal structural break variables that test for a structural change in the series: Denoting t_{entry} as the month when the subscription model was introduced in the market, $\mathrm{SubscriptionEntryStep}_t$ is a step dummy that equals 1 starting in t_{entry}, and 0 before, and $\mathrm{SubscriptionEntryTrend}_t$ is a trend break variable that equals $t+1-t_{entry}$ starting in t_{entry}, and 0 before. $\mathrm{SubscriptionEntryTrend}_t$ can therefore be interpreted as an interaction term between a trend variable and $\mathrm{SubscriptionEntryStep}_t$. These variables capture the focal structural changes in the level as well

as growth path of a platform's console revenue, video game revenue, and video game supply after the subscription model entry.

Second, following standard practice in structural break analyses (Perron 1989; Perron 1994), we add the lagged dependent variable and its lagged first differences to each equation to ensure that the residual series is white noise. The number of lags is decided upon following a recursive procedure, starting with k equal to 3, and reducing the model successively until the last lag is significant at the 5% significance level.[4] If no lags are significant, no lags are included (Deleersnyder et al. 2002).

Third, because indirect network effect theory shows that video game customers prefer to buy consoles with large video game catalogs, and video game sellers prefer to release video games for consoles with large installed bases (Stremersch et al. 2007), we include the (log-transformed) number of new video game titles ($lnVideoGameIntroductions_t$) and its lag ($lnVideoGameIntroductions_{t-1}$) in Eq. (1) and the lagged (log-transformed) console installed base ($lnInstalledBase_{t-6}$) in Eq. (3). Because data on a platform's console installed base are unavailable, it is operationalized as a platform's cumulative console unit sales prior to time t (Allen et al. 2022; Stremersch et al. 2007). To account for the time that it takes to release a game, we use a 6-month lagged level of installed base prior to the observed video game introductions (Stremersch et al. 2007).[5] These indirect network effect variables do not apply to Eq. (2). In Eq. (2), we control for the (current and lagged) number of new video game titles to investigate the impact of subscription model entry on video game revenue above and beyond its impact on video game supply.[6]

[4] k = 3 is selected to meet a recommended observation-to-parameter ratio of 5 (Leeflang et al. 2015). For a few analyses, our sample size does not suffice to meet this threshold. However, carefully omitting non-essential control variables from these analyses showed that our estimates remained robust to the increase in degrees of freedom.
[5] Using a 12-month lagged level of installed base prior to the observed software introductions leads to substantively robust results. We choose the 6-month lag to retain more observations.
[6] We present the results of Eq. (2b) that does not control for the video game supply in Appendix B.

Finally, we control for the trend in the dependent variables ($Trend_t$) and for the fact that in the video game industry, performance is impacted by seasonality ($Holiday_t$) and the arrival of new console generations ($NextGen_t$) (e.g., Binken & Stremersch; Landsman & Stremersch 2011; Sun et al. 2016). The use of a linear trend in our log-transformed data captures the expected non-linear trend in the video game growth models that we estimate (e.g., Binken & Stremersch 2009, Gretz et al. 2019, Stremersch et al. 2007). We run these structural break analyses for each of our two observed subscription entries separately. Aside from the trend variable, all continuous variables are mean-centered. We account for first-order autocorrelation by applying the Prais–Winsten correction.

4. STUDY 1: XBOX GAMEPASS LAUNCH

4.1. Xbox Game Pass Event Description

Microsoft revealed its gaming subscription service *Xbox Game Pass* on February 28, 2017, and officially launched the service on June 1, 2017. The announcement and launch of the service and its benefits were communicated through Xbox's proprietary news website and were widely picked up by all major outlets covering the video game industry. It was instantly dubbed the "Netflix for games" (Kuchera 2017). At launch, the service gave users access to a catalog of 115 games available for download on Microsoft's at-the-time console, i.e., the Xbox One, for a subscription fee of $9.99 per month. Since then, the catalog has been updated with different games cycling in and out of the catalog. By 2023, over 1,000 unique games had been featured in the catalog at some point in time. The average game remains in the subscription catalog for 460 days. Since launch, all games in the subscription catalog have been available for purchase to both subscription users and non-users, yet subscription users have been able to do so at a discount of 20%. If a game is removed from the catalog or the user ends their subscription, the game can no longer be played unless the user purchases it for permanent ownership.

On June 9, 2019, Microsoft introduced a higher-price tier for Xbox Game Pass called *Xbox Game Pass Ultimate*, for $14.99 per month, until it moved up to $16.99 per month in July 2023 when the base tier moved up to $10.99 per month. Xbox Game Pass Ultimate added access to Microsoft's online multiplayer service *Xbox Live Gold* (which, until then, was sold separately) and Microsoft's PC subscription service *Xbox Game Pass for PC* (which launched the same day) to the base tier benefits. At the time, there were no other differences in benefits between Xbox Game Pass users, Xbox Game Pass Ultimate users, and non-subscribers.

4.2. Xbox Game Pass Revenue

Microsoft rarely communicates its Xbox Game Pass subscriber numbers. In its first 5 years, it only did so 4 times; the first time when they reached 10 million subscribers in 2020 (Microsoft 2020), and the last time when they reached 25 million in 2022 (Microsoft 2022). Other subscriber numbers have been inferred from external sources such as court documents that were either released or leaked from Microsoft's legal dispute with the Federal Trade Commission over Microsoft's efforts to acquire video game seller Activision Blizzard (Batchelor 2023b, Warren 2023). To estimate the subscriber revenue that Xbox Game Pass has accumulated since launch, we therefore estimate an S-shaped growth curve (3-parameter Gompertz model) fitted to these available data (see Figure 3).

Figure 3. Estimated Monthly Xbox Game Pass Subscribers over Time by Authors

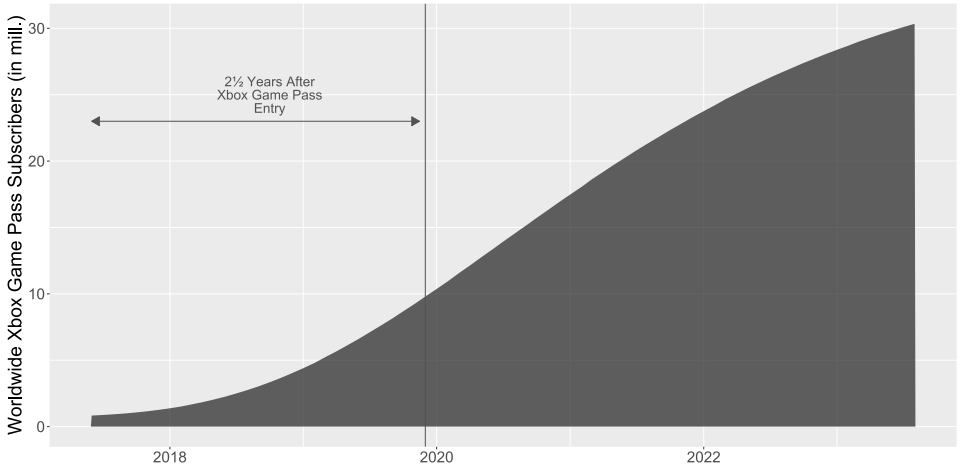


Figure 3 provides us with an estimate of the number of subscribers in each month of the data period under study, i.e., 2 and ½ years after launch. Summing up these monthly numbers, Xbox Game Pass is estimated to have accumulated over 111 million subscriber-months worldwide over its first 2 and ½ years. Because Microsoft earns, on average, $9.26 in net revenue per subscriber (Batchelor 2023b), this number corresponds to $1.03 billion in subscriber revenue worldwide, or approximately $571 million (or $19 million per month) in U.S. subscriber revenue.[7,8] Following our conceptualization earlier, we estimate whether this new income stream through the entry of the Game Pass subscription model is associated with a structural break in Xbox's console revenue, video game revenue and/or video game supply.

4.3. Model Results of Xbox Game Pass Entry

Before we can interpret the estimated coefficients of our structural break models, we need to assure that the time series are stationary. We therefore test console revenue, video game revenue, and the number of video game introductions for the presence of a unit root based on Augmented Dickey–Fuller (ADF) tests. Assuming a trend and a constant, the ADF test statistics have values from -3.587 to -5.710, rejecting the presence of a unit root. This implies that we can interpret the estimated coefficients of our structural break analyses (Perron 1994).

We present the results of Eq. (1) to Eq. (3) for the impact of the Xbox subscription model entry in Table 5. We also report interval estimates of the effect of the subscription entry on each outcome variable at multiple levels in Figure 4 and Figure 5, in line with the recommendation of McShane et al. (2024). The R-squared(s) show that all models fit the data well (R^2's between .744 and .938), which is not surprising as we include all key variables and lagged dependent variables. We focus on the structural break variables $SubscriptionEntryStep_t$

[7] This is lower than Xbox Game Pass' $9.99 subscription fee due to promotions.
[8] U.S. market share is based on the U.S. market share in lifetime Xbox One sales of 56.88% retrieved from vgchartz.com.

and SubscriptionEntryTrend$_t$ that indicate whether the entry of the subscription model led to a change in level and/or growth path of Xbox's console revenue, video game revenue, and the number of new video game introductions.

Table 5. Impact of Xbox Game Pass Entry on Console Revenue, Video Game Revenue and Video Game Supply

	Console Revenue		Video Game Revenue		Video Game Supply	
	[1]		[2]		[3]	
Structural Break	**Coef.**	***p***	**Coef.**	***p***	**Coef.**	***p***
SubscriptionEntryStep$_t$	.488	*.042*	.083	*.764*	-.404	*.006*
	(.234)		(.275)		(.141)	
SubscriptionEntryTrend$_t$	.018	*.332*	-.006	*.791*	.020	*.157*
	(.018)		(.024)		(.014)	
Time Series Operators						
ln(ConsoleRevenue$_{t-1}$)	.267	*.013*				
	(.104)					
Δln(ConsoleRevenue$_{t-1}$)	-.282	*.002*				
	(.085)					
Δln(ConsoleRevenue$_{t-2}$)	-.216	*.001*				
	(.058)					
ln(VideoGameRevenue$_{t-1}$)			.168	*.243*		
			(.142)			
Δln(VideoGameRevenue$_{t-1}$)			.129	*.375*		
			(.144)			
Δln(VideoGameRevenue$_{t-2}$)			-.040	*.705*		
			(.105)			
Δln(VideoGameRevenue$_{t-3}$)			.253	*.021*		
			(.106)			
Indirect Network Effects						
ln(VideoGameIntroductions$_t$)	.216	*.129*	.263	*.189*		
	(.14)		(.197)			
ln(VideoGameIntroductions$_{t-1}$)	.375	*.009*	.138	*.472*	-.030	*.812*
	(.139)		(.190)		(.125)	
ln(InstalledBase$_{t-6}$)					1.854	*.000*
					(.366)	
Additional Control Variables						
ln(ConsolePrice$_{t-1}$)	.455	*.322*				
	(.455)					
ln(VideoGamePrice$_{t-1}$)			1.242	*.232*		
			(1.026)			
Holidays	1.723	*.000*	1.066	*.000*	.019	*.849*
	(.121)		(.189)		(.099)	
Trend	-.036	*.024*	-.000	*.988*	-.046	*.015*
	(.015)		(.026)		(.018)	
Intercept	18.575	*.000*	18.008	*.000*	5.240	*.000*
	(.281)		(.564)		(.441)	
R^2	.938		.800		.744	
N	60		60		60	

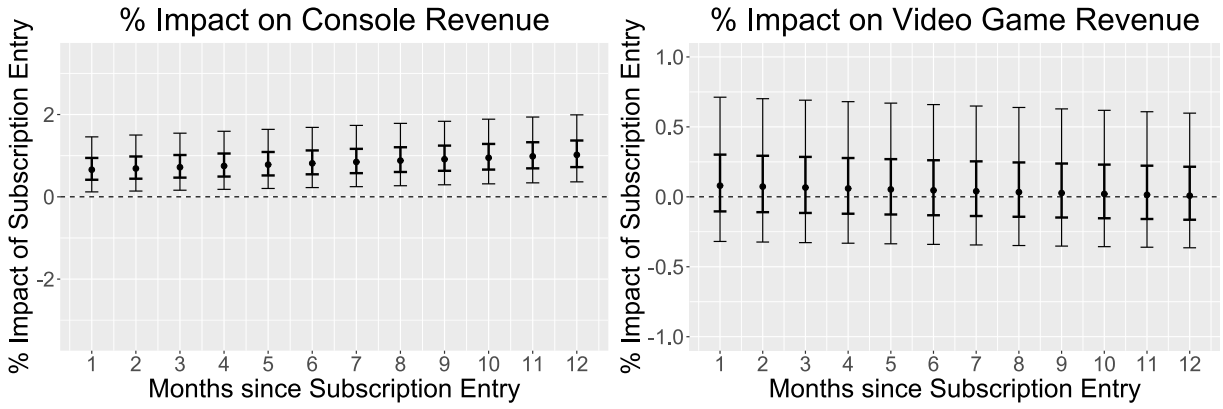
Note: Standard errors between brackets.

4.3.1. The Impact on Xbox's Console Revenue and Video Game Revenue

For Xbox's console revenue, we find that subscription model entry had a positive effect on the level and trend of sales revenue of Xbox consoles ($\alpha_{SES}^{Xbox\,[1]}$ = .488, p = .042; $\alpha_{SET}^{Xbox\,[1]}$ = .018,

p = .332); the mean percentage increase in the month of the subscription model entry equaled 65.9% and increased slightly over time (see Figure 4).[9] Such an increase corresponded to an $85 million increase in console revenue. A percentage change of this magnitude is nontrivial; the interval estimate for a conventional 90% level suggests that every value from a 12% increase to a 145.7% increase is compatible with our data.

Figure 4. Interval Estimates of the % Impact of Xbox Game Pass Entry on Console Revenue and Video Game Revenue



Note: Point estimates are given by the points; 50% and 90% interval estimates are given by the thick and thin lines, respectively.

For Xbox's video game revenue, we find that subscription model entry slightly increased the physical video game revenue level yet decreased its trend ($\beta_{SES}^{Xbox\,[2]}$ = .083, p = .764; $\beta_{SET}^{Xbox\,[2]}$ = -.006, p = .791); the mean percentage increase in the month of the subscription model entry equaled 8% above and beyond its impact on the number of video game introductions. Such an increase corresponded to a $9.6 million gain in video game revenue. Since the point estimates remain close to zero and 90% interval estimates contain no values that are deemed managerially substantial (see Figure 4), we therefore find the subscription model impact on the Xbox platform's per-title video game revenue was positive but modest. Without controlling for the change in video game introductions (see Table B.1 in Appendix B),

[9] The percentage effect of subscription model entry on the outcome variable of interest is given by $\hat{g} = \exp(\hat{\delta}) - 1$, where $\hat{\delta}$ equals the sum of the estimates of the coefficient of the $\text{SubscriptionEntryStep}_t$ and $\text{SubscriptionEntryTrend}_t$ variables. For the interval estimates of the percentage effect in Figure 4, we consider the interval estimates of the coefficient of the $\text{SubscriptionEntryStep}_t$ variable and the point estimate of the coefficient of the $\text{SubscriptionEntryTrend}_t$ variable.

however, total video game revenue decreased 17.1% in the month of the subscription model entry, totaling a $20.5 million loss ($\beta_{SES}^{Xbox\,[2b]}$ = -.155, p = .462), due to the subscription entry's negative impact on video game supply (see below).

Decomposing the subscription entry impact on video game revenue into its impact on first-party versus third-party video game revenue (see Table 6, and Table WB.1 in Web Appendix B for the full model results per publishing party), we find that the largest percentage gain was found among first-party video games ($\beta_{SES}^{Xbox\,First-Party\,[2]}$ = .230, p = .553; $\beta_{SES}^{Xbox\,Third-Party\,[2]}$ = .072, p = .782), with a 23.9% (versus 6.4%) increase in the month of subscription entry. Because first-party video games account for only 12.3% of Xbox's total video game revenue, this corresponded to a $3.6 million gain in first-party video game revenue (versus a $6.7 million gain in third-party video game revenue).

Table 6. Impact of Xbox Game Pass Entry on First- vs. Third-Party Video Game Revenue

	Video Game Revenue			
	First-Party		**Third-Party**	
Structural Break	**Coef.**	***p***	**Coef.**	***p***
$SubscriptionEntryStep_t$	.230	*.553*	.072	*.782*
	(.385)		(.258)	
$SubscriptionEntryTrend_t$	-.015	*.484*	-.010	*.685*
	(.022)		(.024)	
Accounting for Impact on Video Game Supply	✓		✓	
R^2		.689		.785
N		60		60

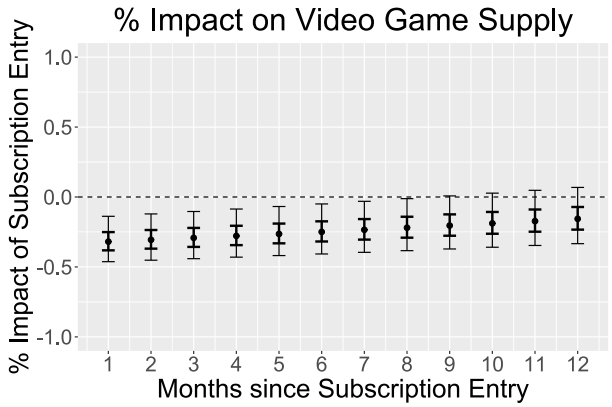
Note: Standard errors between brackets.

4.3.2. The Impact on Xbox's Video Game Supply

While the results of Eq. (1) and (2) showed the complementary impact of the subscription model on the video game sellers' revenue streams, we find that the subscription model entry had a negative impact on the number of video game introductions on the Xbox platform; the mean percentage decrease in video game supply in the month of subscription model entry equaled 31.9% ($\gamma_{SES}^{Xbox\,[3]}$ = -.404, p = .006; $\gamma_{SET}^{Xbox\,[3]}$ = .020, p = .157). This corresponded to 14 fewer video game introductions. A 90% interval estimate ranging from a 53.2% decrease to

a 20.6% decrease corroborates this drop in supply (see Figure 5). However, the subscription model entry showed a positive impact on the growth path of video game supply. The decrease in the level of video game introductions was thus reduced over time.

Figure 5. Interval Estimates of the % Impact of Xbox Game Pass Entry on Video Game Supply



Note: Point estimates are given by the points; 50% and 90% interval estimates are given by the thick and thin lines, respectively.

We again decompose this subscription entry impact on video game supply into its impact on first-party versus third-party video game introductions. The results are summarized in Table 7 (see Table WC.1 in Web Appendix C for the full model results per publishing party). We find that the largest percentage decrease occurs for first-party video games ($\beta_{SES}^{Xbox\ First-Party}$ [3] = -.859, p = .001; $\beta_{SET}^{Xbox\ Third-Party}$ [3] = -.289, p = .014), with a 56.8% (versus 24.4%) decrease in introductions in the month of subscription entry. Since the Xbox platform mostly relies on third-party video games, this amounted to 2 fewer monthly first-party titles (versus 10 fewer third-party titles). These results show that Xbox's subscription model allowed Microsoft to downscale its first-party video game production further, relying on its subscription service as its tent-pole platform feature to grow the platform rather than individual first-party games.

Table 7. Impact of Xbox Game Pass Entry on First- vs. Third-Party Video Game Supply

	Video Game Supply [3]			
	First-Party		Third-Party	
Structural Break	**Coef.**	***p***	**Coef.**	***p***
$SubscriptionEntryStep_t$	-.859	*.001*	-.289	*.014*
	(.240)		(.114)	
$SubscriptionEntryTrend_t$	.019	*.399*	.009	*.383*
	(.022)		(.011)	
R^2		.641		.854
N		60		60

Note: Standard errors between brackets.

Next, we repeat the structural break analyses of Eq. (3) on video game introductions differing in video game quality (see Table 8, and Table WC.2 in Web Appendix C for the full model results per quality tier), we find that the negative impact on video game introductions was driven by a negative impact on video games of low quality, which decreased by 58.7% in the month of subscription entry ($\gamma_{SES}^{Xbox\ 40-60\ [3]}$ = -.841, p = .063; $\gamma_{SET}^{Xbox\ 40-60\ [3]}$ = -.043, p = .386). For video games of the higher quality tiers, we find that the impact of subscription entry was much more trivial. These results show that Xbox's subscription model allowed Xbox to increase the average quality of its video game catalog.

Table 8. Impact of Xbox Game Pass Entry on Video Game Supply per Quality Tier

	Video Game Supply [3]					
	Rated 40-60		Rated 60-80		Rated 80-100	
Structural Break	**Coef.**	***p***	**Coef.**	***p***	**Coef.**	***p***
$SubscriptionEntryStep_t$	-.841	*.063*	-.178	*.166*	.010	*.947*
	(.442)		(.127)		(.150)	
$SubscriptionEntryTrend_t$	-.043	*.386*	-.019	*.162*	.008	*.604*
	(.050)		(.013)		(.015)	
R^2		.391		.666		.713
N		60		60		60

Note: Standard errors between brackets.

4.3.3. Robustness Checks on the Impact of Xbox Game Pass Entry

We run several additional analyses to verify the robustness of our results. First, we check if the focal results hold if we consider sales in units instead of revenue. Second, we rerun our analyses with a much shorter 1-year postentry window, to assess the sensitivity of the results to the focal

postentry window of 2 and ½ years. Third, we estimate the console revenue, video game revenue, and video game supply equations simultaneously as a system of seemingly unrelated regressions (SUR) to control for potentially correlated error terms. The results of these alternative specifications are substantively robust to our focal results (see Tables WD.1-WD.4 in Web Appendix D).

We also estimate a falsification test, in which we analyze the effect of Xbox's subscription model entry on outcomes of a "placebo platform" that did not introduce a subscription model but reflects similar competitive dynamics. Specifically, we analyze the effect of Xbox's subscription model entry of Xbox's nearest competition that did not launch a subscription model, which was PlayStation at the time. The falsification test shows that the changes in Xbox's performance in response to its subscription model entry were substantially different from the estimates for the competing placebo platform (see more details in Web Appendix E). We therefore conclude that the observed subscription model impact was likely not driven by preexisting trends or common shocks in the video game industry.

4.4. Conclusion Study 1

Table 9 shows that the introduction of Microsoft's Xbox Game Pass subscription model positively impacted the platform's revenues: it led to a new revenue stream without cannibalizing the existing revenue streams from console and video game sales. Total video game revenue declined, but not proportionally, and this decrease in video game revenue could mostly be attributed to the subscription model's negative impact on video game supply, which we most prominently found among lower-quality video game titles. To determine whether this conclusion is specific to the Xbox platform only, we present Study 2 that investigates the entry of Sony's gaming subscription model PlayStation Plus in 2022.

Table 9. Summary of Revenue Impact of Xbox Game Pass

Platform Revenue Sources	% Impact on Revenue in Month of Subscription Entry	Absolute Impact on Revenue in Month of Subscription Entry	Impact on Revenue Growth
Subscription Revenue		+ **$19.0 million**	
Console Revenue	+ **65.9%**	+ **$85.0 million**	**positive**
Total Video Game Revenue	- **17.1%**	- **$20.5 million**	**negative**
First-Party Video Game Revenue	- 11.7%	- $1.7 million	negative
Third-Party Video Game Revenue	- 16.3%	- $17.2 million	negative
Video Game Revenue (controlling for ΔSupply)	+ **8.0%**	+ **$9.6 million**	**negative**
First-Party Video Game Revenue	+ 23.9%	+ $3.6 million	negative
Third-Party Video Game Revenue	+ 6.4%	+ $6.7 million	negative

5. STUDY 2: PLAYSTATION PLUS LAUNCH

5.1. All-New PlayStation Plus Event Description

Sony announced its new gaming subscription model All-New PlayStation Plus on March 29, 2022, and officially launched the subscription service on June 13, 2022. The entry was widely covered as Sony's "*attempt to take on Microsoft's subscription Xbox Game Pass*" (Schreier 2022). All-new PlayStation Plus launched with two tiers that fit the catalog-based subscription model as defined here.[10] PlayStation Plus Extra provides users access to a catalog of about 400 games available for download on Sony's actively supported consoles, i.e., the PlayStation 4 and PlayStation 5, for a subscription fee of $14.99 per month. The higher-price tier PlayStation Plus Premium adds additional access to about 350 games that originally launched on Sony's older consoles, available via cloud streaming, for a fee of $17.99 per month. Like Xbox Game Pass, the PlayStation Plus catalog has been updated with different games cycling in and out of the catalog since its launch, and all games in the subscription catalog have been available for purchase to both subscription users and non-users.

[10] Sony's PlayStation Plus Essential is not considered in our analyses since it predominantly serves to access online features and does not provide access to a subscription catalog.

5.2. PlayStation Plus Revenue

Like Microsoft, Sony does not comment regularly on its PlayStation Plus subscriber numbers. A 2023 investor meeting, however, revealed that Sony was able to convert approximately 13% of its existing online services' incumbent users to its new catalog-based subscription service and that the service had reached 14.1 million subscribers within the first 10 months (Sony 2023). This revealed a growth curve, which we replicated through pixel counting in Figure 6.

Figure 6. Estimated Monthly PlayStation Plus Subscribers over Time by Authors

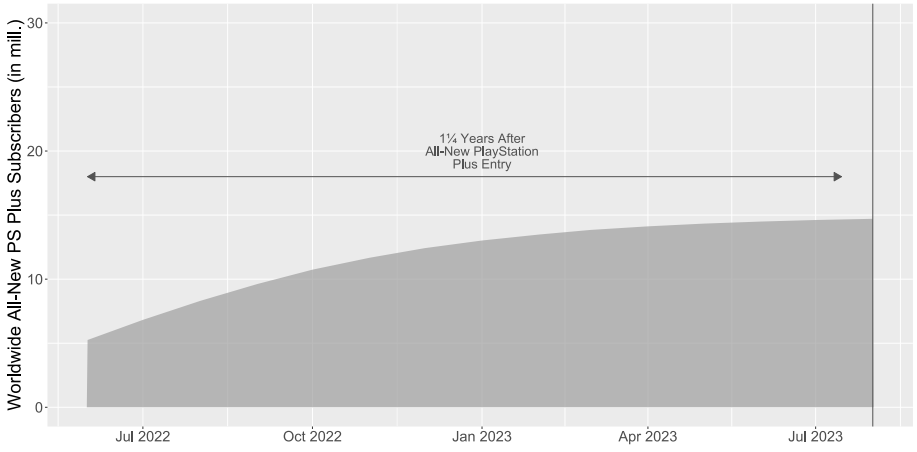


Figure 6 provides us with an estimate of the number of subscribers in each month of the data period under study, i.e., 1 and ¼ years after launch. Summing up these monthly numbers, PlayStation Plus is estimated to have accumulated over 177 million subscriber-months worldwide across its first 1 and ¼ years. Because 57% of users subscribe to the higher-price tier of $17.99 per month (and 43% to the lower-price tier of $14.99) (Sony 2023), this corresponds to $2.95 billion in subscriber revenue worldwide, or approximately $1 billion (or $66.6 million per month) in U.S. subscriber revenue.[11] We rely on our formal estimation to assess whether this stream of subscription revenue led to structural changes in the console revenue, video game revenue, and video game supply of PlayStation.

[11] U.S. market share is based on the U.S. market share in lifetime PlayStation 4 and PlayStation 5 sales of 34.21% retrieved from vgchartz.com.

5.3. Model Results of All-New PlayStation Plus Entry

We repeat the required tests of the model assumptions ahead of interpreting our model results, as in Study 1, and reject the presence of a unit root for all series under study based on ADF tests (ADF test statistics between -3.669 to -4.970). We present the results of Eq. (1) to Eq. (3) for the impact of the PlayStation subscription model entry in Table 10.

Table 10. Impact of PlayStation Plus Entry on Console Revenue, Video Game Revenue and Video Game Supply

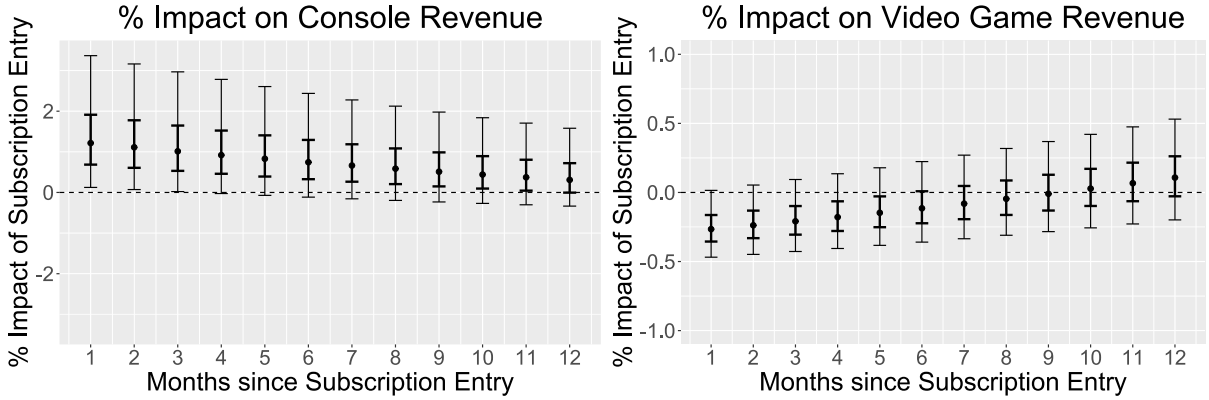
	Console Revenue		**Video Game Revenue**		**Video Game Supply**	
	[1]		**[2]**		**[3]**	
Structural Break	**Coef.**	***p***	**Coef.**	***p***	**Coef.**	***p***
$SubscriptionEntryStep_t$	.843	*.043*	-.346	*.079*	.461	*.007*
	(.401)		(.191)		(.16)	
$SubscriptionEntryTrend_t$	-.048	*.556*	.037	*.097*	-.058	*.010*
	(.081)		(.022)		(.021)	
Time Series Operators						
$\ln(ConsoleRevenue_{t-1})$	-.186	*.191*				
	(.139)					
$\Delta\ln(ConsoleRevenue_{t-1})$	.175	*.097*				
	(.102)					
$\Delta\ln(ConsoleRevenue_{t-2})$						
$\Delta\ln(VideoGameIntroductions_{t-1})$					.260	*.074*
					(.142)	
$\ln(VideoGameRevenue_{t-1})$			.299	*.059*		
			(.153)			
$\Delta\ln(VideoGameRevenue_{t-1})$			-.101	*.411*		
			(.121)			
$\Delta\ln(VideoGameRevenue_{t-2})$			-.243	*.016*		
			(.095)			
Indirect Network Effects						
$\ln(VideoGameIntroductions_t)$	-.045	*.925*	.400	*.258*		
	(.479)		(.348)			
$\ln(VideoGameIntroductions_{t-1})$	-.140	*.760*	.123	*.744*	-.450	*.042*
	(.454)		(.373)		(.213)	
$\ln(InstalledBase_{t-6})$					1.092	*.629*
					(2.24)	
Additional Control Variables						
$\ln(ConsolePrice_{t-1})$	-1.517	*.092*				
	(.875)					
$\ln(VideoGamePrice_{t-1})$			-.703	*.014*		
			(.271)			
Holidays	.792	*.002*	1.082	*.000*	.195	*.026*
	(.242)		(.15)		(.084)	
Trend	-.013	*.745*	-.022	*.157*	.036	*.304*
	(.041)		(.015)		(.035)	
Next Gen	2.377	*.000*	-.085	*.630*	-.008	*.964*
	(.472)		(.176)		(.172)	
Intercept	17.024	*.000*	18.540	*.000*	4.113	*.000*
	(.886)		(.311)		(.743)	
R^2	.871		.923		.795	
N	45		45		45	

Note: Standard errors between brackets.

5.3.1. The Impact on PlayStation's Console Revenue and Video Game Revenue

For PlayStation's console revenue, we find that the subscription model entry positively and substantially impacted console revenue of the PlayStation platform; the mean percentage increase in the month of subscription model entry equaled 121.5% ($\alpha_{SES}^{PlayStation\,[1]}$ = .843, p = .043. $\alpha_{SET}^{PlayStation\,[1]}$ = -.048, p = .556), corresponding to a $189.6 million increase in console revenue. A 90% interval estimate ranging from a 12.4% increase to a 336.7% increase corroborates the size of this increase. However, the subscription model had a negative impact on PlayStation console revenue growth, i.e., its positive impact decreased over time (see Figure 7). Nevertheless, we conclude that the entry of PlayStation Plus substantially increased the attractiveness of the platform's consoles to consumers.

Figure 7. Interval Estimates of the % Impact of PlayStation Plus Entry on Console Revenue and Video Game Revenue



Note: Point estimates are given by the points; 50% and 90% interval estimates are given by the thick and thin lines, respectively.

For PlayStation's video game revenue, we find that subscription model entry decreased the (physical) video game revenue level yet increased its growth path ($\beta_{SES}^{PlayStation\,[2]}$ = -.346, p = .079; $\beta_{SET}^{PlayStation\,[2]}$ = .037, p = .097). The mean percentage decrease in the month of subscription model entry equaled 26.6%, above and beyond its impact on video game supply, yet shrunk to a smaller number within a few months (See Figure 7). Such an initial decrease corresponded to $25.4 million loss in video game revenue on subscription model entry. PlayStation's total video game revenue decrease (without controlling for the impact on video

game supply, see Table B.2 in Appendix B) was more modest, with an 18.2% decrease totaling a $17.4 million loss in the month of the subscription model entry ($\beta_{SES}^{PlayStation\ [2b]}$ = -.221, p = .245), driven by the subscription entry's positive impact on video game supply (see below).

To determine who suffered most from that decrease, we repeat the structural break analyses of Eq. (2) on first-party versus third-party video game revenue (see Table 11, and Table WB.2 in Web Appendix B for the full model results per publishing party). We find that especially PlayStation's first-party video games suffered with a negative impact on their revenue level and growth path ($\beta_{SES}^{PlayStation\ First-Party\ [2]}$ = -.787, p = .147; $\beta_{SET}^{PlayStation\ First-Party\ [2]}$ = -.036, p = .490). We find a 56.1% (or $12.5 million) decrease in first-party video game revenue on subscription entry. For third-party video games, the subscription model's percentage impact on their video game revenue was substantially smaller (-25.3% or $18.4 million) and quickly made up via its positive impact on the growth path ($\beta_{SES}^{PlayStation\ Third-Party\ [2]}$ = -.351, p = .078; $\beta_{SET}^{PlayStation\ Third-Party\ [2]}$ = .059, p = .011). Therefore, the impact of the subscription model on video game revenue could overall be considered trivial, even at the extremes of a 90% interval.

Table 11. Impact of PlayStation Plus Entry on First- vs. Third-Party Video Game Revenue

	Video Game Revenue			
	First-Party		**Third-Party**	
Structural Break	**Coef.**	***p***	**Coef.**	***p***
$SubscriptionEntryStep_t$	-.787	*.147*	-.351	*.078*
	(.530)		(.193)	
$SubscriptionEntryTrend_t$	-.036	*.490*	.059	*.011*
	(.051)		(.022)	
Accounting for Impact on Video Game Supply	✓		✓	
R^2		.715		.925
N		45		45

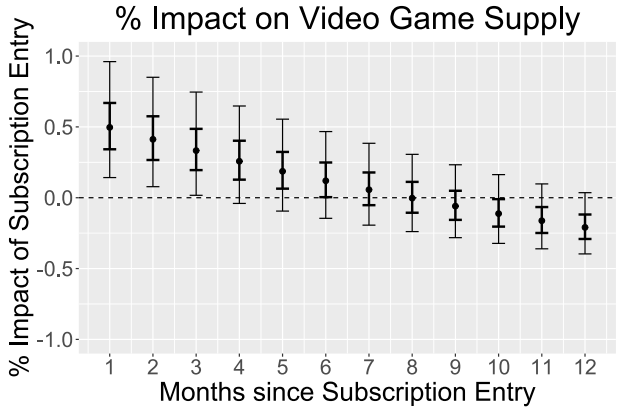
Note: Standard errors between brackets.

5.3.2. The Impact on PlayStation's Video Game Supply

In contrast to Xbox's subscription model entry, we find that PlayStation Plus' entry had an initially positive impact on the number of video game introductions, yet decreased video game

supply over time, i.e., there was a negative impact on its growth path ($\gamma_{SES}^{PlayStation\ [3]}$ = .461, p = .007; $\gamma_{SET}^{PlayStation\ [3]}$ = -.058, p = .010). The mean percentage increase in video game supply in the month of subscription model entry equaled 49.7%. This corresponded to nearly 59 more video game introductions, yet the impact became more trivial over time (see Figure 8).

Figure 8. Interval Estimates of the % Impact of PlayStation Plus on Video Game Supply



Note: Point estimates are given by the points; 50% and 90% interval estimates are given by the thick and thin lines, respectively.

Repeating the structural break analyses of Eq. (3) on first-party versus third-party video game supply (see Table 12, and Table WC.3 in Web Appendix C for the full model results), we find that the introduction of the subscription model increased PlayStation's first-party video game supply more than its third-party supply ($\beta_{SES}^{PlayStation\ First-Party\ [3]}$ = 2.331, p = .000; $\beta_{SES}^{PlayStation\ Third-Party\ [3]}$ = .372, p = .019). Finally, splitting up the video game introductions in different quality tiers in Table 13 (see Table WC.4 in Web Appendix C for the full model results) shows that the subscription model entry, over time, was associated with increases in high-quality video game introductions ($\gamma_{SES}^{PlayStation\ 80-100\ [3]}$ = .018, p = .962; $\gamma_{SET}^{PlayStation\ 80-100\ [3]}$ = .075, p = .072) and decreases in lower-quality video game introductions ($\gamma_{SES}^{PlayStation\ 60-80\ [3]}$ = .635, p = .049; $\gamma_{SET}^{PlayStation\ 60-80\ [3]}$ = -.058, p = .107), due to the, respectively, positive and negative growth paths. The subscription model thus allowed PlayStation to increase the average quality of its supply over time.

Table 12. Impact of PlayStation Plus Entry on First- vs. Third-Party Video Game Supply

	Video Game Supply [3]			
	First-Party		Third-Party	
Structural Break	**Coef.**	***p***	**Coef.**	***p***
$SubscriptionEntryStep_t$	2.331	*.000*	.372	*.019*
	(.347)		(.151)	
$SubscriptionEntryTrend_t$	.115	*.000*	-.050	*.010*
	(.030)		(.018)	
R^2		.753		.796
N		45		45

Note: Standard errors between brackets.

Table 13. Impact of PlayStation Plus on Video Game Supply per Quality Tier

	Video Game Supply [3]					
	Rated 40-60		Rated 60-80		Rated 80-100	
Structural Break	**Coef.**	***p***	**Coef.**	***p***	**Coef.**	***p***
$SubscriptionEntryStep_t$	.176	*.484*	.635	*.049*	.018	*.962*
	(.249)		(.311)		(.385)	
$SubscriptionEntryTrend_t$	.014	*.570*	-.058	*.107*	.075	*.072*
	(.025)		(.035)		(.041)	
R^2		.663		.405		.297
N		45		45		45

Note: Standard errors between brackets.

5.3.3. Robustness Checks on the Impact of PlayStation Plus Entry

In line with Study 1, we verify whether our focal results hold if we consider unit sales instead of sales revenue as focal outcome variables, and if we estimate the equations simultaneously as a system of seemingly unrelated regressions (SUR). We find that all results are substantively robust (see Tables WD.5-WD.8 in Web Appendix D). We also conduct a falsification test, in which we analyze the effect of PlayStation's subscription model entry on the outcome variables of its nearest competition. We choose not to use Xbox as the placebo platform given that the development of its own subscription model may have had too much influence. We consider the Nintendo Switch as the most suitable placebo. We find that the impact of the subscription model was substantially different for PlayStation compared to its impact on the placebo platform (see more details in Web Appendix E), and likely not driven by preexisting trends or common shocks in the video game industry.

5.4. Conclusion Study 2

The results of Study 2 confirm and strengthen the findings of Study 1. Table 14 shows that the introduction of Sony's PlayStation Plus subscription model positively impacted the platform's revenues: it led to a new revenue stream without cannibalizing the existing revenue streams from console and video game sales. Video game revenue declined at first, but this was mostly driven by a decrease in first-party video game revenue, whereas third-party video game revenue recovered over time.

Table 14. Summary of Revenue Impact of PlayStation Plus

Platform Revenue Sources	% Impact in Month of Subscription Entry	Absolute Impact in Month of Subscription Entry	Impact on Revenue Growth
Subscription Revenue		**+ $66.6 million**	
Console Revenue	**+ 121.5%**	**+ $189.6 million**	**negative**
Total Video Game Revenue	**- 18.2%**	**- $17.4 million**	**positive**
First-Party Video Game Revenue	- 38.7%	- $8.6 million	positive
Third-Party Video Game Revenue	- 7.7%	- $5.6 million	positive
Video Game Revenue (control for ΔSupply)	**- 26.6%**	**- $25.4 million**	**positive**
First-Party Video Game Revenue	- 56.1%	- $12.5 million	negative
Third-Party Video Game Revenue	- 25.3%	- $18.4 million	positive

6. DISCUSSION

6.1. Summary of Findings

Across the two main subscription model entries within the video game console industry, we found that the introduction of the subscription model had a largely positive impact on the aggregate performance of the platform in the video game console industry. On the demand side, both major subscription models under study generated a new stream of subscription revenue and increased console revenue sales. We also found limited evidence of the cannibalizing impact of subscription models on (physical) video game revenue, above and beyond their impact on video game supply. PlayStation's video game revenue decreased at first, but this was mostly driven by first-party video game revenue. Video game sellers' third-party revenue was

impacted much less and recovered fast. In Xbox's case, the subscription model slightly increased video game revenue.

On the supply side, we found only limited evidence of subscription models driving out video game sellers. When video game introductions were found to decrease, this was mostly driven by fewer first-party video game introductions or fewer low-quality video game introductions after the subscription model, especially in the case of Xbox. Both major subscription models under study are therefore associated with a healthier pipeline of video game introductions either by increasing the quantity of video games in the case of PlayStation or increasing their average quality in the case of Xbox and PlayStation.

6.2. Theoretical Contributions and Implications

For industry observers and scholars, we provide a theoretical framework that studies the impact of the subscription model in the video game console industry on the incumbent business model of selling consoles and video games. Our results demonstrate that both scholarly and managerially, the dominant logic that subscription models in entertainment industries primarily cannibalize existing revenue streams does not necessarily apply to the video game console industry. Instead, the positive impact on console revenue and the limited impact on video game revenue in the video game console industry contrasts with findings in the music or movie and TV industry. This confirms that the effects of subscription models are context-specific (Stremersch et al. 2023). We are also the first to empirically show that subscription models may impact the supply of software introductions on platforms.

While we call on future research to provide more cumulative evidence to validate these results, one possible explanation is that video game platforms are a much more proprietary, closed-loop system. In contrast to the music or movie and TV industry, consumption of software within both the ownership-based model and subscription-based model predominantly

takes place on the same platform hardware. Subscription services such as Spotify or Netflix do not allow consumers to buy songs or movies on their platform for perpetual ownership. This implies that video game platform owners are much more in control of their various business models and their relationship. Platforms can strategically populate their catalogs to serve their platform goals. Our results, for instance, show that subscription models may allow platforms to use their increased channel power to gain quality in their video game offering.

These findings may help platform owners to appease – often higher-end – third-party video game sellers that have questioned whether the subscription model makes sense for their industry (Makuch 2021; Warren 2023). Our results primarily suggest that the subscription model has a limited impact on (physical) video game revenue over time, especially for third-party sellers. Because platform owners compensate sellers for licensing their video games to the subscription model, the net result may even turn out positive for participating sellers. For non-participating sellers, the initial decrease in video game revenue found in Study 2 warrants caution as some revenue displacement from video game purchases to subscription payments may take place. Video game sellers should also be cautious of revenue loss due to supplying fewer titles to the platform. The decrease in video game introductions found in Study 1 may point to a devaluation of individual titles in the eyes of the platform. We find that this is especially worrisome for sellers of lower-quality video games.

Such lessons learned can potentially be extended to other industries where the rise of subscription models has key stakeholders worried about the financial uncertainty and cannibalization associated with it. Subscription models that are based on drawing eyeballs and driving engagement need not necessarily hurt sales. Other entertainment markets may therefore adopt strategies inherent to the gaming industry to enhance their subscription business models. One suggestion is to form a closer connection between the subscription model and hardware or sales platforms to drive hardware and software sales. Companies such as Amazon and Apple

already have dedicated streaming hardware and sales platforms of their own that operate in tandem with their subscription service, but few companies have achieved the integration of their subscription *and* sales content as efficiently as the gaming industry has. Another suggestion is to integrate features that stimulate social and emotional connections to enhance user engagement and spillover purchasing. Just as gaming platforms have built-in features like multiplayer gaming or Twitch live-streaming, other entertainment platforms can introduce features such as watch or listening parties, where users can consume content together in real-time, or social sharing options, such as collaborative watch- or playlists that stimulate repeat consumption beyond a software's tenure on a subscription service.

6.3. Limitations and Future Research

Our study also has limitations that may direct future research. First, our empirical analysis focusses on two key subscription model introductions in the video game console industry. Context-specific studies can have great richness and are valuable research inquiries (Stremersch et al. 2023). However, one needs to be cautious to generalize the findings too easily to other settings beyond the context studied. Future research should examine the extent to which the structural changes we observe, persist in other contexts within gaming or other entertainment industries (Apple and Google, for instance, increasingly bet on their mobile app subscription services to complement their app store [Brown 2022]). We also only observe U.S. sales. Other regions may exhibit different consumption habits where the need for video game and console ownership may be less persistent upon the arrival of the subscription model.

Note that we also refrain from null hypothesis significance testing (NHST) as we believe that for studies like ours where the focus lies on managerial insights, there are real managerial costs associated with unjustifiably rejecting the alternative hypothesis (Lodish et al. 1995). Therefore, we interpret coefficients and interval estimates, and report them with their

standard errors, exact p-values and sample sizes to allow future research to make more general conclusions based on the cumulative evidence from multiple studies (McShane et al. 2024).

Second, our falsification tests demonstrate that the observed positive effects of the focal subscription models are likely not driven by preexisting trends or common shocks in the video game console industry. However, like all studies drawing on observational data, we cannot completely rule out unmeasured factors that underly some of our results. Continued research may identify or construct more precise counterfactuals that mirror the dynamics of the industry that is impacted by a subscription model without being directly influenced by it.

Third, because of our aggregate-level data, our study is a first exploration of the impact of the subscription model on changes in the market dynamics of the video game console industry. Methodologically, more disaggregate data of a higher frequency, for instance, would enable alternative estimation methods to measure the impact of subscription model entry, such as a baseline analysis (Pauwels & Neslin 2015). Substantively, consumer-level (panel) data, for instance, would enable the worthwhile investigation of how the impact of the subscription model differs across individual consumers and/or channels. For example, what are the consequences of subscribing to a subscription service for consumers' purchase behavior across the multiple digital and physical channels that consumers use? How does the impact vary by age? The positive effects that we observe may be generational. As cloud streaming of video games gains popularity, playing owned games on dedicated devices may become increasingly irrelevant. Future research should therefore investigate the long-term impact of subscription models on the video game console industry.

Fourth, our data allow us to research the sales and supply implications of the subscription model, but we do not observe (changes in) costs, neither on the platform owners' hardware and/or subscription side nor on the game sellers' software side. We also do not observe any payments of the platform owners to video game sellers for licensing their video

games to the subscription catalog. As a result, we cannot assess the impact of the subscription model on the profitability of both sides. We also did not include attitudinal (e.g., video game and platform engagement) measures that might reflect secondary objectives of subscription models, such as increasing customer loyalty. Additionally, we suggest addressing how subscription model entry affected other market dynamics within platform markets (e.g., price and advertising elasticity).

Finally, given the increasing interest of companies and brands to platformize their business, there are a lot of further research avenues to explore these business models. While a lot of focus has been given to branded platforms (Wichmann et al. 2022), this attention was lagging in the gaming literature, and our research offers a first stepping stone to remedy this. However, at the same time, our research also fits in a broader literature that should take the next step into investigating how to optimally monetize subscription models and platforms at large. We are not the first paper on platformization or subscription models, but in the larger scope of the impact of platforms on the economy, the work has only just begun.

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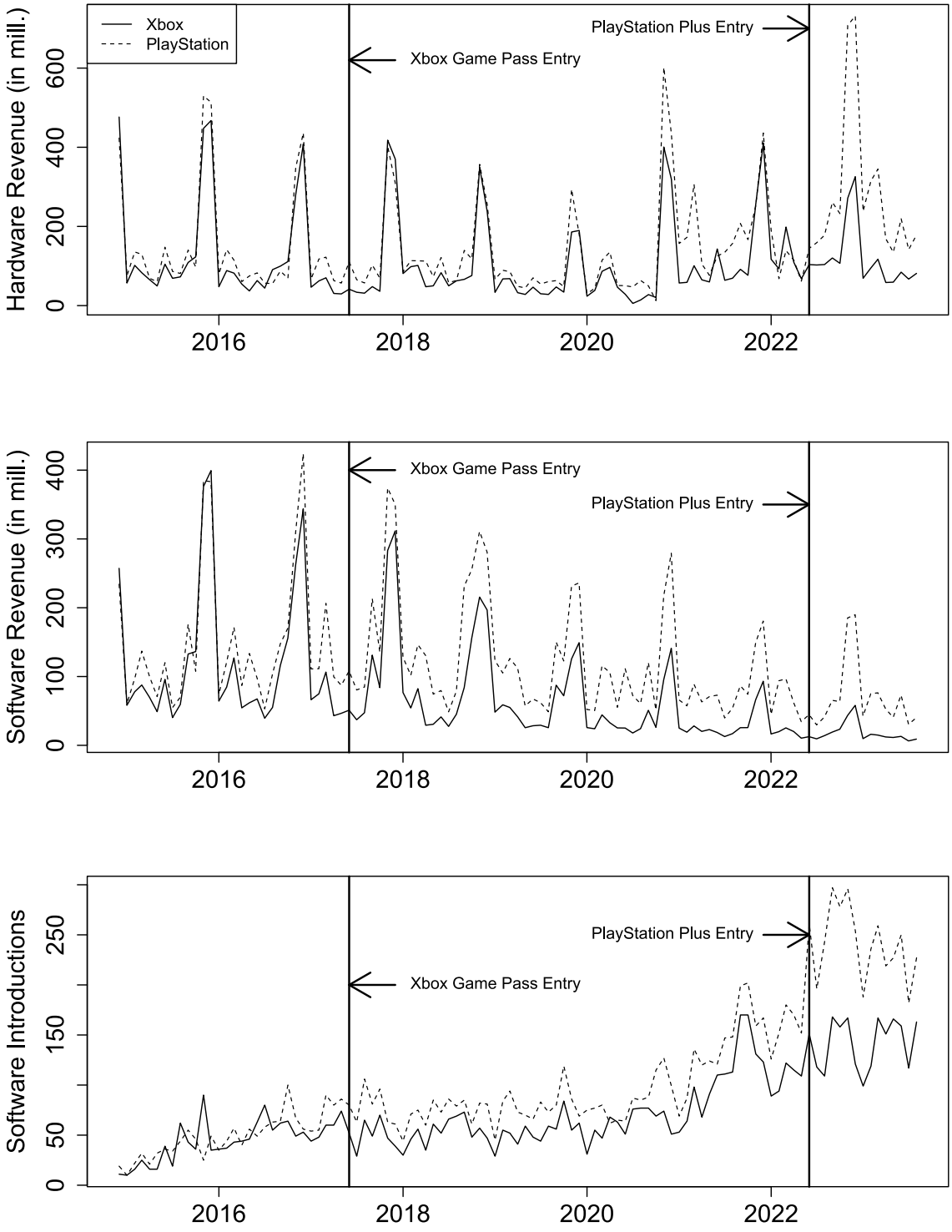
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APPENDIX A

Figure A1. Xbox and PlayStation Hardware Revenue, Software Revenue and Software Supply Over Time



APPENDIX B

Table B.1. Impact of Xbox Game Pass Entry on Video Game Revenue (with vs. without controlling for ΔSupply)

	Video Game Revenue			
	Focal Model			
	[2] Controlling for ΔSupply		**[2b] Without controlling for ΔSupply**	
Structural Break	**Coef.**	***p***	**Coef.**	***p***
$SubscriptionEntryStep_t$	.083	*.764*	-.155	*.462*
	(.275)		(.209)	
$SubscriptionEntryTrend_t$	-.006	*.791*	-.032	*.029*
	(.024)		(.014)	
Time Series Operators				
$\ln(VideoGameRevenue_{t-1})$	.168	*.243*	.055	*.627*
	(.142)		(.113)	
$\Delta\ln(VideoGameRevenue_{t-1})$	.129	*.375*	.246	*.038*
	(.144)		(.115)	
$\Delta\ln(VideoGameRevenue_{t-2})$	-.040	*.705*	.003	*.975*
	(.105)		(.101)	
$\Delta\ln(VideoGameRevenue_{t-3})$	.253	*.021*	.310	*.004*
	(.106)		(.101)	
Indirect Network Effects				
$\ln(VideoGameIntroductions_t)$	.263	*.189*		
	(.197)			
$\ln(VideoGameIntroductions_{t-1})$	.138	*.472*		
	(.190)			
Additional Control Variables				
$\ln(VideoGamePrice_{t-1})$	1.242	*.232*	1.958	*.035*
	(1.026)		(.902)	
Holidays	1.066	*.000*	1.118	*.000*
	(.189)		(.182)	
Trend	-.000	*.988*	.030	*.055*
	(.026)		(.015)	
Intercept	18.008	*.000*	17.391	*.000*
	(.564)		(.363)	
R^2	.800		.773	
N	60		60	

Note: Standard errors between brackets.

Table B.2. Impact of PlayStation Plus Entry on Video Game Revenue (with vs. without controlling for ΔSupply)

	Video Game Revenue			
	Focal Model [2] Controlling for ΔSupply		**[2b] Without controlling for ΔSupply**	
Structural Break	**Coef.**	***p***	**Coef.**	***p***
$SubscriptionEntryStep_t$	-.346	*.079*	-.221	*.245*
	(.191)		(.187)	
$SubscriptionEntryTrend_t$	.037	*.097*	.019	*.342*
	(.022)		(.019)	
Time Series Operators				
$\ln(VideoGameRevenue_{t-1})$	.299	*.059*	.146	*.307*
	(.153)		(.141)	
$\Delta\ln(VideoGameRevenue_{t-1})$	-.101	*.411*	-.040	*.707*
	(.121)		(.106)	
$\Delta\ln(VideoGameRevenue_{t-2})$	-.243	*.016*	-.228	*.014*
	(.095)		(.088)	
Indirect Network Effects				
$\ln(VideoGameIntroductions_t)$	.400	*.258*		
	(.348)			
$\ln(VideoGameIntroductions_{t-1})$	.123	*.744*		
	(.373)			
Additional Control Variables				
$\ln(VideoGamePrice_{t-1})$	-.703	*.014*	-.524	*.063*
	(.271)		(.272)	
Holidays	1.082	*.000*	1.200	*.000*
	(.15)		(.134)	
Trend	-.022	*.157*	-.007	*.536*
	(.015)		(.011)	
Next Gen	-.085	*.630*	-.046	*.810*
	(.176)		(.189)	
Intercept	18.540	*.000*	18.138	*.000*
	(.311)		(.109)	
R^2	.923		.835	
N	45		45	

Note: Standard errors between brackets.