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Ecosystem Competition: Platforms, Subsidiary Markets and Multihoming in the Videogames Industry

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Abstract. Emerging licensing regimes that generate revenue from game sales, along with gamers' consideration of video game purchases in their platform adoption decisions, call for a reexamination of traditional models of platform competition. We develop a novel model of competition between ecosystems, defined by platforms and their console-specific subsidiary markets for video games, to incorporate postadoption factors into platform pricing decisions. Counterintuitively, our results show that access to additional surplus from game sales intensifies competition, forcing platforms to further subsidize the gamer side. In the absence of royalties, publishers' licensing fees remain unaffected even when the subsidiary market is considered; however, these fees increase under royalty transfers, suggesting that money-side considerations dominate in ecosystem competition. When publishers multihome, the role of the subsidiary market becomes more pronounced: gamer-side subsidies deepen while platforms impose higher licensing fees. The subsidiary market also induces greater multihoming than predicted by traditional licensing models. Surprisingly, the effect of royalties on platforms becomes nonmonotonic, in contrast to scenarios where all publishers singlehome. This leads to a threshold beyond which platforms may no longer prefer multihoming, diverging from conventional models where multihoming is typically advantageous. Overall, our findings highlight that platforms' strategic responses to gamers' postadoption behavior and royalty-based licensing structures cannot be inferred through simple extensions of existing frameworks.

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1. Introduction

The videogame console industry offers a rich example of platform-based competition in which hardware manufacturers, game publishers, and gamers interact within an interconnected ecosystem. Console makers such as Nintendo, Sony, and Microsoft sell hardware to gamers while licensing their platforms to publishers who develop and distribute games. Historically, these licensing relationships have involved a substantial upfront commitment (Rose and Hancock 2025). Evidence from early cartridge-based systems such as the Nintendo Entertainment System and Sega Genesis, as well as more recent platforms like Sony's PlayStation series, highlights the central role of high lump-sum licensing fees in platform–publisher contracts, underscoring that access to the console installed base has long been a primary source of value for publishers (Grant 2005, Campbell 2013).

Over time, licensing practices have evolved to include not only fixed fees but also per-unit royalties on game sales. Industry reports describe arrangements in which major consoles such as PlayStation and Xbox have been reported to charge publishers a fixed licensing fee plus a per-unit amount on each copy of the game sold, so that platform revenues scale with the popularity of titles sold in the subsidiary games market (Greco and Appleyard 2001, Pham 2010). Similarly, empirical research on console competition (Chintagunta et al. 2009) shows that gamers' adoption decisions depend on both the availability and pricing of games, indicating that the downstream games market and the upstream console market are closely interlinked in practice. This stands in contrast to much of the platform economics literature, where publishers are typically modeled as paying licensing fees and then passively supplying titles. Thus, the interdependence between game-purchasing decisions and platform adoption by gamers and publishers remains only partially understood.

These industry patterns raise a natural question: How does the presence of a royalty-bearing games market—where publishers set game prices and share a portion of game-sale revenues with platforms—affect platforms' pricing and licensing strategies and their overall profitability? When platforms can earn revenues not just from console sales and fixed licensing fees but also from a share of game sales, each gamer represents a stream of potential downstream royalties. Likewise, publishers' pricing decisions shape not only the attractiveness of a platform to gamers but also the size of the royalty base that platforms may seek to capture. Understanding how these forces interact is essential for explaining observed shifts in hardware pricing, licensing terms, and exclusivity (Lee 2013) arrangements across console generations.

Our research develops a formal model of competing console platforms that incorporates two features the analytical literature has typically not modeled jointly. First, we explicitly account for the subsidiary games market by allowing publishers to set game prices and gamers to purchase games after adopting a console. This captures the idea that gamers do not derive value from the console alone, but from the ability to play games, and that publishers' pricing decisions critically shape that value. Second, we introduce a royalty-based licensing regime in which platforms may receive a per-unit payment on game sales, in addition to any fixed licensing fees they charge publishers. Platforms thus face a richer set of trade-offs: they can subsidize gamers more aggressively to expand their installed base and future royalty income, adjust licensing terms to publishers considering royalty flows, or rely more heavily on direct revenues from one side of the market.

An additional and practically important feature of the console industry is that many major game franchises are released on more than one platform. Games such as sports titles and large action franchises routinely appear simultaneously on multiple consoles, and multiplatform titles often dominate sales charts (Collins 2025). This publisher multihoming can increase the reach of a game and the potential royalty base for competing platforms, but it also reduces exclusivity and weakens each platform's differentiation in terms of unique content. Building on our royalty-based framework, we therefore extend the analysis to endogenize publishers' decisions to singlehome or multihome, and ask how the presence of royalties and a subsidiary games market changes the familiar intuition that multihoming on one side of a platform tends to benefit the platforms.

Within this unified setting, we analyze how platforms adjust their console prices and publisher fees when they take into account the downstream subsidiary games market and potential royalties from game sales. We show that access to additional surplus in the games market does not automatically make platforms better off. When platforms anticipate that each additional gamer will generate future game purchases, they have stronger incentives to discount consoles to attract more gamers, which can intensify competition on the gamer side. At the same time, when royalties are part of the licensing arrangement, platforms can respond by increasing the fees charged to publishers, effectively extracting more surplus from the publisher side instead of simply substituting royalties for licensing income. These forces can make gamers better off, and in some cases publishers as well, even when platform profits do not rise. We also examine how these effects interact with publishers' multihoming decisions. Allowing publishers to develop for multiple platforms increases potential royalty revenues but also changes how platforms value exclusivity and content differentiation. Our analysis reveals that, once royalty-based revenues from the games market are taken into account, multihoming may no longer always benefit platforms.

By grounding our model in observed licensing practices, the evolution of royalty-based contracts, and the prevalence of multiplatform releases in the console industry, and by explicitly connecting platform pricing to agents' interactions in the subsidiary games market, we contribute to a more complete understanding of ecosystem competition. Our results suggest that the strategic implications of royalties and multihoming in platform markets cannot be inferred by simple extrapolation from traditional two-sided models that overlook the details of downstream markets in which platform agents interact.

2. Related Literature

Platform Economics research has been built upon a traditional revenue model (Parker and Van Alstyne 2005, Eisenmann et al. 2006) where a platform sets prices on both sides of the market and in doing so it incorporates same-side and cross-side network effects. From the vast body of literature that examines platform competition (Armstrong 2006, Hagiu and Spulber 2013, Chellappa and Mukherjee 2021, Adner et al. 2020) a common observation emerges; in the context of two-sided markets, platforms make strategic pricing and licensing decisions by distinguishing between the 'money-side' where they extract revenue from and the 'subsidy-side' that they incentivize to generate indirect benefits for the revenue side. When setting prices or licensing fees, platforms determine which side to discount to maximize surplus extraction from the other side and the overall revenue.

A significant portion of platforms literature studies the videogames market where consoles serve gamers on one side of the market and publishers on the other. This stream of literature, especially empirical research (Chintagunta et al. 2009, Zhu and Iansiti 2012, Derdenger 2014, Haviv and Huang 2020) acknowledge that it is important to incorporate the dynamics of a games market in order to understand a platform's pricing decision and resulting sales (demand) outcomes in the context of the entire ecosystem. However, analytical models of videogame platforms have not studied this important aspect where interaction between gamers and publishers in a subsidiary games market may impact platform decisions and ultimately adoption.

Although not in the videogames industry context, there is an emerging stream of literature that acknowledges that activities external to the platform may impact platform adoption decisions (Dou and Wu 2021, Zhang et al. 2024). In particular, Dou and Wu (2021) consider a platform's strategy of piggybacking or recruiting users from external networks to enhance network effects. They find that including such an external market changes platform's pricing strategies in the focal market that may intensify or ease price competition depending on which side of the market is piggybacking on external networks. The role of an external market that is not necessarily under the control of the platform, but where platform agents are involved and their interactions impact platform's strategic decisions is key to understanding console strategies in the videogames industry. Even when relationships between platforms and content creators have been modeled, prior work (Hagiu and Lee 2011) that considers such an interaction treats the latter as independent producers and the platform is merely used as a distribution channel. This is distinct and different from the videogames industry in that game publishers need to first license a platform so as to develop games and consoles need to explicitly incentivize such licensing in the presence of network effects.

Further, the videogames industry seems to increasingly incorporate a distinct form of licensing where platforms expect revenue from game sales by publishers in the subsidiary market, and this possibility impacts platform decisions as well. The impact of this licensing regime on platforms' strategic decisions in the videogames industry while incorporating agent interaction in the subsidiary market has not received attention in the extant literature. Our research reveals several new insights that videogames platform strategists relying on extant wisdom must be cautioned about, and such insights are not mere extrapolations of extant understanding of platform's pricing strategy. Our results show that access to this new surplus from games-sales only serves to intensify competition wherein the platforms are forced to further subsidize the gamer side. Counter to intuition, publishers' licensing fees are unaffected in the absence of royalty even when considering the subsidiary market but surprisingly they increase with royalty transfer—implying that money-side considerations dominate under this ecosystem competition.

In the videogames industry, publishers may also choose to develop games for competing platforms. This phenomenon of adopting multiple competing platforms by platform agents is known as multihoming (Jeitschko and Tremblay 2020, Chellappa and Mukherjee 2021). This stream of literature suggests that platform's traditional pricing strategy of a money-side and subsidy-side may not be held and the role of interdependence of the two-sides on platform's pricing may be diminished if both sides multihome (Bakos and Halaburda 2020) or if consumers have different levels of multihoming (Barua and Mukherjee 2021). In this literature, as well, the impact of actions in a subsidiary market on platform's decisions in the videogames industry have not been studied.

When publishers multihome, the impact of the subsidiary market is further highlighted wherein the gamer-side discounts are deeper while the platforms charge higher license fees. The subsidiary market induces greater multihoming than observed in extant traditional licensing models although surprisingly the impact of royalty on the platforms is nonmonotonic in contrast to the case when all publishers singlehome. This results in a threshold where multihoming may not be preferred by platforms in contrast to extant models where multihoming by one side of the platform is typically beneficial for platforms and enhances platform profits (Bryan and Gans 2019, Bakos and Halaburda 2020, Li and Zhu 2021, Cachon et al. 2023, Teh et al. 2023).

Through our modeling abstraction, we put the findings of the extant platform economics literature, particularly in the videogames industry, under a microeconomic lens when a subsidiary games market's existence is taken into consideration by competing platforms when setting their prices. Table 1 summarizes our context and contribution with respect to extant literature.

3. Model

We develop our model from the extant models of platform competition in the console-based videogames industry. In order to contrast and delineate the impact of the new considerations on platform decisions, we first establish a baseline model for comparison purposes. Further, note that in addition to the case of singlehoming publishers modeled in this section, we also establish a baseline model of multihoming publishers in Section 4 and follow up with an extensive analysis of alternative licensing implications.

In the traditional two-sided platform (console) duopoly models for this industry, consoles compete with each other by strategically setting their fees so as to attract and extract rents from agents (gamers and publishers) on the two distinct sides of the market. Following extant literature (Armstrong 2006, Adner et al. 2020, Chellappa and Mukherjee 2021, Dou and Wu 2021),

Table 1. Comparison of Modeling Contribution to Extant Literature

Analytical models of console-based videogames

Study	Console's consideration in pricing decision	Console's pricing regimes	Modeling notes
This paper	Console accounts for publishers setting game prices, and gamers purchasing games, in its own console and licensing fees.	Standard licensing model (console/licensing fees) + royalty from game sales	• Competing platforms set console and licensing fees for gamers and publishers respectively • Publisher adopts console and sets game prices • Gamers consider both console fees and game price before adopting a platform • Publishers can choose to multihome
Bakos and Halaburda (2020)	Console does not account for the agents' actions in the games market in setting its fees.	Standard licensing model (console/licensing fees)	• Competing platforms set console and licensing fees for gamers and publishers respectively. • Gamers and publishers simultaneously adopt consoles. ○ Game prices are ignored by platforms. • Publishers can choose to multihome.
Belleflamme and Peitz (2010)	Publishers set game prices, but console decisions are independent of such decisions.	Standard licensing model (console/licensing fees)	• Competing platforms set console and licensing fees for gamers and publishers respectively. • Gamers and publishers simultaneously adopt consoles. ○ Publisher sets game prices that are ignored by platforms. • Publishers can choose to multihome.
Chellappa and Mukherjee (2021)	Console does not account for the agents' actions in the games market in setting its fees.	Standard licensing model (console/licensing fees)	• Competing platforms set console and licensing fees for gamers and publishers respectively. • Gamers and publishers simultaneously adopt consoles. ○ Game prices are ignored by platforms. • Publishers can choose to multihome.
Kim et al. (2021)	Console does not account for publishers' adoption decisions in a two-sided market.	Only royalty from game sales	• Monopoly platform sets console fee for gamers but does not charge publishers a licensing fee. • Gamers consider both console fees and game price before adopting a platform. ○ Platform or publisher may set game price.

Empirical models that study videogames consoles

Study	Do videogames prices play a role in platform sales/adoption?
Chintagunta et al. (2009)	Console sales estimates incorporate videogames prices and resulting availability.
Derdenger (2014)	Gamer's console adoption choice depends upon their utility from game purchase.
Zhu and Iansiti (2012)	Console sales estimates incorporate videogames prices and resulting availability.

Related general models of two-sided platforms

Study	Do activities of agents outside the platform play a role in platform's decisions?
Adner et al. (2020)	• Platforms decide whether to leverage a competing platform's user network by making its hardware compatible with the competitor's software. • Consumer's adoption of compatible software outside the focal platform impacts platform decision.
Bhargava (2022)	• A monopoly platform's (e.g., YouTube's) pricing decision is impacted by the action of agents in a three-sided market of creators, viewers and advertisers. • Decisions regarding creators and advertisers who do not interact account for interactions between viewers and creators/advertisers.

Table 1. (Continued)

Related general models of two-sided platforms	
Dou and Wu (2021)	• Users in external markets are recruited (and piggybacked upon) by competing platforms. • Such an external market impacts platforms' pricing decision.
Zhang et al. (2024)	• Competing platforms partner with data brokers to acquire external data to enhance their targeting capabilities in the presence of consumer privacy concern. • Such partnership decisions shape platform's pricing decisions.

we model the basic objective function of a platform $i \in \{a, b\}$ in the duopoly as

$$\max_{\{f^i, l^i\}} \Pi^i = n_g^i f^i + n_d^i l^i, \tag{1}$$

where a platform sets console fees (f^i) that gamers (g) pay when they purchase a console, and licensing fees (l^i) that publishers (d) pay to the platform to develop games. n_g^i and n_d^i represent the number of gamers and publishers who adopt the platform i.

Typically, this competition is abstracted through a Hotelling model where the two platforms take extreme positions. Gamers and publishers are distributed in their respective preferences indexed by their location $x \in [0, 1]$ and $y \in [0, 1]$ on their respective Hotelling lines (Armstrong 2006). Generally, agents (gamers and publishers) are modeled to incur a disutility (strength of which is parametrized by t) for moving away from their ideal preference when they adopt a platform. Agent's utility from adopting a platform is typically modeled as a function of platform's intrinsic value (θ) and same-side and cross-side network effects parameterized by α and β respectively.

As a result, the utility of a publisher (gamer) at location $y(x)$ on the Hotelling line at distance $y^i(x^i)$ from adopting the focal platform is $u_d^i(y)(u_d^i(x))$:

$$u_d^i(y) = \theta + \beta n_g^i - l^i - ty^i \tag{2}$$

$$u_g^i(x) = \theta + \alpha n_g^i + \beta n_d^i - f^i - tx^i \tag{3}$$

Considering these utility functions, the two platforms simultaneously set console and licensing fees such that the intended agents adopt their respective platforms. This gives us the equilibrium console and licensing fees of standard platform duopoly models, referred elsewhere in the paper as Traditional Licensing (TL) regime.

Lemma TL. *In the TL regime, a platform sets the console and licensing fees as $f_{TL}^{i*} = t - \alpha - \beta$ and $l_{TL}^{i*} = t - \beta$ respectively.*

Please note that we derive the expressions in Lemma TL only to represent the results of the extant models in our parameter set for ease of comparison with our model. The proofs of all the Lemmas and Propositions are available in Online Appendix A.

3.1. Modeling a Platform's Subsidiary Market for Videogames

To model game purchase, we consider a representative gamer who has a valuation $v \sim U[0, V]$ for a game where V represents the highest valuation for a game in the market. A gamer will purchase a game if $v - p^i \geq 0$ where p^i is the price set by the publisher. We can therefore derive the probability that a gamer will purchase a game to be

$$d(p^i) = 1 - \frac{p^i}{V}. \tag{4}$$

From n_d^i publishers of the console, if a gamer purchases μ games per publisher, the revenue per gamer is $\mu p^i d(p^i) n_d^i$. Since n_g^i gamers adopt the console, the total potential revenue for publishers from the subsidiary market is given as

$$R(p^i) = \mu p^i d(p^i) n_g^i n_d^i \tag{5}$$

where each publisher sells $\mu d(p^i) n_g^i$ games.

As discussed earlier in Section 2, our work also models another prevalent licensing regime in the videogames industry that has been ignored by extant literature. In contrast to the traditional licensing (TL) model, we model and refer to this form of licensing as the RL_k regime in this paper. A parameter $k \in [0, p^i]$ captures the royalty that a platform receives for each game sold. Therefore, we can write the objective function of a publisher in the videogames market under the RL_k regime as

$$p^{i*} = \arg\max_{\{p^i\}} [r(p^i) = \mu[p^i - k] d(p^i)]. \tag{6}$$

Equation (6) also allows us to examine the case where platforms need to consider these agent interactions outside their own control but may not receive any direct revenue from game sales. We denote this regime as $RL_{0|k=0}$.

Note that gamers are distributed along two dimensions: location x (preference for platform features) and valuation v (willingness to pay for games). These distributions play different roles in the model. A gamer's location determines platform adoption through a Hotelling indifference condition, while her valuation governs which games she purchases conditional on adoption and is used by publishers to set optimal game prices. Publishers observe the distribution of v and directly optimize game prices to maximize revenue from game sales as shown in Equation (6).

Lemma 1. *In the RL_k regime, a publisher set its optimal game price as $p^{i*} = \frac{V+k}{2}$.*

As we can see from Lemma 1, publishers set prices proportional to the per-game revenue transfer they make to the platform. In other words, it is apparent from this result that a portion of the revenue sharing burden borne by the publisher in the RL_k regime, is transferred directly to the gamer through higher game prices. Therefore, while it may look like a gamer is worse off in this regime, we do not yet know how a platform might respond to this potential additional surplus from this market. For example, a platform could forego some revenue from publisher licensing in order to further enjoy revenue from game sales, or it could also discount a gamer's console fee so as to attract more gamers. The latter can make the platform more attractive to publishers through indirect network effects leading to greater number of publishers and more game sales revenue. Another option for the platform is to focus largely on extracting revenue through its fees without much consideration of game sales revenue.

The optimality of these decisions in a competitive setting is not apparent. These strategic responses of a platform and its competitor to the presence of a subsidiary market not under their control, form the crux of our investigation. In other words, while we can see that the market for videogames generates additional surplus for the agents with potential returns to the platforms, it is not clear without further analysis whether this extra revenue is indeed beneficial to the platforms, and how they would determine their fees for both sides of the market.

3.2. Incorporating Gamers' and Publishers' Decisions in the Subsidiary Market in the Platform Duopoly

We now develop the RL_k licensing regime from the extant TL model to incorporate gamers' and publishers' decisions in the subsidiary market discussed in Section 3.1. But before we develop the model it is important to understand the changes to the timeline and information sets as compared with the extant TL model.

3.2.1. Timeline of Decision Making. The subsidiary market is introduced through a two-stage model such that in stage 1, the platforms simultaneously announce their fees for both sides (console and licensing fees). Publishers adopt one of two platforms to develop games. In stage 2, for the games developed, publishers announce game prices. In this stage, with the knowledge of console fees and game prices, gamers adopt a platform and purchase games in the subsidiary market.

It is important to note that this captures the gap in extant models wherein there is no consideration given to what happens after platforms are adopted. It is also important to note that from the information set perspective gamers are simply price takers who ensure that they are basic individual rationality (IR) and individual compatibility (IC) constraints are satisfied, that is, they derive nonzero utility and their choice of the focal platform and games purchase therein gives them a greater utility than the alternative. On the other hand, the publishers, while considering IR and IC constraints to adopt a console for development, also engage in price setting for their games. They are able to do so because of their knowledge of the distribution of valuation for games as discussed in Section 3.1. To reiterate, platform $i \in \{a, b\}$ set $f^{i*}$and l^{i*} in stage 1, and the publisher after observing console and licensing fees set by platforms in stage 1 sets p^{i*} in stage 2. In stage 2, the gamer observes f^{i*}, l^{i*}, p^{i*} and takes them into account for his choice of platform adoption.

3.2.2. Impact of Subsidiary Market on Platform Duopoly. We now need to consider the utility functions in the presence of the subsidiary market in contrast to extant TL model as described in Equations (2) and (3). In particular, we need to incorporate the platform's understanding of agent behavior in setting their fees, that is, f^i and l^i are functions of game price p^i. The platform knows that the publisher will not only consider the same elements as in Equation (2) but also in addition will take into account the revenue from game sales. This gives us the following:

$$u_d^i(y) = \theta + \beta n_g^i - l(p^i) - ty^i + \underbrace{r(p^i)}_{\substack{\text{revenue from} \\ \text{game sales}}} \tag{7}$$

Similarly, the platform will take into account that gamers will additionally consider their surplus from game purchase for adopting the platform:

$$u_g^i(x) = \theta + \alpha n_g^i + \beta n_d^i - f(p^i) - tx^i + \underbrace{\mu[v - p^i]n_d^i}_{\substack{\text{surplus from} \\ \text{game purchase}}} \tag{8}$$

A gamer who derives a value v for the game will enjoy a per game surplus of $v - p^i$, and as discussed in Section 3.1, a representative gamer buys μ games from n_d^i publishers. Therefore, his total surplus is $\mu[v - p^i]n_d^i$. Equations (7) and (8) each include an additional term that captures the publisher's pricing/royalty payment in the prevalent licensing regime (RL_k) as well as the gamer's purchase decision respectively. Therefore, we now have the new objective function for the RL_k licensing regime as follows:

$$\max_{\{f(p^i),l(p^i)\}} \Pi^i = n_g^i f(p^i) + n_d^i l(p^i) + \underbrace{k\mu d(p^i) n_g^i n_d^i}_{\substack{\text{revenue from} \\ \text{subsidiary market}}}, \quad (9)$$

In Equation (9), $\mu p^i d(p^i) n_g^i$ is the revenue generated by a publisher from gamers in the subsidiary market. Therefore, the total additional revenue generated by a platform from the royalty transferred by n_d^i publishers is $k\mu d(p^i) n_g^i n_d^i$.

3.2.3. Solution Technique. Keeping in mind the timeline of the game and information set, we solve for the equilibrium fees to be set by the platforms. We solve the game by backward induction where we first solve for the game prices set by publishers to obtain p^{i*} as given in Lemma 2. Since by bounded rationality, the platform will expect the publisher to set prices in this fashion, it will compute and incorporate this price in its setting of fees. An additional component that needs to be accounted for is the platform's expectation of gamer surplus. Since the platform knows only the distribution of gamer valuations ($v \sim U[0, V]$), in computing the surplus from games it will consider a representative gamer whose valuation is given by expected value of v. At this point the solution technique is consistent with extant Hotelling models of platforms with network effects, where a fulfilled expectations equilibrium provides a solution (Katz and Shapiro 1985, Farrell and Saloner 1986, Economides 1996). Note that the indifferent gamer is found by solving $u_g^a(x; E[v]) = u_g^b(x; E[v])$, where the utilities already embed the expected surplus from game purchases (see Equation 8). For notational simplicity, we write this as $u_a(\hat{x}) = u_b(\hat{x})$, but the functional dependence on $E[v]$ is implicit throughout.

Further, console adoption market and games market have distinct coverage properties. Some gamers may adopt the console without purchasing the games (Adner et al. 2020). In the console adoption market, modeled via Hotelling line with unit mass of gamers, we assume full market coverage that is ensured by a sufficiently high intrinsic platform valuation θ. This is standard in Hotelling-based platform models (Armstrong 2006, Chellappa and Mukherjee 2021). The condition $n_g^a + n_g^b = 1$ refers to the shares of console adopters, not to whether all adopters purchase games. In the games market where publishers set game prices after platforms announce fees, we impose no coverage assumption in this market. Equation (4) governs the probability that a gamer purchases a game conditional on having adopted a console: $d(p^i) = 1 - p^i/V$. Some console adopters may optimally purchase zero games, depending on their valuation v.

Further details and exact derivation are provided in the respective proofs in Online Appendix A.

3.2.4. Analysis.

Lemma 2. *In the royalty-based licensing (RL_k) regime, a platform sets the console and licensing fees as $f^{i*} = t - \alpha - \beta - \mu\frac{(V-k)}{4}$ and $l^{i*} = t - \beta + \mu\frac{k(V+k)}{4V}$ respectively.*

As with extant models of platform competition, platform fees on either side are correspondingly discounted by the network effect parameters. The net surplus available to the publisher in the subsidiary market is correspondingly reduced by k per game since that is a direct revenue that the publisher shares with the platform. A platform considers this surplus that is generated in the subsidiary market, and the gamer side is further discounted by a factor proportional to the actual surplus($v - k$) available to the publisher. In other words, in anticipation of the potential surplus from the subsidiary market, under competition, the platform discounts its console fees. While the licensing fee is also a function of the above parameters that characterize the subsidiary market, it is important to note that this fee is increasing in the gamers' valuation of games as well as the royalty.

To understand the impact of the subsidiary market, we now compare the fees from the licensing-only regime as derived in Lemma TL with that of the prevalent licensing-plus-royalty regime as given in Lemma 2.

Proposition 1. *In the royalty-based licensing (RL_k) regime where platforms consider gamer and publisher decisions in the subsidiary market, they further discount the gamer side as compared with the traditional licensing model (TL).*

We shall first explore the RL_0 regime where gamer decisions in the subsidiary market are taken into account by the platform even if it does not receive an explicit royalty from game sales. Comparing Lemma TL and Lemma 2 and setting $k = 0$, we see that irrespective of royalty received, the platform is forced to discount gamers as compared with the traditional licensing model. Such a discount though, is decreasing in the royalty that the platform receives. Thus, a first understanding provided by our model is that the new licensing regime and platform consideration of gamer purchase decisions only serve to intensify competition, at least on the gamer side. In other words, the platforms recognize that each additional gamer creates value through game purchases and potentially through royalty transfer from their purchase in the subsidiary market. Therefore, platforms are likely focused on making their platforms attractive to gamers to extract any potential value from the other side.

Proposition 2. *In the royalty-based licensing (RL_k) regime when platforms compete for the surplus generated in the subsidiary market, they charge a higher licensing fee only if they receive payback from the publisher. The licensing fee remains unchanged from the traditional licensing model otherwise.*

When we consider licensing fees, we observe that in the absence of royalty to the platforms (RL_0case), the platforms pursue the same strategy as in the traditional licensing model—however it is interesting to note that when royalties are paid to the platform they actually increase their licensing fees. The economic intuition behind this observation is similar to those from the literature on money-side and subsidy-side for platforms (Armstrong 2006) wherein platforms often choose to subsidize one side of the platform so as to enjoy the benefits from networks effects on the other side from which they extract revenue. The impact of the subsidiary market is such that while the nature of the side-specific strategies does not change, the intensity with which they engage each side is increased. It is important to note that such intensity of rent extraction is proportionally increasing in the royalty amount for both the subsidy (gamer) and money (publisher) sides. This is a significant observation in that royalties are not simple transfer payments to a platform; platforms simply do not substitute revenue from game sales in lieu of revenue from licensing fees. This warrants a further investigation of the surplus generated by the presence of a subsidiary market for videogames.

Lemma 3. *The total surplus generated in the subsidiary market for a platform's videogames is* $S_{RL_K} = \mu \frac{(3V+k)(V-k)}{32V}$.

Proposition 3. *Platforms are not always better off due to the excess surplus generated in the subsidiary market; they stand to gain only when the royalty is above a significant threshold.*

The distribution of gamer valuation of videogames determines their participation and therefore the total surplus generated in this market is given by Lemma 3. Note that this surplus is principally distributed between gamers who retain a portion $S_g = \mu \frac{(V-k)^2}{32V}$ and publishers who get to keep $r(p^{i*}) = \mu \frac{(V-k)^2}{16V}$ after transferring $S_P = \mu \frac{k(V-k)}{8V}$ to the platform. A first understanding of the split in surplus is provided by examining the total platform profit which is given by

$$\Pi^{i*} = t - \frac{\alpha}{2} - \beta - \frac{\mu(V-3k)}{8} \tag{10}$$

It is clear from Equation (10) that at a base level, consideration of gamers' purchase decisions in the subsidiary market clearly intensifies competition in the absence of explicit royalties(RL_0) from the publishers. We can see this from comparing the above equation (after setting $k = 0$) with the profits from the *TL* model. The question therefore is who benefits from this scenario; an analysis of gamer and publisher surplus tells us the rest of the story. The total (platform adoption plus subsidiary market) gamer surplus in the RL_0 regime is derived as

$$\theta - \frac{5t}{4} + \frac{3(\alpha+\beta)}{2} + \underbrace{\frac{5\mu V}{16}}_{\substack{\text{Surplus from} \\ \text{Games Market}}} \tag{11}$$

And similarly, the total publisher surplus is given by

$$\theta - \frac{5t}{4} + \frac{3\beta}{2} + \underbrace{\frac{\mu V}{8}}_{\substack{\text{Surplus from} \\ \text{Games Market}}} \tag{12}$$

From the additional surplus terms (to the *TL* model) in the above equations, we can see that both the gamer and the publisher are better off when the platforms have to consider the gamer purchase decisions and in the RL_0 case, this gain is more than the loss suffered by the platform due to lowered game fees. In other words, in the absence of explicit royalties, the competitive intensity is informed by the unchanged licensing fees and the further discounted gamer fees (than the *TL* model). However, we also see that $\frac{\partial \Pi}{\partial k} > 0$ implying that platform profits are increasing in royalty; a further examination, as detailed in Proposition 3, tells us that there is a threshold such that the overall profits for a platform can be more than the *TL* model. This threshold $\left(k > \frac{V}{3}\right)$ provides us with an insight into competition with consideration of a subsidiary market, that is, platforms can be better off in this new regime based on the royalties they receive.

In summary, we cannot rely on the intuition that platforms may always be better off due to access to the surplus from the games market as competition forces them to intensify their gamer-side discounting strategies. Importantly we find that while both optimizers (platforms that optimize fees and publishers that optimize game prices) may find themselves worse off than in the traditional licensing model, the price-taker (gamer) is always better off when the subsidiary market is considered. Thus clearly, reliance and extrapolation of results from extant literature to design platform pricing strategies under the prevalent licensing regime may fall short of optimal outcomes.

So far, we have made the assumption that publishers singlehome. This allowed us to disentangle the platform decisions from a publisher's ability to develop for multiple platforms. In Section 4, we explore the effects of multihoming publishers on the role of a subsidiary market on platforms' pricing decisions.

4. Multihoming Publishers

Although, publishers may develop games exclusively for a platform (e.g., Halo for Xbox, The Last of Us for

PlayStation, The Legend of Zelda for Nintendo), multihoming is not uncommon, for example, publishers such as Electronic Arts (EA), Ubisoft, Activision, and Visual concepts regularly launch their major franchises—such as FIFA, Assassin's Creed, Call of Duty, and NBA 2K—simultaneously on PlayStation, Xbox, and sometimes Nintendo Switch. Multiplatform games consistently dominate best-seller lists across different consoles (Knezovic 2025). Both research and practitioners note that though publishers may multihome generally gamers are exclusive in their loyalty to a platform. As a result, multihoming by publishers has been modeled by extant research although neither the subsequent game purchase decision nor the royalty-based licensing has been considered.

In this section, we therefore, re-examine how the incorporation of royalty from subsidiary market interacts with multihoming and impacts the extant understanding of platform competition when one side of the market multihomes (Bryan and Gans 2019, Bakos and Halaburda 2020, Li and Zhu 2021, Cachon et al. 2023, Teh et al. 2023). Just as in the previous section, we shall now first develop the respective utility functions for platform adoption that includes the subsidiary market wherein gamers may enjoy purchasing games from both singlehoming and multihoming publishers.

It is to be noted here that along the lines of recent work (Bakos and Halaburda 2020, Chellappa and Mukherjee 2021), we endogenize the decision of a publisher to multihome, that is, publishers may choose to exclusively develop for a single platform or for both platforms based on their utilities from doing so. We shall first characterize the utility function of the gamer discussed in Equation (8) for the multihoming case. Note that now the gamer derives cross-side network effects from both the exclusive publishers of the focal platform as well as the multihoming publishers (n_d^{ab}) of the platform such that $n_d^a + n_d^b + n_d^{ab} = 1$; the proportions of exclusive and multihoming publishers shall be derived in equilibrium.

We now rewrite the utility function of a gamer in Equation (8) as

$$u_g^i(x) = \theta + \alpha n_g^i + \beta[n_d^i + n_d^{ab}] - f(p^i) - tx^i + \mu[v - p^i][n_d^i + n_d^{ab}] \tag{13}$$

From the publisher's perspective, not only does the multihoming publisher license both platforms but also has to pay a royalty to both platforms. We model this along the lines of Bakos and Halaburda (2020) where the utility of a multihoming publisher is

$$u_d^{ab}(y) = u_d^a + u_d^b \tag{14}$$

Therefore, we can write the platform's profit when publishers multihome as,

$$\max_{\{f(p^i),\, l(p^i)\}} \Pi^i = f(p^i)n_g^i + l(p^i)[n_d^i + n_d^{ab}] + k\mu d(p^i)n_g^i[n_d^i + n_d^{ab}]. \tag{15}$$

Just as in Section 3 (singlehoming publisher case), we shall also provide the results of the traditional (TL) model with multihoming publishers in Online Appendix B. The timeline of events and the solution technique are similar to those discussed in Section 3.2.1, with the only difference being that a publisher may now choose to either singlehome or multihome. We shall now analyze the fees and royalties in the multihoming case:

Lemma 4. *In the RL_k regime with multihoming publishers, platform i sets the console and licensing fees as,*

$$f^{i*} = t - \alpha - \frac{\beta(\theta + 2\beta)}{2t} - \frac{4\mu V((V^2 - k^2)(\beta + 2\theta) + 2\beta V(2V - 5k)) + \mu^2(V-k)(V^2(V-5k) + k^2(V-k))}{64tV^2}$$

and $l^{i*} = \frac{\theta}{2} + \mu\frac{[V-k]^2 + 2k^2}{16V}$ *respectively.*

Proposition 4. *In contrast to the singlehoming scenario where console fees in the royalty-based models are always lower, when publisher multihome, above a certain royalty payback* (k) *threshold, platforms may charge higher console fees than extant multihoming* (TL) *models.*

Just as in the singlehoming publisher case, we first consider the RL_0 scenario where no royalties are paid, two sets of comparisons are warranted. First, we need to examine the discounted fees with and without a subsidiary market, and second, we also need to compare them with the discount offered in the singlehoming publisher case so as to examine and understand the role of the subsidiary market. Henceforth, we shall use the superscript *sh* and *mh* to represent singlehoming and multihoming publishers' scenarios respectively.

Consider the console fees in Lemma 4; while the first part of the expression $\left(t - \alpha - \frac{\beta(\theta+2\beta)}{2t}\right)$ represents the console fees in the traditional licensing model with multihoming publishers ($f_{TL}^{i*,mh}$), the second part $\left(\frac{4\mu V((\beta+2\theta)+4\beta)+\mu^2(V^2)}{64t}\right)$ represents an additional discount that the platform now provides to the gamers. Note that this discount is given even in the absence of any direct royalty paid to the platform (RL_0). This confirms that independent of homing behavior, platform's consideration of the subsidiary market is beneficial to gamers when no royalty is paid back to the platform from the subsidiary market. Further, we find that this subsidy is higher in the multihoming case compared with that in the singlehoming case, that is, $f_{TL}^{i*,mh} - f_{RL_0}^{i*,mh} > f_{TL}^{i*,sh} - f_{RL_0}^{i*,sh}$ leading us to conclude that whereas multihoming increases competition on the nonmultihoming side, consideration of the subsidiary market further underscores this intensity.

However, unlike the singlehoming case, the royalty payback plays an important role in this comparison. While in both single and multihoming scenarios, the subsidy to gamers is decreasing in the royalty payback, we observe that interestingly this leads to a scenario where the console fees are even higher than the extant *TL* model, above a threshold. This is an important observation from our analysis in that generally in multihoming the console fee is lower than the *TL* case, that is, when publishers can multihome, the platform competition on the nonmultihoming (gamer) side become more intense, but this is not necessarily true in the RL_k regime when platforms receive a high royalty payback from the subsidiary market.

An important point of departure from extant models of multihoming stems from the platform's strategic decision to subsidize the nonmultihoming side. Generally, in extant models as well as our baseline comparison models (*TL*), a platform charges an even lower console fee (than singlehoming) in the multihoming scenario. This is reflective of the fact that the multihoming side being the money side, being attractive to gamers (for cross-side network effects purposes) is even more significant. However, we note that this may not always be true if the platform is able to get significantly higher royalty payback. In such a scenario, the platform does not shy away from extracting revenue from the gamer side as well, and in fact does so even more than that in the singlehoming case.

Next, we need to examine the platform's licensing fee setting in this current regime. From Lemma 4, we have Proposition 5.

Proposition 5. *In the RL_k regime, platforms always charge higher licensing fees in the multihoming scenario compared with extant (TL) models, irrespective of the royalty payback.*

Not surprisingly, just as in the singlehoming case, the publisher (multihoming) side is the "money side" here as well. However, we observe one critical difference wherein even when platforms do not receive a payback ($k = 0$), the consideration of gamers purchase decision causes the platform to charge a higher licensing fee than in extant models. Extending this observation from the RL_0 regime, and considering comparative static with respect to k, we observe that while licensing fee in this case is always greater than that in extant models, it is nonmonotonic in its relationship with the payback parameter. While this is surprising, the economic intuition is apparent when considering the corresponding change in the proportion of multihoming publishers with respect to k. An important question to explore is why do platforms first lower and then increase their licensing fees with respect to k in the multihoming case while in the singlehoming case generally licensing fees are strictly increasing in k. To answer this question, we shall examine the relative proportion of single and multihoming publishers considering the publishers' incentive to choose one or the other.

Proposition 6. *Publishers' incentive to multihome decreases in the royalty payback (k). Under smaller (higher) royalty payback, a greater (lower) number of publishers multihome than the extant (TL) model.*

Consider the proportion of multihoming publishers in the RL_k regime in Equation (16). By comparing the number of multihomers in the RL_0 with the *TL* model where $n_{d,TL}^{ab} = \frac{\theta+\beta}{t} - 1$, we can clearly see that in the absence of royalty payment ($k = 0$) to the platform, the number of multihomers is higher than the extant multihoming model.

$$n_{d,RL_k}^{ab} = \frac{\theta + \beta}{t} - 1 + \mu \frac{(V-k)^2 - 2k^2}{8tV} \tag{16}$$

Further, we can see that $\frac{\partial n_{d,RL_k}^{ab}}{\partial k} < 0$. A simple explanation for this observation is that in addition to the licensing fees for both platforms, the multihoming publisher also has to pay double the royalty. Keeping this in mind, we can therefore see that the platform reduces its licensing fees as k increases to continue to be attractive to the multihoming publisher. However, since the multihoming publisher's incentive is strictly falling in k, at some k, the platform switches back to extract revenue from the singlehoming publisher and thus providing the explanation for our observation in Proposition 5. This is evident from the fact that the proportion of singlehomers is increasing in k. Therefore, it appears that the royalty payback, and the consideration of the subsidiary market plays an important role in understanding the differences to the multihoming publisher in the RL_k regime.

In further investigating the differences in the number of multihoming publishers in the extant model and RL_k regime, we see that while the subsidiary market scenario incentivizes more multihoming, beyond a certain threshold, $k = (\sqrt{2} - 1)V$, we find fewer number of multihoming publishers compared with extant model.

In summary, while the larger understanding of the money and subsidy side remains the same, our analysis of the multihoming publishers in this regime reveals several differences driven by the royalty payback. Not only are platform responses nonmonotonic in reaction to this parameter, unlike the singlehoming case, they may even be higher or lower in their magnitude. This leads us to the larger examination of value to platforms in publisher's multihoming.

Proposition 7. *In contrast to extant models of multihoming, publisher multihoming does not always make the platform better off in the royalty-based regime.*

The extant literature on multihoming agrees on the outcome of multihoming for platforms; a vast number of papers (Bryan and Gans 2019, Bakos and Halaburda 2020, Li and Zhu 2021, Cachon et al. 2023, Teh et al. 2023) find that one-sided multihoming benefits platforms. The general intuition behind this observation is that platforms are able to exercise power on the multihoming side thus softening competition overall. Our research provides a key departure from this understanding when the licensing regime incorporates royalty. Essentially, we show that in this licensing regime that involves a royalty payback, the competition is softened only to a certain extent in the one-sided multihoming case.

Note that in the RL_k regime, platforms extract revenue from publishers through licensing as well as royalty. Keep in mind, however, that these two streams of revenue are not necessarily independent of each other, in that, the licensing fee is also impacted by the royalty and has a U-shaped relationship with; the licensing fee first decreases in this royalty and then increases. Further, as discussed earlier, the number of multihomers is strictly decreasing in this royalty payment. Therefore, publishers' total revenue from multihomers is falling in k.

Now let us consider the revenue from publishers who develop exclusively for one platform. We observe that this revenue is increasing in the royalty parameter. An analysis of the adopters of a given platform will tell us that the rate at which n^{ab}_{d,RL_k} falls with k is higher than the rate at which the number of singlehomers increase; specifically, $\frac{\partial n^{ab}_{d,RL_k}}{\partial k} = -\frac{\mu(V+k)}{4tV}$ and $\frac{\partial n^{i}_{d,RL_k}}{\partial k} = \frac{\mu(V+k)}{8tV}$. Thus, the total number of publishers on a platform is decreasing in k, and consequentially the total revenue of the platform from publishers also decreases with k. Further, the revenue that a platform gets from a publisher's game sales ($k\mu n^i_g d_i[n^i_d + n^{ab}_d]$) is such that it first increases in k and then decreases. Finally, the total revenue from gamers that platform gets is increasing in the royalty payback. All these effects together contribute toward a platform's profit that first increases in k and then decreases with higher royalty payment; specifically, $\frac{\partial^2 \Pi^{i,mh}_{RL_k}}{\partial k^2} = -\frac{3\mu^2[[V-k]^2+2V^2]}{64tV^2}$.

Note that from the singlehoming scenario (Lemma 2), we can derive that a platform's profit is $\Pi^{i,sh}_{RL_k} = t - \frac{\alpha}{2} - \beta - \mu[V - 3k]$ and this profit is increasing in k. Further, as shown in the Online Appendix A, from Lemmas 2 and 4, we can derive that in the RL_0 regime when the platform receives no royalty payback, the platform profit in the multihoming case is strictly higher than the profit in the singlehoming. By contrast, when k is at its highest possible level (i.e., $k = V$), we can verify that the platform's profit in the singlehoming scenario is strictly higher than that in multihoming. Therefore, conditional on the royalty payback k, multihoming by one side of the platform may not be beneficial to the platform as previously understood in the extant literature.

5. Discussion and Conclusions

Our research addresses a fundamental gap in prevailing models of video game console competition by incorporating two closely linked, yet often overlooked, realities of this industry. First, gamers purchase consoles in order to play games, so their game purchase decision feeds into their console adoption decisions rather than occurring as an independent, downstream choice. Second, licensing and adoption by publishers is rarely a one-off event; instead, the dominant contractual form is an ongoing relationship in which publishers adopt a platform and then make per-copy royalty payments on each unit sold, rather than paying only a fixed fee at entry. Industry practice clearly reflects this pattern, and empirical academic work underscores that games and game prices are central drivers of gamer demand and platform performance, yet formal models have treated them in a reduced or simplified way. By jointly emphasizing the role of gamers' game-purchasing behavior and publishers' royalty payments to the console maker, this research reframes platform competition as inherently tied to a rich subsidiary market rather than only to console and initial licensing choices.

Building on this premise, the analysis develops a first formal model that explicitly incorporates the subsidiary games market—where publishers sell titles and platforms earn royalties—into the core of platform competition in the video game console industry. In this framework, console makers do not simply set hardware prices and fixed license fees in isolation; they also strategically anticipate the flow of value from game sales through per-unit or percentage-based royalties, reflecting the revenue patterns observed historically from Nintendo's cartridge systems to the disc- and download-based ecosystems of Sega, Sony, and Microsoft. Modeling gamers' postadoption game purchases as endogenous and linking platform revenues to realized game sales, the results show that the presence of a subsidiary market can lead platforms to offer deeper subsidies to gamers and to adjust licensing and royalty terms in ways that standard two-sided models would not predict. In turn, these findings generate a set of managerial and theoretical contributions: they highlight how console strategies must be evaluated at the ecosystem level, reshape intuitions about pricing on both sides of the market, and clarify the strategic consequences of publisher multihoming.

Managerial Implications. For managers, our research findings emphasize that console strategy must be designed at the ecosystem level, integrating console pricing, licensing fees, and downstream game revenues rather than optimizing platform adoption element in isolation. When platforms expect substantial profit from royalties on future game sales, each additional gamer becomes more valuable, which rationalizes deep subsidies on the gamer side and low console margins. This perspective cautions against viewing royalties as simple substitutes for upfront licensing fees: in singlehoming settings, higher per-game royalties can go hand in hand with higher license fees if they simultaneously increase incentives to subsidize adoption and grow the installed base. Managers should therefore evaluate proposed changes to royalty or licensing terms by tracing their impact on gamer-side pricing and game monetization, not just on cash flows from licensing to publishers.

Our analysis also shows that royalty design and publisher multihoming policy must be coordinated, and caution managers about treating publisher multihoming as unambiguously beneficial. Multihoming can enhance console value and royalty volume at moderate royalty levels, but as royalties rise it can become less attractive for publishers and less desirable for platforms, which may then prefer more exclusivity or restricted multihoming to preserve differentiation and control competition for gamers. This creates a three-way balancing act across gamer subsidies, publisher contract terms, and multihoming breadth, with direct implications for revenue-sharing, exclusivity deals, and decisions about supporting cross-platform development. For emerging models such as subscriptions and cloud gaming, where payouts depend on engagement rather than unit sales, the same logic applies, that is, platforms that ignore the subsidiary games market and treat higher "royalties" and broader multihoming as unconditionally good risk overestimating their upside and underinvesting in the gamer-side incentives needed to sustain adoption.

Contributions to Theory. Our research extends analytical models of console platform competition by explicitly incorporating a subsidiary games market in which postadoption interactions between gamers, publishers, and platforms are central considerations. Instead of treating console competition as a one-shot adoption decision, the model recognizes that many games supplied by singlehoming publishers run only on the console they license, so the downstream market for games is platform-specific unless and until publishers choose to multihome and support multiple consoles. This modeling framework captures how gamers' expectations about game consumption and publishers' platform choices jointly shape console adoption and royalty flows. By embedding these activities into a two-stage game where platforms first set console prices and licensing terms and then gamers and publishers interact in the subsidiary market, the analysis formalizes the feedback loop between adoption and usage that empirical work highlights, but most theoretical models abstract away from.

Our analysis yields three main insights into platform economics in the videogames industry. First, adding a surplus-generating subsidiary market does not automatically make platforms better off; royalty revenues from game consumption can intensify competition for gamers, increase gamer welfare, and force platforms to be more deliberate about how licensing fees and royalties are combined. Second, explicitly modeling the dual licensing regime, with upfront fees plus per-unit royalties, shows that access to royalty income can lead platforms to increase, not decrease, fixed licensing fees in equilibrium, which aligns with industry practice where substantial certification or licensing fees coexist with sizable royalty rates. Third, embedding publisher multihoming in this royalty-bearing context reveals that while multihoming expands reach and can raise royalty volume at moderate rates, high royalties erode its attractiveness and strengthen incentives for exclusivity. This perspective resonates with current industry dynamics, where exclusives and timed exclusives remain strategically important even as most major console releases are available on multiple platforms and cross-platform support is widespread.

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