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CHANNEL COORDINATION ON EXCLUSIVE VS. NON-EXCLUSIVE CONTENT UNDER ENDOGENOUS CONSUMER HOMING

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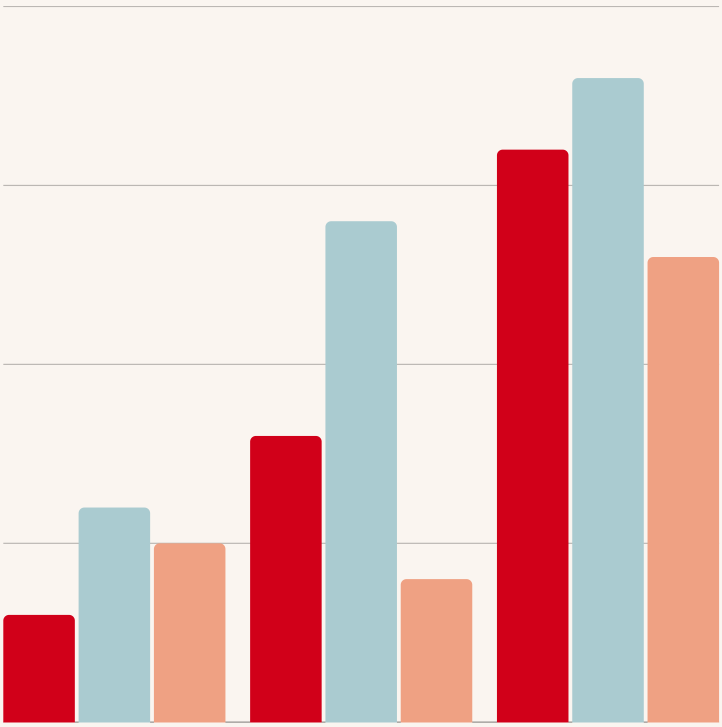

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Channel Coordination on Exclusive vs. Non-Exclusive Content under Endogenous Consumer Homing*

Malin Arve† Ole Kristian Dyskeland‡ Øystein Foros§

Abstract

We analyze competition between two digital platforms selling subscriptions for unlimited access to their content catalogs (e.g., streaming and TV broadcasting platforms). A content provider offers additional content to the platforms. The content provider chooses between offering a revenue sharing contract and a per-consumer wholesale pricing contract towards the platforms, thereby endogenously determining whether its content will be distributed non-exclusively (on both platforms) or exclusively (on one platform). Our model yields clear predictions: In markets with low initial exclusivity, the content provider and both platforms prefer per-consumer wholesale pricing to endogenously promote non-exclusive distribution. Platforms set subscription prices that lead to full consumer singlehoming. Conversely, in markets with high initial exclusivity, all market players prefer a revenue-sharing contract that induces exclusive distribution, with platforms setting prices that encourage some consumers to multihome.

JEL Classification: L13, L14, L82

Keywords: Content provision, digital platforms, multihoming, pricing.

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1 Introduction

Many digital platforms, including streaming and TV distribution platforms, generate revenue through consumer subscriptions that provide access to their full content catalog. Consequently, the business model differs from traditional retailing, as well as app stores and e-book stores, where consumers typically purchase individual units of content.[1] A significant share of platforms' content catalogs is sourced from vertically separated content providers – such as music artists (or music labels) or film and television production companies (or film studios).

A key observation is that these markets vary in the degree of exclusive content each of the platforms offer and in consumer behavior – specifically, whether consumers typically subscribe to only one platform (consumer singlehoming) or whether a significant portion subscribes to multiple platforms (consumer multihoming). Streaming platforms for movies and series, such as Netflix and HBO Max, feature a significant amount of exclusive content, with new releases being distributed exclusively on their platforms. To watch House of the Dragon, a consumer must subscribe to HBO Max, while access to Squid Game requires a Netflix subscription. These exclusives create positive incremental value for consumers from subscribing to both. In contrast, music streaming platforms, like Apple Music and Spotify, offer catalogs of content, including new releases, with minimal exclusivity. The incremental value of subscribing to both Apple Music and Spotify is limited. Unsurprisingly, consumer multihoming is more prevalent in markets where platforms provide a substantial amount of exclusive content.[2]

From recent literature on discrete choice models – where the classical linear city of Hotelling (1929) is the most common workhorse model – we know that allowing consumers to subscribe to multiple platforms may significantly change competitive pricing strategies (Kim and Serfes, 2006; Doganoglu and Wright, 2006; Anderson et al., 2017; Jiang et al., 2019; Foros et al., 2024; among others). Under consumer multihoming, pricing strategies are not about business-stealing, but about converting a rival's singlehoming consumer into a multihoming one who subscribes to both platforms.[3]

This, in turn, may reasonably influence contracting terms between content providers and platforms, including the structure of those contracts, and gives rise to our research question: How do the

[1] Moreover, in contrast to subscription-based platforms, app and e-book stores typically apply the agency model, where consumer pricing is delegated to content providers. See discussion in the Literature Review (Section 2).

[2] According to a 2021 poll, 87 % of Disney+ users also subscribe to Netflix, 90 % of HBO Max users also subscribe to Netflix, and 92 % of Apple TV+ users also subscribe to Netflix (Statista, 2021). In a 2016 survey of 167 U.S. participants, Jiang et al. (2019) found that 17 % subscribed to Hulu, 67 % to Netflix, and 13 % to both. In contrast, the music streaming market does not exhibit the same pattern of consumers subscribing to multiple services (CIPR, 2024). See the Literature Review (Section 2)

[3] This is not restricted to subscription based digital services. Following the launch of the iPad in 2010, Jeff Bezos (Amazon) highlighted the value of owning a Kindle alongside an iPad (press release, December 27, 2010): "We're seeing that many of the people who are buying Kindles also own an LCD tablet (e.g. an iPad). Customers report using their LCD tablets for games, movies, and web browsing and their Kindles for reading sessions. They report preferring Kindle for reading because it weighs less, eliminates battery anxiety with its month-long battery life, and has the advanced paper-like Pearl e-ink display that reduces eye-strain, doesn't interfere with sleep patterns at bedtime, and works outside in direct sunlight, an important consideration especially for vacation reading." See Anderson et al. (2017) for further discussion.

wholesale contracting terms between a content provider and competing digital platforms depend on whether the platforms aim to encourage consumer multihoming or not?

To investigate this, we build a model in which a content provider makes a take-it-or-leave-it offer (for access to distribute its content) to two digital platforms, which sell subscriptions to their content catalogs.[4] Platforms compete à la Hotelling in the consumer subscription market. In contrast to the classical Hotelling model, where all consumers are assumed to subscribe to at most one platform (singlehoming), we follow recent literature that allows platforms to induce consumers to subscribe to both platforms (multihoming).

The content provider can offer either a per-consumer wholesale price or a revenue-sharing contract to the platforms (the latter qualitatively equals a lump-sum fixed fee in our model), and we explore which type of wholesale contract the content provider and the platforms individually prefer and whether the content provider opts for wholesale terms that result in both platforms accepting the offer (non-exclusive distribution) or only one platform accepting it (exclusive distribution). Since the wholesale contract is determined before the platforms set their subscription prices, the equilibrium concept is subgame perfect Nash equilibrium (SPE).

We provide remarkably clear predictions: In markets with a low initial level of exclusive content, all market players, i.e., the content provider and both platforms, prefer contracts with a per-consumer wholesale price that leads to non-exclusive distribution, with platforms setting subscription prices that result in complete consumer singlehoming. In contrast, above a threshold level of initial exclusives, market players prefer a revenue-sharing contract that induces exclusive distribution. Platforms set subscription prices that encourage some of the consumers to multihome. This indicates a snowball effect – when early content providers and platforms choose exclusivity, later content providers are more likely to follow suit; and the same holds for non-exclusivity.

Assuming all consumers are singlehoming – as in traditional TV distribution – Armstrong (1999) shows that per-consumer wholesale pricing benefits all market participants compared to a lump-sum fee or revenue sharing. The key intuition is that per-consumer wholesale pricing softens price competition. Moreover, the content provider sets a per-consumer wholesale price that both platforms are willing to accept (content is distributed non-exclusively). In contrast, under consumer multihoming, consumer prices reflect the incremental value offered – specifically, the degree of exclusive content (for simplicity, we assume that consumers gain no additional value from accessing the same content on multiple platforms). In this setting, we show that all market players prefer a revenue-sharing contract that induces exclusive distribution through one platform.

For an intermediate initial level of exclusivity both singlehoming and multihoming equilibria may occur when platforms set consumer prices (multiple equilibria). This results in a wide range of

[4] In an extension we show that if, instead, the platforms makes the take-it-or-leave-it offer to the content provider, the outcome is qualitatively the same to the one from the main model. See section 4.4.4.

SPE candidates. However, we show that for such intermediate levels of exclusives, all non–Pareto-dominated SPEs involve complete consumer singlehoming, thus extending the insight of singlehoming beyond only low levels of exclusivity.

In our model, we deliberately assume that the content provider announces an observable contract, allowing both platforms to freely accept or reject the offer, with acceptance or rejection being publicly observable (a reasonable assumption since platforms can easily monitor each other's content catalogs). As a result, initially we do not consider contracts that explicitly grant exclusive distribution rights to one platform. Interestingly, having established our results in this scenario, we then demonstrate that the content provider weakly prefers not to include such exclusive rights, even if it has the option to do so.[5]

While it is generally easy to observe whether content is distributed exclusively on a single platform or made available across multiple platforms, the specific terms of the underlying wholesale contracts are typically less transparent. Our model predicts that the nature of wholesale contracts – whether they involve per-consumer payments or pure revenue sharing – depends on consumer homing behavior. The key distinction lies in whether platforms make marginal payments to content providers upon acquiring new subscribers. If they do, the contract resembles per-consumer wholesale pricing; if not, it aligns more with revenue sharing (or lump-sum fees).

In video streaming, platforms like Netflix typically operate under cost-plus contracts, covering production costs plus a markup, with no marginal payments tied to subscriber growth (see e.g., Baldwin, 2013, and Littleton, 2024). This aligns with our model's prediction that revenue-sharing/lump-sum fee contracts are optimal when platforms encourage multihoming.

Conversely, music streaming platforms like Spotify and Apple Music rely on the streamshare model, which allocates payments to artists based on their share of total streams (Bender et al., 2021; Alaei et al., 2022; Spotify, 2025). At first glance, the wholesale terms may resemble a revenue-sharing model. However, as outlined by Spotify (2025), holding an artist's streamshare constant, the payment to the artist increases in the size of the platform's subscriber base. This structure effectively embeds a per-subscriber wholesale element, consistent with the predictions from our model for markets with singlehoming and non-exclusive content distribution.[6] We return to this issue in Section 5.

The remainder of the paper is structured as follows: Section 2 reviews the related literature, Section 3 presents the model, Section 4 presents the equilibrium analysis, and Section 5 offers concluding

[5]The use of exclusivity rights is controversial. In the United States, we can consider case law that exclusive arrangement in specifically sports broadcasting rights are presumptively legal. See e.g. the Spinelli v NFL case (Spinelli v. NFL, 2018). The European Commission is more sceptical, albeit has allowed some degree of exclusive rights to be sold. Most notably in Europe is the 2003 EC decision on sale of broadcasting rights for UEFA Champions League. (See European Commission, 2003). See Martimort and Pouyet (2024) for a discussion.

[6]There have been isolated instances where artists have temporarily withheld their music from Spotify. A prominent example is Taylor Swift, who for a period chose not to distribute her music on Spotify, effectively granting exclusive access to competing platforms such as Apple Music. However, she has since revised her strategy and now distributes her music across all major streaming services (Bender et al., 2021). This shift suggests that non-exclusive distribution represents the equilibrium strategy for artists.

remarks. Proofs can be found in Appendix A, unless otherwise specified in the text.

2 Related Literature

In discrete choice models, such as Hotelling's (1929) classical linear city, all consumers are assumed to singlehome (i.e., subscribe to either HBO Max or Netflix, but not both). Drawing from the TV distribution market, where consumer singlehoming has been common (consumers typically do not subscribe to more than one cable-TV or satellite provider), Armstrong (1999) demonstrates that a content provider benefits more from using a per-consumer wholesale price rather than a lump-sum fee.[7] The content provider sets the per-consumer wholesale price such that both platforms accept the offer. Consequently, the content provider does not want to include exclusive distribution rights into the wholesale contract as long as the optimal wholesale contracting terms – a per-consumer wholesale price – is used. The advantage of the per-consumer wholesale price over a lump-sum fee lies in its effect on platform price competition: With a per-consumer wholesale price, platforms' marginal costs increase, softening competition, whereas a lump-sum fee leaves marginal costs unaffected.[8]

Weeds (2016) shows that even when the content provider is vertically integrated with one of the platforms, it offers its content to a rival platform under a per-consumer wholesale price in order to reduce platform competition.[9] If the content provider is restricted to use a lump-sum fee (equal to a revenue-sharing contract in our model), Armstrong (1999) and Stennek (2014) show that the content provider is better off by including exclusive distribution rights (i.e., exclusivity is agreed upon in the contract and is not the outcome of only one of the platforms accepting the offer from the content provider).[10]

Carroni et al. (2024) analyze the impact of a 'superstar' content provider offering exclusive content to one of two competing platforms.[11] Alongside the superstar, a fringe of complementors decides whether to distribute their content exclusively or non-exclusively. The authors show that exclusivity arises when platform competition is intense, since consumers become more responsive to the superstar's presence. This effect is amplified in a two-sided setting with cross-group network effects. Their baseline model assumes consumer singlehoming and imposes a demand structure that prevents platform foreclosure. By contrast, we demonstrate that under endogenous consumer homing, no such restrictions are required: Even with a 'superstar' content provider, platforms have incentives to lower prices to induce consumer multihoming, which in turn prevents foreclosure.

[7] See also Harbord and Ottaviani (2001).

[8] Drouard (2022) consider exclusive versus non-exclusive distribution of content (using a lump-sum fee) to two vertically differentiated platforms with some locked-in consumers, when consumers are allowed to multihome. They show that if a large fraction of consumers are locked-in, platform competition is softened and the content provider prefers to distribute the content through both platforms.

[9] In a dynamic setting, Weeds (2016) shows that a content provider might prefer to set a per-consumer wholesale price to ensure that its content is distributed exclusively on its own platform.

[10] Chai et al. (2025) also analyze a Hotelling framework featuring one content provider and two competing platforms, assuming that all consumers single-home. They show that the outcome regarding exclusive versus non-exclusive distribution depends on the platforms' installed consumer bases and the distribution of bargaining power (a Nash bargaining game between the content provider and the platforms).

[11] See also Shekhar (2021).

The assumption of consumer singlehoming has become less reasonable for how people access TV channels, music, films, and series. Today, widespread high-speed broadband – via fiber or mobile – enables consumers to choose among numerous streaming services, and many subscribe to multiple platforms offering distinct content catalogs. Recent literature highlights that when consumers are allowed to multihome, and platforms seek to encourage it, competitive pricing strategies change significantly. Our model builds on the work of Kim and Serfes (2006) and Anderson et al. (2017), who extended Hotelling (1929)'s classical model to allow for endogenous consumer homing decisions – where consumers choose to subscribe to either platform, both, or neither.

With multihoming, the 'incremental pricing principle' applies, which means that prices reflect the incremental value (or level of exclusives, i.e., non-overlapping content) that a platform offers. Anderson et al. (2017) finds that for symmetric levels of exclusives, there is a unique singlehoming equilibrium at low exclusivity levels and a unique multihoming equilibrium at high levels, with multiple equilibria at intermediate levels. Our analysis aligns with Anderson et al. (2017) by characterizing a full-fledged equilibria analysis with respect to platforms' decision on consumer pricing (see also Jiang et al., 2019, and Foros et al., 2024).[12]

With respect to wholesale contracting terms, we follow Armstrong (1999) that compare the outcome under two types of contracts. Where Armstrong compare a unit wholesale price with a lump-sum fee, we consider revenue-sharing instead of a lump-sum fee. The reason is that revenue sharing is often used by digital platforms. However, we show that the outcome under a lump-sum fee resembles the outcome under revenue-sharing contract in our model (Appendix B).

Jiang et al. (2019) is closely related to our model, as they consider a content provider that offers additional content to two platforms competing à la Hotelling, with consumers allowed to multihome. Jiang et al. restrict their attention to wholesale contracts consisting of a lump-sum fee. In our model, the content provider can choose between offering a revenue-sharing contract and a per-consumer wholesale pricing contract to the platforms. This is crucial in our model and drives the clear predictions regarding subgame perfect equilibria.

Like Weeds (2016), Wu and Chiu (2023) examine a scenario in which one of two competing platforms has the option to provide its content to rival. Unlike Weeds, they allow for consumer multihoming and show that that, under partial multihoming, the vertically integrated platform's content will not be made available to the rival platform.

We assume that the incremental value for consumers of access to overlapping (non-exclusive) content at both platforms is zero (e.g., having access to the same movie at both Netflix and HBO provides no incremental value over having access just at one of them). Combined with the conventional Hotelling assumption of market coverage, such that there are no consumers who are not served by

[12] Kim and Serfes (2006) also analyze location incentives. Foros et al. (2024) also consider a one-sided market where platforms collect their revenues from consumers, but where conventional network effects are present.

either platform, consumer multihoming kills all profit for the content provider under non-exclusive distribution of its content.[13] This outcome may be altered if consumers have positive incremental value from reaching the same type of content at both platforms (Anderson et al., 2017) or by allowing for an uncovered market where there are consumers in the hinterlands of the platforms that do not buy from neither of the platforms (Dyskeland and Foros, 2023).

We consider the value of the additional content offered by the content provider as exogenously given. Under the assumption of consumer singlehoming, Stennek (2014) shows that if the content provider includes exclusive distribution rights into the contract, the content provider's investments into content increase. Stennek (2014) considers bargaining over a lump-sum fee (see also D'Annunzio, 2017). Jiang et al. (2019) consider investment incentives when both platforms are free to accept or reject the lump-sum fee offered from the content provider.[14]

The assumption of complete consumer singlehoming is also prevalent in early contributions to the literature on two-sided media markets. In these models, platforms generate revenue by selling their singlehoming consumers as exclusive eyeballs to advertisers (Anderson and Coate, 2005; Dukes and Gal-Or, 2003; Gal-Or and Dukes, 2003; Peitz and Valletti, 2008). The aforementioned papers by Stennek (2014) and Weeds (2016) assume that the content provider collects ad revenues from all consumers to whom its content is distributed. More recent literature on two-sided markets, however, allows for consumers to access multiple platforms (Ambrus et al., 2016; Anderson et al., 2018; Athey et al., 2018; Bakos and Halaburda, 2020; Belleflamme and Peitz, 2019; Haan et al., 2021; Jeitschko and Tremblay, 2020).

The business model with platforms selling unlimited access to their content catalogs differs from app stores and e-book stores, where each app or e-book from content providers are sold individually to consumers. Moreover, in contrast to subscription-based platforms, platforms like Apple delegate consumer pricing to content providers through the agency model in app stores and e-book stores (see Gilbert, 2015; Abhishek et al., 2016; Boik and Corts, 2016; Johnson, 2017; and Foros et al., 2017, among others). Bender et al. (2021) consider competition between a music streaming platform (Spotify) and a digital music store, where the latter charges consumer per download, and show how the streaming platform should set royalty scheme to attract artists.[15]

3 Model

We consider a linear city à la Hotelling (1929) with two digital subscription-based platforms, $i = 0, 1$, located at either end of a line with length one, $X_0 = 0$ and $X_1 = 1$. The consumers are

[13] Lu and Matsushima (2024) analyze a Hotelling model where consumers may multihome and platforms can use personalized pricing.

[14] Offering quality enhancing premium content is closely linked to offering a cost-reducing innovation analysed in the patent licensing literature, where Katz and Shapiro (1986) and Kamien and Tauman (1986), among others are seminal contributions. To our knowledge, the patent licensing literature does not consider consumer multihoming in a discrete choice model set up.

[15] Gal-Or and Shi (2022) examine how a subscription-based platform can incentivize competing vendors (e.g., fitness centers) to allow their services be provided through the platform's subscription.

assumed to be uniformly distributed between the platforms with a density equal to one. The level of non-exclusive content, which is distributed by both platforms, is represented by $n > 0$, and $\varepsilon_i > 0$ represents the level of exclusive content which is distributed only by platform i. A consumer located at x who singlehomes on only platform i gets utility $u_i(x) = n + \varepsilon_i - p_i - t|X_i - x|$, whereas a consumer who multihomes and consume both platforms gets utility $u_b = n + \varepsilon_0 + \varepsilon_1 - p_0 - p_1 - t$.

A consumer who singlehomes on platform i does not care about the distribution between n and ε_i, only the sum $n + \varepsilon_i$; whereas the decision to multihome is dependent only on the incremental value each platform adds, i.e. only ε_i. For simplicity, we assume that consumers who multihome get no incremental value from having access to the same content at both platforms.[16] The platforms charge consumers $p_i \geq 0$, and the transportation cost is $t > 0$. We assume the initial level of non-exclusive and exclusive content are given by $n = \widehat{n}$ and $\varepsilon_i = \varepsilon > 0$, respectively; where $\widehat{n} + \varepsilon$ is sufficiently high to ensure market coverage (all consumers buy from at least one of the platforms).

A monopoly upstream content provider offers additional content for which the consumers have an exogenously given willingness to pay $\Delta > 0$. If both platforms buy access, we have $n = \widehat{n} + \Delta$. Without loss of generality, if only one platform buys access to Δ, we assume it will be platform 0. Let us define:

$$\Delta_\varepsilon \in \{0, \Delta\},$$

such that we have:

$$\varepsilon_0 = \varepsilon + \Delta_\varepsilon \text{ and } \varepsilon_1 = \varepsilon.$$

Hence, if only platform 0 buys access, $\Delta_\varepsilon = \Delta$, otherwise $\Delta_\varepsilon = 0$.

The content provider makes an observable take-it-or-leave-it contract offer to the platforms.[17] The platforms independently decide to accept or not. The outcome is observable by all. With respect to the structure of the wholesale contract, we compare two alternatives: (i) a revenue-sharing contract, $\theta \in (0, 1)$, where the acquiring platform(s) pays a $(1 - \theta)$ share of its flow payoff to the content provider; and (ii) a per-consumer wholesale price, $w \geq 0$. We will study whether, and when, both or either platform accepts the content provider's offer. Initially, we study the outcome when the content provider's offer is available for both platforms to independently decide whether to accept or not. Thereafter, we show that allowing the content provider to offer one platform exclusive distribution rights does not qualitatively change the outcome.

Our model is a two-stage game and we find the subgame perfect Nash equilibria (SPE) by backward induction. The stages are as follows: First, the content provider sets wholesale terms of trade as a credible commitment to an observable take-it-or-leave-it offer, and the platforms simultaneously decide whether to accept or reject the offer; And second the platforms compete in prices for consumers.

[16] Anderson et al. (2017) allow for positive incremental value to consumers from overlapping content. This will have no impact on the qualitative results in the current model.

[17] In an extension (Section 4.4.4) we study the outcome when the platforms independently make simultaneous take-it-or-leave-it offer to the content provider instead, and we show that the outcome is qualitatively the same to the results from the main model.

We define:

$$\underline{\varepsilon} = t \text{ and } \overline{\varepsilon} = 2t - \Delta/2,$$

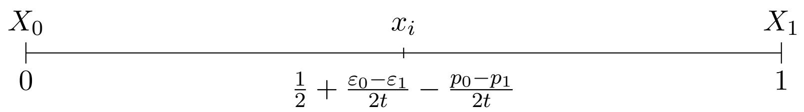
and make the following assumptions:

Assumption 1. $\underline{\varepsilon} < \varepsilon < \overline{\varepsilon}$.

Assumption 2. Δ *is positive, but arbitrarily small.*

Assumption 1 ensures that consumer multihoming can arise as an equilibrium candidate, $\varepsilon > \underline{\varepsilon}$, and precludes the non-interesting case of complete multihoming, $\varepsilon < \overline{\varepsilon}$. Assumption 2 does not qualitatively affect our results, but simplifies the exposition. In practice, for digital subscription-based platforms like Spotify and Netflix, each newly released piece of content typically represents only a small – and often negligible – fraction of the overall content catalog's value. However, in Section 4.4 we relax Assumption 2 and show that the results are qualitatively the same. From Assumptions 1 and 2 it follows that $t < \varepsilon < 2t$.

(a) Singlehomer-multihomer margins.



(b) Indifferent-singlehomer margin.

Figure 1. The singlehomer margin and the singlehomer-multihomer margins.

Demand under (partial) consumer multihoming: If some consumers are multihoming, demand follows from the *singlehomer-multihomer margins*, which is determined by the location of the consumer indifferent between buying from only platform i and from both platforms. The location of the indifferent consumer, x_{ij}, is determined by solving $u_b = u_i(x)$. The demand of platform i is then equal to (see Figure 1a):

$$D_i^{MH} = x_{ji} = \left| 1 - \frac{\varepsilon_i - p_i}{t} - X_j \right|. \tag{1}$$

Note that the platforms' demand under consumer multihoming is independent of the rival's price, p_j, and level of exclusive content, ε_j, this reflects the 'strategic independence' result (Kim and Serfes, 2006; Anderson et al., 2017). The reason is that a decrease in p_j (or increase in ε_j) does not affect the number of consumers at platform i, only that platform i's "last" singlehomer is turned into a multihomer (see the singlehomer-multihomer margins in Figure 1a).

We divide D_i^{MH} into two components, $m + s_i^{MH}$. The number of multihoming consumers:

$$m = \frac{\varepsilon_0 + \varepsilon_1}{t} - \frac{p_0 + p_1}{t} - 1, \tag{2}$$

and the number of singlehoming consumers:

$$s_i^{MH} = |X_i - x_{ij}| = 1 - \frac{\varepsilon_j - p_j}{t}.$$

The condition to ensure that least some consumers singlehome follows from eq. 2:

$$t < (\varepsilon_0 + \varepsilon_1) - (p_0 + p_1) \leq 2t, \tag{3}$$

where the first inequality follows from $m > 0$ and the second follows from $m \leq 1$.

Demand under consumer singlehoming: If $m \leq 0$, all consumers singlehome, and demand follows from the conventional Hotelling model's *indifferent-singlehomer margin*, the location of the consumer indifferent between either platform, $u_0(x) = u_1(x)$ (see Figure 1b):

$$D_i^{SH} = |x_i^{SH} - X_i| = \frac{1}{2} + \frac{\varepsilon_i - \varepsilon_j}{2t} - \frac{p_i - p_j}{2t}. \tag{4}$$

From the assumption of market coverage, the non-exclusive content level, n, does not affect demand, neither under multihoming, D_i^{MH}, nor singlehoming, D_i^{S}.

Profits: The platforms' stage 2 flow payoffs are:

$$\pi_i(p_i, p_j | c_i) = \pi_i(p_i, p_j) = \big(p_i - c_i\big) D_i(p_i, p_j),$$

and $\theta\pi_i(p_i, p_j, c_i)$ are their profits. $c_i \in \{0, w\}$ represents the per-consumer wholesale price, which becomes a marginal cost for the platforms. If the platform accepts an offer from the content provider which uses a revenue-sharing contract we have that $c_i = 0$ and $\theta \leq 1$; if the contract is a per-consumer wholesale price, we have $c_i = w$ and $\theta = 1$. Note that we set all other marginal costs to zero for both platforms and the content provider, which reflects the reality for many digital platforms.

4 Analysis

4.1 Consumer Pricing (stage 2)

The platforms compete for consumers in prices, their stage 2 objective is to maximize flow payoff:

$$\max_{p_i} \pi_i(p_i, p_j | c_i) = \begin{cases} \pi_i^{MH} = (p_i - c_i) D_i^{MH} & \text{under multihoming,} \\ \pi_i^{SH} = (p_i - c_i) D_i^{SH} & \text{under singlehoming.} \end{cases} \tag{5}$$

Let us first find the equilibrium candidate under the assumption of (i) partial consumer multihoming ($0 < m < 1$), and then (ii) complete consumer singlehoming. Thereafter, we find the condition which ensures that no platform has an incentive to deviate from the equilibrium candidate.

Assumption of consumer multihoming: From $\partial\pi_i^{MH}/\partial p_i = 0$, we find the equilibrium multihoming candidate:[18]

$$p_i^{MH} = \frac{\varepsilon_i + c_i}{2} \text{ and } \pi_i^{MH} = \frac{(\varepsilon_i - c_i)^2}{4t}. \tag{6}$$

Due to the strategic independence result (Kim and Serfes, 2006; Anderson et al., 2017) it follows that the reaction functions are identical to the equilibrium price candidate.

Assumption of consumer singlehoming: From $\partial\pi_i^{SH}/\partial p_i = 0$, we find the reaction function of platform i under consumer singlehoming:

$$p_i^{SH}(p_j) = \frac{t + (\varepsilon_i - \varepsilon_j) + p_j + c_i}{2}.$$

[18]The levels from Assumption 1 follows from inserting the equilibrium candidate multihoming prices (eq. 6) into the multihomer condition (eq. 3).

The equilibrium singlehoming candidate becomes:

$$p_i^{SH} = t + \frac{(\varepsilon_i - \varepsilon_j) + 2c_i + c_j}{3} \text{ and } \pi_i^{SH} = \frac{\left(3t + (\varepsilon_i - \varepsilon_j) - (c_i - c_j)\right)^2}{18t}. \quad (7)$$

Equilibria: Even if $\varepsilon > \underline{\varepsilon}$ is fulfilled, such that some consumers want to multihome if the platforms set prices p_i^{MH}, the platforms may individually have incentives to increase their price to induce complete consumer singlehoming. By the same token, if ε_i becomes sufficiently high, platforms may deviate from p_i^{SH} to induce consumer multihoming.

Under the multihoming candidate equilibrium, the deviation price of platform i is found by inserting p_j^{MH} into the singlehoming reaction function, $p_i^{SH}(p_j)$. However, for the equilibrium singlehoming candidate, due to the strategic independency result, the deviation price is equal to the equilibrium candidate price (see eq. 6).

The conditions that ensure our consumer multihoming and singlehoming equilibria are, respectively:

$$\pi_i^{MH} - \pi_i^{SH}(p_i^{SH}(p_j^{MH}), p_j^{MH}) > 0 \text{ iff } \varepsilon > \varepsilon_{MH},$$

$$\pi_i^{SH} - \pi_i^{MH} > 0 \qquad \text{iff } \varepsilon < \varepsilon^{SH}.$$

Platform 0 has stronger deviation incentives than platform 1, such that the binding constraints are platform 0's. The formal expression are shown in Appendix A and their approximate values under Assumption 2 are:

$$\varepsilon_{MH} \approx 1.09t + 0.45c_0 + 0.55c_1,$$
$$\varepsilon^{SH} \approx \sqrt{2}t + 0.53c_0 + 0.47c_1. \quad (8)$$

As will become clear in the analysis, these expressions will simplify to $\varepsilon_{MH} \approx 1.09t$ and $\varepsilon^{SH} \approx \sqrt{2}t$.

Since $\varepsilon^{SH} - \varepsilon_{MH} > 0$ we have an interval with multiple equilibria.[19] We have:

Lemma 1. *(i) Unique partial consumer multihoming equilibrium: $p_0^{MH} = (\varepsilon + \Delta_\varepsilon + c_0)/2$ and $p_1^{MH} = (\varepsilon + c_1)/2$ is a unique stage 2 Nash equilibrium if $\varepsilon^{SH} < \varepsilon < \overline{\varepsilon}$; (ii) Unique consumer singlehoming equilibrium: $p_0^{SH} = t + \Delta_\varepsilon/3 + (2c_0 + c_1)/3$ and $p_1^{SH} = t - \Delta_\varepsilon/3 + (c_0 + 2c_1)/3$ is a unique stage 2 Nash equilibrium if $\varepsilon < \varepsilon_{MH}$; and (iii) Multiple equilibria: both equilibria (1) and (2) exist for the interval $\varepsilon_{MH} \leq \varepsilon \leq \varepsilon^{SH}$.*

The proof is given in Appendix A. Figure 2 illustrates the thresholds, given Assumption 2.

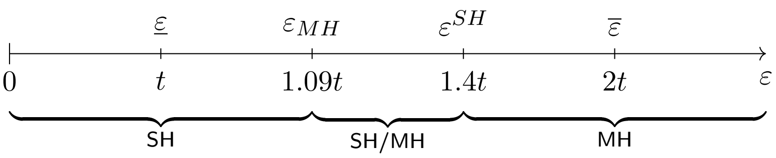


Figure 2. The critical values, for $\Delta \simeq 0$ and $c_i \simeq 0$. Illustrative figure, not to scale. For low levels of exclusive content, consumers will singlehome; for high levels of exclusive content, consumers will multihome; and for an intermediate range, both homing outcomes can constitute an equilibrium.

As a preliminary insight, it is straightforward to check that in the absence of the content provider and

[19] We follow Anderson et al. (2017). See also Jiang et al. (2019) and Foros et al. (2024).

Δ, the consumer multihoming Nash equilibrium is Pareto-dominated by the consumer singlehoming Nash equilibrium for $\varepsilon \leq \varepsilon^{SH}$. This means that even if there are multiple equilibria for $\varepsilon_{MH} \leq \varepsilon \leq \varepsilon^{SH}$, both platforms are better off under consumer singlehoming. In the sequel we show that this result extends beyond this simple benchmark.

4.2 Access Pricing (stage 1)

We can immediately rule out the case where the content provider makes an offer which neither platforms will accept as a SPE. To illustrate this, consider a case where a revenue sharing contract is used. If $\theta > 0$, and neither platform accepts the offer, the content provider would be (strictly) better off by increasing θ – i.e. taking a smaller cut of the revenue – to induce accept from at least one of the platforms. The same argument applies under per-consumer wholesale pricing.

We first consider outcomes assuming that the content provider offers a revenue sharing contract, then we will consider outcomes assuming the content provider offers a per-consumer wholesale price, and lastly we will consider which wholesale contract the content provider prefers.

4.2.1 Revenue sharing contract

Let us begin with the intervals where we have a unique Nash equilibrium at stage 2 (see Lemma 1). If $\varepsilon > \varepsilon^{SH}$, we have a unique stage 2 equilibrium with consumer multihoming. The content provider prefers to set θ as low as possible, in order to maximize its own profit. However, if θ is too low, the platforms will not find it worthwhile to accept the offer from the content provider. The content provider can only ask for the surplus the content Δ generates to the platforms. In order to set θ such that both platforms accept the offer, the minimum share they can offer is the one where platform 1 is indifferent between both platforms accepting the offer and only the rival accepting the offer:[20]

$$\theta \pi_1^{MH-0} \geq \pi_1^{MH-\Delta} \implies \theta = \theta^{MH-0} \equiv 1. \tag{9}$$

This follows from the incremental pricing principle (Kim and Serfes, 2006; Anderson et al., 2017); if the incremental value of overlapping content is zero to multihoming consumers, the platform's willingness to pay for non-exclusive content is zero, i.e., $\theta^{MH-0} = 1$. Consequently, inducing both platforms to accept the offer requires eliminating all profits for the content provider; $\pi_{CP}(\theta^{MH-0}) = 0$.

If the content provider wants to induce only platform 0 to accept the offer under consumer multihoming, the lowest level of θ the content provider can set follows from:

$$\theta \pi_0^{MH-\Delta} \geq \pi_0^{MH-0} \implies \theta = \theta^{MH-\Delta} \equiv \frac{\varepsilon^2}{(\varepsilon + \Delta)^2}, \tag{10}$$

which is less than 1 for $\Delta > 0$. Thus, the content provider is better off by inducing only platform 0 to accept the offer under consumer multihoming. This gives following net profits:

$$\theta^{MH-\Delta} \pi_0^{MH-\Delta} = \pi_1^{MH-\Delta} = \frac{\varepsilon^2}{4t} \text{ and } \pi_{CP}(\theta^{MH-\Delta}) = \Delta \frac{2\varepsilon + \Delta}{4t}.$$

[20] A note on notation: We use the superscript "$MH - \Delta_\varepsilon$" or "$SH - \Delta_\varepsilon$" to denote the specific homing-distribution outcomes. This means that θ/w with superscript $MH - 0$ refers to consumer multihoming with non-excluisve distribution through both platforms, whereas $MH - \Delta$ refers to consumer multihoming and with exclusive distribution of the content. Likewise with consumer singlehoming (SH).

If $\varepsilon < \varepsilon_{MH}$, we have a unique stage 2 equilibrium with consumer singlehoming. The lowest θ the content provider can set which ensures that both platforms accept the offer follows from:

$$\theta\pi_1^{SH-0} \geq \pi_1^{SH-\Delta} \implies \theta = \theta^{SH-0} \equiv \frac{(3t-\Delta)^2}{9t^2}, \tag{11}$$

which gives net profits:

$$\theta^{SH-0}\pi_i^{SH-0} = \frac{(3t-\Delta)^2}{18t} \text{ and } \pi_{CP}(\theta^{SH-0}) = \Delta\frac{6t-\Delta}{9t}.$$

Alternatively, for the content provider to induce only platform 0 to accept the offer, the revenue sharing follows from:

$$\theta\pi_0^{SH-\Delta} \geq \pi_0^{SH-0} \implies \theta = \theta^{SH-\Delta} \equiv \frac{9t^2}{(3t+\Delta)^2}, \tag{12}$$

which gives net profits:

$$\theta^{SH-\Delta}\pi_0^{SH-\Delta} = \frac{t}{2},\ \pi_1^{SH-\Delta} = \frac{(3t-\Delta)^2}{18t} \text{ and } \pi_{CP}(\theta^{SH-\Delta}) = \Delta\frac{6t+\Delta}{18t}.$$

We have that:

$$\pi_{CP}(\theta^{SH-0}) - \pi_{CP}(\theta^{SH-\Delta}) = \Delta\frac{2t-\Delta}{6t} > 0, \text{ if } 2t > \Delta. \tag{13}$$

Recall that $\varepsilon > t$ and $\varepsilon < 2t$ by Assumption 1. It follows that that under consumer singlehoming, the content provider prefers to offer a revenue sharing contract such as to induce both platforms to accept.

We have the following result (see Appendix A for proofs):

Proposition 1 (*Subgame perfect equilibria*). *Suppose the content provider uses a revenue sharing contract: (i) $\varepsilon^{SH} < \varepsilon < \bar{\varepsilon}$: We have a unique SPE outcome where only platform 0 has access to Δ and where some consumers multihome. The platforms' prices are $p_0^{MH-\Delta} = (\varepsilon+\Delta)/2, p_1^{MH-\Delta} = \varepsilon/2$, and the revenue share is given by $\theta^{MH-\Delta} = \varepsilon^2/(\varepsilon+\Delta)^2$; (ii) $0 < \varepsilon < \varepsilon_{MH}$: We have a unique SPE outcome where both platforms have access to Δ and consumers singlehome. The platforms' prices are $p_i^{SH-0} = t$ and the revenue share is given by $\theta^{SH-0} = (3t-\Delta)^2/(9t^2)$; and (iii) $\varepsilon_{MH} \leq \varepsilon \leq \varepsilon^{SH}$: We have multiple SPE outcomes, including the SPEs from (1) and (2).*

Proposition 1 has an interval with multiple SPEs for intermediate values of ε as subgame perfection (only) requires that at any point in the game, the player's action will lead to Nash equilibrium of the following game, i.e., the subgame, no matter what the earlier actions were.

Without further restrictions on the equilibrium concept, Proposition 1 is mute on which SPE will be played. By restricting attention to SPEs in which all players do not weakly prefer another SPE, i.e., SPEs that are not Pareto-dominated, we are able to make clearer predictions for intermediate values of ε. This is formally stated in the next proposition (and proven in Appendix A).

Proposition 2. *Assume $\varepsilon_{MH} \leq \varepsilon \leq \varepsilon^{SH}$ (multiple equilibria exist) and that the content provider uses a revenue sharing contract. All SPE outcomes that are not Pareto-dominated involve complete consumer singlehoming.*

Proposition 2 implies that the insight about consumer singlehoming in Proposition 1 extends beyond ε_{MH}. When restricting attention to SPEs in which all players do not weakly prefer another SPE, all equilibrium outcomes involve singlehoming for ε below ε^{SH}, i.e., also for intermediate values of ε.

4.2.2 Per-consumer wholesale price

If $\varepsilon > \varepsilon^{SH}$ (Lemma 1), we have a unique stage 2 equilibrium where some consumers multihome. The content provider needs to ensure that only platform 0 accepts the offer, as with a revenue sharing contract.[21] The highest w platform 0 accepts follows from:

$$\pi_0^{MH-\Delta}(w) \geq \pi_0^{MH-0}(0) \implies w = w^{MH-\Delta} \equiv \Delta. \tag{14}$$

The content provider's profits are $\pi_{CP}^{MH-\Delta}(w^{MH-\Delta}) = w(\Delta+\varepsilon-w)/(2t)$, where $\partial\pi_{CP}^{MH-\Delta}/\partial w > 0$ if $w < (\Delta+\varepsilon)/2$. This clearly holds under Assumption 2, such that the content provider chooses to set $w^{MH-\Delta} = \Delta$. Net profits are:

$$\pi_0^{MH-\Delta}(w^{MH-\Delta}) = \pi_1^{MH-\Delta} = \frac{\varepsilon^2}{4t} \text{ and } \pi_{CP}(w^{MH-\Delta}) = \Delta\frac{\varepsilon}{2t}.$$

If $\varepsilon < \varepsilon_{MH}$ (Lemma 1), we have a unique singlehoming stage 2 equilibrium. The equilibrium resembles Armstrong (1999), who assumes that all consumers singlehome. It is a dominant strategy for platform i to accept the offer as long as $w \leq \Delta$. The content provider wants the highest possible wholesale price, such that under singlehoming we have $w^{SH-0} = w^{MH-\Delta} = \Delta$, and the net profits are:

$$\pi_i^{SH-0}(w^{SH-0}) = \frac{t}{2} \text{ and } \pi_{CP}(w^{SH-0}) = \Delta. \tag{15}$$

This gives us the following proposition (whose proof can be found in Appendix A):

Proposition 3 (*Subgame perfect equilibria*)**.** *Assume that the content provider uses a per-consumer wholesale price contract: (i) $\varepsilon^{SH} < \varepsilon < \overline{\varepsilon}$: we have a unique SPE outcome with partial consumer multihoming where only platform 0 has access to Δ at a per-consumer wholesale price, $w^{MH-\Delta} = \Delta$. The platform prices are $p_0^{MH-\Delta}(w^{MH-\Delta}) = (\varepsilon+\Delta)/2 + \Delta/2$ and $p_1^{MH} = \varepsilon/2$; (ii) $0 < \varepsilon < \varepsilon_{MH}$: we have a unique SPE outcome with full consumer singlehoming where both platforms accept the offer from the content provider at $w^{SH-0} = \Delta$. The platform prices are $p_i^{SH-0}(w^{SH-0}) = t + \Delta$; and (iii) $\varepsilon_{MH} \leq \varepsilon \leq \varepsilon^{SH}$: we have multiple SPE outcomes, including the SPEs from (1) and (2).*

Interestingly, even though the formulas for the thresholds ε_{MH} and ε^{SH} depend on the per-consumer wholesale prices offered by the content provider (see eq. 8), in the equilibria described in (1) and (2) of Propositions 1 and 3 these expressions simplify and the threshold values are the same for both the per-consumer wholesale price and the royalty sharing scheme.

Similarily to the case of revenue sharing contracts, without further restrictions on the equilibrium concept, Proposition 1 is mute on which SPE will be played for intermediate values of ε. By restricting

[21] It's easy to verify that in order to attract both platforms to accept the offer, the content provider would have to set $w = 0$.

attention to SPEs in which all players do not weakly prefer another SPE, i.e., SPEs that are not Pareto-dominated, we are able to make clearer predictions for intermediate values of ε. This is formally stated in the next proposition (and proven in Appendix A).

Proposition 4. *Assume $\varepsilon_{MH} \leq \varepsilon \leq \varepsilon^{SH}$ (multiple equilibria exist) and that the content provider uses a per-consumer whoelsale price. All SPE outcomes that are not Pareto-dominated involve complete singlehoming by the consumers.*

As in the case of revenue sharing, Proposition 4 implies that the insight about consumer singlehoming in Proposition 3 extends beyond ε_{MH}, also in the case of per-consumer wholesale price. When restricting attention to SPEs in which all players do not weakly prefer another SPE, all equilibrium outcomes involve singlehoming for ε below ε^{SH}, i.e., also for intermediate values of ε.

4.3 Contracting implications

The vertical contracting partners, the content provider and one or both of the platforms, have conflicting interests with respect to how to split the surplus generated from the content offered by the content provider. The content provider prefers θ as low as possible (w as high as possible), all else equal. The platform(s) prefer a high θ (low w), all else equal. However, the contracting partners may align when it comes to the format of wholesale terms of trade, the choice between revenue sharing or a per-consumer wholesale price.

As shown by Armstrong (1999), under the assumption that all consumers are singlehoming, the content provider is better off under a per-consumer wholesale price compared to a fixed lump-sum fee. The outcome is the same if a lump-sum fee is replaced with a revenue-sharing scheme, as in our model (see Appendix B):

$$\pi_{CP}(w^{SH-0}) - \pi_{CP}(\theta^{SH-0}) = \Delta \frac{3t + \Delta}{9t}.$$

Under consumer singlehoming, platforms are also better better off under this outcome:

$$\pi_1^{SH-0}(w^{SH-0}) - \theta^{SH-0}\pi_1^{SH-0} = \Delta \frac{6t - \Delta}{18t}.$$

Consequently, for a low initial level of exclusives, $\varepsilon < \varepsilon_{MH}$, where we have a unique SPE outcome where consumers singlehome, the theoretical prediction is that we will observe a per-consumer wholesale price, set such that both platforms accept the offer. The intuition is simply that a per-consumer wholesale price softens price competition between the platforms. In a Hotelling model with market coverage, there is a complete pass-through of the wholesale price, $w^{SH-0} = \Delta$, and the content provider captures the gain from higher consumer prices. In contrast, under a revenue sharing scheme (or a lump-sum fee), there is no such price softening effect.

In contrast, in a SPE outcome with partial consumer multihoming, the content provider is better off under a revenue sharing scheme:

$$\pi_{CP}(\theta^{MH-\Delta}) - \pi_{CP}(w^{MH-\Delta}) = \frac{\Delta^2}{4t},$$

while the platforms are indifferent:

$$\theta^{MH-\Delta}\pi_0^{MH-\Delta} = \pi_1^{MH} = \frac{\varepsilon^2}{4t} \text{ and } \pi_0^{MH-\Delta}(w^{MH-\Delta}) = \pi_1^{MH} = \frac{\varepsilon^2}{4t}.$$

Consequently, for a high number of exclusives, $\varepsilon > \varepsilon^{SH}$, where we have a unique endogenous multihoming SPE outcome, the theoretical prediction is that we will observe a contract with revenue sharing and that only one platform accepts the offer. All contracting partners, the content provider and one of the platforms, are (weakly) benefiting from this. The intuition is that a per-consumer wholesale price increases the consumer price set by platform 0. As a consequence, the "last" multihoming consumers are turned into singlehomers on platform 1, such that demand for platform 0 is reduced as w increases. The total incremental value the content provider can capture is lower than under a revenue sharing scheme, where the per-consumer wholesale price (marginal cost) is zero.

To summarize about unique subgame perfect equilibria:[22]

Lemma 2. *If all contracting parties achieve the structure of the wholesale contract they all individually prefer, we have: (i) $\varepsilon < \varepsilon_{MH}$: unique SPE outcome with consumer singlehoming, and non-exclusive distribution with a per-consumer wholesale price contract; and (ii) $\varepsilon > \varepsilon^{SH}$: unique SPE outcome with partial consumer multihoming, and exclusive distribution with revenue sharing contract.*

Let us turn to the interval $\varepsilon_{MH} \leq \varepsilon \leq \varepsilon^{SH}$, where multiple SPE outcomes exist. To make some progress, we will, as in Propositions 2 and 4, apply the concept of Pareto-dominance and only focus on SPEs that are not Pareto-dominated by other SPEs. When comparing ex ante profits for both the content provider and the platforms (details in Appendix A), we find the following result:

Lemma 3. *For $\varepsilon_{MH} \leq \varepsilon \leq \varepsilon^{SH}$, if all contracting parties achieve the structure of the wholesale contract they all individually prefer and we exclude SPEs that are Pareto-dominated, we have the following: (i) in all SPEs involving non-exclusive distribution, a per-consumer wholesale price contract is preferred; and (ii) in all SPEs involving exclusive distribution, a revenue-sharing contract is preferred.*

If we allow for the conditions used in Lemma 3, our model provides clear-cut predictions. For $\varepsilon \leq \varepsilon^{SH}$, in all SPEs involving non-exclusivity we should observe per-consumer wholesale prices. For low enough values of ε ($\varepsilon \leq \varepsilon_{MH}$) there is a unique SPE, which involves non-exclusive distribution of Δ and a per-consumer wholesale price. For $\varepsilon \geq \varepsilon_{MH}$, in all SPEs involving exclusivity we should observe revenue-sharing schemes. For high enough values of ε ($\varepsilon \geq \varepsilon^{SH}$) there is a unique SPE, which involves exclusive distribution of Δ and a revenue-sharing scheme.

We summarize our results (Lemmas 2 and 3) in the following proposition:

Proposition 5. *If all contracting parties achieve their preferred structure of the wholesale contract and we exclude SPEs that are Pareto-dominated: (i) in all SPEs with non-exclusivity, all parties prefer a per-consumer wholesale price contract. Such SPEs exists for all $\varepsilon \leq \varepsilon^{SH}$ and the SPE is unique*

[22] The proof follows directly from the analysis in the main text.

if $\varepsilon \leq \varepsilon_{MH}$; and (ii) in all SPEs with exclusivity, all parties prefer a revenue-sharing contract. Such SPEs exists for all $\varepsilon \geq \varepsilon_{MH}$ and the SPE is unique if $\varepsilon \geq \varepsilon^{SH}$.

We further elaborate on how these predictions align with observed practices in digital subscription-based platform markets in Section 5.

4.4 Extensions and robustness

4.4.1 Exclusive distribution rights

We have so far focused on take-it-or-leave-it wholesale contracts offered by the content provider where both platforms decide whether to accept or reject the offer. Let us now allow the content provider to offer exclusive distribution rights to one of the platforms. We still assume that Assumptions 1 and 2 hold.

Under consumer multihoming, exclusive distribution rights are unnecessary. The content provider can set wholesale terms in a way that ensures only one platform accepts the offer, even without granting exclusivity rights. As demonstrated earlier, the content provider benefits more from using a revenue-sharing contract rather than a per-consumer wholesale price, allowing it to capture the entire incremental value it provides. Therefore, the outcome remains the same whether the content provider includes exclusivity in the contract or not. In other words, exclusive distribution rights are not required when there is partial consumer multihoming.

Under consumer singlehoming, from previous literature we can deduce that exclusive distribution rights will only be used if the content provider is restricted to use a lump-sum fixed fee (equivalent to a revenue sharing contract in our model). Under a lump-sum fee, Jiang et al. (2019) show that the lump-sum fee is set such that both platforms accept the offer without exclusive distribution rights (this holds as long as $\Delta < 2t$). As shown by Stennek (2014) and Armstrong (1999), the content provider cannot realise the outcome that maximises total channel profit, such that the content provider would have been better off by using exclusive distribution rights under a lump-sum fixed fee. However, Armstrong (1999) shows that if the content provider has the ability to choose between a lump-sum fee and a per-consumer wholesale price, the content provider would be strictly better offer by using per-consumer wholesale pricing that does not include exclusive distribution rights (see further discussion in Section 2 above). Consequently, allowing the content provider to use a wholesale contract that includes exclusive distribution rights does not alter our results.

4.4.2 Market foreclosure of the inferior platform

So far, we have restricted attention to where Δ is positive, but arbitrary small (Assumption 2). We now relax this assumption and consider the effect on the participation constraint, before we provide a fuller equilibrium analysis in Subsection 4.4.3. We may think of a high Δ as a 'superstar' content provider like Taylor Swift. A concern is that exclusive distribution of Δ through platform 0 may cause foreclosure of platform 1 from the market when Δ is sufficiently high.

Under per-consumer wholesale pricing, we know that the per-consumer wholesale price is equal to the value of the content, Δ, also if only platform 0 has access, $w^{SH-\Delta} = \Delta$. From equation (7), we then have $p_1^{SH-\Delta} = t$ and $\pi_1^{SH-\Delta} = t/2$, such that platform 1 is not foreclosed from the market. The reason is that the marginal cost of platform 0, $w^{SH-\Delta} = \Delta$, increases in Δ, such that platform 0 increases its price (recall the complete pass-through in the Hotelling-model).

In contrast, under a revenue sharing contract, we have $p_1^{SH-\Delta} = t - \Delta/3$ and $\pi_1^{SH-\Delta} = (3t - \Delta)^2/(18t)$, if only platform 0 has access to Δ. The participation constraint for platform 1 then requires:

$$\pi_1^{SH-\Delta} \geq 0 \Rightarrow \Delta \leq 3t.$$

However, from above we have that under endogenous homing, we need that $0 < \varepsilon < \varepsilon^{SH}$ to have a singlehoming equilibrium, where $\varepsilon^{SH} \approx 1.4t - 0.53\Delta$. From this we can directly conclude that under endogenous consumer homing, we have:

Proposition 6. *The market participation constraint from the classical Hotelling model is never binding when platforms are free to drop their prices to induce multihoming. The platform with less exclusives (platform 1), will not be driven out of the market under endogenous homing. This holds both with a per-consumer wholesale contract and a revenue sharing contract.*

Proposition 6 shows that when allowing platforms to endogenously attempt to reach multihomers, the corner solution (market foreclosure of the inferior platform) does not arise in equilibrium. Consequently, the classical Hotelling model with an assumption of complete singlehoming exaggerates the concern of foreclosure of the inferior platform. Before the asymmetry in exclusives reaches the level where the market participation constraint is binding, the platforms choose to drop prices to induce multihoming. This makes the equilibria analyses more clear-cut, since all foreclosure outcomes under singlehoming will not be part of an equilibria.[23] In the next subsection, we provide further details related to the case of larger Δ, i.e., where Assumption 2 is relaxed.

4.4.3 SPE analysis for larger values of the incremental content

Throughout the main analysis we have imposed the assumption that Δ is arbitrarily small (Assumption 2). This has greatly simplified the analysis. In this subsection, we relax that assumption and show how our main results extend to the case with larger values of Δ. However, we will maintain that there is an upper limit to the value of Δ and replace Assumption 2 by the following assumption:

Assumption 3. $0 < \Delta < (\sqrt{2} + 1)t \approx 2.41t.$

In this section we first show that for (relatively) small values of ε, there is a unique SPE in which both platforms buy content and consumers singlehome. Furthermore in this scenario, the content provider and platforms prefer contracts with a per-consumer wholesale price compared to a revenue-sharing contract.

[23] Jiang et al. (2019) provide a comprehensive analysis of the outcome, also under the corner solution where the market participation constraint is binding under singlehoming.

Proposition 7. *For $\varepsilon < \varepsilon_{MH}(\Delta) = 2\big((\sqrt{2}+1)t - \Delta\big)/(\sqrt{2}+3)$, there is a unique SPE outcome in which both platforms buy access to Δ and set prices to induce consumer singlehoming. The platforms' prices are $p_i^{SH-0}(w^{SH-0}) = t + \Delta$, and the per-consumer wholesale price is $w^{SH-0} = \Delta$.*

This proposition generalizes the insights from the previous analysis:[24] When the initial level of exclusives is sufficiently low, the unique SPE involves consumer singlehoming and non-exclusive distribution of the content. This holds both with per-consumer wholesale pricing and revenue sharing. The equilibrium prices are the same as in Proposition 1 (part 2) for revenue sharing, and Proposition 3 (part 2) for per-consumer wholesale prices. The intuition for low values of exclusives from the previous analysis thus carries over when we relax Assumption 2 to Assumption 3.

Notice, however, that the threshold under which this is the unique SPE follows from the same condition as in the previous analysis (eq. 8), but where Δ is no longer negligible. Under Assumption 3, the formal analysis becomes slightly more complex as the homing-outcome threshold when both platforms buy access to Δ is different from the case when only one platform buys access. In the former case, the additional level of exclusives is unaffected by the decision to buy access to Δ and we therefore denote the threshold when both buy content (and neither platform get increased incremental value to consumers) as $\varepsilon_{MH}(0)$ to distinguish it from the threshold in the case where only one platform buys access to Δ, which we denote $\varepsilon_{MH}(\Delta)$.

Similarly, the next proposition generalizes the insights for large values of ε, i.e., when the initial value of exclusives on the two platforms is large.[25]

Proposition 8. *For $\varepsilon > \varepsilon^{SH}(0) = \sqrt{2}t$, there is a unique SPE in which only one platform buys access to Δ and consumers multihome. The platforms' prices are $p_0^{MH-\Delta} = (\varepsilon + \Delta)/2, p_1^{MH-\Delta} = \varepsilon/2$, and the revenue sharing follows from $\theta^{MH-\Delta} = \varepsilon^2/(\varepsilon + \Delta)^2$.*

This proposition generalizes the insights from the previous analysis for the case when the initial level of exclusives is high enough: the unique SPE involves multihoming and only one platform buy access to the content, both under per-consumer wholesale pricing and revenue sharing. The equilibrium prices are the same as in Proposition 1 (part 1, for revenue sharing) and Proposition 2 (part 1, for per-consumer wholesale prices) and the intuition for low values of exclusives from the previous analysis carries over when we relax Assumption 2 to Assumption 3.

As can be seen in Appendix C, for intermediate values of initial exclusives ($\varepsilon_{MH}(\Delta) \leq \varepsilon \leq \varepsilon^{SH}(0)$) the analysis is more complex and allows for multiple SPE. However, similar to the main analysis, the SPE described in Proposition 7 remains a SPE for all $\varepsilon < \varepsilon^{SH}(\Delta)$ and the SPE described in Proposition 8 remains a SPE for all $\varepsilon > \varepsilon^{SH}(0)$.

[24]In particular, Proposition 1, Proposition 3, and Lemma 2. The proof is a straightforward generalization of Lemma 2 part (i) and follows directly from the analysis in the main text in front of Lemma 2.

[25]This proof is a straightforward generalization of Lemma 2 part (ii) and follows directly from the analysis in the main text in front of Lemma 2.

4.4.4 Take-it-or-leave-it offer from platforms

In the main analysis, we assumed that the content provider makes the wholesale-price offer to the platforms. In this extension we show what happens in the opposite case where the platforms, independently but simultaneously, makes take-it-or-leave-it offers to the content provider. This setup may be more realistic for many digital subscription-based platform markets. In this framework, the content provider's role is limited to either accepting or rejecting each platform's offer. Our analysis focuses specifically on two cases: one where all consumers singlehome and another where a fraction of consumers multihome. As a result, we do not provide a comprehensive analysis of consumer homing behavior as in the basic model.

Let us first consider the case where a fraction of consumers multihome. With a revenue sharing contract, it is straightforward to check that there is one equilibrium with non-exclusive distribution, where $\theta_0^{MH-0} = \theta_1^{MH-0} = 1$; the content provider's profit is zero and the platform profits equal the one where they do not distribute Δ. All other equilibria involve the content provider only obtaining one offer (which, as previously, we will assume is platform 0). As shown in Appendix D, all values of $\theta \geq \left(\frac{\varepsilon}{\varepsilon+\Delta}\right)^2$ are equilibria prices for which Δ is distributed exclusively to platform 0. The equilibrium with non-exclusive distribution is Pareto-dominated by all the equilibria with exclusive distribution. Qualitatively, the outcome therefore resembles the outcome in the basic model.

For per-consumer wholesale prices, the same analysis (see Appendix D), yields one equilibrium with non-exclusive distribution equilibrium with $w_0^{MH-0} = w_1^{MH-0} = 0$ and multiple exclusive distribution equilibria for $0 \leq w_0^{MH-\Delta} \leq \Delta$ and where platform 1 does not make an offer. The equilibrium with non-exclusive distribution is Pareto-dominated by the all the equilibria with exclusive distribution. Therefore, also in the case of per-consumer wholesale prices, our results qualitatively resemble the outcome in the basic model.

When turning to the case of singlehoming, similar arguments (details in Appendix D) allow us to conclude that qualitatively, the outcome resembles the outcome in the basic model: Both platforms will offer contracts to the content provider (with $\theta \geq \left(\frac{3t-\Delta}{3t}\right)^2$ or $w \leq \Delta$) and content will therefore be distributed non-exclusively on both platforms with both types of contracts.

5 Discussion and concluding remarks

We examine the structure of wholesale contracts between a digital content provider and competing distribution platforms that offer subscription services granting unlimited access to their content catalogs. Our analysis focuses on the conditions under which such contracts endogenously lead to either exclusive or non-exclusive distribution of an additional piece of content provided by the content provider. Consumers' homing decisions are fully endogenous, allowing platforms to strategically choose whether to encourage singlehoming or multihoming.

In markets with a low initial level of exclusivity, both the content provider and the platforms prefer a per-consumer wholesale pricing model, which supports non-exclusive distribution. Under this structure, platforms set subscription prices that induce all consumers to singlehome. Conversely, in markets characterized by a high degree of exclusivity, all market players favors a revenue-sharing contract, which results in exclusive distribution of the addition content on one platform. In this case, platforms set subscription prices that lead some consumers to multihome. For intermediate levels of exclusivity, recent literature has shown the existence of multiple equilibria – some featuring complete consumer singlehoming and others consumer multihoming. This results in a broad set of potential subgame perfect equilibria (SPE) outcomes in our model, where wholesale contracts are agreed upon before platforms compete for consumers. Nonetheless, we demonstrate that for these intermediate cases, all non–Pareto-dominated SPEs involve complete consumer singlehoming, thereby extending the relevance of consumer singlehoming outcomes beyond markets with only low levels of exclusivity.

Our results suggest the presence of a snowball effect. In markets with initial low levels of exclusivity – such as music streaming, where consumers tend to singlehome – new releases are more likely to be distributed non-exclusively. This is consistent with what we observe for music streaming. All else equal, market participants benefit more from per-consumer wholesale pricing than from revenue-sharing or lump-sum contracts in these settings. In contrast, in markets with high initial levels of exclusivity – such as film and video streaming platforms, where at least some consumers are induced to multihome – new releases are more likely to be distributed exclusively. In such cases, revenue-sharing or lump-sum contracts tend to be more advantageous for market players.

A central concern is that exclusive distribution of premium or "superstar" content may lead to market foreclosure, whereby the platform without access to such content is driven out of the market. However, we demonstrate that in the Hotelling framework, the market-participation constraint is never binding when platforms are free to adjust prices to incentivize multihoming. As a result, the inferior platform – defined as the one with fewer exclusives – remains viable in the market. This finding holds under both per-consumer wholesale pricing and revenue-sharing contracts. Thus, the classical Hotelling model, when coupled with an assumption of complete singlehoming, tends to overstate the foreclosure risk. Before exclusivity disparities reach a threshold where participation constraints would bind, platforms find it optimal to lower prices and induce consumer multihoming.

While our model assumes only one content provider, we believe the insights extend to settings with multiple content providers. Content providers to subscription-based platforms do not offer essential inputs necessary for platforms to be in the market. The content provider offers a piece of unique content that the platforms can include into their content catalogs (a new song or a new movie, for instance). Moreover, in contrast to traditional retail, digital platforms offering unlimited-access subscriptions face no shelf-space constraints. As a result, content providers do not compete directly for inclusion in a platform's catalog – a new song or film can be added without displacing existing content. However, as catalog size grows, competition for consumer attention, which remains limited may increase from content provider' perspective. Subscribers can only consume one piece of content at a time.

How do our model's predictions on wholesale contracts correspond to observed practices in digital platform markets offering "all-you-can-eat" subscriptions to consumers? We compare two polar forms of wholesale contracts: A per-consumer wholesale price and a revenue-sharing contract. The key qualitative distinction lies in whether the contract entails a marginal payment to the content provider by the platform upon acquiring an additional subscriber. If such a marginal payment exists, the contract incorporates features of per-consumer wholesale pricing. If not, it more closely resembles a revenue-sharing contract (or a lump-sum fee) in our model.

Let us start with platforms that promote consumer multihoming, such as movie and series streaming platforms. In its early stages, Netflix encouraged consumers to subscribe in addition to their existing TV packages from cable or satellite providers. Netflix's first flagship exclusive original, House of Cards, launched in 2013, involved an upfront payment to the content provider (MRD) of approximately $3.8 million per episode (Baldwin, 2013). Netflix and other video streaming platforms continue to use what is known as a "cost-plus model," in which the platform covers production costs plus a margin – typically 10% to 20%, or higher – for the content provider (see, e.g., Littleton (2024)). As a result, there is no marginal wholesale cost associated with acquiring an additional subscriber. This aligns with our model's predictions: In settings characterized by consumer multihoming, market participants are better off avoiding per-consumer payments from platforms to content providers.

Music streaming platforms such as Spotify and Apple Music offer relatively little exclusive content, limiting the incremental value of multihoming for consumers. As a result, platforms primarily compete through pricing strategies aimed at business stealing rather than enhancing the incremental value from multihoming. The dominant wholesale contract in music streaming is the streamshare model, where payments to artists are based on their share of total streams on the platform (Bender et al., 2021; Alaei et al., 2022; Spotify, 2025). This raises a key question: Does the streamshare model imply a marginal payment to the content provider – i.e., the artist or label – when a platform, such as Spotify, acquires an additional subscriber?

In our model, the answer is yes. The total size of a platform's content catalog is defined as the sum of non-exclusive (n) and exclusive content (ε), i.e., $v = n + \varepsilon$. Under the assumption of consumer singlehoming, the composition of the catalog – the relative share of exclusive versus non-exclusive content – does not matter. Furthermore, in our model, consumers are homogeneous in how the overall catalog size (v), and any marginal addition (Δ), contributes to their utility. An artist's streamshare is then given by Δ/v. When a platform gains an additional subscriber, the number of streams for the artist contributing the marginal content (Δ) increases, resulting in a marginal payment from the platform to the artist. Therefore, the streamshare model employed by music streaming platforms incorporates elements of a per-consumer wholesale pricing structure.[26]

Spotify (2025) illustrates that even when an artist's streamshare remains constant – i.e., holding Δ/v fixed – the total payments to the artist increase as the platform's subscriber base expands, see Figure 3. This highlights a key feature of the streamshare (pro-rata) model: Marginal payments to content providers (artists) are driven not only by relative consumption but also by the scale of the platform. This mechanism underscores the presence of a per-subscriber wholesale component even though they are typically referred to as a revenue-sharing model in the industry.[27]

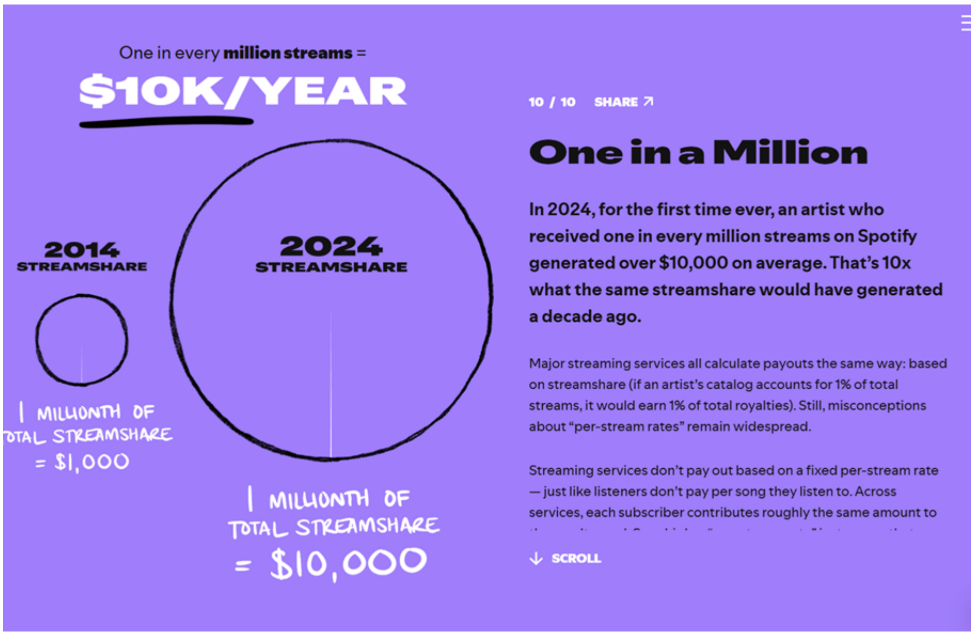


Figure 3. Spotify (2025) illustrates how maintaining a constant streamshare for an artist (i.e., holding Δ/v fixed) has led to higher total payments over time, driven by growth in the platform's subscriber base.

The evolution of how traditional TV channels are distributed offers another insightful example. Until recently, the dominant model involved cable and satellite-TV providers offering "all-you-can-eat" subscriptions to bundles of TV channels – content catalogs. Content providers, in this context, were broadcasters who sold access to their channels to these distribution platforms. Even when consumers had a choice between multiple distributors (e.g., more than one satellite provider or between satellite and cable), they almost always chose to subscribe to just one provider (consumer singlehoming). Interestingly, wholesale contracts between broadcasters and distribution platforms were typically structured as a simple per-subscriber per month wholesale price (Crawford and Yurukoglu, 2012).

[26] It is important to note that a key feature of these markets is consumer heterogeneity in usage intensity. In the context of music streaming, for example, some consumers may stream only a few hours per month, while others stream several hours each day. This variation in consumption is characteristic of all "all-you-can-eat" subscription models, whether in digital streaming services, gym memberships, or even pizza buffets. This is not taken into account in our model. In the context of music streaming, Alaei et al. (2022) examine two types of wholesale contracts that account for consumer heterogeneity in both total consumption and how consumption is distributed across artists. Under the streamshare model (referred to as pro-rata by Alaei et al. (2022)), artists are compensated in proportion to their share of the platform's total streaming volume, as discussed above. Alternatively, under the user-centric model, each subscriber's fee is allocated proportionally among artists based on that individual's listening behavior. As Alaei et al. (2022) highlight, when user consumption is homogeneous – consistent with the simplification in our model – the pro-rata and user-centric models generate identical payments to artists.

[27] Payments to artists and rights owners count for about 70 percent of Spotify's subscriber revenues (Alaei et al., 2022; Bender et al., 2021).

In recent years, however, many consumers have opted out of traditional TV packages. Instead, they subscribe to standalone broadband services (e.g., fiber or 5G) and then purchase streaming services directly from broadcasters – often alongside other streaming platforms like Netflix. Broadcaster-owned streaming platforms generally offer exclusive content, such as proprietary channels and premium sports rights, which encourages multihoming. Like movie and series streaming platforms, these broadcaster services aim to differentiate themselves through exclusivity. Importantly, unlike traditional TV distribution, these platforms typically do not incur marginal wholesale costs for each additional subscriber.

A concrete example is the distribution of premium football in Norway, where the most in-demand leagues are Premier League (UK), Eliteserien (the Norwegian premier league), and the Champions League. The three major broadcasters – TV 2, Discovery, and Viasat – compete for national distribution rights. Historically, once a broadcaster secured the rights, for example to the Premier League, they typically entered into non-exclusive agreements with all major distribution platforms (cable, satellite, and fiber). These contracts were based on a per-subscriber wholesale price, which tended to soften competition among distribution platforms vying for singlehoming consumers. In recent years, however, all three broadcasters have shifted towards selling access to their premium football exclusively through their own streaming services – TV 2 Play, Discovery+, and Viaplay. Currently, Premier League matches are available only via a Viaplay subscription, while Eliteserien and Champions League require a TV 2 Play subscription. This shift suggests that broadcasters are actively encouraging consumer multihoming via exclusive content on their streaming platforms. Notably, by selling directly to consumers through their own services, broadcasters have forward integrated, such that there is no per-subscriber wholesale costs from capturing an additional subscriber.

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Appendices

A Proofs

Proof of Lemma 1: The platforms do not have incentives to deviate from a consumer multihoming as long as it is (weakly) the best response to the rival's pricing, which gives us the critical values:

$$\pi_0^{MH} - \pi_0^{SH}\left(p_0^{SH}(p_1^{MH}), p_1^{MH}\right) \geq 0$$

$$\implies \varepsilon \geq \varepsilon_{MH,0} \equiv \frac{2}{2\sqrt{2}-1}t - \frac{2(\sqrt{2}-1)}{2\sqrt{2}-1}\Delta + \frac{2(\sqrt{2}-1)}{2\sqrt{2}-1}c_0 + \frac{1}{2\sqrt{2}-1}c_1.$$

$$\pi_1^{MH} - \pi_1^{SH}\left(p_1^{SH}(p_0^{MH}), p_0^{MH}\right) \geq 0$$

$$\implies \varepsilon \geq \varepsilon_{MH,1} \equiv \frac{1}{2\sqrt{2}-1}\left(2t - \Delta_\varepsilon\right) + \frac{2(\sqrt{2}-1)}{2\sqrt{2}-1}c_1 + \frac{1}{2\sqrt{2}-1}c_0.$$

Where we have $\varepsilon_{MH,0} - \varepsilon_{MH,1} > 0$, which means that platform 0 is the first platform to have incentives to deviate from consumer multihoming to induce singlehoming, and becomes the binding constraint, we have defined: $\varepsilon_{MH} = \varepsilon_{MH,0}$. Note that because of the 'strategic independence' result we have that $\pi_i^{MH}(p_i(p_j^{SH}, p_j^{SH}) = \pi_i^{MH}$, such that we we find the critical values for when the platforms do not have incentives to deviate from a singlehoming equilibrium:

$$\pi_0^{SH} - \pi_0^{MH} \geq 0$$

$$\implies \varepsilon \leq \varepsilon^{SH,0} \equiv \sqrt{2}t - \frac{(3-\sqrt{2})}{3}\Delta + \frac{(3-\sqrt{2})}{3}c_0 + \frac{\sqrt{2}}{3}c_1,$$

$$\pi_1^{SH} - \pi_1^{MH} \geq 0$$

$$\implies \varepsilon \leq \varepsilon^{SH,1} \equiv \frac{2}{3\sqrt{2}}(3t - \Delta_\varepsilon) + \frac{(3-\sqrt{2})}{3}c_1 + \frac{\sqrt{2}}{3}c_0.$$

where we have that $\varepsilon^{SH,0} - \varepsilon^{SH,1} < 0$, such that platform 0 is also the first platform to have incentives to deviate from singlehoming, such that their constraint is the binding one, we have defined: $\varepsilon^{SH} = \varepsilon^{SH,0}$. Lastly, it is straightforward to verify that $\varepsilon^{SH} - \varepsilon_{MH} > 0$, such that there exists a segment $[\varepsilon_{MH}, \varepsilon^{SH}]$ where both consumer multihoming and singlehoming constitute Nash equilibria. □

Proof of Proposition 1. The platform pricing consumer homing outcomes follows from Lemma 1.

(1) The content provider's maximum payoffs $\pi_{CP}^{MH-0} = 0$ from offering $\theta^{MH-0} = 1$ (eq. 9) or $\pi_{CP}^{MH-\Delta} = \Delta\frac{2\varepsilon+\Delta}{4t}$ from offering $\theta^{MH-\Delta} = \varepsilon^2/(\varepsilon+\Delta)^2$ (eq. 10), where it immediately follows that $\pi_{CP}^{MH-\Delta} > \pi_{CP}^{MH-0}$, such that $\theta^{MH-\Delta}$ is a dominant strategy for the content provider to offer. For platform 0, it is a (weakly) dominant strategy to accept the offer and get payoff $\varepsilon^2/(4t)$, which is also the rejection payoff, for platform 1 accepting the offer would imply a payoff reduction from $\varepsilon^2/(4t)$ to $\varepsilon^2/(4t) - \varepsilon^4/\left(4t(\varepsilon+\Delta)^2\right)$, which is a strategy dominated by not accepting the offer.

(2) The content provider's maximum payoffs $\pi_{CP}^{SH-0} = \Delta(6t-\Delta)/(9t)$ from $\theta^{SH-0} = (3t - \Delta)^2/(9t^2)$ (eq. 11), or $\pi_{CP}^{SH-\Delta} = \Delta(6t+\Delta)/(18t)$ from $\theta^{SH-\Delta} = 9t^2/(3t+\Delta)^2$ (eq. 12), where it follows from eq. 13 that, given Assumption 1, the content provider's dominant strategy is to sell to both platforms. The platform will have payoff $t/2$, and deviation to not accepting the content provider's offer will give a lower payoff $(3t-\Delta)^2/(18t)$.

(3) It follows immediately that both (1) and (2) hold in the range $\varepsilon_{MH} \leq \varepsilon \leq \varepsilon^{SH}$. Other SPEs in this range are described in more detail in the proof of Proposition 2. □

Proof of Proposition 2. This proof starts with a characterization of all SPEs of the game before proceeding to analyze Pareto-dominance. These are outlined as cases 1 to 8 below. The headline for each case summarized the stage-game equilibria in the different branches of the game tree. For instance $\{CC-SH, CN-SH, NN-SH\}$ means that singlehoming occurs in all three branches of the tree (where two, one or none of the platforms have bought access to Δ).

The notation $\tilde{\pi}_i$ is used to denote final payoff for platform i, $\theta\pi_i$, for the contracting platforms, i.e. both platforms if both platforms accept in equilibrium and platform 0 if only platform 0 accepts, and π_i is platform i does not enter into a contract with the content provider.

Case 1: $\{CC - SH, CN - SH, NN - SH\}$**.** The equilibrium candidate where both platforms accept the offer gives access fee and final payoffs, $\tilde{\pi}_i = \theta\pi_1^{SH-0}$:

$$\theta^{SH-0} = \frac{(3t-\Delta)^2}{9t^2} \text{ and } \pi_{CP}(\theta^{SH-0}) = \Delta\frac{6t-\Delta}{9t} \text{ and } \tilde{\pi}_i = \frac{(3t-\Delta)^2}{18t}.$$

The equilibrium candidate where only platform 0 accepts the offer gives access fee and final payoffs, $\tilde{\pi}_i = \theta\pi_0^{SH-\Delta}$:

$$\theta^{SH-\Delta} = \frac{9t^2}{(3t+\Delta)^2} \text{ and } \pi_{CP}(\theta^{SH-\Delta}) = \Delta\frac{6t+\Delta}{18t} \text{ and } \tilde{\pi}_i = \frac{t}{2}.$$

The CP prefers to set a price so as to sell to both platforms (as $\Delta < 2t$) and the equilibrium contract details that will be played as well as the associated profits are:

$$\theta = \frac{(3t-\Delta)^2}{9t^2}, \pi_{CP} = \Delta\frac{6t-\Delta}{9t} \text{ and } \tilde{\pi}_i = \frac{(3t-\Delta)^2}{18t}.$$

Case 2: $\{CC - MH, CN - MH, NN - MH\}$**.** The equilibrium candidate where both platforms accept the offer gives access fee and final payoffs, $\tilde{\pi}_i = \theta\pi_1^{MH-0}$:

$$\theta^{MH-0} = 1 \text{ and } \pi_{CP}(\theta^{MH-0}) = 0 \text{ and } \tilde{\pi}_i = \frac{\varepsilon^2}{4t}.$$

The equilibrium candidate where only platform 0 accepts the offer gives access fee and final payoffs, $\tilde{\pi}_i = \theta\pi_0^{MH-\Delta}$:

$$\theta^{MH-\Delta} = \frac{\varepsilon^2}{(\varepsilon+\Delta)^2} \text{ and } \pi_{CP}(\theta^{MH-\Delta}) = \Delta\frac{2\varepsilon+\Delta}{4t} \text{ and } \tilde{\pi}_i = \frac{\varepsilon^2}{4t}.$$

The content provider prefers to sell to only one platform and the equilibrium contract details that will be observed and associated profits are:

$$\theta = \frac{\varepsilon^2}{(\varepsilon+\Delta)^2},\ \pi_{CP} = \Delta\frac{2\varepsilon+\Delta}{4t},\ \tilde{\pi_0} = \frac{\varepsilon^2}{4t} \text{ and } \tilde{\pi_1} = \frac{\varepsilon^2}{4t}.$$

Case 3: $\{CC - SH, CN - SH, NN - MH\}$**.** The equilibrium candidate where both platforms accept the offer gives access fee and final payoffs:

$$\theta^{SH-0} = \frac{(3t-\Delta)^2}{9t^2} \text{ and } \pi_{CP}(\theta^{SH-0}) = \Delta\frac{6t-\Delta}{9t} \text{ and } \tilde{\pi}_i = \frac{(3t-\Delta)^2}{18t}.$$

The equilibrium candidate where only platform 0 accepts the offer gives access fee and final payoffs:

$$\theta^{SHMH-\Delta} = \frac{9\varepsilon^2}{2(3t+\Delta)^2} \text{ and } \pi_{CP}(\theta^{SHMH-\Delta}) = \frac{(3t+\Delta)^2}{18t} - \frac{\varepsilon^2}{4t} \text{ and } \tilde{\pi}_i = \frac{\varepsilon^2}{4t}.$$

For sufficiently small Δ, we have that for $\varepsilon \in [\varepsilon_{MH}, \varepsilon^{SH}]$ the content provider will prefer to set θ such that only platform 0 accepts (reverse of Case 1). We have that the observed equilibrium consists of:

$$\theta = \frac{9\varepsilon^2}{2(3t+\Delta)^2}.$$

This yields the following profits:

$$\pi_{CP} = \frac{(3t+\Delta)^2}{18t} - \frac{\varepsilon^2}{4t} \text{ and } \tilde{\pi_0} = \frac{\varepsilon^2}{4t} \text{ and } \tilde{\pi_1} = \frac{(3t-\Delta)^2}{18t}.$$

Case 4: $\{CC - MH, CN - MH, NN - SH\}$. The equilibrium candidate where both platforms accept the offer gives access fee and final payoffs:

$$\theta^{MH-0} = 1 \text{ and } \pi_{CP}(\theta^{MH-0}) = 0 \text{ and } \tilde{\pi}_i = \frac{\varepsilon^2}{4t}.$$

The equilibrium candidate where only platform 0 accepts the offer gives access fee and final payoffs:

$$\theta^{MHSH-\Delta} = \frac{2t^2}{(\varepsilon+\Delta)^2} \text{ and } \pi_{CP}(\theta^{MHSH-\Delta}) = \frac{(\varepsilon+\Delta)^2}{4t} - \frac{t}{2} \text{ and } \tilde{\pi}_i = \frac{t}{2}.$$

The CP prefers to sell to both platforms (as $(\varepsilon + \Delta) < \sqrt{2}t$ holds for sufficiently small Δ when $\varepsilon \in [\varepsilon_{MH}, \varepsilon^{SH}]$) and the equilibrium contract details that will be observed are $\theta = 1$.

This yields the following profits:

$$\pi_{CP} = 0 \text{ and } \tilde{\pi}_i = \frac{\varepsilon^2}{4t}.$$

Case 5: $\{CC - MH, CN - SH, NN - SH\}$**.** The equilibrium candidate where both platforms accept the offer gives access fee and final payoffs:

$$\theta^{MHSH-0} = \frac{2(3t-\Delta)^2}{9\varepsilon^2} \text{ and } \pi_{CP}(\theta^{MHSH-0}) = \frac{\varepsilon^2}{2t} - \frac{(3t-\Delta)^2}{9t} \text{ and } \tilde{\pi}_i = \frac{(3t-\Delta)^2}{18t}.$$

The equilibrium candidate where only platform 0 accepts the offer gives access fee and final payoffs:

$$\theta^{SH-\Delta} = \frac{9t^2}{(3t+\Delta)^2} \text{ and } \pi_{CP}(\theta^{SH-\Delta}) = \Delta\frac{6t+\Delta}{18t} \text{ and } \tilde{\pi}_i = \frac{t}{2}.$$

The content provider prefers to sell to only one platform (as $\varepsilon < \sqrt{6t^2 - \Delta(2t-\Delta)}/\sqrt{3}$ for small enough Δ) and the equilibrium contract details that will be observed and the payoffs are:

$$\theta = \frac{9t^2}{(3t+\Delta)^2}, \ \pi_{CP} = \Delta\frac{6t+\Delta}{18t} \text{ and } \tilde{\pi_0} = \frac{t}{2} \text{ and } \tilde{\pi_1} = \frac{(3t-\Delta)^2}{18t}.$$

Case 6: $\{CC - MH, CN - SH, NN - MH\}$**.** The equilibrium candidate where both platforms accept the offer gives access fee and final payoffs:

$$\theta^{MHSH-0} = \frac{2(3t-\Delta)^2}{9\varepsilon^2} \text{ and } \pi_{CP}(\theta^{MHSH-0}) = \frac{\varepsilon^2}{2t} - \frac{(3t-\Delta)^2}{9t} \text{ and } \tilde{\pi}_i = \frac{(3t-\Delta)^2}{18t}.$$

The equilibrium candidate where only platform 0 accepts the offer gives access fee and final payoffs:

$$\theta^{SHMH-\Delta} = \frac{9\varepsilon^2}{2(3t+\Delta)^2} \text{ and } \pi_{CP}(\theta^{SHMH-\Delta}) = \frac{(3t+\Delta)^2}{18t} - \frac{\varepsilon^2}{4t} \text{ and } \tilde{\pi}_i = \frac{\varepsilon^2}{4t}.$$

The CP prefers to sell to only one platform (as $\varepsilon < \sqrt{2}\sqrt{9t^2 - \Delta(2t-\Delta)}/3$ holds for sufficiently small Δ when $\varepsilon \in [\varepsilon_{MH}, \varepsilon^{SH}]$) and the equilibrium contract details that will be observed are:

$$\theta = \frac{9\varepsilon^2}{2(3t-\Delta)^2}.$$

This yields the following profits:

$$\pi_{CP} = \frac{(3t+\Delta)^2}{18t} - \frac{\varepsilon^2}{4t} \text{ and } \tilde{\pi_0} = \frac{\varepsilon^2}{4t} \text{ and } \tilde{\pi_1} = \frac{(3t-\Delta)^2}{18t}.$$

Case 7: $\{CC - SH, CN - MH, NN - SH\}$**.** The equilibrium candidate where both platforms accept the offer gives access fee and final payoffs:

$$\theta^{SHMH-0} = \frac{\varepsilon^2}{2t^2} \text{ and } \pi_{CP}(\theta^{SHMH-0}) = t - \frac{\varepsilon^2}{2t} \text{ and } \tilde{\pi}_i = \frac{\varepsilon^2}{4t}.$$

The equilibrium candidate where only platform 0 accepts the offer gives access fee and final payoffs:

$$\theta^{MHSH-\Delta} = \frac{2t^2}{(\varepsilon+\Delta)^2} \text{ and } \pi_{CP}(\theta^{MHSH-\Delta}) = \frac{(\varepsilon+\Delta)^2}{4t} - \frac{t}{2} \text{ and } \tilde{\pi}_i = \frac{t}{2}.$$

The CP prefers to sell to both platforms (as $\varepsilon < \sqrt{2}\sqrt{9t^2 - \Delta^2}/3 - \Delta/3$ holds for sufficiently small Δ when $\varepsilon \in [\varepsilon_{MH}, \varepsilon^{SH}]$) and the equilibrium contract details that will be observed are:

$$\theta = \frac{\varepsilon^2}{2t^2}.$$

This yields the following profits:

$$\pi_{CP} = t - \frac{\varepsilon^2}{2t} \text{ and } \tilde{\pi}_i = \frac{\varepsilon^2}{4t}$$

Case 8: $\{CC - SH, CN - MH, NN - MH\}$**.** The equilibrium candidate where both platforms accept the offer gives access fee and final payoffs:

$$\theta^{SHMH-0} = \frac{\varepsilon^2}{2t^2} \text{ and } \pi_{CP}(\theta^{SHMH-0}) = t - \frac{\varepsilon^2}{2t} \text{ and } \tilde{\pi}_i = \frac{\varepsilon^2}{4t}.$$

The equilibrium candidate where only platform 0 accepts the offer gives access fee and final payoffs:

$$\theta^{MH-\Delta} = \frac{\varepsilon^2}{(\varepsilon + \Delta)^2} \text{ and } \pi_{CP}(\theta^{MH-\Delta}) = \Delta \frac{2\varepsilon + \Delta}{4t} \text{ and } \tilde{\pi}_i = \frac{\varepsilon^2}{4t}.$$

The CP prefers to sell to both platforms (as $\Delta > t(\sqrt{3} - 1)$ holds for sufficiently small Δ) and the equilibrium contract details are the same as in Case 7.

SPE comparisons: The equilibrium characterized in case 2 is Pareto-dominated by the one described in cases 3 and 6 as the content provider gets a higher payoff in cases 3 and 6 while platform 0 is indifferent as it obtains the same payoff in both cases. Platform 1 also prefers cases 3 and 6 (the condition for this becomes the same as the condition on profits for the CP).

It is straightforward to see that case 4 is dominated by case 2. In fact, in case 2, the content provider gets a higher payoff while the platforms are indifferent as they obtain the same payoff in all cases.

Case 5 is dominated by case 1 as the platforms both obtain the same profit as in case 1 under Assumption 2, but the content provider obtains a higher payoff in case 1.

To sum up, the SPEs that are not dominated are cases 1, 3, 6, 7 and 8, all in which the outcome that will be realized in the SPE involves singlehoming.

□

Proof of Proposition 3. The platform pricing consumer homing outcomes follows from Lemma 1.

(1) The content provider's maximum payoffs $\pi_{CP}^{MH-0}(w^{MH-0}) = 0$ from offering $w^{MH-0} = 0$, or $\pi_{CP}^{MH-\Delta} = \Delta\varepsilon/(2t)$ from offering $w^{MH-\Delta} = \Delta$. It immediately follows that the content provider's dominant strategy is to offer $w^{MH-\Delta}$, to induce only platform 0 to accept the offer. For platform 0 it is a (weakly) dominant strategy to accept the offer and get net payoff $\varepsilon^2/(4t)$, for platform 1, accepting the offer gives payoff $(\varepsilon^2 - \Delta)^2/(4t)$ which is a dominated strategy by not accepting.

(2) The content provider's maximum payoffs $\pi_{CP}^{SH-0}(w^{SH-0}) = \Delta$ (see eq. 15) from offering $w^{SH-0} = \Delta$, or $\pi_{CP}^{SH-\Delta}(w^{SH-\Delta}) = \Delta/2$ from offering $w^{SH-\Delta} = \Delta$. It immediately follows that the content provider's dominant strategy is to offer w^{SH-0}, to induce both platforms to

accept the offer. The platforms' net payoff is $t/2$, and their deviation payoff is $(3t - \Delta)^2/(18t)$ compared to not accepting $t/2$.

(3) It follows immediately that both (1) and (2) hold in the range $\varepsilon_{MH} \leq \varepsilon \leq \varepsilon^{SH}$. Other SPEs in this range are described in more detail in the proof of Proposition 4.

□

Proof of Proposition 4. This proof starts with a characterization of all SPEs of the game when $\varepsilon \in (\varepsilon_{MH}, \varepsilon^{SH})$ before proceeding to analyze Pareto-dominance.

Case 1: $\{CC - SH, CN - SH, NN - SH\}$. If the content provider wants to induce both platforms to buy, the fee cannot be higher than $w^{SH-0} = \Delta$.

The content provider's payoff in this case becomes $\pi_{CP}(w^{SH-0}) = \Delta$.

If the content provider sets the fee to induce only one platform to accept the offer, we get

$$w^{SH-\Delta} = \Delta \text{ and } \pi_{CP}(w^{SH-\Delta}) = \frac{\Delta}{2}.$$

If follows immediately that the content provider prefers to induce both platforms to buy.

Case 2: $\{CC - MH, CN - MH, NN - MH\}$. If the content provider sets a w to induce both platforms to accept the offer, we have:

$$w^{MH-0} = 0 \text{ and } \pi_{CP}(w^{MH-0}) = 0,$$

and if it sets the fee to induce only one platform to accept the offer:

$$w^{MH-\Delta} = \Delta \text{ and } \pi_{CP}(w^{MH-\Delta}) = \Delta\frac{\varepsilon}{2t}.$$

It follows immediately that the CP prefers to serve only platform 0.

Case 3: $\{CC - SH, CN - SH, NN - MH\}$. The content provider prefers to set a fee w as high as possible. To induce both platforms to accept the offer, the fee and the CP's payoff becomes:

$$w^{SH-0} = \Delta \text{ and } \pi_{CP}(w^{SH-0}) = \Delta,$$

and if they set the fee to induce only platform 0 to accept the offer

$$w^{SHMH-\Delta} = \Delta + 3\left(t - \frac{\varepsilon}{\sqrt{2}}\right) \text{ and } \pi_{CP}(w^{SHMH-\Delta}) = \frac{\varepsilon\left(\sqrt{2}\,(3t + \Delta) - 3\varepsilon\right)}{4t}.$$

The CP prefers to sell to both if:

$$\pi_{CP}(w^{SH-0}) \geq \pi_{CP}(w^{SHMH-\Delta}).$$

If Δ is small, we require that ε is sufficiently small, i.e.,

$$\varepsilon < \left(\Delta + 3t - \sqrt{9t^2 - \Delta(18t - \Delta)}\right)/(3\sqrt{2})$$

for the content proivder to prefer the fee that induces both platforms to buy. When Δ is sufficiently small, as in Assumption 2, this is never true and the content provider prefers to sell to only one platform.

Case 4: $\{CC - MH, CN - MH, NN - SH\}$. If the content providers set a w to induce both platforms to accept the offer, we have:

$$w^{MH-0} = 0 \text{ and } \pi_{CP}(w^{MH-0}) = 0,$$

and if they set the fee to induce both platforms to accept the offer:

$$w^{MH-\Delta} = \Delta + \varepsilon - \sqrt{2}t \text{ and } \pi_{CP}(w^{MH-\Delta}) = \frac{\varepsilon + \Delta}{\sqrt{2}} - t.$$

It follows that the content provider prefers to set a fee which induces only platform 0 to accept the offer while $\sqrt{2}t < (\varepsilon + \Delta)$. Under Assumption 2, this is never true and the content provider prefers to induce both to buy.

Case 5: $\{CC - MH, CN - SH, NN - SH\}$**.** To induce both platforms to accept the offer, the fee and the CP's payoff becomes:

$$w^{MHSH-0} = \frac{2\Delta - 3(2t - \sqrt{2}\varepsilon)}{2 + 3\sqrt{2}} \text{ and}$$

$$\pi_{CP}(w^{MHSH-0}) = \frac{2\left(2\Delta + 3\sqrt{2}\varepsilon - 6t\right)(3t + \varepsilon - \Delta)}{(2 + 3\sqrt{2})^2 t}.$$

and if the content provider sets the fee to induce only one platform to accept the offer

$$w^{SH-\Delta} = \Delta \text{ and } \pi_{CP}(w^{SH-\Delta}) = \frac{\Delta}{2}.$$

We have that the CP, when using a per-consumer wholesale price, will prefer to sell to both if

$$\varepsilon < \frac{\sqrt{\left(6\sqrt{2} + 11\right)\Delta^2 - 3\left(\sqrt{2} + 10\right)\Delta t + 9\left(6\sqrt{2} + 11\right)t^2} - (3 - \sqrt{2})[3t - \Delta]}{6}$$

It follows that if $\varepsilon < \sqrt{2}t$ the CP will prefer to induce only platform 0 to accept the offer.

Case 6: $\{CC - MH, CN - SH, NN - MH\}$**.** To induce both platforms to accept the offer, the fee and the CP's payoff becomes:

$$w^{MHSH-0} = \frac{2\Delta - 3(2t - \sqrt{2}\varepsilon)}{2 + 3\sqrt{2}} \text{ and}$$

$$\pi_{CP}(w^{MHSH-0}) = \frac{2\left(2\Delta + 3\sqrt{2}\varepsilon - 6t\right)(3t + \varepsilon - \Delta)}{(2 + 3\sqrt{2})^2 t}.$$

and if they set the fee to induce only platform 0 to accept the offer

$$w^{SHMH-\Delta} = \Delta + 3\left(t - \frac{\varepsilon}{\sqrt{2}}\right) \text{ and } \pi_{CP}(w^{SHMH-\Delta}) = \frac{\varepsilon\left(\sqrt{2}\,(3t + \Delta) - 3\varepsilon\right)}{4t}.$$

We have that the CP, when using a per-consumer wholesale price, will prefer to sell to both if

$$\varepsilon \geq \frac{\sqrt{2\left(572\sqrt{2} + 1065\right)\Delta^2 - 84\left(36\sqrt{2} + 73\right)\Delta t + 18\left(460\sqrt{2} + 729\right)t^2}}{66 + 60\sqrt{2}}$$

$$+ \frac{\left(23\sqrt{2} + 4\right)\Delta + 3(20 - \sqrt{2})t}{66 + 60\sqrt{2}},$$

which becomes $\varepsilon \geq \sqrt{2}t$ under Assumption 2 ($\Delta \to 0$) and does not hold on the relevant interval. Therefore the content provider prefers to set the fee to induce only platform 0 to buy.

Case 7: $\{CC - SH, CN - MH, NN - SH\}$**.** If the content provider wants to induce both platforms to accept the offer, there is not upper bound on the optimal fee level since this costs is directly transferred to the consumers in the case where both platforms have the same costs and all consumer singlehome. Therefore, we get

$$w^{SHMH-0} \geq \Delta \text{ and } \pi_{CP} = w^{SHMH-0} \geq \Delta.$$

If they want to set a price to induce only platform 0 to accept the offer, we have:

$$w^{SHMH-\Delta} = \Delta + \varepsilon - \sqrt{2}t \text{ and}$$

$$\pi_{CP}(w^{SHMH-\Delta}) = \frac{(\varepsilon + \Delta - \sqrt{2}t)\left((3+\sqrt{2})t - \varepsilon\right)}{6t}.$$

Since $w^{SHMH-\Delta} = \Delta + \varepsilon - \sqrt{2}t < \Delta$ for $\varepsilon \in (\varepsilon_{MH}, \varepsilon^{SH})$ and demand for platform 0 ($\frac{((3+\sqrt{2})t-\varepsilon)}{6t}$) is less than one, it is immediate that the content provider prefers to set the fee such that both platforms buy.

Case 8: $\{CC - SH, CN - MH, NN - MH\}$**.** The same argument as in case 7 applies, with the exception that if the content provider wants to set a price to induce only platform 0 to accept the offer, we have:

$$w^{MH-\Delta} = \Delta \text{ and } \pi_{CP}(w^{MH-\Delta}) = \Delta\frac{\varepsilon}{2t}.$$

The result from case 7 nevertheless holds.

SPE comparisons: It is straightforward to see that case 4 is dominated by case 2 and case 5 is dominated by case 1.

Case 2 is dominated by cases 3 and 6 since the platforms earn the same level of profits, but the content provider earns more profit since $\Delta\frac{\varepsilon}{2t} < \frac{\varepsilon(\sqrt{2}(3t+\Delta)-3\varepsilon)}{4t}$ is equivalent to $\varepsilon < \sqrt{2}t \equiv \varepsilon^{SH}$ under Assumption 2.

To sum up, the SPEs that are not Pareto-dominated by another SPE, i.e., cases 1, 3, 6, 7 and 8, all involve singlehoming by the consumers. □

Proof of Lemma 3. From the analysis in the proofs of Propositions 1 and 4, both with a royalty sharing scheme and a per-consumer wholesale price the following SPE outcomes are not Pareto-dominated: Non-exclusivity and singlehoming from case 1 in the proofs of Propositions 1 and 4. Exclusivity and singlehoming from cases 3 and 6 in the proofs of Propositions 1 and 4. Non-exclusivity and singlehoming from cases 7 and 8 the proofs of Propositions 1 and 4. There are no other other SPEs under one of the pricing schemes that are not Pareto-dominated.

For $\varepsilon_{MH} \leq \varepsilon \leq \varepsilon^{SH}$, straightforward revenue comparisons yield the result summarized in the lemma:

In case 1, the content provider prefers a per-consumer wholesale price to a royalty sharing scheme since $\Delta\frac{6t-\Delta}{9t} \leq \Delta$. The platforms also prefer a per-consumer wholesale price to a royalty sharing scheme since $\frac{(3t-\Delta)^2}{18t} \leq \frac{t}{2}$.

In cases 7 and 8, the content provider prefers a per-consumer wholesale price to a royalty sharing scheme since $t - \frac{\varepsilon^2}{2t} \leq \Delta$. The platforms also prefer a per-consumer wholesale price to a royalty sharing scheme since $\frac{\varepsilon^2}{4t} \leq \frac{t}{2}$.

In cases 3 and 6, the content provider prefers a royalty sharing scheme to a per-consumer wholesale price since $\frac{(3t+\Delta)^2}{18t} - \frac{\varepsilon^2}{4t} \geq \frac{\varepsilon\left(\sqrt{2}(3t+\Delta)-3\varepsilon\right)}{4t}$. Platform 0 is indifferent between a royalty sharing scheme and a per-consumer wholesale price since it gets the same ex ante profits in both cases. Finally, platform 1 prefers a royalty sharing scheme to a per-consumer wholesale price since $\frac{(3t-\Delta)^2}{18t} \geq \frac{\varepsilon^2}{4t}$ under Assumption 2. □

B Fixed lump-sum fee

Consider platform payoff $\pi = \pi_A$ if they accept the content provider's offer and $\pi = \pi_B$ if they do not, π_{CP} denote the content provider's payoff.

Revenue Sharing: If the content provider offers as wholesale terms of trade a revenue sharing contract, they will set θ such that $\theta\pi_A \geq \pi_B \implies \theta = \pi_B/\pi_A$ which gives payoffs: $\pi = \pi_A(\frac{\pi_B}{\pi_A}) = \pi_B$ and $\pi_{CP} = (1 - \frac{\pi_B}{\pi_A})\pi_A = \pi_A - \pi_B$.

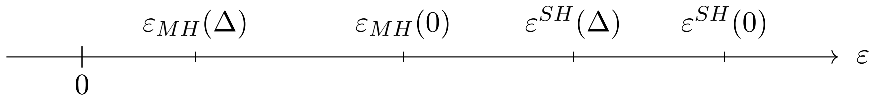
Lump-sum fee: If the content provider offers as wholesale terms of trade a lump-sum fee, F, they will set the fee such that $\pi_A - F \geq \pi_B \implies F = \pi_A - \pi_B$, which gives payoffs: $\pi = \pi_A - (\pi_A - \pi_B) = \pi_B$ and $\pi_{CP} = F = \pi_A - \pi_B$.

By the equivalence between the payoffs for both platforms and content provider in both cases, we have that they are strategically equivalent.

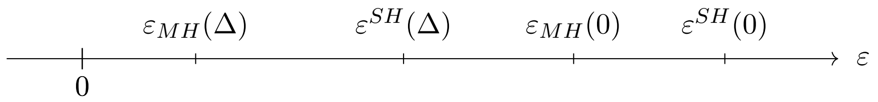
C SPE cases

As in the case with Δ arbitrarily small, there are multiple SPEs for intermediate values of ε. However, for larger values of Δ the analysis becomes even more complex than in the previous analysis. To show this, we split the interval of possible values of Δ and consider first $\Delta \in \left(0, \frac{3\sqrt{2}}{7}t\right)$ and then $\Delta \in \left[\frac{3\sqrt{2}}{7}t, (\sqrt{2}+1)t\right)$.

For $\Delta \in \left(0, \frac{3\sqrt{2}}{7}t\right)$, Figure C.1a illustrates the thresholds for singlehoming and multihoming to be a SPE candidate for various values of ε.



(a) Thresholds of platform exclusive content when $\Delta \in (0; \frac{3\sqrt{2}}{7}t)$ (Not to scale).



(b) Thresholds of platform exclusive content when $\Delta \in (\frac{3\sqrt{2}}{7}t; (\sqrt{2}+1)t)$ (Not to scale).

Figure C.1. Thresholds of platform exclusive content when Assumption 2 is relaxed.

In this constellation, the analysis under Assumption 2 holds in the intervals $\varepsilon < \varepsilon_{MH}(\Delta)$, $\varepsilon >$

$\varepsilon^{SH}(0)$ and $\varepsilon_{MH}(0) < \varepsilon < \varepsilon^{SH}(\Delta)$. In the remaining intervals, i.e., $\varepsilon_{MH}(\Delta) < \varepsilon < \varepsilon_{MH}(0)$ and $\varepsilon^{SH}(\Delta) < \varepsilon < \varepsilon^{SH}(0)$, only some of the SPE characterized for $\varepsilon_{MH}(0) < \varepsilon < \varepsilon^{SH}(\Delta)$ exist.

For $\Delta \in \left(\frac{3\sqrt{2}}{7}t; (\sqrt{2}+1)t\right)$, Figure C.1b illustrates the thresholds for singlehoming and multihoming to be a SPE-candidate for various values of ε.

Compared to the previous case the position of $\varepsilon^{SH}(\Delta)$ and $\varepsilon_{MH}(0)$ is inverted.

For $\varepsilon_{MH}(\Delta) < \varepsilon < \varepsilon_{MH}(0)$, in addition to the equilibrium outcomes identified in the main analysis, there is also another possible outcome in which when only platform 0 buys access to Δ, the platforms will set prices to induce multihoming by the consumers. In the case of revenue-sharing, this can be shown to be a SPE if $\varepsilon > (\sqrt{2}\sqrt{9t^2 - \Delta^2} - \Delta)/3$.

In the range $\varepsilon_{MH}(0) < \varepsilon < \varepsilon^{SH}(0)$, we have additional SPEs. In this range it can be shown that multihoming can be supported in a SPE independently of whether one, both or neither platforms accept the content provider's offer. Another additional SPE is where consumers singlehome if no platform affers Δ but they multihome if one or both platforms buy access to Δ. The scenario where the platforms compete for singlehoming consumers when both platforms accept the content provider's offer and consumers consumers multihome otherwise may under some conditions ($\Delta > (\sqrt{3}-1)t$) also be a SPE.

Finally, note that if the value of Δ grows beyond the values in Assumption 3, then the results presented for low values of ε no longer holds and we may get multihoming in the SPE here as well. This can be seen from the figures above since $\varepsilon^{SH}(\Delta) < 0$ for $\varepsilon \geq (\sqrt{2}+1)t$ implying that the interval below $\varepsilon^{SH}(\Delta)$ "disappears".

The details of all the possible SPEs can be found in the proofs of Propositions 2 and 4.

D Take-it-or-leave-it offer from the platforms

This proof uses the profit expressions in eqs. 6 and 7.

Consider first the case of multihoming (which we know is the unique equilibra for $\varepsilon \geq \varepsilon^{SH}$).

For revenue sharing contracts, both platforms offering a contract (and buying access to Δ) constitutes an equilibrium if and only if

$$\frac{\varepsilon_i^2}{4t} \leq \theta_i \frac{\varepsilon_i^2}{4t}.$$

Since $\theta_i \in [0,1]$. The only possible situation in which this is true is for $\theta_0 = \theta_1 = 1$.

For an equilibrium to involve exclusive distribution, it needs to be the case the platform 0 has incentives to buy and platform 1 does not.[28]

Platform 0 has an incentive to offer a contract with θ so that it can buy access if and only if

$$\frac{\varepsilon^2}{4t} \leq \theta \frac{(\varepsilon+\Delta)^2}{4t}.$$

This is equivalent to $\theta \geq \left(\frac{\varepsilon}{\varepsilon+\Delta}\right)^2$.

[28]Note that in this version of the model, the content provider is passive and will accept any (non-negative) contract it is offered as that is better than no income.

Platform 1 has no incentives to offer a contract since it does not change its profits

$$\frac{\varepsilon^2}{4t} \geq \theta\frac{\varepsilon^2}{4t}.$$

Finally, if comparing the profits for all parties in the equilibrium with non-exclusive distribution and $\theta = 1$ to any of the other equilibria we can see that the content provider and platform 1 obtain the same profit in both cases while platform 0 strictly prefers the outcome with exclusive content. The equilibrium with non-exclusive distribution is thus Pareto-dominated.

The same analysis for per-consumer wholesale prices gives an equilibrium in which Δ is distributed non-exclusively with $w_0 = w_1 = 0$ and multiple equilibria in which Δ is distributed exclusively and $0 \geq w \geq \Delta$. The former equilibrium is Pareto-dominated by all the latter equilibria.

We now turn to the case of singlehoming (which is the unique equilibria for $\varepsilon \leq \varepsilon_{MH}$

Under revenue sharing, exclusive distribution cannot be part of an equilibrium. Assume it is, then it can be shown that the platform who has not offered a contract to buy Δ has incentives to offer $\theta_j \geq \left(\frac{(3t-\Delta)}{3t}\right)^2$. This follows directly from

$$\theta\frac{9t^2}{18t} \geq \frac{(3t-\Delta)^2}{18t}.$$

There a multiple equilibria with non-exclusive distribution since

$$\frac{(3t-\Delta)^2}{18t} \leq \theta_i\frac{9t^2}{18t}.$$

This is equivalent to $\theta_i \geq \left(\frac{3t-\Delta}{3t}\right)^2$.

Finally, with per-consumer wholesale prices, the same type of arguments lead us to conclude that there are no equilibria with exclusive distribution. This is because the platform without access to Δ would have an incentive to buy access since

$$\frac{(3t-\Delta+w_j)^2}{18t} \leq \frac{(3-w_i+w_j)^2}{18t}.$$

There are multiple equilibria with exclusive distribution and $0 \leq w \leq \Delta$. This follows from

$$\frac{(3t-(w_i-w_j))^2}{18t} \geq \frac{(3t-\Delta+w_j))^2}{18t}.$$

We analyze competition between two digital platforms selling subscriptions for unlimited access to their content catalogs (e.g., streaming and TV broadcasting platforms). A content provider offers additional content to the platforms. The content provider chooses between offering a revenue sharing contract and a per-consumer wholesale pricing contract towards the platforms, thereby endogenously determining whether its content will be distributed non-exclusively (on both platforms) or exclusively (on one platform). Our model yields clear predictions: In markets with low initial exclusivity, the content provider and both platforms prefer per-consumer wholesale pricing to endogenously promote non-exclusive distribution. Platforms set subscription prices that lead to full consumer singlehoming. Conversely, in markets with high initial exclusivity, all market players prefer a revenue-sharing contract that induces exclusive distribution, with platforms setting prices that encourage some consumers to multihome.

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