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Abstract

This article studies incentives for a premium provider (Superstar) to offer exclusive contracts to competing platforms mediating the interactions between consumers and firms. When platform competition is intense, more consumers subscribe to the platform hosting the Superstar exclusively. This mechanism is self-reinforcing as firms follow consumer decisions and (some) join exclusively the platform with the Superstar. Exclusivity always benefits firms and may benefit consumers. Moreover, when the Superstar is integrated with a platform, non-exclusivity becomes more likely than if the Superstar was independent. This analysis provides several implications for managers and policy makers operating in digital and traditional markets.

JEL-Codes: L130, L220, L860.

Keywords: exclusive contracts, platforms, two-sided markets, ripple effect, content providers, market power.

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1. Introduction

Two-sided platforms enable valuable interactions between different groups of agents. When platforms compete, an agent usually faces a trade-off between single-homing and multi-homing. On the one hand, multi-homing allows an agent to interact with a large mass of agents on the other side. On the other hand, the platform is a bottleneck for single-homing agents. As a result, depending on their relative importance for the other side, this puts them in a better bargaining position vis-à-vis the platform(s).

However, not all agents create the same externalities to the other side of the market. As noted by Biglaiser et al. (2019), some agents are more relevant than others and this can give rise to market power. Examples can be found in several markets. In the music industry, popular artists (e.g., Beyoncé, Taylor Swift) are generally valued more than emerging artists. The same happens in the market for apps (e.g., Whatsapp and Instagram), open source software (e.g., Red Hat), games (e.g, Fortnite), news (i.e., Sean Penn interviewing El Chapo), sport broadcasting (e.g., Real Madrid, Juventus). In retail markets as well, consumers usually value the presence of a branded, luxury or popular retailer differently from the presence of local or not-branded retailers. For simplicity, we call these agents "Superstars".

The aim of the present article is twofold. First, we give a rationale to the choice of a Superstar to sign an exclusive contract with a platform. Second, we identify the impact of such a choice on platform competition, i.e., whether exclusives are pro- or anti-competitive.[1] We consider two platforms acting as intermediaries between consumers and firms (e.g., content providers). Consumers subscribe to a platform to have access to its catalogue. The firm side is composed of a Superstar and a mass of small firms. The Superstar acts as a monopolist supplier of her *premium* product and offers take-it-or-leave-it (TIOLI) contracts to either one or both platforms. The other firms are price-takers and have no bargaining power *vis-à-vis* the platforms.

We find that Superstar exclusivity induces demand asymmetries between platforms. Namely, under non-exclusivity, platforms are symmetric, all small firms multi-home, and the downstream market for consumers is equally split. With Superstar exclusivity, more consumers affiliate with this platform attracted by the exclusive premium product. This generates some positive spillovers on the firm side. First, aggregate variety increases as more firms join the platform hosting the Superstar exclusively than in the case of non-exclusivity. Indeed, some zero-homers become single-homers. Second, some small firms who were previously active on both platforms find it profitable to join only the platform hosting the Superstar. Indeed, some multi-homers become single-homers. All in all, there is a (second-order) feedback effect that we call "ripple effect".

Although this effect emphasizes the gains of exclusivity, the latter would require to give up a large customer base and lose the associated revenues. As a result, exclusives would require the Superstar to extract enough surplus (and revenues) from the platform hosting the premium content. The optimal choice ultimately depends on the fierceness of platform competition, which determines the magnitude of the ripple effect. When competition is sufficiently intense,

[1] Recent evidences show Superstar exclusive contracts in the music industry changed platform competition, helping Apple and Tidal to gain market shares against Spotify. See e.g., RollingStone, October 5, 2016. 'How Apple Music, Tidal Exclusives Are Reshaping Music Industry': `http://www.rollingstone.com/music/news/inside-the-war-over-album-exclusives-w443385`.

the ripple effect gets stronger and increases the profits of the Superstar, who then opts for exclusivity. This is because a large mass of consumers would migrate to the platform hosting the Superstar. The Superstar extracts more surplus via an exclusive deal by exploiting the endogenous asymmetry in the market. The mechanism is reversed when platforms are sufficiently differentiated. In this case, the ripple effect is weakened. Not many consumers would switch from one platform to the other and so the Superstar prefers a wider audience and multi-homes.

This article also sheds some light about potential anti- or pro-competitive implications of exclusive contracts for the small firms and consumers. Typically exclusive contracts and market power ring multiple alarm bells in the policy circles. For instance, in the music industry, the Chinese regulator, SAPPRFT, argued that exclusive contracts "ultimately harm the (music) industry". Similar arguments were made by Spotify in 2016 claiming that Superstar exclusives were bad for artists, consumers, and platforms.[2] Our results offer a different perspective. First, we find that exclusivity always increases the welfare of small firms. This happens because Superstar exclusivity encourages the entry of firms that were not active otherwise. Second, in some cases, consumers benefit from exclusivity because final price do not fully internalize the value added by the Superstar. Indeed, our results suggest that policymakers should not be worried. Contrary to the conventional wisdom that regards exclusivity as potentially dangerous for welfare, it may also represent the first-best outcome in the industry.

Our paper provides a framework to understand potential anti- or pro-competitive effects created by the recent string of acquisitions and mergers occurred in several two sided market. For instance, in 2018 IBM acquired the dominant open-source cloud company Red Hat for $ 34 bn. In 2019, Spotify bought Gimlet, a very popular podcast creator. By providing a "vertical integration" version of our model, we show that a platform owning the Superstar would be more likely to offer premium product to its rival than under vertical separation. This is because the vertically integrated platform would price aggressively when not offering the content to the rival, making this alternative less appealing than non-exclusivity. Hence, antitrust enforcers would not be worried about potential foreclosure stemming from vertical integration.

In the baseline model we make three simplifying assumptions: *(i)* consumer single-homing, *(ii)* one-sided price competition, and *(iii)* presence of one Superstar. Regarding assumption *(i)*, one could argue that consumers may be damaged by exclusivity when they are allowed to multi-home. The staunch fan of a Superstar with a strong preference for one platform would need to multi-home to access the content of her preferred artist at another platform. Similarly, firms are often subsidized or charged to offer their product. This requires us to relax assumption *(ii)*. Furthermore, there may be more than one Superstar and their decision to go exclusive may restore symmetry between platforms as well as reduce or amplify the ripple effect. We relax these three assumptions in the extensions. We demonstrate that our main results and intuitions remain robust to richer and complex scenarios: the Superstar always prefers exclusivity in a sufficiently competitive market as the ripple effect is strong and non-exclusivity otherwise.

The outline of the article is structured as follows. In Section 2, we present some parallels with the existing literature. In Section 3, we present the preliminaries of the model. We discuss the

[2]See e.g., Digitalmusicnews, September 18, 2017. 'The Chinese Government Says Streaming Music Exclusives Suck' https://www.digitalmusicnews.com/2017/09/18/sapprft-streaming-music-exclusives/
See e.g., The Verge, August 26, 2016. 'Spotify talent manager: Exclusives are 'bad for the whole industry" https://www.theverge.com/2016/8/26/12657630/spotify-exclusives-subscriber-numbers-2016-troy-carter.

main results in Section 4, whereas the implications for welfare and policy-makers are presented in the following section. In Section 6 we consider a variation of our main model by allowing for the vertical integration between the Superstar and one platform. Section 7 discusses several extensions and shows the generality of the model. Section 8 provides a discussion of the main results and their applicability to several industries.

2. Related Literature

Our article relates to the stream of the economic literature on two-sided markets (Rochet & Tirole 2003, 2006, Armstrong 2006) and on homing decisions. In a recent article, Belleflamme & Peitz (2018) examine the allocative effects of homing decisions. They show that when platforms prefer to impose exclusivity to both sides of the market, at least one side is likely to be harmed, whereas allowing multi-homing may accomplish the purpose of having all sides of the market and the platforms better off. In a similar and related study, Armstrong & Wright (2007) let platforms offer a contract to sellers. They show that when platforms offer an exclusive contract to some sellers, they do so by charging a prohibitively high price to multi-homing sellers and a discount to single-homers. As a result, there is a partial (complete) foreclosure as all users on this side (both sides) would prefer to single-home. In Hagiu & Lee (2011), platforms bid for content providers on a lump-sum transfer and they distinguish two cases: the outright sale of the content to the platform and the control right for the content providers. More recently, Ishihara & Oki (2017) consider platform competition in a market where a monopolist multi-product content provider decides how much content to provide exclusively to each platform and how this affects its bargaining power relative to the platform(s).

This article takes a different perspective. First, although most of the literature considers markets populated by small agents (see e.g., discussion in Biglaiser et al. 2019), we explicitly model heterogeneity in market power between agents in one side of the market. Specifically, the Superstar acts as an all-powerful supplier of her product and can exercise market power *vis-à-vis* the platforms. The small firms instead are heterogeneous in their production cost and are price-takers. Second, the Superstar offers a premium product relative to the other firms. This is very similar to the premium content discussed by Armstrong (1999) and more recently by D'Annunzio (2017)[3]. Third, following Rosen (1981) we let the Superstar be more efficient than any other firms. This aspect emerges as the small firms have positive and heterogeneous production costs, whereas production costs of the Superstar are negligible.

To the best of our knowledge, this is the first article incorporating agent's market power in a two-sided market model. The contractual arrangement we use is equivalent to the Superstar auctioning her exclusive product and the platform(s) bid for it. For this, we follow Jehiel & Moldovanu (2000): they implement a second-price sealed bid auction with a fixed fee, where the optimal bid equals the difference between winning and losing the auction. In our case, the contract fee is equal to the difference of the profits obtained by the platform winning the contract and the profits obtained when the rival wins the contract.[4]

[3] Armstrong (1999) shows that, in a traditional one-sided market, a premium content is always offered exclusively. Moreover, in comparing different types of contracts, he also shows that, with exclusivity, a lump-sum contract is revenue-maximizing relative to a royalty-based one.

[4] Montes et al. (2018) apply this auction mechanism in a model where an upstream data broker sells data to either one or two downstream firms. They show that, with a contract based on a fixed tariff, the data broker

Exclusive contracts have recently become topical among scholars. Weeds (2016) studies the incentives of a vertically integrated TV to offer its premium programming to a rival distributor. She finds that when competition is dynamic, exclusivity might be the best solution, thereby contrasting traditional findings in static markets. Because of switching costs, the future market share advantage might outweigh the opportunity cost of renouncing to some current audience. Similar to Weeds (2016), in our model, the emergence of exclusivity is linked to the strength of the downstream competition. However, our result depends on the static ripple effect rather than on the dynamic aspects stemming from switching costs. Moreover, our results also differ from D'Annunzio (2017). She consider two competing platforms and the decision to provide a premium content. She shows that whereas a premium content is always offered exclusively, vertical integration between the provider and one platform may change incentives to invest in quality. In our model, the premium provider faces a trade-off between exclusivity and non-exclusivity and this choice depends on how intense platform competition is. On a somewhat different scenario, Kourandi et al. (2015) study the contractual decision made by Internet Service Providers to content providers. Similar to our results, they show that exclusivity can be welfare enhancing when competition of content providers over informative ads is sufficiently intense. Finally, Chen & Fu (2017) show that an exclusive contract determines a surplus reallocation from firms to consumers. We argue that when considering a two-sided market and the ripple effect, social welfare may increase with exclusivity as it encourages entry of additional smaller firms.

Whereas several theoretical articles have dealt with exclusive contracts, the empirical literature is still lacking. Datta et al. (2017) examine music consumption and variety in digital platforms and their impact on discovery and top artists. Ershov (2018) looks at the mobile app market. The latter study is quite relevant for our analysis and concerns the entry of a strong competitor (the Superstar) in the Google Play app store. The author shows that when the Superstar enters in a niche market, she entails a demand-discovery effect and generates additional entry. This result is somewhat similar to our mechanism, for which exclusivity fosters more entry of small firms in the market.

3. The model

We consider a two-sided market along the lines of Armstrong (2006) where consumers single-home and firms can either multi-home or single-home. Hereafter, we refer to firms as content providers (CPs). There are two platforms $i = 1, 2$ located at the opposite ends of a unit-length Hotelling line. Platform 1 is located at the coordinate $x_1 = 0$, whereas platform 2 is located at the coordinate $x_2 = 1$. Platforms set prices p_i to consumers, whereas CPs freely access the platform and obtain marginal benefits γ when interacting with consumers.[5] There are two types of CPs: small content providers and the Superstar. These are free to choose to not participate in the market (zero-home), to join one platform (single-home), or to join both platforms (multi-home).

always finds it optimal to sell data exclusively to one firm.

[5]These externalities can be interpreted in terms of final transactions with each consumer joining the platform. For instance, these can identify ancillary revenues such as merchandising, advertising, and any other type of multi-market contact. This assumption captures the idea that CPs value the size of their potential audience.

The Superstar is defined by the following properties. First, she brings to the table an additional value for consumers relative to small CPs. For instance, she offers a premium content with strong consumer capture. Second, she has all the bargaining power over her content and makes a TIOLI offer to the platform(s). The Superstar offers a fixed fee contract to platform i from the set $\{\{F_i^E\}, \{F_i^{NE}\}\}$, where F_i^{NE} is the non-exclusive contract offered to platform i whereas F_i^E is the exclusive contract offered to the platform i only. Profits of the Superstar when offering an exclusive contract are:

$$\pi = \gamma \cdot D_i + F_i^E,$$

where D_i is the share of consumers subscribing to platform i. Profits of the Superstar when offering non-exclusive contracts are:

$$\pi = \gamma \cdot (D_1 + D_2) + F_1^{NE} + F_2^{NE}$$

Small CPs have no bargaining power and have heterogeneous production costs denoted by $f \in U(0,1)$ common to platforms. CPs obtain the cross-network benefit γ when interacting with a consumer. Therefore, a cost-f CP is willing to join platform i if $\gamma \cdot D_i > f$, so that the total mass of small CPs active on platform i is $n_i = Prob(f \leq \gamma \cdot D_i) = \gamma \cdot D_i$.

Consumers are uniformly distributed along the Hotelling line and identified by their location x. They face a transportation cost τ per unit of distance. The utility of a consumer from joining platform i is:

$$u_i = v + \phi \cdot g_i + \theta \cdot n_i - p_i - \tau \cdot |x_i - x|, \tag{1}$$

where v is the intrinsic utility of joining any platforms, g_i takes value 1 when platform i offers the premium content and 0 otherwise. Note that the presence of small CPs and the Superstar generates different cross-network externalities. Specifically, $\phi > 0$ represents the value generated by the Superstar on the consumer side, whereas $\theta > 0$ measures the marginal contribution of each small CPs to consumer utility. The cross-network benefit θ together with ϕ can be interpreted as a measure of the aggregate quality of the entire catalogue offered by a platform. The profit of a platform is given as

$$\Pi_i - g_i \cdot F_i^k = p_i \cdot D_i(g_i, g_j) - g_i \cdot F_i^k \text{ for } i \neq j \in \{1,2\} \text{ and } k \in \{E, NE\}.$$

Note that Π_i is the gross profit of platform before paying fixed fees. We will use the gross profit of the supplier in the following sections to define contracts.

Throughout the article, we assume a sufficiently large v such that consumers always obtain positive utility. We also assume that τ is high enough (i.e., $\tau > \gamma \cdot \theta + \phi/3$) to guarantee concavity of the profit function with respect to price and positive consumer demands at the two platforms.

The Timing. The timing of the game is as follows. In the first stage, the Superstar decides either whether to offer an exclusive to platform i (F_i^E) or non-exclusive contracts to both (F_i^{NE}). In the second stage, platforms accept or reject the offers. In the third stage, platforms set prices and consumers and content providers simultaneously decide which platform to join.

4. Analysis

In this section the model is analyzed by backward induction. We first present the price competition on the consumer side for a given presence of the Superstar in each platform. Then, in the subsequent section, we analyze the optimal contractual choice of the Superstar.

4.1. Price competition

Consumers decide which platform to join. Comparing u_1 with u_2, a consumer located at coordinate x will join platform 1 if $x \leq \frac{1}{2} + \frac{\theta\cdot(n_1-n_2)+(p_2-p_1)+\phi\cdot(g_1-g_2)}{2\tau}$. Consumer demand on platforms $i \neq j \in \{1,2\}$ are given by:

$$D_i(g_i,g_j) = \frac{1}{2} + \frac{\theta\cdot(n_i-n_j)+(p_j-p_i)+\phi\cdot(g_i-g_j)}{2\tau}, \qquad D_j(g_j,g_i) = 1 - D_i(g_i,g_j).$$

The mass of small CPs joining platform i is denoted by (3) and given by $n_i = \gamma \cdot D_i$. Since consumers correctly anticipate the number of CPs on each platform, consumer demands for i and j become:

$$D_i(g_i,g_j) = \frac{\tau}{2(\tau-\theta\cdot\gamma)} + \frac{\phi\cdot(g_i-g_j)-(p_i-p_j)-\theta\cdot\gamma}{2(\tau-\theta\cdot\gamma)}, \qquad D_j(g_j,g_i) = 1 - D_i(g_i,g_j). \quad (2)$$

Going one step backwards, each platform anticipates the joining decision of consumers and decides the optimal price p_i^*. Platform $i's$ gross profits are:

$$\Pi_i = p_i \cdot D_i(g_i,g_j). \quad (3)$$

Notice that, when prices are chosen, platform i has already received and accepted (or not) the offer of the Superstar. If she is present exclusively on platform i (i.e., $g_i = 1, g_j = 0$), platform i pays the fixed fee F_i^E from the gross profits in equation (3). If the Superstar multi-homes, i.e., $g_i = g_j = 1$, platform i pays the fixed fee F_i^{NE}. If the Superstar content is not available at all, then $g_i = g_j = 0$ and platforms pay no fees.

By differentiating the profits in (3) with respect to p_i, the first-order conditions give the following result.

Lemma 1. *For $i,j \in \{1,2\}$, with $i \neq j$, platform i's best reply is the following:*

$$p_i(p_j) = \frac{\tau}{2} + \frac{\phi\cdot(g_i-g_j)}{2} + \frac{p_j}{2} - \frac{\theta\cdot\gamma}{2}.$$

Lemma 1 shows price complementarity and the usual positive effect of the transportation cost on prices. As in Armstrong (2006), the last term accounts for the cross-network externalities. The novelty of this article is the term $\frac{\phi\cdot(g_i-g_j)}{2}$, which captures the impact that the presence of the Superstar has in terms of higher consumer price. Specifically, whenever $g_i = 1 > 0 = g_j$, the Superstar content is exclusive to platform i, which can thus set a higher price in response to rival's price. Differently, if $g_i = g_j$, platforms are symmetric and the model resembles Rasch & Wenzel (2013)'s analysis when the price for CPs is set to zero. Formally, Lemma 1 leads to the following two results.

Lemma 2. *If $g_i = g_j = g \in \{0, 1\}$, the two platforms charge the same price $p^* := \tau - \gamma \cdot \theta$ to consumers. The platforms split the market equally. Content providers with $f \leq \gamma/2$ multi-home, whereas content providers with $f > \gamma/2$ zero-home.*

Proof. See Appendix A.1. □

Lemma 2 describes a symmetric scenario where neither platform enjoys the competitive advantage of the premium content. Two cases are comprehended in this scenario. In the first, with $g = 0$, no platform offers the Superstar content. In the second, with $g = 1$, both platforms offer it. Figure 1 provides a graphical representation of consumer and content provider demands. The equilibrium outcomes when the Superstar is exclusively available on platform i is presented by the following lemma.

Lemma 3. *If $g_i = 1$ and $g_j = 0$, equilibrium prices are*

$$p^*_{ii} = p^* + \frac{\phi}{3}, \qquad p^*_{ji} = p^* - \frac{\phi}{3}.$$

Platform i has a higher consumer demand ($D^*_{ii} = \frac{1}{2} + \frac{\phi}{6(\tau-\gamma\cdot\theta)} > D^*_{ji} = 1 - D^*_{ii}$).

Proof. See Appendix A.2. □

Lemma 3 highlights important differences with the symmetric case described above. First, one can observe that an exclusive contract renders the final prices asymmetric: the price in platform i is always larger than the price in platform j. For the sake of exposition, p^*_{ij} represents the optimal price for platform i is exclusive on platform j. We note that $p^*_{ii} > p^*$ and $p^*_{ji} < p^*$. So, the price goes up (down) for the platform (not) with the exclusive content. Moreover, as in Armstrong & Wright (2007), demands of the two platforms are unbalanced in favour of the platform with the exclusive content. We can then conclude that:

Proposition 1. *Superstar exclusivity fosters content variety and induces single-homing of some other content providers. Content providers with $f \leq \gamma \cdot D^*_{ji}$ multi-home, those content providers with $f \in (\gamma \cdot D^*_{ji}, \gamma \cdot D^*_{ii}]$ single-home on platform i, whereas all content providers with $f > \gamma \cdot D^*_{ii}$ zero-home.*

An exclusive contract with the Superstar impacts on the homing decision of the other CPs, thereby generating additional exclusivity. This is due a *ripple effect*, that is the feedback generated by exclusivity in one market (the consumer market) spills onto another market (the CP one). As depicted by Figure 1, when the Superstar offers a non-exclusive contract, the market is equally split: all CPs with low production costs multi-home, whereas all CPs with high production costs stay out of the market (i.e., they zero-home). With Superstar exclusivity on platform i, more consumers are active on that platform with respect to the rival. This is the typical business-stealing (first-order) effect. Since the number of CPs active on a platform depends on the number of consumers joining that platform, some zero-homers and some multi-homers now become single-homers. More CPs enter the market, thereby increasing content variety, and the mass of CPs active on each platform becomes asymmetric as well. For instance, in the music industry, the presence of the Superstar on a playlist may make some indie artists more likely to be discovered, thereby increasing their profitability or lowering the opportunity cost of staying out of the market. In the shopping mall industry, this may induce some new

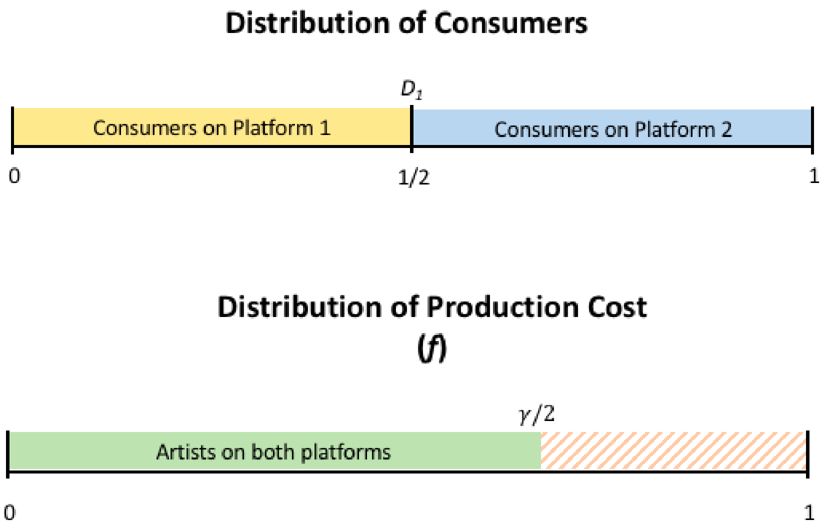

Figure 1: Market configuration when the Superstar is absent or offers a non-exclusive contract.

retailers to enter the same shopping mall where the Superstar retailer is present and some retailers may prefer to single-home.

Figure 2 shows this mechanism graphically. All CPs with sufficiently low production costs remain active on both platforms. Instead, CPs with production costs larger than the utility provided by platform j single-home on platform i, whereas the others continue to zero-home. In other words, the Superstar's decision triggers a domino effect mediated by cross-network externalities such that (some) high-cost and previously inactive CPs and some CPs previously multi-homing *endogenously* become active only on platform i.

4.2. Superstar

4.2.1. Superstar exclusivity

In this subsection, we look at the case when the Superstar offers an exclusive contract to one platform. Borrowing the mechanism from Jehiel & Moldovanu (2000) and Montes et al. (2018), the Superstar offers the contract to platform i under the threat of offering the exclusive content to the rival if platform i rejects the offer. This the same as the one in which the Superstar let platforms compete in an auction and allocate the exclusive content to the highest bidder. Formally, the Superstar solves the following problem:

$$\max_{F_i^E} \gamma \cdot D_i + F_i^E$$
$$\text{subject to } \Pi_{ii}^* - F_i^E \geq \Pi_{ij},$$

where Π_{ij} is the profit of platform i when contractual agreements with the Superstar breaks down and platform j accepts the contract. As a result, the Superstar sets $F_i^E = \Pi_{ii}^* - \Pi_{ij}^*$ such that the participation constraint of the platform i is binding.

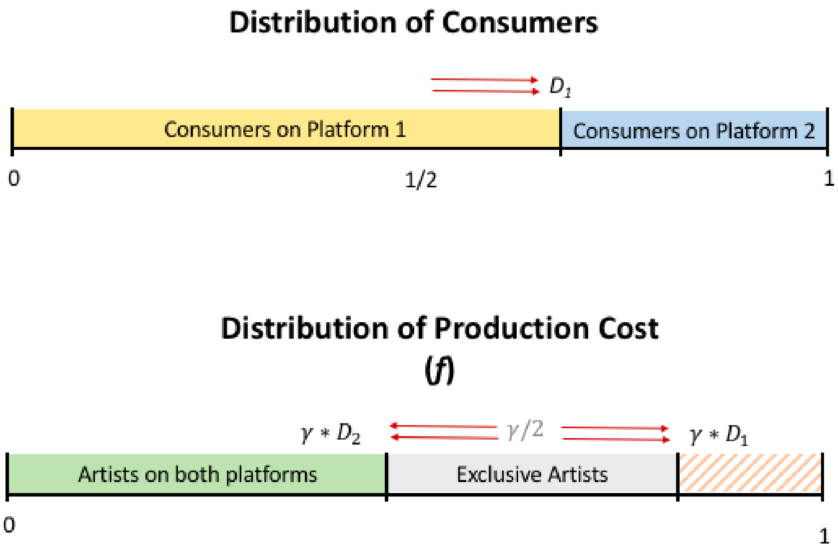

Figure 2: Market configuration when the Superstar offers an exclusive contract to platform 1.

Lemma 4. *When the Superstar offers an exclusive contract to platform i, she sets a fee equal to* $F_i^{E,*} = \frac{2\phi}{3}$ *and obtains* $\pi(F_i^{E,*}) = \frac{2\phi}{3} + \gamma \cdot \left(\frac{1}{2} + \frac{\phi}{6(\tau - \gamma \cdot \theta)}\right)$.

The above lemma shows that the Superstar appropriates more than two-thirds of the surplus she creates.

4.2.2. Superstar non-exclusivity

Next, we study an incentive-compatible contract which is accepted by both platforms. To compute the outside option of each platform, we look at the case when the respective platform when rejecting the contract, that is $\Pi_{ij}^* = \frac{(3(\tau-\gamma\cdot\theta)-\phi)^2}{18(\tau-\gamma\cdot\theta)}$. Since the Superstar offers a contract to both platforms, she obtains revenues over the entire market. To be incentive compatible, each platform has to prefer profits $\Pi_i^*(g=1) = (\tau - \gamma \cdot \theta)/2 - F_i^{NE}$ to the outside option Π_{ij}^*. Formally, the Superstar solves:

$$\max_{F_1^{NE}, F_2^{NE}} \gamma \cdot (D_1 + D_2) + F_1^{NE} + F_2^{NE}$$
$$\text{subject to } \Pi_i^*(g=1) - F_i^{NE} \geq \Pi_{ij} \quad \forall \{i,j\} \in \{1,2\} \text{ with } i \neq j.$$

It follows that the Superstar sets the fixed fee F such that the participation constraint of the platforms are binding. We can therefore state the following lemma.

Lemma 5. *When the Superstar offers a non-exclusive contract, she sets a symmetric fee to the two platforms given by* $F^{NE,*} = \frac{\phi}{3} - \frac{\phi^2}{18(\tau-\gamma\cdot\theta)}$ *and obtains* $\pi(F^{NE,*}) = \gamma + \frac{2\phi}{3} - \frac{\phi^2}{9(\tau-\gamma\cdot\theta)}$.

4.2.3. Superstar contract choice: Exclusivity or not?

The Superstar's decision is based on the comparison of profits in the two regimes. Specifically,

Proposition 2. *The Superstar offers an exclusive contract when* $\tau < \bar{\tau} := \gamma \cdot \theta + \frac{\phi}{3} + \frac{2\phi^2}{9\gamma}$. *Else, she offers a non-exclusive contract.*

Proposition 2 is the result of a trade-off between reaching all consumers (non-exclusivity) and extracting a larger surplus from one platform (exclusivity), i.e., $F_i^{E,*} > 2F^{NE,*}$. The ripple effect elicited by exclusivity results in a larger proportion of consumers joining the platform offering the Superstar content, and so some small CPs single-home along with the Superstar. It is important to note that the ripple effect gets stronger as the degree of differentiation between platforms decreases. This happens because, in a market where platforms are perceived as less differentiated, the exclusive content creates incentives to switch from one platform to another for a larger proportion of consumers as τ decreases. The business stealing effect of exclusivity is exacerbated due to two-sidedness of the market generating the ripple effect. And so, this heightened business stealing effect creates additional revenues eventually extracted by the Superstar.

By contrast, when platforms are sufficiently differentiated, the ripple effect is not strong enough as consumers stick to their preferred platform. Indeed, the Superstar prefers a larger audience to the revenues from exclusivity. As in Weeds (2016), it is the intensity of the competition in the market for consumers which makes the difference for a Superstar. However, the mechanism that explains the optimal choice on exclusivity comes from the presence of this complementarity between the two sides which generates the ripple effect.

5. Welfare Analysis

To understand the impact of Superstar exclusivity on the welfare of different agents, we first compare Superstar exclusivity with Superstar absence.

Lemma 6. *Superstar exclusivity increases total welfare relative to Superstar absence. Specifically,*

1. *Consumers on the platform with Superstar exclusivity are better-off, whereas those on the rival platform are worse-off. Overall, consumer surplus improves with exclusivity.*
2. *Multi-homing content providers are worse-off, whereas those single-homing are better-off. Overall, content provider surplus improves with exclusivity.*

Proof. See Appendix A.3. □

In relation to the complete absence of the Superstar, two effects can be highlighted. On the one hand, consumers and CPs joining the platform without the Superstar suffer. This is because the presence of the Superstar only on i results in a shrink in the size of the network of j. On the other hand, the platform with the Superstar provides both consumers and single-homing small CPs with a higher surplus compared to the case of no Superstar. In aggregate terms, the latter effect always prevails.

As there are many similarities between Superstar non-exclusivity and Superstar absence, comparing exclusivity and non-exclusivity becomes now quite straightforward. This allows us to highlight the conditions under which the incentives of the Superstar are aligned/misaligned with the welfare. Additionally, it challenges the claim made by Spotify in 2016 and by the Chinese regulator that Superstar exclusivity is bad for content providers and consumers. Notice that the surplus of CPs is the same when the Superstar is absent and when she multi-homes, so that we can conclude the following.

Lemma 7. *Overall, content provider surplus improves with exclusivity relative to non-exclusivity.*

The above lemma is simply the result of the gains enjoyed by those CPs who change their homing decision due to Superstar exclusivity, that is zero-homers and multi-homers who become single-homers. Therefore, the special treatment of an actor with market power creates a positive spillover in the market. This result suggests that emerging artists who otherwise would have struggled to be active on the market should welcome Superstar exclusivity. We can now present the following proposition concerning welfare effects for consumers.

Proposition 3. *Let* $\underline{\gamma} := \frac{5\phi}{3\theta}$ *and* $\tilde{\tau} := \gamma \cdot \theta + \frac{1}{36}\left\{\phi + \sqrt{72\gamma \cdot \theta \cdot \phi + \phi^2}\right\}$*. If competition is sufficiently intense* ($\tau < \tilde{\tau}$) *and content providers' cross-network externalities are sufficiently large* ($\gamma > \underline{\gamma}$)*, consumer surplus is higher with Superstar exclusivity relative to non-exclusivity.*

Proof. See Appendix A.4. □

The above proposition suggests that when market competition is intense and CPs' ancillary revenues are sufficiently large, the overall effect on consumers is positive. In other words, the positive effect on those consumers joining the platform with the Superstar is strong enough to drive up the total consumer surplus. Instead, when market competition is relaxed or content providers cross-network externalities are not large enough, consumers would be better-off with a multi-homing Superstars. This result is quite intuitive. If the transportation cost is sufficiently low, more consumers (i.e., consumers located relatively more distant) are willing to join the large platform hosting the Superstar. When CPs' cross-network externalities are sufficiently large, the consumer price (i.e. see Lemma 2) decreases with γ. Indeed, when these two conditions hold, consumers enjoy a larger surplus with exclusivity. Else, consumers prefer non-exclusivity as an exclusive contract will hurt them.

Putting together the above two results, it is easy to observe that Superstar multi-homing always welfare-enhancing for consumers. Only when the Superstar goes exclusive, this choice could be detrimental for consumers. The following proposition describes this result in detail.

Proposition 4. *If (i)* $\gamma < \underline{\gamma}$ *and* $\tau < \bar{\tau}$ *or (ii)* $\gamma > \underline{\gamma}$ *and* $\tau > \min[\bar{\tau}, \tilde{\tau}]$*, the Superstar incentives are misaligned with those of consumers. In all other cases, the Superstar incentives are aligned with those of consumers. The misalignment occurs only when the Superstar opts for exclusivity.*

Proof. See Appendix A.5. □

Proposition 4 provides a complete picture of the effect of the Superstar's decision on consumer welfare. It describes situations in which the Superstar's choice may be harmful for consumers. When competition is sufficiently intense (i.e., low τ) and consumers are highly remunerative for CPs (i.e., $\gamma > \underline{\gamma}$), the Superstar offers an exclusive contract and this enhances consumer welfare. This happens as consumers face a lower subscription price when γ is large and new CPs find less costly (or more remunerative) to enter the market. Hence the ripple effect is amplified. This case is represented by the red area in Figure 3 and shows a full alignment of interests between consumers and the Superstar. A similar mechanism is at stake also when the Superstar offers a non-exclusive contract. In this case, the most distant consumers may face the platform with exclusive contract quite expensive. As the Superstar offers a non-exclusive contract when competition is softened, this prevents a welfare loss for consumers. In all other

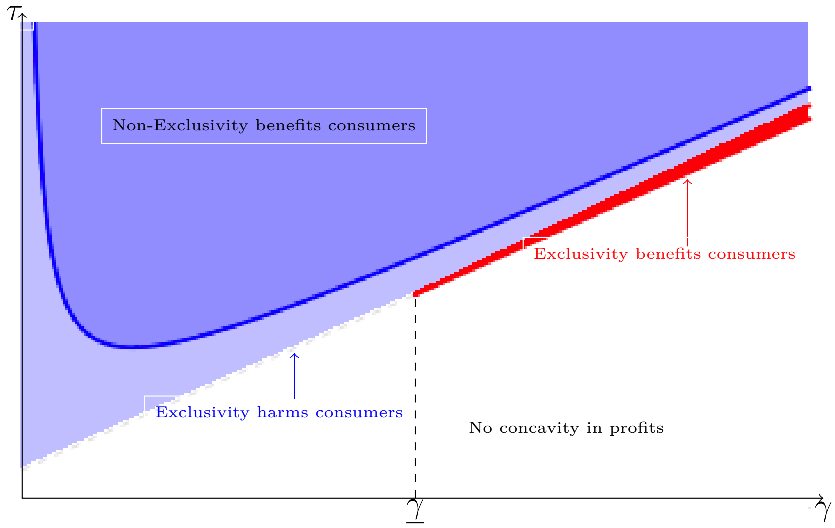

Figure 3: Superstar choices and consumer surplus.

cases, represented by the area below the bold blue line and above the red area, Superstar's decision is harmful for consumers. This is the area where the Superstar offers exclusive contracts which hurts consumer surplus compared to the case of non-exclusivity.

These results have clear policy implications. Our findings suggest that in some circumstances exclusivity may be beneficial for consumers and in most cases the agent with market power (i.e., the Superstar) does what is good for them.

6. Vertical Integration

In this section, we modify the benchmark model by allowing for a vertical integration between the Superstar and one platform. A recent stream of vertical integration motivates our analysis. For instance, IBM for its public cloud platform is in the process of acquiring Red Hat, an open source software house making ancillary revenues from customer services. Similarly, Spotify recently acquired Gimlet, one of the most popular podcast creators previously offering content to both Spotify and Apple Music. These examples well suit our framework.[6]

Indeed, our benchmark model changes as follows. Without loss of generality, let us assume that the Superstar is integrated with platform i. This platform has two alternatives. On the one hand, it can decide to be the sole distributor of a premium product. On the other hand, it can license or distribute the premium content also to its rival j. In the second case, it sets F. Next, each platform competes on prices to attract final consumers and simultaneously content providers decide which platform to join. In this variation, profits of platform i are given by:

$$\Pi_i = p_i \cdot D_i + \gamma \cdot (D_i + g_j \cdot D_j) + g_j \cdot F \tag{4}$$

[6] Starting from similar motivating examples, Pouyet & Trégouët (2018) focus on the impact that vertical integration in two-sided markets may have on competition, showing that the relative size of cross-side externalities is key to assess the pro- or anti-competitiveness of a vertical merger.

Clearly, platform i can control p_i and F. By solving the model backwards, it can easily be checked that the best response of platform j follows Lemma 1, whereas the best response of platform i is given by:

$$p_i(p_j) = \frac{\tau}{2} + \frac{p_j}{2} - \frac{\gamma(1-g_j)}{2} + \frac{(1-g_j)\phi}{2} - \frac{\theta\gamma}{2} \tag{5}$$

Notice that under non-exclusivity the best reply above is equivalent to the one presented in Lemma 2, so that equilibrium prices, demands, and gross profits are unaltered compared to the case of vertical separation. Instead, when platform i does not offer its premium content to platform j, we obtain the following Lemma:

Lemma 8. *If $g_i = 1$ and $g_j = 0$, equilibrium prices are*

$$p_i^* = \tau - \gamma\theta - \frac{2\gamma}{3} + \frac{\phi}{3}, \qquad p_j^* = \tau - \gamma\theta - \frac{\gamma}{3} - \frac{\phi}{3}.$$

Demands are $D_i^* = \frac{\gamma}{6}(3 + \frac{\phi+\gamma}{\tau-\gamma\theta})$, $D_j^* = 1 - D_i^*$, $n_i^* = \gamma \cdot D_{ii}$, and $n_j^* = \gamma \cdot D_j$. Profits are $\Pi_i^* = \frac{(3(\tau-\gamma\theta)+\phi+\gamma)^2}{18(\tau-\gamma\theta)}$ and $\Pi_j^* = \frac{(3(\tau-\gamma\theta)-\phi-\gamma)^2}{18(\tau-\gamma\theta)}$.

Note that exclusivity in this setting creates a competitive pressures over both platforms relative to the benchmark model. This is because platform i internalizes the Superstar's ancillary revenues and therefore it charges a lower price than under vertical separation, thereby reducing profits on both platforms.

This profit reduction has important implications when platform i decides to offer its content to platform j in exchange of a fee F. Indeed, for given F, the willingness to accept the offer is higher than in the case of vertical separation. This is because the outside option, represented by Π_j^* in Lemma 8, is surely lower. Hence, j has a lower bargaining power and the fee paid will be higher than the one it would have paid under vertical separation. In particular, $F^* = \Pi^* - \Pi_j^*$ where Π^* is the profit made under a symmetric platform competition.

Comparing the profits that the vertical entity would make under exclusivity (Π_i^*) and non-exclusivity (i.e., $\Pi^* + F$) of the premium content we get the following result:

Proposition 5. *The Superstar content is offered to the rival only if $\tau > \tau^{VI} := \gamma\theta + \frac{\gamma+2\phi}{9} + \frac{\phi^2}{9}$*

As in the benchmark model, a Superstar content is offered exclusively when competition in the consumer market is sufficiently intense as a larger mass of consumers migrate from j to i. Relative to the vertical separation, exclusivity makes competition fiercer in this case as platform i sets a lower price. Comparing the cutoff levels of τ in Proposition 2 and Proposition 5, we can conclude the following:

Proposition 6. *A vertically integrated platform has more incentives to let the rival access the Superstar content than under vertical separation.*

One may expect that vertical integration between a platform and a Superstar would create foreclosure of a rival platform. Our results show that relative to vertical separation, non-exclusivity under vertical integration will occur more often. This is because the larger demand obtained with exclusivity would compensate the price reduction only if τ is really low. Else, in all other cases, it would be optimal to license the product to the rival platform thereby extracting the surplus of the premium content and reaching the entire market.

7. Extensions

The above results are robust to several extensions and more complex scenarios. We now consider three alternative model specifications and relax some assumptions which may seem unreasonable at first. Hence, we present a model with multiple Superstars. Then, we introduce the presence of multi-homing consumers. Finally, we formally present a model in which platforms set a price to consumers and CPs.

7.1. Two-Superstars

An interesting extension of our benchmark model relates to the contracting decisions of multiple Superstars and how these eventually extract the surplus they generate for the platform. Relative to the baseline model with one Superstar, the presence of multiple Superstars lowers the surplus they can grab as the marginal value they create on a platform is now reduced. In turn, this puts platforms in a better bargaining position *vis-à-vis* the Superstar(s). In the following paragraphs, we explore the case of two Superstars.

For simplicity, there are $N = 2$ Superstars denoted by $s \in \{A, B\}$, each providing consumers with additional value of ϕ_s. These two Superstars simultaneously choose their contracts in the first stage. A Superstar's strategy set denoted by superscript $\Omega = \{i, j, ij\}$, which i, j represent the platform(s) to which the contract(s) is offered. The simultaneous choice results in nine possible market outcomes (see Table 1).[7] The payoff of Superstar s given the strategy choice of $s' \neq s$ is given by $\pi_s^{\omega_A,\omega_B}$, where $\omega_A, \omega_B \in \Omega$ with ω_A and ω_B being the choice of Superstars A and B respectively. The entire game is presented in Appendix A.6.

		B: i	B: j	B: ij
A	i	$(\pi_A^{i,i}, \pi_B^{i,i})$	$(\pi_A^{i,j}, \pi_B^{i,j})$	$(\pi_A^{i,ij}, \pi_B^{i,ij})$
	j	$(\pi_A^{j,i}, \pi_B^{j,i})$	$(\pi_A^{j,j}, \pi_B^{j,j})$	$(\pi_A^{j,ij}, \pi_B^{j,ij})$
	ij	$(\pi_A^{ij,i}, \pi_B^{ij,i})$	$(\pi_A^{ij,j}, \pi_B^{ij,j})$	$(\pi_A^{ij,ij}, \pi_B^{ij,ij})$

The table depicts the payoffs of a Superstar for a contract strategy given the choice of the other Superstar.

Table 1: Payoff Matrix

The analysis with two Superstars gives us the following result:

Proposition 7. *When there are two Superstars, the equilibrium contract choice is symmetric. Specifically,*

1. *When $\tau < \hat{\tau} := \min\{\tau_A,\ \tau_B\}$, there are multiple Nash Equilibria: (i, i), (j, j) and (ij, ij);*
2. *Else, when $\tau \geq \hat{\tau}$, there is a unique Nash equilibrium: (ij, ij);*

where τ_s with $s \in \{A, B\}$ is the transportation cost cut-off to induce exclusivity of Superstar s.

Proof. See Appendix A.6. □

[7] The strategy ij of a Superstar implies that the she goes non-exclusively to both the platforms.

Proposition 7 shows that the presence of more than one Superstar always leads to symmetric equilibria. On the one hand, there exist equilibria in which Superstars always find it optimal to offer non-exclusive contracts, regardless of the intensity of competition in the consumer market. On the other hand, when competition is sufficiently intense, Superstars also find it optimal to make an exclusive offer to the same platform.

To grasp the intuition, consider the optimal response of B given the choice of A. When A signs an exclusive contract with platform i, Superstar B would never offer an exclusive contract to platform j. This is because the gain from the presence of B on platform j, ϕ_B is directly pitted against ϕ_A when consumers choose between platforms. This would (almost) restore symmetry between platforms. Indeed, the incremental gain is small because of a competing Superstar on the other platform. In contrast to the fixed fee, the cross-network benefit of a Superstar from the exclusive presence of another Superstar rises. Suppose B is exclusive on the same platform as A, the cross-network benefit does not stem only from the incremental rise in consumers on platform i due to $B's$ exclusive presence. It comes rather from the total gain in consumers due to the presence of both Superstars. Hence, by being active on the same platform, B piggybacks on the total demand expansion due to the presence of both Superstars.

All in all, the analysis of the best responses identifies the presence of different equilibrium strategies. For a sufficiently low τ, Superstars either single-home on the same platform or multi-home. By contrast, for a sufficiently large τ, multi-homing is the only possible equilibrium. These results are consistent with the analysis in the main model and picture a scenario in which Superstars' decisions are self-reinforcing. Superstars follow other Superstars as a lack of coordination would harm them by neutralizing the externalities they create in the market and on the basis on which they exploit their market power. An important and immediate implication is that exclusivity engenders again more exclusivity not only among small CPs (as we previously shown) but also between Superstars.

7.2. Multi-homing Consumers

In this section, we consider multi-homing consumers. This is important as the value of the interaction between different sides of the market is what engenders our ripple effect, which is crucial for the Superstar's decision. When consumers multi-home, their switching behaviour gets less relevant for CPs. Recent research has highlighted that multiple interactions with the same consumers generate decreasing returns for the opposite side of the market, such as advertisers or content providers (Ambrus et al. 2016, Calvano & Polo 2017, D'Annunzio & Russo 2017, Anderson et al. 2018). As our ripple effect depends on how many consumers would switch in response to the Superstar decision, multi-homing is intuitively likely to dampen it. Notwithstanding, we show that for sufficiently low transportation costs, the Superstar prefers to sign an exclusive contract. Else, she prefers non-exclusivity. In Appendix A.7, we show that our main results and intuitions persist even in a conservative scenario.

7.3. Two-sided Pricing

So far, we presented a simple model where platforms charge only consumers and CPs make ancillary revenues. In a real world, it is often the case that platforms also charge the other side of the market. For instance, CPs are remunerated by platforms like Spotify and Tidal, whereas

Apple developers pay an annual fee to join the Developer Programme. In a two-sided market framework, this implies that platform i sets a duple of prices $\{l_i, p_i\}$ to maximize profits, where p_i is the price set on the consumer side and l_i is the one on the CP side.

Relative to a model *à la* Armstrong (2006), in which the price structure only depends on platform differentiation (τ on both sides) and on cross-group externalities, in this model platforms are differentiated only on the consumer side. This clearly implies that a positive price paid by CPs does not necessarily result in a negative price paid by consumers. Specifically, the consumer price will be positive, whereas the the price for CPs will be always positive when their own cross-group benefit is larger than consumer cross group benefit, i.e., $\gamma > \theta$, and negative otherwise. In other words, CPs would be subsidized when ancillary revenues are sufficiently low (see Appendix A.8).

Despite the fact that CPs are now influenced by the price (subsidy) when deciding to join the market, the Superstar's decision again remains influenced only by the fierceness of downstream competition. When ancillary revenues for CPs are sufficiently relatively small, CPs are subsidized ($l_i < 0$) for the externality they create. Under exclusivity, the response of any CP to additional consumer switching from platform j to i is less reactive. So, the platform hosting the Superstar subsidizes CPs even more. In the opposite case, consumers are more valuable for the other side (CP) of the market, so the platform extracts more surplus by charging them a higher price under exclusivity.

As we discussed above, exclusivity entails a direct effect on the consumer side and a feedback on the CPs. By subsidizing or charging CPs, the platform mainly manages the size of the feedback effect. The direct effect on the consumer side of the market (which engenders the feedback effect) instead continues to depend on platform differentiation. So, exclusivity emerges in equilibrium when τ is sufficiently low, and non-exclusivity otherwise. A potential shortcoming may be related to the welfare. As CPs pay a price, it is not straightforward that exclusivity brings about a surplus generation. However, we show that it is the case also in this richer setup (see Appendix A.8).

8. Discussion and Concluding Remarks

Would an agent with market power offer content exclusively on one platform at the cost of losing audience? This article presents a mechanism through which this agent (i.e., the Superstar) prefers (not) to offer an exclusive contract and discusses anti- or pro-competitive effects of such a choice in a two-sided market.

We show that exclusivity is optimal when platforms are not too differentiated from the perspective of final consumers. A ripple effect is associated with the choice of exclusivity, as it leads to asymmetric consumer demand in favor of the platform that hosts the Superstar. As a result, this platform is also more appealing for a larger mass of firms and some zero-homers and multi-homers become single-homers. This effect becomes less important when platforms are sufficiently differentiated, as consumers will be less likely to switch from their preferred platform. Importantly, our findings are robust to several extensions and are supported by anecdotal evidence. In 2016, Spotify was claiming that Superstar exclusives with Apple Music were bad for the industry. At that time, Spotify did not engage in Superstar exclusives and Apple had just entered the market. Two years later, when Apple Music gained market shares and challenged Spotify in the subscription-segment (growth rate in 2018Q1 16%), ironically

Spotify started offering exclusive content as well (e.g., Taylor Swift).

Managerial Implications. Our analysis is relevant for all industries in which platforms deal with big players. In the music industry, our leading example, access to content providers (i.e., artists) is mediated by platforms. In this market, it is common that Superstars create positive spillovers on small artists. For instance, Superstars can lead to more content discovery when using playlists, thereby benefiting independent and small artists. Similarly, in the *mobile app market* there is evidence of demand-discovery and entry of new developers triggered by the presence of Superstar apps (Ershov 2018). Moreover, in the *supply-chain industry*, an agent offering patent rights for a technology that enhances consumer experience may either sign an exclusive contract or non-exclusive contracts. We conjecture that the platform winning the exclusive right would attract more consumers as well as a larger cluster of small suppliers to that product. This may result in cheaper production costs enhancing further a manufacturing firm's market power *vis-à-vis* the rival. The contractual choice will again depend on the magnitude of the *ripple effect*. Our results also provide insights for the *cloud platform market* with open-source developers. This market is characterized by the co-existence of large firms (e.g., Red Hat) and smaller open-source software developers. We conjecture that an exclusive deal between a big player and one clouding platform (e.g., IBM) may induce more small developers to offer exclusives as well. In a similar fashion, our intuitions are applicable to more traditional markets such as the *consumer retail mall industry.* For instance, suppose two shopping malls compete for consumers and these are located at the opposite of a city. We argue that the exclusive presence of a brand with devoted followers (e.g., Gucci, Zara) and market power in one shopping mall would depend on the ability to can attract a larger footfall of consumers *vis-à-vis* a rival mall. As a result, this would make more attractive for smaller stores to aggregate at that mall and hence more consumers so on and so forth.

Policy Implications. This work provides three very clear implications for competition policy. The presence of exclusive deals and market power usually cause concern among policy-makers and regulators. Firstly, we suggest that, in most cases, the contract decision arising in the market is the first best from a policy-maker's perspective. This is because it always generates positive spillovers in the seller side of the market (i.e., firms, content providers, apps, shops) and can benefit consumers in several cases. We thus recommend policy-makers to be circumspect when making market interventionist policies to correct for the apparent harm in the market caused by exclusives. Market intervention in most cases may be detrimental to welfare. Hence, catering to the extant negative view on exclusives is not advisable without a detailed analysis of the specific market. Secondly, we suggest that the *raison d'être* of exclusive deals in the market may not be due to firm anti-competitive strategies but they may be market-determined contracts that turn out to be welfare enhancing. Thirdly, we show that relative to vertical separation, integration between a Superstar and a platform would lead to non-exclusivity in more circumstances. According to our analysis, the recent stream of acquisitions in the music market (i.e., Spotify acquiring Gimlet and Anchor) and cloud market (i.e., IBM integrating with Red Hat) would increase the probability of having non-exclusive clauses relative to the pre-acquisition scenario. This strong result suggests that concerns over potential foreclosure in the access to a premium content in presence of vertical integration might be overstated.

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Appendix A.

A.1. Proof of Lemma 2

When $g_i = g_j = g$, the best replies of the two firms are symmetric, so that $p_j(p_i) = p_i(p_j) = p^* = \tau - \gamma \cdot \theta$. Plugging p^* and g into the demand and profit functions, we obtain $D^* = 1/2$ and $\Pi^* := (\tau - \gamma \cdot \theta)/2 - g \cdot F_i^{NE}$. For the last point, it is just sufficient to notice that $n_i = \gamma \cdot D_i = \gamma/2$.

A.2. Proof of Lemma 3

When $g_i = 1$ and $g_j = 0$, the best replies are retrieved by Lemma 1. The equilibrium prices are simply $p^*_{ii} = p^* + \frac{\phi}{3}$ and $p^*_{ji} = p^* - \frac{\phi}{3}$. Plugging them into the demand functions, the demand for platform i is $D^*_{ii} = \frac{1}{2} + \frac{\phi}{6(\tau-\gamma\cdot\theta)}$ and the demand for platform j is $D^*_{ji} = \frac{1}{2} - \frac{\phi}{6(\tau-\gamma\cdot\theta)} = 1 - D^*_{ii}$. Coupling together equilibrium prices and demands, platforms' net profits are $\Pi^*_i - F^E_i = \frac{(3(\tau-\gamma\cdot\theta)+\phi)^2}{18(\tau-\gamma\cdot\theta)} - F^E_i$ and $\Pi^*_j = \frac{(3(\tau-\gamma\cdot\theta)-\phi)^2}{18(\tau-\gamma\cdot\theta)}$, respectively.

A.3. Proof of Lemma 6

First, consider the case of no Superstar, i.e., $g_1 = g_2 = 0$. Consumer surplus is:

$$CS = 2\int_0^{\frac{1}{2}} \left(v + \theta \cdot \frac{\gamma}{2} - (\tau - \gamma \cdot \theta) - \tau \cdot x\right)dx = v + \frac{1}{4}\left(6\gamma \cdot \theta - 5\tau\right) = v + \frac{1}{4}\left(\gamma \cdot \theta - 5p^*\right)$$

This case never occurs at equilibrium as the Superstar always finds it profitable to be active in the market. Nevertheless, it is useful to grasp the net effect of the presence of the Superstar. In terms of surplus accruing to CPs, we get:

$$PS = \int_0^{\frac{\gamma}{2}} \Big(\gamma - 2x\Big)dx = \frac{\gamma^2}{4}.$$

Next, consider the case when the Superstar offers an exclusive contract. The consumer surplus on platform i is:

$$\begin{aligned} CS^*_{ii} =& \int_0^{D^*_{ii}} \Big(v + \phi \cdot n^*_{ii} - p^*_{ii} + \phi - \tau \cdot x\Big)dx \\ =& \frac{3p^*_{ii}}{72(p^{,*})^2}\Big\{\phi \cdot (7\tau + 6\gamma \cdot \theta) - 3(5\tau - 4v - 6\gamma \cdot \theta) \cdot p^{,*}\Big\}. \end{aligned}$$

Consumer surplus on platform j is:

$$\begin{aligned} CS^*_{ji} =& \int_{D^*_{ii}}^1 \Big(v + \phi \cdot n^*_{ji} - p^*_{ji} - \tau(1 - x)\Big)dx \\ =& \frac{(3p^*_{ji})^2}{72(p^*)^2}\Big\{\phi \cdot (5\tau + 65\gamma \cdot \theta) - 3(5\tau - 4v - 6\gamma \cdot \theta) \cdot p^*\Big\}. \end{aligned}$$

The total consumer surplus is:

$$CS^* = CS^*_{ii} + CS^*_{ji} = v + \frac{3\gamma \cdot \theta + \phi}{2} + \frac{\tau}{36}\Big\{\frac{\phi^2}{(p^*_{ii})^2} - 45\Big\}$$

Consider now the surplus accruing to CPs. For ease of exposition, we distinguish between the surplus generated for those CPs who multi-home (subscript m) and for those who single-home as follows:

$$PS^*_{mi} = \int_0^{n_{ji}} \Big(\gamma - 2x\Big)dx, \qquad PS^*_{ii} = \int_{n_{ji}}^{n_{ii}} \Big(\gamma - x\Big)dx$$

By comparing the consumer surplus on platform i in the two cases, we have $CS^*_{ii} > CS$ and $CS^*_{ji} < CS$. Overall, the consumer surplus increases when there is exclusivity. On the CP side, we have $PS^*_{mi} < PS < PS^*_{ii}$ and $PS^*_{mi} + PS^*_{ii} > PS$.

A.4. Proof of Proposition 3

The overall effect on the consumer surplus is such that

$$\begin{aligned} CS^* - (CS + \phi) =& \frac{\phi}{36}\Big\{-18 + \frac{\tau \cdot \phi}{p^{2,*}}\Big\} > 0 \\ \Leftrightarrow& \tau < \tilde{\tau} := \gamma \cdot \theta + \frac{1}{36}\Big\{\phi + \sqrt{72\gamma \cdot \theta \cdot \phi + \phi^2}\Big\} \quad \text{and} \quad \gamma > \underline{\gamma} := \frac{5\phi}{3\theta}. \end{aligned}$$

A.5. Proof of Proposition 4

To prove Proposition 4, compare the two cut-offs of $\tilde{\tau}$ and $\bar{\tau}$. It immediately follows that $\bar{\tau}$ can be larger or smaller than $\tilde{\tau}$ for some parameter ranges. When $\gamma < \underline{\gamma}$, non-exclusivity damages consumers for any level of τ. Hence, when $\gamma < \underline{\gamma}$ and $\tau < \bar{\tau}$, we have a misalignment of incentives: the Superstar chooses an exclusive contract but consumers prefer a non-exclusive one. Suppose $\gamma > \underline{\gamma}$. In this case, if $\tau < \bar{\tau}$ exclusivity is chosen and it increases consumer welfare. It immediately follows that interests of consumers and the Superstar are aligned for $\tau < \min[\tilde{\tau}, \bar{\tau}]$. Else, these are misaligned. Note that misalignment arises only when the Superstar chooses an exclusive contract.

A.6. Two-Superstars

To study the effect of more than one Superstar. For simplicity, let there be two Superstars $s \in \{A, B\}$ generating a consumer benefit ϕ_s in the market. The timing of the game is similar as in the main model. These two Superstars make a simultaneous contract choice in the first stage by choosing among three strategies, $\{i, j, ij\}$, where i (j) identifies the case when an exclusive contract is offered to platform i (j) and ij the case of non-exclusivity. For the sake of readability, in this subsection we do not use the superscript $\{E, NE\}$ to identify exclusive and non-exclusive fees. Hence, there are nine possible outcomes in the market (Table 1). We proceed as follows. First, we present the four main scenarios arising and the outside option each platform faces when a Superstar makes an offer.[8] In particular, we look at the cases when (i) Superstars are exclusive on different platforms, (ii) Superstars are exclusive on the same platform, (iii) one Superstar multi-homes and the other is exclusive, and (iv) both Superstars multi-home. Then, we solve the game and show that the main intuitions of the model remain (almost) unaltered.

Superstars are exclusive on different platforms

Consider the case where Superstar A goes exclusively to platform i and Superstar B goes exclusively to platform j. The utility of the consumer subscribing to platform i is $u_i = v + \phi_A - p_i - \tau|x_i - x|$, whereas the utility of an agent subscribing to platform j is $u_j = v + \phi_B - p_j - \tau|x_j - x|$. The demands are easily derived. When price competition takes place, platform i sets a price:

$$p_i = \tau - \gamma \cdot \theta + \frac{\phi_A}{3} - \frac{\phi_B}{3} \text{ and } p_j = \tau - \gamma \cdot \theta + \frac{\phi_B}{3} - \frac{\phi_A}{3}.$$

It immediately follows that when Superstars are symmetric, $\phi_A = \phi_B$, the prices are the same as in our benchmark regime with Superstar multi-homing. Hence, Superstars if they cannot coordinate their behavior will create externalities on each other. This happens because the marginal benefit of having a Superstar on board is reduced as platforms get more symmetric. The resulting platform profits in the second period are:

$$\Pi_i^{i,j} - F_A^i = \frac{(3(\tau - \gamma \cdot \theta) + \phi_A - \phi_B)^2}{18(\tau - \gamma \cdot \theta)} - F_A^i$$

[8] It suffices to have only four scenarios to solve the game, as the remaining payoffs can be obtained by appropriate substitution of the notations for those cases.

and

$$\Pi_j^{i,j} - F_B^j = \frac{(3(\tau - \gamma \cdot \theta) - \phi_A + \phi_B)^2}{18(\tau - \gamma \cdot \theta)} - F_B^j$$

where $\Pi_i^{i,j}$ denotes the profit of platform i and $\Pi_j^{i,j}$ denotes the profit of platform j.

In the first stage of the game, Superstars make simultaneous TIOLI offers to the platforms. Given that B offers an exclusive contract to platform j, A offers a fixed tariff such that platform i gets its outside option. The outside option for platform i represents the case in which the exclusive contract is offered to j. Formally, A solves:

$$\max_{F^i} \pi_A^{i,j} = \max \gamma \cdot D_i + F_A^i$$
$$\text{subject to } \Pi_i^{i,j} - F_A^i \geq \Pi_i^O$$

where $\Pi_i^O = \frac{(3(\tau-\gamma \cdot \theta)-(\phi_A+\phi_B))^2}{18(\tau-\gamma\cdot\theta)}$ is the profit of platform i when both Superstars are on platform j. Setting the fixed fees to just satisfy the participation constraint of the platform i, we get $F_s^i = \Pi_i^{i,j} - \Pi_i^O$. Superstars' profits are then given as

$$\pi_A^{i,j} = \frac{(3\tau(3\gamma + 4\phi_A) - 4\phi_A \cdot \phi_B - 9\gamma^2 \cdot \theta + 3\gamma(\phi_A - 4\phi_A \cdot \theta - \phi_B)}{18(\tau - \gamma \cdot \theta)}$$
$$\pi_B^{i,j} = \frac{(3\gamma(3\tau - 3\gamma \cdot \theta - \phi_A) + 3(4\tau + \gamma - 4\gamma \cdot \theta)\phi_B - 4\phi_A \cdot \phi_B)}{18(\tau - \gamma \cdot \theta)}$$

Clearly, similar payoffs are derived when Superstar B (A) offers an exclusive contract to platform i (j).

Superstars are exclusive on the same platform

Consider now the case that both Superstars join the same platform and offer exclusive contracts either on platform i or j. As these two cases are identical, we only present the scenario where both join platform i. As the Superstars' contribution to an agent subscribing to platform i is additive, prices, demands, and profits are identical to those presented in Section 4 with replacing $\phi = \phi_A + \phi_B$. The price set by platform i (j) increases (decreases) by $\frac{\phi_A+\phi_B}{3}$ and the corresponding platform profits are:

$$\Pi_i^{i,i} - F_A^i - F_B^i = \frac{(3(\tau - \gamma \cdot \theta) + \phi_A + \phi_B)^2}{18(\tau - \gamma \cdot \theta)} - F_A^i - F_B^i$$

and

$$\Pi_j^{i,i} = \frac{(3(\tau - \gamma \cdot \theta) - \phi_A - \phi_B)^2}{18(\tau - \gamma \cdot \theta)}.$$

In the first stage of the game, Superstar A (B) makes TIOLI offers. The fixed fees are set to offer the platform i just its outside option. The outside option of platform i when contracting with A is the profit i obtains when A contracts exclusively with platform j, whereas B still contracts with platform i.

Hence, the outside option for platform i when rejecting Superstar A and B's offers are:

$$\Pi_i^{O,A} = \frac{(3(\tau - \gamma \cdot \theta) - \phi_A + \phi_B)^2}{18(\tau - \gamma \cdot \theta)}, \qquad \Pi_i^{O,B} = \frac{(3(\tau - \gamma \cdot \theta) + \phi_A - \phi_B)^2}{18(\tau - \gamma \cdot \theta)}$$

respectively. Similar mechanism works when both Superstars offer a contract to platform j. So the optimal fees are $F_A^i = \Pi_i^{i,i} - \Pi_i^{O,A}$ for A and $F_B^i = \Pi_i^{i,i} - \Pi_i^{O,B}$ for B. The resulting Superstar profits are:

$$\pi_A^{i,i} = \frac{(3\tau(3\gamma + 4\phi_A) + 4\phi_A \cdot \phi_B - 9\gamma^2 \cdot \theta + 3\gamma(\phi_A - 4\phi_A \cdot \theta + \phi_B)}{18(\tau - \gamma \cdot \theta)}$$
$$\pi_B^{i,i} = \frac{(3\gamma(3\tau - 3\gamma \cdot \theta + \phi_A) + 3(4\tau + \gamma - 4\gamma \cdot \theta)\phi_B + 4\phi_A \cdot \phi_B)}{18(\tau - \gamma \cdot \theta)}$$

One Superstar multi-homes and other single-homes

Consider now the case in which one Superstar multi-homes and the other Superstar offers an exclusive content. With appropriate substitution, this case corresponds to four potential scenarios: (i) A multi-homes, whereas B exclusively goes on platform i, (ii) A multi-homes while B exclusively goes on platform j, (iii) A goes exclusively on platform i and B multi-homes, and (iv) A goes exclusively go on platform j and B multi-homes. For the sake of simplicity, let us suppose that A multi-homes and B offers an exclusive deal to platform i. As A multi-homes, she does not have any impact on prices. Instead, platform i with B exclusive charges $p_j^{ij,i} = \tau - \gamma \cdot \theta + \frac{\phi_B}{3}$, whereas platform j charges $p_i^{ij,i} = \tau - \gamma \cdot \theta - \frac{\phi_B}{3}$. Related profits are:

$$\Pi_i^{ij,i} - F_A^{ij} - F_B^i = \frac{(3(\tau - \gamma \cdot \theta) + \phi_B)^2}{18(\tau - \gamma \cdot \theta)} - F_A^{ij} - F_B^i$$

and

$$\Pi_j^{ij,i} - F_A^{ij} = \frac{(3(\tau - \gamma \cdot \theta) - \phi_B)^2}{18(\tau - \gamma \cdot \theta)} - F_A^{ij}.$$

In the contracting stage, A offers a non-exclusive contract to i (j) under the threat that in case of a contractual breakdown, she would single-home on j (i). B offers an exclusive contract under the threat that, in case of a contractual breakdown, she would be exclusive on j. As a result, the outside option for i when an offer is made by A is equal to the profit obtained when Superstars are exclusive on different platforms and the fee set by A on i is

$$F_i^{ij} = \Pi_i^{ij,i} - \frac{(3\tau - 3\gamma \cdot \theta + \phi_B - \phi_A)^2}{18(\tau - \gamma\theta)}.$$

The fee clearly differs on platform j as the outside option is that A offers an exclusive contract to platform i who already hosts B. In other words, the outside option for platform j is to be in a situation where both Superstars are on platform i. So,

$$F_A^j = \Pi_j^{ij,i} - \frac{(3\tau - 3\gamma\theta - \phi_B - \phi_A)^2}{18(\tau - \gamma \cdot \theta)}.$$

Now, consider the threat made by B: if i does not the accept contract, this will be offered to j and the outside option will be $\frac{(3\tau-3\gamma\cdot\theta+\phi_B)^2}{18(\tau-\gamma\theta)}$ so $F_B^{ij} = \Pi_i^{i,i} - \Pi_j^{ij,j}$. Final profits for A and B are:

$$\pi_A^{ij,i} = \gamma + \frac{\phi_A}{9}(6 - \frac{\phi_A}{\tau - \gamma\cdot\theta}), \qquad \pi_B^{ij,i} = \frac{\gamma}{2} + \frac{\phi_B(4(\tau-\gamma\cdot\theta)+\gamma)}{6(\tau-\gamma\cdot\theta)}.$$

Profits in all other scenarios can be easily calculated and they are not reported for the sake of brevity.

Both Superstars multi-home

Finally consider the case that both superstars multi-home. Here, demands are identical to the those in the main model. Platforms are symmetric and set a price equal to $p_i = \tau - \gamma\cdot\theta$ and the corresponding platform profits are:

$$\Pi_i^{ij,ij} = \frac{\tau-\gamma\cdot\theta}{2} - F_A^{ij} - F_B^{ij}.$$

In the first stage, each Superstar makes a TIOLI offer to a platform under the threat of exclusivity on its rival's platform. Formally, a Superstar A solves:

$$\max_{F_A^i, F_B^{ij}} \pi_A^{ij,ij} = \gamma\cdot 1 + F_A^{ij} + F_A^{ij}$$
$$\text{subject to } \Pi_i^{ij,ij} - F_A^{ij} \geq \Pi^O \quad \forall i \in 1,2,$$

where $\Pi_i^O = \frac{(3(\tau-\gamma\cdot\theta)-\phi_A)^2}{18(\tau-\gamma\cdot\theta)}$ for $i \in \{1,2\}$ are the profits obtained by the platform when A sells exclusively to platform j, whereas B multi-homes. Hence, the non-exclusive fees set by Superstar A to platform i and j respectively are $F_A^{ij} = \Pi_i^{ij,ij} - \Pi_i^O$ and $F_A^j = \Pi_j^{ij,ij} - \Pi_i^O$. Final profits are:

$$\pi_s^{ij,ij} = \tau - \gamma\cdot\theta + \gamma + \frac{\phi_k}{9}(6 - \frac{\phi_s}{\tau-\gamma\cdot\theta}).$$

Simultaneous contract choice of the two Superstars

Suppose that S_{-k} is exclusive on platform i. It is easy to see that S_k would never choose to exclusively offer the contract to platform j. Moreover, the best response of S_k now depends on the transportation cost. If transportation costs are low, then she goes exclusively on platform i else, she multi-homes. Specifically:

$$\pi_s^{i,i} > \pi_s^{ij,i} \text{ for } \tau < \tau_A := \frac{9\gamma^2\cdot\theta + 3\gamma\cdot\phi_B + 2\phi_A^2 + 3\gamma\cdot\phi_A + 4\phi_A\cdot\phi_B}{9\gamma}.$$

Similarly, we get the cut-off for B when A single-homes. Specifically:

$$\pi_B^{i,i} > \pi_B^{ij,i} \text{ for } \tau < \tau_B := \frac{9\gamma^2\cdot\theta + 3\gamma\cdot\phi_B + 2\phi_B^2 + 3\gamma\cdot\phi_A + 4\phi_A\cdot\phi_B}{9\gamma}.$$

Here notice that $\tau_A < \tau_B$ when $\phi_A < \phi_B$.

Moreover, for the case that B (A) multi-homes, the best response of A (B) is to multi-home as well. Hence, the equilibrium contract choice is given as follows:
For $\tau < \min\{\tau_A,\ \tau_B\}$, the Nash Equilibria are given by (i,i), (j,j) and (ij,ij).
For $\tau \geq \min\{\tau_A,\ \tau_B\}$, there is a unique Nash Equilibrium given by (ij,ij).

A.7. Multi-homing Consumers

To study multi-homing consumers, we present the most unfavourable scenario for the existence of the ripple effect, that is, when CPs do not weigh differently the value accruing from multi-homing or single-homing consumers. In other words, the value of switching is less relevant.

We begin by considering CP's profits on platform i as equal to $\gamma \cdot (D_i^S + D^M) - f$ where D_i^S is the mass of single-homing consumers and D^M the mass of multi-homing consumers. The total mass of small CPs on platform i is:

$$n_i = Prob(f \leq \gamma \cdot (D_i^S + D^M)) = \gamma \cdot (D_i^S + D^M) \tag{6}$$

A multi-homing CP obtains $\gamma \cdot (D_1 + D_2) - 2f = \gamma \cdot (1 + D^M) - 2f$. Using the same argument, Superstar's profits are:

$$\pi = \begin{cases} \gamma \cdot (D_i^S + D^M) + F^E & \text{if exclusive on platform } i \\ \gamma \cdot (D_i^S + D_j^S + 2D^M) + F_1^{NE} + F_2^{NE} & \text{if non-exclusive} \end{cases}$$

where F identifies the fee under non-exclusivity and F^i under exclusivity on platform i. Consumers who multi-home obtain the following utility, u^m, such that:

$$u^m = v + \phi \cdot +\theta \cdot \max\{n_1, n_2\} - (p_1 + p_2) - \tau. \tag{7}$$

By comparing the utility in equation (7) with the utility of single-homing in platform $i \in \{1, 2\}$ expressed in equation (1), one can find two cut-offs determining the location of a consumer indifferent between single-homing on each platform and multi-homing:

$$\bar{x}_1 = 1 - \frac{\phi \cdot (1 - g_1) + \theta \cdot \max\{n_1 - n_2, 0\} - p_2}{\tau}, \qquad \bar{x}_2 = \frac{\phi \cdot (1 - g_2) + \theta \cdot \max\{n_2 - n_1, 0\} - p_1}{\tau}. \tag{8}$$

The consumer demand of each platform is the sum of single-homing and multi-homing consumers. Remarkably, consumers multi-home if and only if there is Superstar exclusivity. Else, no consumer would prefer to multi-home as the cut-off $\bar{x}_1$ ($\bar{x}_2$) would be larger (smaller) than 1 (0), hence out of the Hotelling line. As a result, consumers would only single-home. The reference case for non-exclusivity is depicted by the benchmark model where equilibrium results are reported by Lemma 2.

We therefore solve the model only for the case of exclusivity on platform 1. This implies that $g_1 = 1$, $g_2 = 0$, and $n_1 > n_2$. The cut-offs become:

$$\bar{x}_1 = 1 - \frac{\theta(n_1 - n_2) - p_2}{\tau}, \qquad \bar{x}_2 = \frac{\phi - p_1}{\tau}. \tag{9}$$

This leads to the following results:

$$D_1 = \frac{\theta - p_1}{\tau}, \qquad D_2 = \frac{\gamma(\theta \cdot \phi - p_1 \cdot \theta) - p_2 \cdot \tau}{\tau(\theta + \tau)} \tag{10}$$

and $n_1 = \gamma \cdot D_1$, whereas $n_2 = \gamma \cdot D_2$. Going one step backwards, each platform anticipates the joining decision of consumers and decides the optimal price p_i. Platform $i's$ gross profits are $\Pi_i = p_i \cdot D_i$.

By following the same reasoning of the benchmark model, when the Superstar single-homes on platform i, the price set by platform i is $p^*_{ii} = \frac{\phi}{2}$, whereas the price set by platform j is $p^*_{ji} = \frac{\phi \cdot \gamma \cdot \theta}{4\tau}$.

Next, to analyze the Superstar's decision, we first consider the case under exclusive contracts. the Superstar makes a TIOLI offer to platform i under the condition that if she rejects, the contract would be offered to the rival platform j:

$$\max_{F^i} \gamma \cdot D_i + F_i^E$$
$$\text{subject to } \Pi^*_{ii} - F_i^E \geq \Pi_{ij}$$

where $\Pi_{ij} = \frac{\gamma^3 \cdot \theta^2 \cdot \phi^2}{16\tau^2(\gamma \cdot \theta + \tau)}$ is profit of firm i when contractual agreements with the Superstar break down and platform j accepts the contracts made by the Superstar. As a result, the Superstar sets $F_i^{E,*} = \frac{\phi^2}{4\tau}\left\{1 - \frac{\gamma^2 \cdot \theta^2}{4(\gamma \cdot \theta + \tau)\tau}\right\}$, and she obtains $\pi^* + F_i^{E,*} = \frac{\phi}{16\tau^2}(8\gamma \cdot \tau + 4\tau \cdot \phi - \frac{\gamma \cdot \theta}{\tau + \gamma \cdot \theta})$.

Then, we solve the model when she offers non-exclusivity. In this case, the Superstar reaches the entire market as in the benchmark model but the outside option is given by the new setting with exclusive contract. Therefore, the Superstar solves:

$$\max_{F_i^{NE}, F_j^{NE}} \gamma + F_i^{NE} + F_j^{NE}$$
$$\text{subject to } \Pi^*_i(g = 1) - F_i^{NE} \geq \Pi_i^O \text{ for all } i \in 1, 2,$$

Hence, the Superstar sets $F_i^{NE,*} = F_j^{NE,*} = \frac{\gamma^3 \cdot \theta^2 \cdot \phi^2}{16\tau^2(\gamma \cdot \theta + \tau)}$. So, her profits are $\pi^* = \gamma + 2F^*$. By comparing Superstar profits in the two regimes, it immediately follows that if:

$$\tau < \frac{1}{2}\sqrt{2\phi^2 + 4\gamma \cdot \phi + \gamma^2(2 - \theta)^2} - \gamma(1 - \frac{\theta}{2})$$

the Superstar offers an exclusive contract. Else, she offers a non-exclusive contract. Indeed, results follow the same mechanism as in the benchmark model.

A.8. Two-sided pricing

A single-homing CP on platform i obtains $\gamma \cdot D_i - f - l_i$, where l_i is the price paid by the CP to access the platform. For $l_i < 0$, CPs are subsidized. A multi-homing CP gets $\gamma - 2f - l_i - l_j$. Platform $i's$ profits absent the Superstar content are $\Pi_i = p_i \cdot D_i(0, g_j) + l_i \cdot n_i$. When the platform i offers the Superstar content, profits are $\Pi_i + l_i \cdot n_i - F_i = p_i \cdot D_i(1, g_j) + l_i \cdot n_i - F_i$, where $F_i = F_i(F)$ if $g_j = 0(1)$. To ensure a well-behaved profit function, we let v be sufficiently large and we slightly modify the condition on the transportation costs requiring $\tau > \frac{\gamma^2 + 4\gamma \cdot \theta + \theta^2 + 2\phi}{6}$.

In the third stage, consumer demands become:

$$D_i(g_i, g_j) = \frac{\tau + \theta \cdot (l_i - l_j + \gamma) + (p_j - p_i) + \phi \cdot (g_i - g_j)}{2(\tau - \gamma \cdot \theta)}, \qquad D_j(g_j, g_i) = 1 - D_i(g_i, g_j)$$

By anticipating future market shares, in the second stage platforms have the following best replies for $i, j \in \{1, 2\}$, with $i \neq j$,

$$p_i(p_j, l_j) = \frac{(4\tau - \gamma(\gamma + 3\theta))(\theta \cdot l_j + p_j + t + \phi(g_i - g_j) - \gamma \cdot \theta)}{8\tau - \gamma^2 - 6\gamma \cdot \theta - \theta^2},$$
$$l_i(l_j, p_i) = \frac{(\gamma - \theta)(\theta \cdot l_j + p_j + \tau + \phi(g_i - g_j) - \gamma \cdot \theta)}{8\tau - \gamma^2 - 6\gamma \cdot \theta - \theta^2}$$

We now identify the equilibrium outcomes when the Superstar multi-homes. We identify these equilibrium outcomes as those without any superscript. Let $g_i = g_j = g = 1$, platforms are symmetric and prices are $\tilde{p}^* := \tau - \gamma \cdot (\gamma + 3\theta)/4$ for consumers and $\tilde{l}^* := (\gamma - \theta)/4$ for CPs. The demands are given by $\tilde{D}^* := 1/2$ and $\tilde{n}^* := (\gamma + \theta)/4$.

When the Superstar offers an exclusive contract to platform $i = 1$ ($g_1 = 1$ and $g_2 = 0$), equilibrium prices are:

$$\tilde{p}^*_{11} = \tilde{p}^* \cdot \left(1 + \frac{2\phi}{\eta}\right), \qquad \tilde{p}^*_{21} = \tilde{p}^* \cdot \left(1 - \frac{2\phi}{\eta}\right),$$
$$\tilde{l}^*_{11} = \tilde{l}^* \cdot \left(1 + \frac{2\phi}{\eta}\right), \qquad \tilde{l}^*_{21} = \tilde{l}^* \cdot \left(1 - \frac{2\phi}{\eta}\right),$$

where $\eta = 6\tau - \gamma^2 - 4\gamma \cdot \theta - \theta^2 > 0$. It can be easily seen that $\tilde{p}^*_{11} > \tilde{p}^* > 0$ and $0 < \tilde{p}^*_{21} < \tilde{p}^*$. When $\gamma > \theta$, the CP price is positive and increases with the Superstar, whereas $\gamma < \theta$ CPs are subsidized and the subsidy increases with the Superstar. We also note that $\tilde{D}_{11} < 1$ and $n_1 < 1$, so there is no foreclosure of the rival as a consequence of exclusivity.

Going one step backward, we study the decision of the Superstar following the same reasoning of the previous cases. When the Superstar offers an exclusive contract, her profits are $\tilde{\pi}^*_{11} = \frac{\gamma}{2} + \frac{\phi \cdot (8\tau + \gamma(2-\gamma) - 6\gamma\theta - \theta^2)}{2\eta}$. By contrast, when the Superstar offers a non-exclusive contract, her profits are $\tilde{\pi}^* = \gamma + \tau - (\frac{\gamma^2 + 6\gamma \cdot \theta + \theta^2}{8} + \frac{(\eta - 2\phi)^2(8\tau - \gamma^2 - 6\gamma - \theta^2)}{\eta^2})$.[9]

By comparing the profits of the Superstar, it follows that the Superstar offers an exclusive contract whenever $\tau < \underline{\tilde{\tau}}$, where:

$$\underline{\tilde{\tau}} \equiv \frac{\phi^2}{9\gamma} + \frac{\gamma + 4\gamma \cdot \theta + \theta^2 + \phi}{6} + \frac{\phi}{18\gamma}\left\{3\gamma \cdot (\gamma \cdot (3 + \gamma) - 2\gamma \cdot \theta + \theta^2) + 12\gamma \cdot \phi + 4\phi^2\right\}^{1/2}.$$

Else, she offers a non-exclusive contract.

In terms of welfare, the gain for CPs due to the presence of the exclusive is denoted by $\delta := PS^*_i - PS^* = \frac{\phi^2(\gamma+\theta)^2}{4(\gamma^2 + 4\gamma\theta + \theta^2 - 6\tau)^2} > 0$. Hence, CPs benefit from exclusivity also with two-sided pricing.

[9]For the sake of completeness, when a platform does not obtain the contract when the rival does, platforms' profits are $\tilde{\Pi}_{ij} = \frac{(\eta - 2\phi)^2}{\eta^2} \cdot \tilde{\Pi}^*$.