Program Quality and Exclusive Provision

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This version: June 2012

Abstract

In the present work, we investigate the choices concerning exclusivity over premium programs and the incentives to invest in quality in a two-sided media market. We show that a content provider prefers to give the premium content exclusively to the platform with a competitive advantage on the advertising market, no matter what the vertical structure of the industry is. We also show that a vertically integrated content provider has fewer incentives to invest in quality than an independent one. Moreover, the more the integrated platform is efficient on the advertising market, the less it invests in quality.

When we endogenize the vertical structure of the industry, we find that the content provider prefers to be vertically integrated, and that it prefers to acquire the platform with a competitive advantage on the advertisers market.

Vertical integration reduces consumer surplus, especially if a content provider is controlled by a platform with a competitive advantage on the advertising market.

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I am grateful to Bruno Jullien for his important advices. I also thank Catherine Bontcheff, Carlo Cambini, Lapo Filistrucchi, David Henriques, Yassine Lefouili, Pierfrancesco Reverberi, Patrick Rey and Tommaso Valletti for helpful comments and discussions.

1 Introduction

Television companies deliver (freely or not) information goods to viewers. When they air ads, they sell on viewers' attention caught with programs to advertisers. When viewers and advertisers interact through the media, the market is two-sided. Each group exerts an externality on the other: viewers usually dislike ads, hence advertisers exert a negative externality on viewers; on the contrary, advertisers are interested in reaching a large public, hence viewers exert a positive externality on advertisers.

In the TV industry, activities can be organized into three vertical phases: (1) production of content; (2) packaging of contents; (3) transmission of packages through a distribution system. Traditionally market power in the media industry has been originating from the control over distributive capacity, because of the scarcity of the spectrum. In recent years, the digital technology has enabled a more efficient use of the existing band and the coexistence of different platforms (terrestrial, satellite, cable, IPTV) has further enhanced the distributive capacity.

Although the distribution bottleneck has widened, the market is still very concentrated and it will probably remain as such. Motta and Polo (1997) and Seabright and Weeds (2007) explain the persisting concentration that they observe in media markets using the concept of endogenous sunk cost. In fact, despite the so-called “digital revolution”, barriers to entry are not eliminated since competition among firms tends to push content quality up. Since quality programs tend to be more costly, therefore the investment required in order to be successful on the market rises as the pressure of competition rises. If viewers continue to demand a narrow subset of horizontal program quality, we can expect the concentration in the industry to persist.

The technological evolution is indeed shifting market power towards content right holders, to the point that control over premium contents (not by coincidence named by some authors “must-have” contents) seems to become the new competitive bottleneck. Premium contents are very attractive contents for viewers and, unlike basic ones, they have few substitutes. Moreover, their production and/or the acquisition of their transmission rights imply high fixed costs. Such contents usually consist in important sporting events, blockbuster movies, important television formats, successful television series. The so-called “must-have” component, due to superior technologies and well-known brand names, has a big power in affecting platforms performances, and acquiring exclusive rights is an important strategy.

Traditionally contents have been exchanged on the market (for instance, the MIPTV and MIPCOM are two important events for the television market, in which sellers and buyers of entertainment contents meet). However, these markets are gradually loosing relevance, since content providers work more and more in close collaboration with platforms. Moreover, many

mergers and acquisitions among producers and distributors of content have occurred, that affected the industry structure.[2]

Usually, a platform that manages to acquire the premium content has some competitive advantage in the downstream market. The asymmetry in the downstream market seems to be an important motivation for explaining the control over premium content, either in the form of exclusive contract or through vertical integration. This asymmetry can stem from the fact that a platform already airs very attractive programs for viewers, and/or from the fact that it offers valuable services to advertisers. For example, some authors identify in its ability to reach a public of young and "rich" viewers one of the competitive advantages of Sky.

In the present work, we investigate the choices concerning exclusive distribution of premium contents and quality investments in media markets. We study how these choices are influenced by various factors, like vertical integration and the ability of a platform to reach viewers that are attractive for advertisers. We also endogenize the vertical structure of the industry, allowing the content provider to acquire the control over one of the platforms, in order to study merger decisions in the industry. We analyse the social desirability of equilibrium outcomes.

In order to study this issue, we consider a model that presents features of horizontal and vertical differentiation models (see Hotelling, 1929; Shaked and Sutton, 1982). We consider two channels, operated by two rival platforms, located at the two extremes of a Hotelling line. Each platform offers a homogeneous "basic channel". This basic channel can be bundled with a premium content, produced by a monopolist upstream operator, that increases viewers' utility from the "consumption" of the channel.

Since we intend to model a setting where the premium content is a not substitutable good and it is an important resource on the downstream market, then we assume that the upstream operator is a monopolist and that it holds bargaining power. The upstream operator can offer the premium content to platform exclusively or non-exclusively. It offers in turn each of these contracts and it gives up if it does not reach any agreement. The upstream decides the order of the offers and it makes at each stage a take-it-or-leave-it offer that extracts all the profits from the sale of the premium content. The upstream can be independent or vertically integrated with one downstream platform.

We model a mixed case, where we allow platforms to get revenues from both viewers and advertisers.[3] We assume that viewers exert a positive externality on advertisers, while advertisers exert a negative one on viewers.

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[2] Just to quote few examples, see the following cases: Mediaset/Endemol; AOL/Time Warner; Vivendi/Canal+; ABC/Disney; Newscorp/Tele+; Fox/Wilder; BSkyB's attempt to purchase Manchester United.

We assume that an advertiser gets a different benefit from interacting with viewers on different platforms. We introduce a "target parameter", that is a measure of the efficiency of a commercial channel on the advertising market, and it is an important dimension. This parameter can be linked to characteristics of the audience of a platform or not. It may catch how well the audience of a platform fits with the advertisers' ideal target customers. Taking back the example of Sky, a viewer's choice of a platform can be correlated with some other variables, such as income or age, which advertisers care about. Alternatively, it can be linked to the quality of the service offered to advertisers or to the advertising strategy employed by a platform (see Depken II, 2004).

We find that the content provider always gives the content exclusively to one platform, no matter the structure of the industry. When platforms are asymmetric, the most efficient platform in targeting advertisers always gets the exclusive content. We find that vertical integration does not have any effect on the extent of exclusivity over the premium content, since the content provider always chooses the strategy that maximizes the industry profits.

However, under different industry structures, the content provider has different incentives to invest in quality. If the content provider is independent, it provides a higher level of quality compared to a vertically integrated operator. When platforms are asymmetric, if the content provider is integrated with the most efficient platform on the advertising market, it provides the lowest level of quality on the downstream market.

This occurs because the integrated platform knows that it can sell each viewer that it attracts through the quality content on to advertisers for a high price. Thus, it still have the incentives to attract consumers through the quality content, but it spends less in quality, since it knows that it can earn high revenues on the advertisers market. On the other end, an independent content provider has the incentives to sell a high quality content, in order to widen the demand for the quality content and extract high profits from the downstream market. Finally, when the content provider is integrated with the least efficient platform on the advertisers market, it provides a quality in between the two. Indeed, on the one hand, it wants to increase the upstream revenues from the sale of the content to the rival platform, and, on the other hand, it takes into account the adverse effect on downstream profits of the provision of the premium content to the rival.

We find that consumers are worse off when the content provider is integrated with the most efficient platform on the market and better off when the content provider is independent, since the biggest part of the market enjoys a content of the highest quality, even if at a higher price.

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[3] We assume that the premium content is a film, a television format or a sport event, thus advertising revenues are collected by downstream platforms. If one assumes that the premium content is a channel, the upstream firm operates the first two stage of the industry and it controls advertising revenues.

Then, we show that the content provider prefers to integrate with the most efficient platform on the advertising market, since it gains high revenues from the control over the premium content.

Our results suggest that, in merger control, policy makers should not only pay attention to the effects of vertical integration on exclusivity contracts, but also on the incentives to invest in quality. We also show that the imposition of non-exclusive provision of the quality content may have adverse effects on consumer surplus.

This paper is organized as follows. Section 2 analyzes the relevant literature. Section 3 presents the basic model, where we derive equilibrium outcomes and welfare effects. Section 4 concludes.

2 Literature

Our paper relates to the literature on two-sided media markets. There is a quite large theoretical literature on two-sided media markets.[4] A branch of literature is dealing with programming mix choices. The literature on product mix choice assesses that in two-sided media markets the maximum differentiation principle found in the one-sided literature can be contradicted. Indeed, advertising can push toward minimal platform differentiation (see Gabszewicz, Laussel and Sonnac, 2001, 2002, 2004; Gal-Or and Dukes, 2003).

Some authors also analyse market provision of advertising, and they compare equilibrium results with optimal ones (see, among others, Anderson and Coate, 2005; Peitz and Valletti, 2007). Market provision of advertising can be too low or too high compared to the social optimal choice, depending on the nuisance cost of advertising for viewers. When consumers strongly dislike advertising, platforms tend to air less ads. This result can be influenced by the business model of the platform, by single- and multi-homing assumptions and by the number of active platforms.

Some authors study entry in media markets (see, among others, Choi, 2006; Crampes, Haritchabalet and Jullien, 2009). They find that excessive entry can be an issue. The assumption on the business model and the formalization of the advertising marker can play a role in the conclusions.

In the present paper, we use the framework proposed by the literature, namely, a combination of the Hotelling and the Shaked and Sutton models, in order to study choices concerning production and distribution of quality contents in media markets.[5]

There are few papers that study exclusive strategies in media markets. The first to focus on this issue has been Armstrong (1999). He studies exclusive supply of a premium content, provided by an independent content provider to pure pay-TVs, under different contractual arrangements. He finds that lump-sum payment for contents pushes exclusive contract more than per-subscriber fees.

[4] The empirical literature is not as vast as the theoretical one. For empirical works on media, see the ones by Argentesi and Filistrucchi (2007), Kaiser and Song (2009), Kaiser and Wright (2006).

[5] For a survey, see Anderson and Gabszewicz (2006).

A similar focus is the one of Harbord and Ottaviani (2001). They find that a content provider finds profitable to provide the content exclusively for a lump-sum payment. Moreover, they find that the platform that receives the content chooses to sell on content rights using a per-subscriber fee. Then, Stennek (2007) studies the relationship between investments in program quality and exclusivity, in a bargaining game with alternating offers. He finds that, since exclusivity can increase quality, it should not be prevented.

Another interesting paper is the one by Hagiu and Lee (2011), which analyses how exclusive provision of quality content is influenced by the control over the retail price of this content. When the content provider keeps the right to price the content, they find non-exclusive provision. On the contrary, total selling of control rights can result in exclusively provision. They consider only a pure pay-tv model and they give the bargaining power to the platforms. Then, Weeds (2009) studies exclusive distribution of contents, when the content provider is integrated with one platform. The content is a channel, so advertising revenues are earned by the content provider. She considers two-part payments for the content and she does not endogenize the quality choice. She finds that non-exclusive provision is profitable. Hogendorn and Ka Yat Yuen (2009) analyses the effect of the level of platform interconnection on the exclusivity choices, when the content provider is an independent firm and imposes a per-subscriber fee for the content. They do not endogenize the quality of the offer and do not explicitly model the advertising market. They find that exclusivity is more likely when the initial market share difference is high and cross-platform indirect network effect weak.

Among the quoted papers, the majority part assumes that the content provider is an independent firm, while Weeds (2009) study the case of an integrated content provider. Only Stennek (2007) provides a short comparison between the effects of vertical integration and vertical separation on the exclusivity outcome. Moreover, Harbord and Ottaviani (2001) analyse the incentives to resell content rights, once one platform has acquired the exclusive. In the present work, we explicitly focus on the effects of vertical integration on provision of quality content, considering not only the choices concerning the exclusivity over the contract, but also on the incentives to invest in quality.
We also consider the role of efficiency on the advertising market. Indeed, we consider that advertisers have different benefits from interacting with viewers on different platforms. This can be due to the fact that the audience targeted by one platform fits better the target of the producer, or it can be due to the effectiveness of different advertising strategies used by different platform or to the different quality of the service offered to advertisers. This aspect has been disregarded by the previous literature that studies production and distribution of premium content in media markets, while we show that it can have an impact on premium contents provision.

More generally, this paper is also related to the literature dealing with investment and licensing of a cost-reducing innovation. The closer paper to ours is the one by Katz and Shapiro (1986). However, here we introduce a model which is peculiar of media markets. Moreover, we consider asymmetric firms, differently from the quoted paper.

3 The model

3.1 Basic assumptions

We consider a game à la Anderson and Coate (2005), where two platforms provide channels that are "consumed" by viewers and advertisers. This is a two-sided market, where two groups of agents, advertisers and viewers, interact through a platform. Each platform can improve the quality of its offer by airing a premium content. A premium content is a very valuable content provided by a monopolist upstream operator, that may or may not be vertically integrated with one of the platforms.

Platforms. Each platform provides a channel, indexed by $i \in \{1,2\}$. The two channels are located at the two extremes of a Hotelling line. In particular, platform $i = 1$ is located in zero and platform $i = 2$ is located in one.

Platforms finance themselves in a mixed way: viewers pay a subscription fee in order to watch a channel, and advertisers purchase time slots to advertise their products.[6] Platform *i*'s profit function is $\pi_i = p_i q_i + P_i a_i = p_i q_i + R_i q_i$, where p_i is the subscription fee for viewers, q_i is the mass of viewers that join platform *i*, P_i is the price that each advertiser pays to reach q_i viewers and a_i the amount of advertising. Moreover, $P_i = q_i r_i$ where r_i is the price of one ad that reaches one viewer. Then R_i, with $R_i = a_i r_i$, denotes the revenue per viewer and it is concave in a_i. Production costs are normalized to zero. We normalize the production cost of the basic channel and marginal costs of distribution to zero. Platforms fix p_i and a_i.

Viewers. Viewers make a discrete choice of which channel to watch. One can think that viewers have idiosyncratic preferences for channels, and that they subscribe only to the channel they prefer.

We assume that there is a population of mass one of viewers. Each viewer has a preference parameter *x* for horizontal quality, that represents its favourite type of programming. Parameter *x* is uniformly distributed over the [0,1] interval. The net utilities of a consumer of type *x* from a channel of type *i=1* and of type *i=2* respectively are:

$$U_1 = V + \gamma_1 - xt - \delta a_1 - p_1 \quad (1)$$

$$U_2 = V + \gamma_2 - (1-x)t - \delta a_2 - p_2 \quad (2)$$

[6] We do not endogenize the business model of the platform.

where *V* represents the willingness to pay of each viewer from accessing the platform.[7] We assume that V is high enough to assure complete market participation. As in models of horizontal differentiation (see Hotelling, 1929), we consider that a viewer of type *x* stands a disutility from watching a channel that is not of its preferred horizontal specification. This disutility depends on the "distance" of consumer *x* from the channel and on the transportation cost *t*. Then, as in models of vertical differentiation (see Shaked and Sutton, 1987), we consider a parameter γ_i that represents the quality of the premium content offered by platform *i* and we assume that each viewer has the same marginal utility from the premium content. Moreover, consumers dislike advertising, so they bear a utility loss that depends on the advertising level a_i and on the nuisance cost δ. We assume that all viewers have the same marginal disutility from ads and the same marginal willingness-to-pay for quality.[8]

In order to compute viewers' demands, we determine the viewer $\overline{x}$ who is indifferent between the two channels equalizing equations (1) and (2). Solving for *x*, we obtain:

$$\overline{x} = \frac{1}{2} + \frac{\gamma_1 - \gamma_2 + p_2 - p_1 + \delta(a_2 - a_1)}{2t} \tag{3}$$

Advertisers. Advertisers use ads in order to inform viewers about their products, since viewers are consumers of advertisers' products. We assume that there is a mass one of advertisers, that produce a product of quality $k \in [0, \bar{k}]$. We assume that k is distributed according to a p.d.f. F on this interval, where F is continuously differentiable and $F(0) = 0$. In the text, we use as an explanatory example the case where F is a uniform distribution.

Each consumer has a willingness-to-pay of k for a good of quality k. Since each producer has monopoly power, it imposes a price for the good that extracts all consumer surplus. In formal terms, the profit function of advertiser k on platform *i* is $k\alpha_i q_i - P_i$.

We modify the Anderson and Coate (2005)'s framework by considering a parameter α_i that represents the share of viewers reached by an ad on platform *i* that purchases the advertiser's product of quality k. We assume that each advertiser gets the same or a higher benefit from interacting with viewers on platform *2* than on platform *1*, i.e. $\alpha_1 \leq \alpha_2$. A strict disequality can be due to the fact that platform *2*'s target audience fits better the firm's ideal target audience. Alternatively, this can be linked to a more effective strategy of advertising employed by platform *2*, to a better services offered to advertisers, to a reputation effect or to the platform program mix choice. The role of this last dimension has been disregarded by previous theoretical literature on production and distribution of premium contents in media market.

[7] For example, it represents the utility derived from a basic content provided by the platform.

[8] The assumption that viewers dislike advertising is empirically documented by Wilbur (2008) in the US TV market and by Jeziorski (2011) in the radio US market.

Advertisers can join none, one or both platforms. The marginal advertiser on platform *i* is the one which make zero profits, that is $\underline{k_i} = P_i/\alpha_i q_i$. This entails that the demand for advertising on platform *i* is

$$a_i = 1 - F\left(\frac{P_i}{\alpha_i q_i}\right) = 1 - F\left(\frac{r_i}{\alpha_i}\right) \tag{4}$$

Thus, the inverse per-viewer demand is $r_i = \alpha_i F^{-1}(1 - a_i)$.

In the uniform example, $a_i = 1 - r_i/\alpha_i$ and $r_i = \alpha_i(1 - a_i)$.

The upstream operator. The upstream operator produces a premium content and sells it to downstream platforms. Premium contents have more than ordinary influence on platforms' sales and the owner possesses significant bargaining power vis-à-vis platforms.[9]

In the model, the upstream firm may offer this premium content exclusively to platform *i* or non-exclusively to both platforms. It offers these contracts sequentially, in its preferred order and the negotiation stops when a contract is accepted or at the end of these three stages, if no platform accepts an offer. As Armstrong (1999) points out, this is a credible procedure that allows the content provider to obtain the maximum payoff.

The contract specifies the quality γ_i of the offer and a fixed price T_i.[10] The price is such that it extracts all profits deriving from the sale of the premium content on the downstream market. Obviously, the sum that a platform is willing to pay for the content depends also on the outside option of the platforms, as we will better see in the following. A downstream operator accepts the offer if it is convenient to do so.[11] If a platform is indifferent between accepting or refusing the contract, we assume that it accepts it.

The bargaining process that we designed is intended to give all the bargaining power to the upstream firm, and this is credible since we model premium contents. In section 3.9, we will discuss other contracting forms.

We assume that the production of the premium content entails a quadratic fixed cost proportional to the square of the quality provided, i.e. $max\left\{\mu\frac{\gamma_1^2}{2}, \mu\frac{\gamma_2^2}{2}\right\}$. Parameter μ indicates the "cost of quality", in the sense that the impact of quality on cost increases with μ. We normalize marginal costs of production and distribution to zero.

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[9] See Armstrong (1999) and Harbord and Ottaviani (2001).

[10] Armstrong (1999) provides examples for the use of lump-sum fees in contracts between premium content provider and media platforms. In our analysis, we do not consider contract that specify per-subscriber fees, even if in reality they might exist. In so doing, we abstract from the effects of these per-subscriber fees on downstream competition.

[11] We assume that the contract is enforceable. That is, once the contract is signed, we assume that an authority verifies the enforcement of the contract, imposing high sanctions if it is not honoured. It is like assuming that there is a reputation cost from not honouring the contract. This hypothesis is intended to give some dynamics to the static model.

Welfare. There are two components of welfare. The first is the gross surplus with respect to content, that is:

$$W^c = \int_0^{\overline{x}} (V + \gamma_1 - xt)dx + \int_{\overline{x}}^1 (V + \gamma_2 - (1-x)t)dx \quad (5)$$

The second is the gross surplus with respect to advertising, that is:

$$W^a = q_1 \int_{\underline{k}_1}^{\overline{k}} (k\alpha_1 - \delta)\, dF(k) + q_2 \int_{\underline{k}_2}^{\overline{k}} (k\alpha_2 - \delta)\, dF(k) \quad (6)$$

Total welfare is given by the sum of the two components, less the fixed cost of production of the premium content. Consumer surplus is defined as the integral over all purchasing consumers of their utility.

3.2 The basic game

We consider a game in four stages. First, the upstream operator produces the premium content. Second, the upstream firm contracts with platforms for the provision of the content. Third, downstream operators simultaneously compete for advertisers and viewers. Fourth, advertisers and viewers simultaneously make their consumption choices. We solve the game by backward induction.

3.2.1 Fourth and third stage: equilibrium for given quality level

Platforms sell contents to viewers and advertising space to advertisers. In this paragraph, we specify equilibrium demands, prices and profits as a function of quality levels γ_i.

In the fourth stage, viewers and advertisers make their choices, taking as give the quality of the offers, viewers' subscription fees and advertising levels. Viewers decide which platform to join: all viewers to the left of $\overline{x}$ join platform 1 and all viewers to the right join platform 2, where $\overline{x}$ is defined in equation (3). Thus, viewers' implicit demands are $q_1 = \overline{x}$ and $q_2 = (1 - \overline{x})$. The equilibrium at stage 4 is given by the solution of the system of viewers' implicit demands and the inverse demand of advertisers in equation (4).

At stage 3, we maximize platforms' profits with respect to the subscription fee for viewers p_i and the advertising level a_i. The system of the four first order conditions is:

$$\frac{\partial \pi_i}{\partial p_i} = q_i + p_i \frac{\partial q_i}{\partial p_i} + R_i \frac{\partial q_i}{\partial p_i} = 0 \quad i = \{1,2\} \quad (7)$$

$$\frac{\partial \pi_i}{\partial a_i} = p_i \frac{\partial q_i}{\partial a_i} + q_i \frac{\partial R_i}{\partial a_i} + R_i \frac{\partial q_i}{\partial a_i} = 0 \quad i = \{1,2\} \quad (8)$$

By the system of two first order conditions, we find that the subscription fee for viewers on platform *i* is

$$p_i = t + \frac{\gamma_i - \gamma_j}{3} + \frac{\delta(a_j - a_i)}{3} - \frac{2R_i(a_i) + R_j(a_j)}{3} \quad (9)$$

The first term represents the classical Hotelling term. The second one is due to the introduction of a quality differentiation parameter in the Hotelling model: if a platform has a quality advantage $\Delta = \gamma_i - \gamma_j$ over the rival one, it can ask for a higher price to viewers. This term is zero when $\gamma_i = \gamma_j$, as a uniform increase of quality cancels out in the Hotelling model. The third term is due to the disutility from advertising. Since advertising is a nuisance for consumers, a platform lowers its subscription fee as it increases the advertising time. Symmetrically, it can increase its subscription fee as the rival platform increases its advertising time. Airing less advertising than the rival platform has a similar impact on the subscription fee as a quality advantage. High advertising revenues per-viewer make price competition tougher, since each viewer is very valuable on the advertising market.

Solving this system of equations (9) and the two first order conditions (8), one can find that

$$\frac{\partial R_i}{\partial a_i} = \delta \quad (10)$$

By using the fact that $R_i = r_i q_i$ and that $r_i = \alpha_i F^{-1}(1 - a_i)$, equation (10) can be rewritten as

$$F^{-1}(1 - a_i) - a_i \frac{\partial F^{-1}(1 - a_i)}{\partial a_i} = \frac{\delta}{\alpha_i} \quad (11)$$

First, one can notice that the level of advertising chosen by each platform is independent of the decision of the rival platform and of the decisions taken on the viewers' side of the market. This depends on the competitive bottleneck model: each platform has monopoly power on its audience, and it decides the level of advertising so as to maximize the joint surplus of the platform and its consumers (see Armstrong, 2006). Second, when platforms are symmetric, i.e. $\alpha_1 = \alpha_2$, they air the same level of advertising, i.e. $a_1 = a_2$. When $\alpha_1 < \alpha_2$, platforms choose different levels of advertising. Since R_i is concave and $R_i' > 0$, thus the higher α_i the higher a_i. Thus, at equilibrium, we find $a_1 \leq a_2$.

By substitution, we derive viewers' demands:

$$q_i = \frac{1}{2} + \frac{\gamma_i - \gamma_j}{6t} + \frac{\delta(a_j - a_i)}{6t} + \frac{R_i(a_i) - R_j(a_j)}{6t} \quad (12)$$

Platform *i* market share increases with the quality advantage Δ. Since advertising is a nuisance for viewers, the market share of platform *i* increases when it airs less ads than the rival. Moreover, since viewers receive subsidies from the platform depending on the revenue per viewer on the advertising market, the market share of platform *i* increases with $R_i(a_i)$.

We concentrate the analysis in the region where platforms have positive demands from viewers (i.e. positive demands for each firm, $1 > q_i > 0$ for $i \in \{1,2\}$, under the complete market

assumption $q_1 + q_2 = 1$, which is the region where $t > max\left\{\frac{\gamma_2-\gamma_1}{3} + \frac{\delta(a_1-a_2)}{3} + \frac{R_2(a_2)-R_1(a_1)}{3}; \frac{\gamma_1-\gamma_2}{3} + \frac{\delta(a_2-a_1)}{3} + \frac{R_1(a_1)-R_2(a_2)}{3}\right\}$) and advertisers (i.e. $a_i > 0$ for $i \in \{1,2\}$). In this region, second order conditions hold.

Observe that, in the feasible interval, prices for viewers can be negative. Indeed, the platform can find profitable to subsidize the viewers' side of the market, which is the competitive bottleneck, with revenues from the advertising market.

Then, platform *i*'s profit is:

$$\pi_i = \frac{1}{2t}\left(t + \frac{\gamma_i - \gamma_j}{3} + \frac{\delta(a_j - a_i)}{3} + \frac{R_i(a_i) - R_j(a_j)}{3}\right)^2 \quad (13)$$

When platforms are symmetric, platform *i*'s profit depends only on the transportation cost and the quality of the two offers on the market, since $a_j = a_i$.

The first term in the brackets is the classical Hotelling term, while the second one is due to the introduction of a quality differentiation parameter in the Hotelling model. Since both demands and prices of platform i are linearly increasing in γ_i and decreasing in γ_j, with $i \neq j$, thus they are linearly increasing in Δ. Hence, any advantage in quality is magnified into large advantage in income (because profits are function of Δ^2), while an uniform increase in quality of both platforms does not increase profits. We observe that profits are convex in Δ, thus the profit of the highest quality firm increases with the asymmetry more than the profits of the lowest quality firm decreases. This occurs since the competitive pressure is lower when there is vertical differentiation.

When $\alpha_1 < \alpha_2$, by using the fact that $R_i(a_i)$ is a concave function, one can show that the sum of the last two terms in the profit function is positive for platform 2 and negative for 1.

In the uniform case, at equilibrium we find $a_i = (\alpha_i - \delta)/2\alpha_i$. In order to have a positive level of advertising on each platform, one needs $\alpha_i > \delta$, that is, the marginal utility of an advertiser from interacting with a viewer on platform i is higher than the marginal disutility of a viewer from interacting with an advertiser on platform i. If α_i is too low, platforms prefer not to air advertising, since they cannot extract enough rents from advertisers to subsidize viewers for the nuisance they bear. Under this assumption, we find that the advertising space rises with α_i and so does the per-subscriber advertising fee $r_i = (\alpha_i + \delta)/2$. However, a_i decreases in α_i, while r_i increases in it.

The viewers' subscription fee on platform i is $p_i = t + (\gamma_i - \gamma_j)/3 + (4\delta^2/\alpha_i - \delta^2/\alpha_j - 2\alpha_i - \alpha_j)/12$ and its market share is $q_i = \left(\alpha_i\alpha_j\left(12t + \alpha_i - \alpha_j + 4(\gamma_i - \gamma_j)\right) + (\alpha_j - \alpha_i)\delta^2\right)$. This price is decreasing in both α_i and α_j. A platform decreases its price for viewers as it becomes more efficient on the advertising market. The price also decreases as the rival platform becomes more efficient, since competition in price for

viewers becomes tougher. The direct effect is stronger than the indirect one, that is, p_i decreases more rapidly in α_i than in α_j. When $\alpha_1 < \alpha_2$, the price for viewers on platform 1 always increases in δ and so does its market share. On the contrary, the market share of platform 2 decreases in δ, while p_2 can increase or decrease in δ, depending on the relative values of α_1 and α_2. In particular, when $\alpha_1 < \alpha_2/4$, p_2 decreases in δ.

Finally, platform *i*'s profit is $\pi_i = \left(\alpha_i\alpha_j\left(12t + \alpha_i - \alpha_j + 4(\gamma_i - \gamma_j)\right) + (\alpha_j - \alpha_i)\delta^2\right)^2$. We find that π_i increases in α_i and decreases in α_j. For $\alpha_1 < \alpha_2$, π_1 increases in δ , while π_2 decreases in it.

3.2.2 First and second stage: producing and contracting for the premium content

First, we introduce some notation. In the following, we use Π to denote first and second stage firms' profits (while π denotes third stage profits). Superscript *ei* denotes the exclusive provision of the premium content to platform *i*, *ne* denotes the non-exclusive provision of the content, while *0* denotes the case where no platform airs the premium content. Moreover, we use *(VIi)* to denote the scenario of vertical integration of platform *i* and *(VS)* to denote the scenario of vertical separation.

First, the upstream firm decides whether to produce or not a premium content of a given quality $\overline{\gamma}$, then it contracts with downstream platforms for the provision of the content. Since the production cost of $\overline{\gamma}$ does not play any role when we compare exclusive and non-exclusive contracts we normalize it to zero.[12]

Vertical separation. First, assume that the content provider is an independent firm, and that it contracts with two symmetric platforms (i.e. $\alpha_1 = \alpha_2$) for the provision of the premium content.

Recalling the negotiation described before, the content provider offers in turn an exclusive contract to platform *i* or a non-exclusive contract to both. At each stage of the negotiation the content provider specifies a tariff for the content. It fixes the tariff so as to fill the individual rationality constraint of the platform to which it offers the contract. The maximum tariff that the upstream firm can fix for a given contract depends on the profits that the platform can have from the provision of the quality content under the form of representation under negotiation and on the outside option of the platform. Note that the outside option of the platform depends on the order in which the offers are done.

Under exclusive provision, the upstream firm can have the highest tariff for the exclusive to platform *i* only if it can threaten the platform to give the content to the rival platform *j* in case it rejects the offer. In so doing the content provider leaves the platform with the minimum profits under its outside option. The upstream content provider cannot use this threat if it offers the

[12] We introduce the fixed cost of production in the next section, when we study the choice over the quality level.

exclusive at the last stage of the bargaining, since the bargaining stops. The maximum tariff that the upstream provider can have from the exclusivity to platform *i* is $T_i^e = \pi_i^{ei} - \pi_i^{ej}$.

Under non-exclusive provision, the maximum tariff that the upstream firm can fix is $T_i^{ne} = \pi_i^{ne} - \pi_i^{ej}$, since platform *i* knows that, if it rejects the offer, the rival platform *j* has the exclusive content. The non-exclusive provision of the quality content allows the content provider to create a prisoner's dilemma on the downstream market: both platforms would prefer not to accept the contract, but they cannot coordinate on that choice. Note that in the event platform *i* rejects the contract, platform *j* is always better off by accepting it.

Now consider the incentive constraint of the content provider. Since platforms are symmetric, the profits that the upstream firm can extract from the exclusive content to platform 1 or 2 are the same. Since $T_1^{ne} + T_2^{ne} < T_1^e = T_2^e$, then the upstream operator prefers to provide the content exclusively to platform *i* rather than the non-exclusive content to both platforms. By substituting the expressions of the fixed tariffs, we can rewrite $\pi_1^{ne} - \pi_1^{e2} + \pi_2^{ne} - \pi_2^{e1} < \pi_1^{e1} - \pi_1^{e2} = \pi_2^{e2} - \pi_2^{e1}$. By rearranging the terms and keeping in mind that platforms are symmetric, we find that the previous inequality is verified if and only if $\pi_i^{ei} - \pi_i^{ne} > \pi_j^{ne} - \pi_j^{ei}$ with $i \neq j$, that follows from the convexity of downstream profit functions in Δ. Indeed, the profit of platform 2 increases with the quality more than the profits of platform 1 decreases with respect to the profit without quality.[13]

Thus, the content provider wants platform *i* to accept an exclusive contract. One way to reach this outcome is the following. First, it offers the premium content under a non-exclusive contract for an infinite price to both platforms. No platform accepts.[14] Second, it offers the quality content to platform *i* for a price $T_i^e = \pi_i^{ei} - \pi_i^{ej}$. Platform *i* knows that, if it rejects the contract, the upstream firm will offer the quality content to platform *j* for a tariff that makes it indifferent between having the quality content or not, that is for a tariff $T_j^e = \pi_j^{ej} - \pi_j^0$, thus platform *j* would always accept this offer. Thus, platform *i* accepts the offer of the upstream firm.

When platforms are asymmetric, i.e. $\alpha_1 < \alpha_2$, the upstream firm is no longer indifferent between offering the content exclusively to platform 1 or 2. In this case, since $\pi_1^{e1} - \pi_1^{e2} < \pi_2^{e2} - \pi_2^{e1}$, then the content provider prefers to grant the exclusive to platform 2 rather than to platform 1. This is because the gains from the exclusivity are higher for the most efficient platform on the advertising

[13] This result generalized to a framework with symmetric firm (i.e. $\frac{\partial \Pi_1^{ne}}{\partial \overline{\gamma}} = \frac{\partial \Pi_2^{ne}}{\partial \overline{\gamma}}$) where $\frac{\partial \Pi_2^{e1}}{\partial \overline{\gamma}} = \frac{\partial \Pi_1^{e2}}{\partial \overline{\gamma}} < 0$, $\frac{\partial \Pi_1^{e1}}{\partial \overline{\gamma}} = \frac{\partial \Pi_2^{e2}}{\partial \overline{\gamma}} > 0$ and $\left|\frac{\partial \Pi_1^{e2}}{\partial \overline{\gamma}}\right| < \left|\frac{\partial \Pi_2^{e2}}{\partial \overline{\gamma}}\right|$. This last feature is common to models of product differentiation with linear demands, as Bester and Petrakis (1993) point out.

[14] The offer of the non-exclusive content for an infinite price is one possible strategy that the upstream firm can use to induce platform *i* (1) to refuse the non-exclusive offer and (2) to accept the exclusive contract having as an outside option the exclusivity to the rival platform.

market than for the rival. Note that the upstream firm asks to platform 2 a higher price for the exclusive content compared to the one asked to platform 1. The same is true for the maximum tariff that can be asked by the content provider for a non-exclusive content, i.e. $T_1^{ne} = \pi_1^{ne} - \pi_1^{e2} < T_2^{ne} = \pi_2^{ne} - \pi_2^{e1}$. This entails that the content provider is able to price discriminate among the two platforms. Since we still find that $\pi_2^{e2} - \pi_2^{ne} > \pi_1^{ne} - \pi_1^{e2}$, then the upstream firm can induce platform 2 to accept the exclusive contract and it can extract the highest tariff using, in the negotiation, the same strategy described before.

Thus, the payoffs at stage 2 of the independent content provider, of platform 1 and of platform 2 respectively are: $\Pi_U^{e2} = \frac{2\overline{\gamma}}{3t}\left(t + \frac{\delta(a_1 - a_2)}{3} + \frac{R_2(a_2) - R_1(a_1)}{3}\right)$, $\Pi_1^{e2} = \pi_1^{e2}$ and $\Pi_2^{e2} = \pi_2^{e1}$.

Going backward to stage 1, we can easily state that the quality content of level is always produced, since the upstream firm has positive profit from the sale of the quality content.

Vertical integration. Assume now that the upstream operator is vertically integrated with platform *i*, and that $\alpha_1 = \alpha_2$. A vertically integrated content provider can fix the same maximum tariffs for the exclusive or non-exclusive content as an independent one. However, we have to take into account two differences. First, we assume that the transfer price for the content to the subsidiary platform is zero. Second, a content provider integrated with platform *i* can ask to the rival platform *j* the tariff $T_j^e = \pi_j^{ej} - \pi_j^{ei}$ also at the last stage of the bargaining. Indeed, the threat of using the content if the rival rejects the offer is always credible.

By considering the incentive constraints of the vertically integrated content provider and proceeding as for the scenario of vertical separation, we can conclude that the premium content is always provided exclusively to platform *i*. Indeed, since platforms are symmetric, the integrated platform *i* is indifferent between providing the exclusivity to either platform. Indeed, $\Pi_i^{ei} = \pi_i^{ei}$ and $\Pi_i^{ej} = \pi_i^{ej} + T_j^e = \pi_i^{ej} + \pi_j^{ej} - \pi_j^{ei} = \pi_j^{ej}$, since $\pi_i^{ej} = \pi_j^{ei}$ and $\pi_i^{ei} = \pi_j^{ej}$. We still find that platform *i* prefers to provide the content exclusively rather than to offer non-exclusive contracts to both platforms. Indeed, we can show that $\Pi_i^{ej} = \Pi_i^{ei} > \Pi_i^{ne}$, where $\Pi_i^{ne} = 2\left(\pi_i^{ne} - \pi_i^{ej}\right)$. Still, the result follows from the convexity of platforms' profits in Δ.

When platform *i* is vertically integrated with the content provider, it can induce platform *j* to accept the exclusive contract offering it at the third stage of the bargaining, while making non convenient offers before.

When platforms are asymmetric, i.e. when $\alpha_1 < \alpha_2$, the content provider integrated with platform *i* always give the quality content exclusively to platform 2. Indeed, the vertically integrated platform 1 prefers to provide the exclusive content to platform 2 rather than to the integrated downstream platform, since the losses on the downstream market from not airing the content are

overcome by the gains on the upstream market from selling the content to the most efficient platform on the advertising market. For platform 2, it is always more profitable to keep the exclusive content, since it can better profit from it on the downstream market.

If platform 1 is vertically integrated, its stage 2 payoff is $\Pi_1^{e2} = \frac{1}{2t}\left(t^2 + \frac{\overline{\gamma}^2}{9} + \left(\frac{\delta(a_1-a_2)}{3} + \frac{R_2(a_2)-R_1(a_1)}{3}\right)^2 + \frac{2}{3}t\overline{\gamma} + \left(\frac{6}{3}\overline{\gamma} - 2t\right)\left(\frac{\delta(a_1-a_2)}{3} + \frac{R_2(a_2)-R_1(a_1)}{3}\right)\right)$. If platform 2 is vertically integrated, the profit at stage 2 of the vertically integrated platform 2 is $\Pi_2^{e2} = \pi_2^{e2}$.

Again, at stage 1, the quality content is produced when upstream profits are positive.

We can sum up the results of this section in the following Proposition.[15]

Proposition 1. A content provider always provides the premium content exclusively to one downstream platform. When platform are asymmetric, the most efficient platform on the advertising market gets the exclusive. Results are not affected by the vertical structure of the industry.

Thus, for a given $\overline{\gamma}$, the vertical integrated platform *i* for $i \in \{1,2\}$ and the independent content provider take the same decision concerning the exclusivity over the content. Note that, by conveniently rewriting the incentive constraint of the upstream firm, it can be shown that the content provider chooses the scenario where total industry profits are maximized. In the vertical separation scenario, we find that $\Pi_U^{ne} < \Pi_U^{e2} \Leftrightarrow \pi_1^{ne} - \pi_1^{e2} + \pi_2^{ne} - \pi_2^{e1} < \pi_2^{e2} - \pi_2^{e1} \Leftrightarrow \pi_1^{ne} + \pi_2^{ne} < \pi_2^{e2} + \pi_2^{e2}$ and $\Pi_U^{e1} < \Pi_U^{e2} \Leftrightarrow \pi_1^{e1} - \pi_1^{e2} < \pi_2^{e2} - \pi_2^{e1} \Leftrightarrow \pi_1^{e1} + \pi_2^{e1} < \pi_2^{e2} + \pi_2^{e2}$. As regards the vertically integrated platform 1, we find that $\Pi_1^{ne} < \Pi_1^{e2} \Leftrightarrow \pi_1^{ne} + \pi_2^{ne} - \pi_2^{e1} < \pi_1^{e2} + \pi_2^{e2} - \pi_2^{e1} \Leftrightarrow \pi_1^{ne} + \pi_2^{ne} < \pi_2^{e2} + \pi_2^{e2}$ and $\Pi_1^{e1} < \Pi_1^{e2} \Leftrightarrow \pi_1^{e1} < \pi_1^{e2} + \pi_2^{e2} - \pi_2^{e1} \Leftrightarrow \pi_1^{e1} + \pi_2^{e1} < \pi_2^{e2} + \pi_2^{e2}$. Finally, as regards platform 2, one can write that $\Pi_2^{ne} < \Pi_2^{e2} \Leftrightarrow \pi_1^{ne} - \pi_1^{e2} + \pi_2^{ne} < \pi_2^{e2} \Leftrightarrow \pi_1^{ne} + \pi_2^{ne} < \pi_2^{e2} + \pi_2^{e2}$ and $\Pi_2^{e1} < \Pi_2^{e2} \Leftrightarrow \pi_1^{e1} - \pi_1^{e2} + \pi_2^{e1} < \pi_2^{e2} \Leftrightarrow \pi_1^{e1} + \pi_2^{e1} < \pi_2^{e2} + \pi_2^{e2}$.

In our setting, this contract is the one that Segal (1999) calls the "efficient contract", in the sense that the form of representation that arises in equilibrium maximizes industry profits (subject to stage 3 price competition).

3.3 Market provision of quality

In this section, we endogenize the choice of $\overline{\gamma}$ at stage one. In order to solve the game we proceed backwards. The analysis at stage 3 and 4 parallels the one in section 3.2. For the analysis at stage 2, we can use the results of the previous section. Indeed, in the previous section we have shown that, given a content of quality $\overline{\gamma}$ produced at stage 1, the profit of the content provider are the highest

[15] For all proofs, see the appendix in section 5.

when it signs an exclusive contract with one platform (respectively, platform 2), when platforms are symmetric (respectively, $\alpha_1 < \alpha_2$).[16] This entails that the same rank of profits holds whatever level of quality the content provider produces at stage 1. In particular, let $\overline{\gamma}^{ne}$ be the value of $\overline{\gamma}$ that maximizes the profits under non-exclusive provision. The profits under exclusive provision evaluated for $\overline{\gamma} = \overline{\gamma}^{ne}$ are higher than the ones under non-exclusive provision evaluated for the same value of $\overline{\gamma}$. Then, the best thing that the content provider can do at stage 1 is to provide the quality that maximizes its profit under exclusive provision to one platform, when $\alpha_1 = \alpha_2$ (respectively to platform 2, when $\alpha_1 < \alpha_2$).[17]

At stage 1, the content provider's choice of investment is determined by the point where the marginal benefit and the marginal cost with respect to $\overline{\gamma}$ are equal.[18] The marginal cost is $\mu\,\overline{\gamma}$ under all different industry structures. As concerns the marginal benefit, even if the content provider chooses the same form of representation no matter what the vertical structure of the industry is, the vertical structure of the industry affects the payoff of the content provider, thus its incentives to invest at stage 1.

When platforms are symmetric, i.e. $\alpha_1 = \alpha_2$, by comparing the marginal benefits from quality for the content provider under different vertical structures, we verify that:

$$\frac{\partial \Pi_U^{ei}}{\partial \overline{\gamma}} > \frac{\partial \Pi_i^{ei}}{\partial \overline{\gamma}} = \frac{\partial \Pi_i^{ej}}{\partial \overline{\gamma}} \tag{14}$$

that is, an independent content provider has higher incentives to invest in quality than a vertically integrated one. Indeed, the payoff of an independent content provider is $\Pi_U^{ei}(VS) = \pi_i^{ei} - \pi_i^{ej}$ and the one of a vertically integrated one is $\Pi_i^{ei}(VIi) = \Pi_i^{ej}(VIi) = \pi_i^{ei}$. Since π_i^{ei} is increasing in $\overline{\gamma}$, while π_i^{ej} is decreasing, the result easily follows. Thus, results are very robust, since we just need the profit of the platform that airs the quality content to increase in quality, and the one of the platform that does not air the content to decrease in it.

When platforms are asymmetric, i.e. $\alpha_1 < \alpha_2$, the independent content provider still has higher incentives to invest in quality than an integrated one. Moreover, we find that the most efficient platform on the advertising market has the lowest incentives, that is

$$\frac{\partial \Pi_U^{e2}}{\partial \overline{\gamma}} > \frac{\partial \Pi_1^{e2}}{\partial \overline{\gamma}} > \frac{\partial \Pi_2^{e2}}{\partial \overline{\gamma}} \tag{15}$$

[16] In the previous section we consider just revenues. However, results still hold when we subtract the fixed cost for the production of $\overline{\gamma}$, since the cost cancels down in the comparison of different form of representation.
[17] Notice that, in this section, we allow the upstream firm to provide different qualities under non-exclusive provision to the two platforms.
[18] Second order conditions hold if $9t\mu > 1$.

Indeed, the payoff of the vertically integrated platform 1 is $\Pi_1^{e2}(VI1) = \pi_1^{e2} + \pi_2^{e2} - \pi_2^{e1}$and the payoff of the vertically integrated platform 2 is $\Pi_2^{e2}(VI2) = \pi_2^{e2}$. From equation (13) we can easily show that π_2^{e2} increases in $\overline{\gamma}$, while π_1^{e2} and π_2^{e1} decreases in it. Since π_2^{e1} decreases in quality faster than π_1^{e2}, then the incentives to invest in quality of the integrated platform 1 are higher than the one of the integrated platform 2. The payoff of the independent content provider is $\Pi_U^{e2}(VS) = \pi_2^{e2} - \pi_2^{e1}$, that entails higher incentives to invest than other platforms. Compared to the independent content provider, the integrated platform 1 decreases the quality provided, since it also takes into account the effect of the quality on its downstream profits.

Indeed, when choosing the quality level, the integrated platform 2 only considers its advantage from quality on the downstream market. Instead, an independent content provider and the integrated platform 1 extract the rent deriving from the sale of the premium content by platform *2* on the downstream market, under the threat of giving the content to the platform 1 if platform 2 does not accept. Since platform 1 takes into account also the negative effect on its downstream profit of selling the premium content to the rival platform, thus it provides less quality than an independent content provider, but still more than the integrated platform 2. Thus, the externalities arising from the provision of the quality content affect the choices of the platforms. Observe that a high efficiency on the advertising market decreases the incentives to invest in quality.

Thus, we can state the following proposition:

Proposition 2. An independent content provider has higher incentives to invest in quality than a vertically integrated one. Under vertical integration, the more the platform that controls the content provider is efficient on the advertisers market, the lower is its incentive to invest.

Thus, we find that $\overline{\gamma}^{e2}(VS) = \frac{3}{3t\mu}\left(t + \frac{\delta(a_1 - a_2)}{3} + \frac{R_2(a_2) - R_1(a_1)}{3}\right)$, $\overline{\gamma}^{e2}(VI1) = \frac{3\left(t + \delta(a_1 - a_2) + R_2(a_2) - R_1(a_1)\right)}{9t\mu - 1}$ and $\overline{\gamma}^{e2}(VI2) = \frac{3t + \delta(a_1 - a_2) + R_2(a_2) - R_1(a_1)}{9t\mu - 1}$. We can observe that:

$$\overline{\gamma}^{e2}(VS) > \overline{\gamma}^{e2}(VI1) > \overline{\gamma}^{e2}(VI2) \tag{16}$$

These qualities are always decreasing in t and μ.

3.4 Extension: Control over Premium Content

In this section, we add a stage zero to the timing in section 3.2 where the upstream content provider makes an offer, when interested, in order to acquire the control over one of the downstream

platforms.[19] We are interested in analysing the structure of the industry that is chosen by firms in this setting. We perform this study for the asymmetric model with endogenous quality.[20]

By backward induction, all players know the decisions taken under different scenarios, hence the equilibrium profits. On the basis of these elements, players decide which scenario they prefer. The upstream content provider can make an offer either to platform 1 or to platform 2, if it prefers to be vertically integrated rather than vertically separated. The chosen platform accepts only if the payment it gets is at least as high as its profit under vertical separation.

First, we find that upstream content provider is always willing to pay the minimum price at which a downstream firm i is willing to give up the control over the platform, that is $\Pi_i^{e2}(VS)$. Indeed, we find that, for $i \in \{1,2\}$,

$$\Pi_i^{e2}(VIi) - \Pi_i^{e2}(VS) > \Pi_U^{e2}(VS) \tag{17}$$

Arranging the terms differently, one can say that the sum of the upstream and downstream profits of an independent content provider and an independent platform i are lower than the profit of the platform i integrated with the content provider. This occurs because the vertical integrated content provider internalizes the effect of the provision of the quality content on the downstream profit.

Second, we compare the benefit that the content provider gets from integrating with platform i once it has paid the price for acquiring the platform. As a first step, we verify that the vertically integrated platform 2 makes higher profit than the vertically integrated platform 1, that is $\Pi_1^{e2}(VI1) < \Pi_2^{e2}(VI2)$. However, the content provider has to pay a higher price to integrate with platform 2 rather than to platform 1, that is $\Pi_1^{e2}(VS) < \Pi_2^{e2}(VS)$. We verify that

$$\Pi_1^{e2}(VI1) - \Pi_1^{e2}(VS) < \Pi_2^{e2}(VI2) - \Pi_2^{e2}(VS) \tag{18}$$

Thus, the content provider prefers to acquire platform 2 rather than platform 1. Proposition 3 follows:

Proposition 3. The content provider prefers the vertical integration structure of the market to the vertical separated one. The content provider prefers to merge with the most efficient platform on the advertising market. The content provider manages to accomplish the acquisition.

Indeed, the vertical integration of the content provider with platform 2 creates more surplus than the one with platform 1, since the content provider, when deciding the quality of the premium content, takes into consideration the effects of quality on the downstream profit of the firm that air

[19] We rule out the case where the upstream operator wants to buy both downstream platforms. Considering the case where the merger produces a monopoly on the downstream market would entail other antitrust concerns that are not the issue of this work.

[20] We choose the asymmetric case and the endogenous quality so as to be able to study, respectively, the role of the efficiency on the advertising market and the role of the quality level in merger decisions.

the content. Profits are indeed created on the downstream market. The higher price for acquiring platform 2 does not outweigh the advantage from the vertical integration with it.

3.5 Welfare analysis

In this paragraph we study the effects on consumer surplus and welfare of the choices over the quality of the premium content made by the content provider under different vertical structures of the industry.

In order to see which scenario consumers prefer, we calculate the consumer surplus when a content of quality $\overline{\gamma}$ is exclusively provided to platform 2. Since we find that the derivative of consumer surplus with respect to $\overline{\gamma}$ is positive, then it is easy to state that consumer surplus is higher under vertical separation than under vertical integration. Moreover, when $\alpha_1 < \alpha_2$, consumer surplus is the lowest when the content provider is integrated with platform 2. This result depends on the fact that under vertical separation a larger portion of viewers enjoy a premium content of higher quality. The higher price that they pay for this content does not overcome the advantage that consumers derive from quality.

Proposition 4. Consumer surplus is higher when the platform is independent than when it is vertically integrated. It is the lowest when the content provider is integrated with the most efficient platform on the advertisers market.

We also find that the same is true for the surplus created on the advertisers market. As concerns total welfare, we do not have clear results. Indeed, results depend on the surplus created on the advertising market, thus on the distribution of advertised products quality. In the uniform example, we can clearly rank total welfare, finding that the welfare under vertical separation is the highest one, while the one under vertical integration of platform 2 is the lowest one. This entails that the higher fixed costs implied by the quality provided under vertical separation does not offset the surplus created on both sides of the market.

3.6 Policy implications

The discussion of the previous section highlights that the incentives to invest under vertical separation are higher than under vertical integration. Moreover, when the content provider is integrated with a firm efficient on the advertising market, it has lower incentives to invest in quality. We have shown that higher investments in quality by the content provider always improve consumer surplus.

This entails that in merger control it is important to evaluate the effects of the vertical integration not only on the incentives to provide exclusive contents but also on the incentives to invest, when the objective of the policy is consumer surplus.

The model anticipates that the market players always provide the content exclusively to one platform, which is the most efficient one on the advertising market when platforms are asymmetric. Thus, it is interesting to investigate the effects of the imposition of non-exclusive provision. First, we find that this intervention entails a drop in quality, under all the market structures we consider. A content provider, either separated or integrated, produces always a higher quality when it provides the exclusive content to platform 2 than when it provides the content to both platforms.

Imposing non-exclusive provision may have adverse effects on consumer surplus and welfare. This can be easily verified using the uniform example. Indeed, under exclusive provision the content provider provide a content of higher quality but only for a part of the market. Moreover, the consumers who enjoy the premium content pay a higher price for it, while the others receive a discount. At the net, the sum of these effects can be positive or negative. In particular, keeping the vertical structure as given, both consumer surplus and welfare are higher under exclusive provision of the premium content if t is high. When transportation costs are low, then platforms are close substitutes for viewers and it can be socially beneficial to have the premium content aired by only one platform.

This discussion entails that the effect of a merger on the incentives to invest should be taken into account, both if the objective of the public policy is consumer surplus and total welfare.

3.7 Contract form

The bargaining process that we designed is intended to give all the bargaining power to the upstream firm and allows us to abstract from inefficiencies at the contracting stage. However, one can think to a different bargaining process that limits the bargaining power of the upstream content provider.

Assume that a content provider is able to make the second offer with some probability. In the extreme case that this probability is zero, then the bargaining process is one-shot. In this case, the upstream firm can propose its preferred contract (either an exclusive or non-exclusive contract) to downstream platforms just once, and the parties know that this is the only chance to reach an agreement.

However, while a vertically integrated content provider can still use the threat to give the content to the subsidiary platform in the event the rival platform rejects the exclusive contract, since the internal transfer price for the content provision is zero and does not entail any bargaining, an independent content provider is not able to use this threat. This entails that an independent content provider is able to impose a lower price for the exclusive content than the one under a three-stage bargaining. Thus, with this new contract, the results concerning exclusive provision under vertical

integration are the same as in the basic model. On the contrary, non-exclusive provision of the quality content can occur under vertical separation change.

These results allow us to say that, under vertical integration, there are more exclusive contracts than under vertical separation. However, welfare can be higher under exclusive provision and vertical integration than under non-exclusive provision and vertical separation.

One can also think to different contracting situations. For example, to the case in which the content provider is able to fix a per-viewer fee for the content. In this case, we find more non-exclusive provision of the quality content, since the content provider finds profitable to provide the content to a large audience.

When the content provider earns the revenues from advertising, and this is the case when the content provider is a channel, we also find that there is more non-exclusive provision of the premium content compared to our basic setting. Indeed, the content provider can increase its revenues from advertising by providing the content to all the market.

4 Conclusions

In the present work, we have investigated exclusivity over premium programs and incentives to invest in quality in the media market.

In reality, it can be observed that many platforms try to acquire direct control over content producers through vertical integration. Often, the platform that realized the acquisition has some advantage on the downstream market. In some cases, this advantage stems from the ability of the platform to offer a valuable service to advertisers.

Hence, it is interesting to investigate how vertical integration, as opposed to vertical separation, can affect exclusive and quality choices of content providers, taking into account also the case when one platform has an advantage on the advertisers' market.

We find that the premium content is always granted on an exclusive basis to one platform. When platforms are asymmetric, the chosen platform is the most efficient one on the advertising market, no matter what the vertical structure of the industry is. Indeed, the content provider chooses the form of representation (exclusive or not) that maximizes industry profits. Thus, it is the horizontal market power on the downstream market that determines the outcome of the bargaining over the exclusivity over the premium content.

However, we find that the vertical structure of the industry plays a role when we study the incentives of the firms to invest in quality. Indeed, an independent content provider has a higher incentive to invest in quality compared to a vertically integrated one. Moreover, the higher the target parameter of the subsidiary platform is the lower the investment in quality.

When we endogenize the vertical structure of the market, we find that vertical integration is always the final outcome. Moreover, the content provider chooses to merge with the most efficient platform on the advertising market.

This entails that a higher efficiency on the advertisers market can be used to attract exclusive quality content. However, once the most efficient platform is vertically integrated with the content provider, it has less incentives to invest in quality than the rival vertically integrated platform and than an independent content provider. Indeed, the most efficient platform on the advertising market can earn high revenues on the advertising market by selling viewers attention to advertisers for a high price.

We find that vertical integration lowers consumer surplus. Moreover, we find the worst results in terms of consumer surplus when the content provider is integrated with the most efficient platform on the advertising market. For this reason, consumers would prefer the least efficient platform to vertically integrate or the upstream firm to remain independent, since they would receive higher quality programming.

Even if the model is static, some dynamic considerations can be drawn. It can be observed a trend toward concentration, in the sense that firms always prefer the scenario of vertical integration and vertical integration induces exclusive provision to the most efficient platform on the advertising market. This exacerbates the differences of platforms on the downstream market.

The effect of vertical integration on exclusivity over valuable program is one of the questions in the agenda of public authorities. We highlight that other aspects should be kept in mind in merger control, like the effects of vertical integration on the incentives to invest in quality.

5 Appendix

Proof of Proposition 1. Assume that $\alpha_1 = \alpha_2$. In a Hotelling model we find that $\pi_1^{ne} + \pi_2^{ne} = \pi_1^0 + \pi_2^0$. Moreover, it can be shown that $\frac{\partial \pi_1^{ne}}{\partial \overline{\gamma}} = \frac{\partial \pi_2^{ne}}{\partial \overline{\gamma}}$, $\frac{\partial \pi_i^{ej}}{\partial \overline{\gamma}} < 0$ and $\frac{\partial \pi_i^{ei}}{\partial \overline{\gamma}} > 0$. Now, assume that firm i airs the premium content exclusively. Then, we can easily show that $\left|\frac{\partial \pi_i^{ej}}{\partial \overline{\gamma}}\right| < \left|\frac{\partial \pi_i^{ei}}{\partial \overline{\gamma}}\right|$. This means that π_i^{ei} increases in $\overline{\gamma}$ more than π_i^{ei} decreases in it. Thus, industry profits are maximal when firm *i* airs the premium content exclusively. Since we showed in the text that the content provider chooses the scenario where total industry profits are maximized, then the content provider always provides the premium content exclusively to downstream platform *i*. When $\alpha_1 < \alpha_2$, it can be easily shown that industry profits are maximized when the premium content is exclusively aired by platform 2, thus the most efficient platform on the advertising market gets the exclusive. Results are not affected by the vertical structure of the industry. ■

Proof of Proposition 2. In the text.■

Proof of proposition 3. In the text.

Proof of proposition 4. Consumer surplus is given by $\mathrm{CS} = \int_0^{\overline{x}} U_1 dx + \int_{\overline{x}}^1 U_2 dx$. Thus, $\frac{\partial CS}{\partial \overline{\gamma}} = q_2 - \frac{\partial p_2}{\partial \overline{\gamma}} > 0$. Since consumer surplus increases with the quality of the premium content, we can conclude that consumer surplus is higher when the platform is independent than when it is vertically integrated. It is the lowest when the content provider is integrated with the most efficient platform on the advertisers market.■

6 References

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