TV Wars: Exclusive Content and Platform Competition in Pay TV*

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Abstract

While technological developments have relaxed transmission bottlenecks in television broadcasting, regulatory attention has shifted to control over content, especially "premium" programming such as popular sports and Hollywood movies. This paper examines incentives for exclusive distribution of premium content in pay TV. Static competition analysis shows that a broadcaster with premium content always chooses to supply its rival, using per-subscriber fees to soften retail competition. Incorporating platform competition, exclusive content gives its holder an initial advantage that is amplified by dynamic

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effects. Under certain conditions, this benefit outweighs the opportunity cost of forgone distribution revenues, and exclusivity becomes the equilibrium choice. The analysis can explain the incidence of exclusivity in pay TV markets in several countries. The dynamic mechanism is illustrated using specific cases, and welfare implications are discussed.

1 Introduction

The digital revolution has transformed television broadcasting. Due to an enormous expansion in effective capacity, with hundreds of channels in place of just a handful, and a proliferation of platforms—cable, satellite and IPTV as well as terrestrial (over-the-air broadcast)—transmission bottlenecks are largely eliminated. The lessening of this source of market power has not removed antitrust concerns from the industry, however. Rather, control over content has replaced access to transmission as the focus of antitrust investigation. In particular, attention has focused on certain "premium" programming—live coverage of popular sports and first-release Hollywood movies—which is highly attractive to viewers, has few substitutes and is difficult to replicate.

In the US, access to channels (networks) has historically been a concern in instances where cable overbuilding resulted in a new entrant competing with a vertically integrated incumbent. More recently, direct broadcast satellite (DBS) entrants have negotiated exclusive televisation contracts with sports leagues,[1] exploiting a 1961 antitrust exemption.[2] The concern with control

[1] For example, concern has been expressed in Congress over satellite broadcaster DirecTV's exclusive rights to "NFL Sunday Ticket", an all-game package of the National Football League.

[2] Under the Sports Broadcasting Act of 1961, sports clubs are permitted to sell televisation rights collectively as a league. The Act was passed following an antitrust judgement against the National Football League's contract with broadcaster CBS. It has also been interpreted to permit "blackout rules" which protect a team from competing games broadcast in its home territory on the day of a home game.

over content represents a shift from the 1992 Cable Act,[3] which emphasised access to cable distribution by unintegrated television networks.

The acquisition and exploitation of premium programming has been the subject of extensive antitrust investigation in the UK, where televisation rights to Football Association Premier League (FAPL) soccer matches have been at the centre of a series of enforcement attempts. In the late 1990s the Office of Fair Trading (OFT) tried unsuccessfully to prohibit collective selling by the FAPL.[4,5] Subsequently, the OFT's 2002 investigation into the wholesale supply of premium channels by satellite broadcaster BSkyB—exclusive purchaser of the rights—effectively restricted the way in which these channels are sold to other broadcasters (notably, cable).[6] Initial measures by the European Commission[7] to promote competition, including sub-licensing and the requirement for multiple packages to be auctioned, failed to change the outcome. Finally, in 2006 the FAPL agreed new auction rules ensuring that at least two bidders would obtain live rights.[8] In the subsequent auction, two out of the six available packages were won by Ireland-based broadcaster Setanta Sports, the other four going to BSkyB. At the time of writing, communications regulator Ofcom has commenced a market investigation of pay TV, including control over content, ownership of transmission platforms, retail subscriber bases and vertical integration.[9]

Exclusivity over valuable programming is an important competitive strategy, especially in intra-platform competition. In the late 1990s Telepiù, then

[3] In full, the Cable Television Consumer Protection and Competition Act of 1992.

[4] At the Restrictive Practices Court, 1999. The OFT also raised objections to exclusivity provisions of the Premier League's contract with BSkyB.

[5] Collective selling is examined by Falconieri, Palomino and Sakovics (2004) and Forrest, Simmons and Szymanski (2004).

[6] See Office of Fair Trading, "BSkyB: The outcome of the OFT's Competition Act investigation", December 2002.

[7] Although first investigated under UK competition law, the selling agreement also falls under Article 81 of the EU Treaty.

[8] Commission Decision IP/06/356, 22 March 2006.

[9] See http://www.ofcom.org.uk/media/news/2007/03/nr_20070320, 20 March 2007.

one of two satellite broadcasters in Italy, signed exclusive, long-term deals with most of the major Hollywood studios and leading football clubs.[10,11] Following complaints from its competitor, Stream, the Italian Senate placed a limit on the ownership of football rights; Stream then signed agreements with four first division clubs. On the satellite platform, each operator broadcast its programming exclusively.[12] However, Telepiù signed an agreement for distribution of its channels to Stream's *cable* customers, with Telepiù retaining subscriber control. When Stream and Telepiù merged in 2003, the European Commission imposed wide-ranging remedies including limits on exclusivity over content (in both contract duration and platform scope), and required resale of premium channels to other pay TV platforms.[13] In Scandinavia, by contrast, competing satellite broadcasters Canal Digital and Viasat have retained content exclusivity over a period of years,[14] with both operators remaining in the market.

The broadcasting industry has the following notable features:

- *Programming cost function.* There is a large, up-front "first copy" cost of recording and editing television content; thereafter, the marginal cost of supplying programming to additional viewers is negligible.

- *Horizontal differentiation.* Broadcasters operating on cable, satellite, terrestrial and IPTV platforms are horizontally differentiated along sev-

[10] In Italy, unlike the US and UK, football clubs sell televisation rights individually, with matches being sold by the home team.

[11] Details are from Institut de l'Audiovisuel et des Télécommunications (IDATE), "*Development of Digital TV in Europe, 2000 Report, Italy*", December 2000, available at http://ec.europa.eu/archives/ISPO/infosoc/telecompolicy/en/dtv_it2000v4.pdf.

[12] At first the broadcasters used incompatible encryption systems. In 2000 the Italian Communications Authority forced them to enter into a simulcrypt agreement, providing interoperability between their respective conditional access systems, so that viewers wishing to watch both sets of matches could do so with a single set-top box.

[13] See European Commission, Case no. Comp/M.2876, NewsCorp/Telepiù, 2 April 2003. This was a distress merger, resulting in the formation of Sky Italia.

[14] This was permitted by the European Commission in its Article 81 Decision, Case no. Comp/C.2-38.287, Telenor / Canal+ / Canal Digital, 29 December 2003.

eral dimensions: geographic availability,[15] transmission capabilities,[16] programming,[17] and bundled services.[18] Note that for some characteristics there is differentiation only between platforms (e.g. availability), while operators within the same platform may be differentiated in other dimensions (e.g. programming).

- *Platform competition.* Broadcasting competition has important dynamic aspects, stemming from the characteristics of transmission platforms. Viewers typically adopt a single receiving system and face switching costs between platforms (e.g. equipment and installation), thus winning a subscriber has a future as well as current value. Economies of scale in transmission[19] entail a tendency towards monopolisation at the platform level. There are some market-mediated network effects: equipment costs tend to fall as the number of consumers increases. As a result building market share may be critical for platform operators, especially at times of rapid adoption. Premium programming, especially coverage of popular sports, plays an important role in this process.[20]

[15] Cable networks pass close to 90% of households in the US, but only some 50% in the UK, and fewer still in some other European countries. Satellite reception requires line-of-sight, and some households are unable or unwilling to install a receiving dish. Terrestrial transmission relies on local broadcasting antennas and reception is poor over some terrains. Broadband penetration is growing rapidly in many countries, but in some locations download speeds are limited by infrastructure constraints and may be inadequate for video services.

[16] Cable and broadband have a return path, facilitating interactivity. In Europe, satellite has tended to lead the way in offering greater channel numbers and improved picture quality (e.g. high definition).

[17] In addition to premium channels, broadcasters show a range of "basic" channels, such as general entertainment, news, documentaries, dramas, etc. These are horizontally differentiated, but of lower value to viewers and more readily substitutable with alternative programming.

[18] E.g. cable's "triple play" of television, telephone and broadband.

[19] Distribution systems require substantial, sunk investment in network infrastructure, viz.: cable and broadband access to the home; terrestrial broadcasting sites and antennas; satellite and terrestrial encryption systems (conditional access technologies and set-top boxes).

[20] Rupert Murdoch is reported to have told the 1996 annual meeting of News Corporation

These features create a tension for a broadcaster with control over premium content. Given the low marginal cost of supply, there is significant profit to be made from supplying attractive content to viewers on rival platforms; while at the same time, retaining exclusivity provides an important draw for subscribers to its own platform. This trade-off is at the heart of the the paper. First, in a static competition setting, we examine the decision of an integrated broadcaster to supply its content to a rival (i.e., to engage in wholesale as well as retail supply). Next, dynamic competition is incorporated in order to assess the trade-off between static and dynamic incentives.

The purpose of this paper is twofold. First, as a positive analysis of incentives to supply content to other broadcasters, it can explain the observed incidence of exclusive content and content supply between broadcasters in a number of national pay TV markets. Second, as a normative analysis, it provides guidance to regulators on the competition effects of content exclusivity and supply, assessing consumer and welfare effects for specific cases.

Exclusivity in pay TV is the subject of four papers related to this one. Armstrong (1999) analyses two issues. First, he discusses the possibility of vertically-integrated broadcasters entering into collusive agreements to exchange programming. Secondly, he analyses incentives for exclusive supply of premium content in pay TV, under lump-sum and per-subscriber fees. Harbord and Ottaviani (2001) analyse contractual arrangements and competition in pay TV, with particular reference to the UK industry. Stennek (2006) assesses the implications of exclusive distribution for investment in programme quality, in a model with lump-sum fees. Hagiu and Lee (2007) examine links between exclusivity and control over retail pricing.

More widely, there is an extensive literature on licensing of a cost-reducing innovation (an analogous situation to this one of supplying a quality-raising input): *inter alia*, Kamien and Tauman (1986), Katz and Shapiro (1986),

(parent company of BSkyB) that sport was the "battering ram" of pay-TV.

Jehiel, Moldovanu and Stacchetti (1996), Jehiel and Moldovanu (2000) and Segal (1999). Dynamic leveraging mechanisms—in this case tying—are modelled by Carlton and Waldman (2002) and Choi and Stefanadis (2001). Models of dynamic competition with switching costs and network effects, of which there are many, are comprehensively surveyed by Farrell and Klemperer (2007).

The paper is structured as follows. Section 2 examines incentives for a broadcaster with premium content to supply its downstream rival. Section 3 incorporates dynamic competition, adding a future benefit related to current market share, and analyses the broadcaster's incentives for exclusivity in this context. Section 4 develops a number of examples, illustrating in specific cases how the dynamic effect may arise and drawing welfare implications. Section 5 concludes.

2 Content supply in pay TV

This section investigates incentives for a broadcaster with premium content to contract with a downstream competitor.[21] The vertical structure of the television industry can be described as follows; in practice an operator may undertake a combination of these activities.

- Programme production, e.g. sports coverage, news reporting, making TV dramas, documentaries, etc.;[22]
- Channel packaging: combining programmes into channels, packages and pay-per-view offerings; and

[21] It should be noted that vertical integration is not essential here: given sufficient instruments an unintegrated supplier can extract the industry surplus and makes the equivalent choices (i.e. whether to supply one or both downstream broadcasters).

[22] One could also distinguish upstream inputs into production, e.g. televisation rights, actors, cameramen and other personnel.

- Transmission: via satellite, cable, terrestrial (over-the-air broadcast) and/or IPTV platforms.
- Retailing and revenue generation: pay TV requires an encryption system and subscriber management services.[23]

In the model which follows, content may be thought of as a television channel (network) containing highly attractive programming, such as live coverage of popular sports. This "premium" content has no substitutes: equally attractive content cannot be created or acquired by the rival broadcaster. The channel is assumed to be produced by the broadcaster itself, perhaps using bought-in televisation rights or externally-produced programming. As the channel packager, this operator may sell advertising airtime and receives any resulting revenue. If the channel is supplied to its rival, the broadcaster receives wholesale distribution fees in addition to its own retail revenues, and advertising revenues are derived from the combined audience.

2.1 The model

Retail competition in the pay TV industry is modelled as follows. There are two broadcasters, $i = A, B$, which supply television channels (and perhaps also other services) to a population of consumers (viewers). Consumers regard products supplied by the broadcasters as horizontally differentiated. Following Hotelling (1929), consumers are uniformly distributed on the unit interval; broadcasters' locations are fixed with one located at each end of the line. Consumer utility (net of subscription charges) of consuming the product supplied by firm i is u_i. The consumer located at $x \in [0, 1]$ obtains net utility of $u_A - tx$ if she buys from A and $u_B - t(1 - x)$ if she buys from B, with transport cost $t > 0$. The marginal cost of supplying a consumer is

[23] Revenue may also be obtained by selling airtime to advertisers. The advertiser side of the market is not modelled explicitly here.

taken to be zero.[24]

The Hotelling framework is commonly used to model broadcasting competition: see, *inter alia*, Gabszewicz et al. (2001, 2002, 2004), Gal-Or and Dukes (2003), Dukes and Gal-Or (2003), Anderson and Coate (2005) and Peitz and Valletti (2008). In the context of wholesale supply, it has the implication that per-subscriber fees are effective in softening retail competition and raising equilibrium prices, creating favourable conditions for supply.[25]

The market share of firm i is given by the Hotelling formula,

$$s_i = \frac{1}{2} + \frac{u_i - u_j}{2t}. \tag{1}$$

It can be shown that total consumer surplus is given by

$$CS = \frac{1}{2}(u_A + u_B) - \frac{1}{4}t + \frac{1}{4t}(u_A - u_B)^2. \tag{2}$$

Utility u_i is given by

$$u_i = v_i - p_i \tag{3}$$

where v_i represents the quality of broadcaster i's output (taking account of disutility from any advertising that is carried) and p_i is the subscription charge levied by i.

Quality v_i has two components: basic channels, which (collectively) provide v_0, and—if the broadcaster has access to this—premium content v. We assume that the broadcasters are symmetric *ex ante*, in that v_0 is identical for each. It is also assumed that v_0 is sufficiently large for the market always to be covered. Thus the broadcasters' relative quality depends upon whether or not A supplies the premium channel to B.

If contracting takes place, A supplies its premium content to B using a

[24] Little in the analysis is altered if there is a distribution cost per viewer. It is assumed that any fixed costs are sufficiently small that broadcasters continue to operate.

[25] See Harbord and Ottaviani (2001) section 3.3.1 for a discussion of the strategic effects of reselling for per-subscriber fees in alternative oligopoly models.

two-part payment of the form[26]

$$cs_B + F \tag{4}$$

where c is the per-subscriber fee and F is the lump-sum payment. Advertising revenue of r per viewer accrues to A (as channel supplier).

Timing of the game is as follows. In the first stage A chooses whether or not to provide its premium content to B; if it decides to supply it makes a take-it-or-leave-it offer.[27] In the second stage broadcasters compete for consumers, simultaneously choosing prices. Solving backwards, the analysis below proceeds as follows. First, we derive equilibrium outcomes in the retail market for exclusivity and non-exclusivity in turn. Then the initial contracting stage is solved, assessing whether A has incentive to refuse to supply its premium content to B.

Exclusivity. If A retains exclusivity over its content, firms' profit functions are given by

$$\pi_A = \frac{1}{2t}\left(t + v - p_A + p_B\right)\left(p_A + r\right); \tag{5}$$

$$\pi_B = \frac{1}{2t}\left(t - v + p_A - p_B\right)p_B. \tag{6}$$

One can calculate that equilibrium prices are[28]

$$p_A^{excl} = t + \frac{1}{3}\left(v - 2r\right);$$

$$p_B^{excl} = t - \frac{1}{3}\left(v + r\right),$$

[26] Harbord and Ottaviani (2001) examine reselling with pure per-subscriber fees. Our findings are qualitatively unchanged for $F = 0$.

[27] Other bargaining processes (Nash, Rubinstein) may be used: although division of the surplus from trade may be altered, the decision to supply is not.

[28] Throughout the analysis we ignore non-negativity constraints on prices. One could assume that parameter values are such that prices are positive. Alternatively, negative implicit prices might be achieved through bundling the content with other products (e.g. telecoms services) at a discounted price.

giving equilibrium profits

$$\pi_A^{excl} = \frac{1}{18t}(3t+v+r)^2; \quad (7)$$

$$\pi_B^{excl} = \frac{1}{18t}(3t-v-r)^2. \quad (8)$$

A's market share is given by

$$s_A^{excl} = \frac{1}{2} + \frac{1}{6t}(v+r).$$

For the market to be competitive the following condition is required, and is assumed henceforth

$$3t \geq v + r. \quad (9)$$

Non-exclusivity. If A supplies content v to B, charging per-subscriber fee c, firms' profit functions are given by

$$\pi_A = \frac{1}{2t}(t - p_A + p_B)p_A + \frac{1}{2t}(t + p_A - p_B)c + r;$$

$$\pi_B = \frac{1}{2t}(t + p_A - p_B)(p_B - c).$$

One can calculate that equilibrium prices are symmetric at $p^{ne} = t+c$; market shares are $\frac{1}{2}$ each. Profits of the two firms (ignoring the fixed fee) are given by

$$\pi_A^{ne} = \frac{1}{2}t + c + r;$$

$$\pi_B^{ne} = \frac{1}{2}t.$$

Note that the per-subscriber fee is passed on in full to consumers, and that B's profit is independent of c.

Contracting. Assuming that A supplies its content, it extracts a fixed fee

F equal to the difference between π_B^{ne} and π_B^{excl}; i.e.,

$$F = \frac{1}{18t}(6t - v - r)(v + r) > 0.$$

A's total profit is strictly increasing in the per-subscriber fee c. Thus, A would like to raise c as high as possible. It is a dominant strategy for B to accept a contract with a per-subscriber fee no greater than v, but to reject anything higher than this.[29] Thus, A offers and B accepts a contract with per-subscriber fee equal to v. The equilibrium price is then

$$p^{ne} = t + v.$$

A's total profit (including F) is given by

$$\pi_A^{non} = \frac{1}{2}t + \frac{1}{18t}(v + r)(24t - v - r). \tag{10}$$

2.2 Equilibrium outcome

Proposition 1 ***(Static equilibrium).***

In the static model with per-subscriber fees, the broadcaster with premium content always chooses to supply its downstream rival.

Proof. Define G_0 as A's gain from exclusivity as compared with non-exclusivity, i.e. $G_0 \equiv \pi_A^{excl} - \pi_A^{non}$. From (7) and (10), one can derive that

$$G_0 = -\frac{1}{9t}(9t - v - r)(v + r) < 0. \tag{11}$$

[29] If $c > v$, B would make higher profit by refusing to purchase the content and instead cutting its price by v. It is assumed that the seller cannot contractually require carriage and specify retail prices (resale price maintenance is illegal in most antitrust jurisdictions). Otherwise, such a contract could be used to raise retail prices further, extracting part or all of v_0 from consumers, and B compensated by means of a negative F, an outcome tantamount to collusion.

Thus, exclusivity is always less profitable than non-exclusivity for the integrated firm.[30] ■

Exclusivity imposes two opportunity costs on A: forgone wholesale fees from B, and lower advertising revenues due to reduced reach. The analysis shows that these costs exceed A's benefit (in terms of greater retail market share and a higher retail price) from retaining exclusive content. The result holds even in the absence of advertising revenues (i.e. $r = 0$); with advertising, it is even stronger. Thus, in the static competition model it is never rational for the integrated firm to refuse to supply premium content to its rival.[31]

Proposition 2 ***(Comparative statics).***

It can be shown that G_0 is

(a) decreasing in t;

(b) decreasing in v; and

(c) decreasing in r.

Proofs are straightforward and are omitted. Intuitively, the comparative static results can be explained as follows

- greater horizontal differentiation (higher t) entails that A finds it more difficult to win subscribers from its rival, reducing its ability to substitute direct retail sales for forgone wholesale business;

- for more valuable content there is a larger opportunity cost of wholesale fees (equal to v per viewer); and

[30] We can also consider the case where contracting involves a pure per-subscriber fee. Imposing $F = 0$, the gain becomes $G_0 = -\frac{1}{18t}(12t - v - r)(v + r) < 0$. So: in the absence of a fixed fee, A gains lower wholesale revenues from B but exclusivity remains less profitable than non-exclusivity.

[31] Similarly, an unintegrated seller would choose to supply both firms, assuming that it can overcome commitment issues relating to per-subscriber fees (e.g. by committing to a common rate).

- with higher advertising revenue per viewer (higher r), the opportunity cost of forgone viewering is greater.

Welfare (defined as the sum of consumer and producer surplus) under non-exclusivity and exclusivity respectively is given by

$$\begin{aligned} W_0^{non} &= v_0 + v + r - \frac{1}{4}t; \\ W_0^{excl} &= v_0 + \frac{1}{2}(v+r) + \frac{5}{36t}(v+r)^2 - \frac{1}{4}t. \end{aligned}$$

Thus, welfare is higher under non-exclusivity by an amount

$$\Delta W_0 = \frac{1}{36t}(v+r)(18t - 5(v+r)) > 0.$$

All consumers view the premium content regardless of provider, but per-subscriber fees ensure that their surplus is fully extracted by the channel provider. Moreover, consumers forfeit the benefit of stiffer price competition that arises under exclusivity; overall consumer surplus is lower under non-exclusivity with $\Delta CS_0 = -\frac{1}{36t}(v+r)(18t+v+r)$.[32]

2.3 Discussion

A per-subscriber fee, levied either on its own or via a two-part tariff, has two effects. For the rival broadcaster, the per-subscriber fee represents a marginal cost of supplying an additional consumer. For the seller, it creates an opportunity cost of winning subscribers from its rival. The result is a softening of retail price competition which allows the seller to extract the full value of its content. This happens despite—in fact, because of—supplying its rival: if A were to refuse supply, some consumers located closest to B would no longer view premium content and their potential surplus would be

[32] Allowing for asymmetric firms, Harbord and Ottaviani (2001) find non-exclusivity to be welfare-improving provided that differences in initial programming v_0 are not too large.

forfeited. With a per-subscriber fee, the efficient allocation—all consumers receive the premium content—is also the profit-maximising choice, and hence is implemented by the seller. The finding is in accordance with the wider literature on contracting in the presence of externalities (of which this is an instance): provided sufficient instruments are available, a seller always chooses the efficient allocation.[33,34]

There might be grounds for regulation to reduce the price charged to viewers, perhaps by lowering the per-subscriber fee—as long as this does not undermine the seller's willingness to supply. With the per-subscriber fee set at their maximum willingness to pay, consumers gain no net benefit from viewing the content. It is for this reason that consumers are worse off under non-exclusivity, compared with exclusive distribution where price competition is keener (although non-exclusive distribution remains the welfare optimum). However, as well as affecting its willingness to supply, a reduction in the seller's revenues may weaken incentives for content production.[35]

It may be noted that v and r appear together in the above profit expressions. Advertising revenue r is equivalent to a reduction in the seller's (net) marginal cost. As noted in the introduction, there are strong similarities between a quality-raising input and a cost-reducing technology. It is therefore unsurprising that the two terms appear identically in this analysis. In the remainder of the paper we drop the (somewhat redundant) term r.

So far we have considered only static competition: market structure is fixed and there are no dynamic effects. In the next section we extent the analysis to incorporate a dynamic aspect to competition, and examine its

[33] See, *inter alia*, Segal (1999). In Stennek (2006) the assumption of lump-sum payments (per-subscriber fees are not permitted) biases the analysis towards exclusivity; it is unclear whether his results would extend to more general contractual forms.

[34] Note that although seller is modelled here as an integrated firm, the same outcome can be expected for an unintegrated content supplier with similar instruments (and commitment power). Thus, the result does not stem from vertical integration.

[35] Quality investment is the focus of Stennek (2006). However, his analysis assumes that channels are supplied on the basis of lump-sum fees alone with no per-subscriber fee, an assumption which greatly increases the incentive for exclusivity.

impact on incentives for exclusivity.

3 Platform competition

This section examines the impact of platform competition on an integrated firm's incentives to supply premium content to a rival broadcaster. As noted in the introduction, certain characteristics of transmission platforms—economies of scale, consumer switching costs and network effects—give rise to dynamic effects, with current market share being a significant determinant of future profitability. Competition may take place between firms operating on different platforms (inter-platform competition) or within a single one (intra-platform competition).

We augment the model of section 2 by adding a dynamic dimension to competition. We employ a reduced-form modelling approach, and simply assume that a firm's future profit is increasing in its current market share.[36] Advertising revenue r is omitted from the analysis: as section 2 shows, r and v appear identically in the profit functions and have equivalent effects.[37]

Specifically, suppose that in addition to current profit, firm i obtains a future benefit $b(s_i) \geq 0$ which satisfies $b' > 0$ and $0 < b'' < 4t$.[38] A convex relationship might exist if tomorrow's market share and tomorrow's price are both increasing in today's market share, for example. The benefit function is assumed to be identical for the two firms.

[36] A specific model of quality investment has also been examined, yielding similar results (notes available from the author).

[37] If the reader prefers, v may be considered as the sum of the content's value to viewers and advertising revenue per viewer.

[38] The upper bound on b'' ensures that profit functions are concave in p_i, and is a sufficient condition for uniqueness of equilibrium.

Exclusivity: Adding $b(s_i)$ to (5) and (6), the firms' profit functions become

$$\begin{aligned}\pi_A &= \frac{1}{2t}\left(t + v - p_A + p_B\right)p_A + b\left(s_A\right)\\ \pi_B &= \frac{1}{2t}\left(t - v + p_A - p_B\right)p_B + b\left(s_B\right).\end{aligned}$$

Equilibrium prices are defined implicitly by the first order conditions

$$\begin{aligned}p_A^{excl} &= \frac{1}{2}\left(t + v + p_B - b'\left(s_A\right)\right);\\ p_B^{excl} &= \frac{1}{2}\left(t - v + p_A - b'\left(s_B\right)\right).\end{aligned}$$

Prices are decreasing in b': thus, in the presence of dynamic competition, consumers benefit from lower prices. From convexity of b, A reduces its price by more than B and gains a larger market share than in the static case. I.e., the initial advantage from control of premium content is enhanced under dynamic competition.

Non-exclusivity: When A supplies the content to B, charging a per-subscriber fee c, the firms' profits become (ignoring the fixed fee)

$$\begin{aligned}\pi_A^{ne} &= p_A s_A\left(p_A\right) + \left(1 - s_A\right)c + b\left(s_A\left(p_A\right)\right);\\ \pi_B^{ne} &= \left(p_B - c\right)s_B\left(p_B\right) + b\left(s_B\left(p_B\right)\right).\end{aligned}$$

As before, the maximum per-subscriber fee B will accept is v. Best responses are $p_i = \frac{1}{2}\left\{t + v + p_j - b'\left(s_i\left(p_i\right)\right)\right\}$. The symmetric equilibrium price (equilibrium is unique) is given by

$$p^{ne} = t + v - \overline{b}'$$

where $\overline{b}' \equiv b'\left(\frac{1}{2}\right)$. Again, prices are lower than in the absence of dynamic competition, but market shares are equal.

Profits (ignoring F) are given by

$$\begin{aligned}\pi_A^{ne} &= \frac{1}{2}\left(t-\overline{b}'\right)+v+\overline{b};\\ \pi_B^{ne} &= \frac{1}{2}\left(t-\overline{b}'\right)+\overline{b}\end{aligned}$$

where $\overline{b}=b\left(\frac{1}{2}\right)$. In addition to the per-subscriber fee, with take-it-or-leave-it offers A can also extract a fixed fee equal to the difference in B's profit with/without premium content.

Contracting. To make further progress, we specify that $b(s_i)=\frac{1}{2}\beta s_i^2$ where $0<\beta<4t$.[39] Using this quadratic form, one can calculate that the firms' profits under exclusivity are

$$\begin{aligned}\pi_A^{excl} &= \frac{1}{8(3t-\beta)^2}(4t-\beta)(3t+v-\beta)^2;\\ \pi_B^{excl} &= \frac{1}{8(3t-\beta)^2}(4t-\beta)(3t-v-\beta)^2.\end{aligned}$$

A's market share is given by

$$s_A^{excl}=\frac{1}{2}\left(1+\frac{v}{3t-\beta}\right).$$

We define $\beta_{\max}\equiv 3t-v$, the maximum value of β for which the market remains competitive. To ensure that competition takes place over the relevant range for the propositions below, we impose the parameter restriction $t>3v$.

Under non-exclusivity, the firms' profits are

$$\begin{aligned}\pi_A^{ne} &= \frac{1}{2}t-\frac{1}{8}\beta+v;\\ \pi_B^{ne} &= \frac{1}{2}t-\frac{1}{8}\beta;\end{aligned}$$

[39] Including a linear term makes no difference to the analysis.

and A can extract a fixed fee of

$$F = v\left(6t - v - 2\beta\right)\frac{(4t-\beta)}{8\left(3t-\beta\right)^2}.$$

Equilibrium outcome. A's gain from exclusivity (compared with non-exclusivity) is given by[40]

$$G = \frac{v}{4\left(3t-\beta\right)^2}\left(v\left(4t-\beta\right) - 4\left(3t-\beta\right)^2\right).$$

The following proposition describes the properties of G, from which the integrated firm's incentives for exclusivity can be determined.

Proposition 3 ***(Conditions for exclusivity).***

Exclusivity is chosen by the content holder under the following circumstances.

(a) There exists a critical value $\widehat{\beta}_1$ such that the seller prefers non-exclusivity for $\beta \in \left[0, \widehat{\beta}_1\right)$ and prefers exclusivity for $\beta \in \left(\widehat{\beta}_1, \beta_{\max}\right]$.

(b) There exists a critical value $\widehat{v}$ such that the seller prefers non-exclusivity for $v \in (0, \widehat{v})$ and prefers exclusivity for $v > \widehat{v}$.

(c) For sufficiently large t, the content holder prefers non-exclusivity.

Proof. (a) The proposition follows from the properties of $G(\beta)$:

1. For $\beta = 0$, $G < 0$;
2. $G'(\beta) > 0$ for $\beta \leq \beta_{\max}$;
3. $G(\beta) = 0$ has two roots, $\widehat{\beta}_1 = 3t - \frac{1}{8}v - \frac{1}{8}\sqrt{v^2 + 16tv} \in (0, \beta_{\max})$ and $\widehat{\beta}_2 > \beta_{\max}$.

[40] Again, in the absence of a fixed fee A receives lower revenues from B, thus exclusivity is more likely to be profitable. The equivalent expression for this case can be calculated: results are qualitatively unchanged.

Thus, G is negative for $\beta \in \left[0, \widehat{\beta}_1\right)$ and positive for $\beta \in \left(\widehat{\beta}_1, \beta_{\max}\right]$.

(b) The proposition follows from the properties of $G(v)$:

1. $G(v) = 0$ has two roots, 0 and $\widehat{v} = 4\frac{(3t-\beta)^2}{(4t-\beta)} > 0$;
2. For $v = 0$, $G'(v) < 0$;
3. $\frac{d^2G}{dv^2} = \frac{(4t-\beta)}{2(3t-\beta)^2} > 0$.

Thus, G is negative for $v \in (0, \widehat{v})$ and positive for $v > \widehat{v}$.

(c) For $\beta \leq \beta_{\max}$, $G'(t) = -v^2\frac{(6t-\beta)}{2(3t-\beta)^3} < 0$. Thus, for sufficiently large t, $G < 0$. ■

It can be inferred from Proposition 3 that exclusivity is likely in the following circumstances.

- *Strong dynamic competition.* For sufficiently large β, the dynamic benefit of higher market share outweighs the opportunity cost of forgone wholesale fees from the rival and exclusivity is the more profitable choice.

- *Valuable content.* As section 2 shows, the opportunity cost of forgone wholesale fees is increasing in v. Larger v also widens the asymmetry in market shares, strengthening the dynamic benefit to the content owner. For less valuable content the first effect dominates and non-exclusivity is preferred, but for highly attractive content the dynamic effect dominates and exclusivity is chosen.

- *Little horizontal differentiation.* With smaller t the rival's customers are easier to attract. This has two implications, both of which encourage exclusivity. First, the opportunity cost of forgone wholesale fees is reduced (as shown in section 2). Secondly, building market share is easier: for given v the content owner gains a larger market share, strengthening the dynamic benefit.

Discussion. The findings stem from a trade-off between the static revenue gain (wholesale fees plus advertising revenues) from supplying the rival broadcaster and the dynamic competition benefit from building market share. For the latter effect to dominate, the benefit function $b(s_i)$ must be sufficiently convex. Convexity implies that the marginal benefit to building market share is increasing in the firm's share. Thus, any initial advantage which generates asymmetric market shares is amplified: the larger firm's incentive to build share become stronger while that of its rival weakens.

Exclusive content plays a crucial role in creating an initial asymmetry between the firms. Price competition alone cannot achieve this: with equally attractive content, equilibrium market shares are equal. The owner of exclusive content gains an initial advantage over its rival which, in the presence of a convex b function, is amplified by price competition. Note that in the television broadcasting industry, where the marginal cost of supplying an additional consumer is negligible, a competitive advantage cannot be achieved through cost-reducing innovation. Exclusivity over content is therefore the key instrument of dynamic competition between firms. Thus, Proposition 3 casts light on the importance of "premium" content: it is the particular attractiveness of this programming to viewers, as well as the lack of available substitutes, that makes exclusivity desirable.

The proposition indicates that exclusivity is more likely to be chosen in a situation of intra- rather than inter-platform competition. As noted in the introduction, certain dimensions of differentiation (e.g., geographic availability) apply only between transmission platforms. It is likely, therefore, that horizontal differentiation is lower for firms operating on the same platform than for those on different ones. Added to this, dynamic competition might be stronger in these cases, if (say) exclusion might be feasible. This could explain why exclusivity has been an important aspect of intra-platform competition—as between competing satellite broadcasters in Italy (pre-merger) and in Scandinavia—while content holders have tended to sup-

ply rivals on other transmission systems (e.g. satellite broadcasters typically supply cable operators).

Far from violating the principle in the contracting literature that, provided sufficient instruments are available, the seller chooses the efficient allocation, the result is another instance of this. The content holder implements the allocation which maximises industry profits—but now in a dynamic rather than purely static setting. With its convex form, the dynamic mechanism implies that industry profit is increasing in the asymmetry of market shares. If the dynamic effect is strong enough, this outweighs the static incentive to supply and exclusive content is chosen.[41]

The next section sets out two specific cases in which dynamic effects of the general form above may arise. By detailing particular cases the precise mechanism underlying the dynamic effect can be examined, and welfare implications may be drawn.

4 Examples of platform competition

To illustrate the dynamic effect modelled in reduced form in section 3, two specific cases are set out.[42] First, in section 4.1, we assess the effect of (costly) investment in platform quality. Then, in section 4.2, a two-period model with consumer switching costs is analysed. In both cases results conform to general form found above: profit is increasing in asymmetry of market shares and for sufficiently large v the content holder chooses exclusivity. By analysing

[41] If an alternative mechanism could be found to induce the desired asymmetry in market shares, it would be more efficient to supply the content to all consumers (withholding it forgoes some willingness to pay). But in a competitive setting firms cannot make an agreement regarding market shares, as such behaviour would fall foul of antitrust authorities.

[42] A third case would be exclusion: if by withholding premium content a firm could drive its rival out of the market this might well create a strong incentive for exclusivity. With infrastructure costs being largely sunk, however, exclusion of a platform operator is implausible. (For example, even if a cable operator were to be pushed into bankruptcy, the distribution assets would be sold and a new operator would take over.)

specific cases, as well as illustrating more precisely the kinds of market conditions in which exclusivity is likely to be found, welfare implications can also be drawn.

4.1 Competition with platform investment

Suppose that the attractiveness of a broadcaster's output can be increased by investing in the quality of its platform, e.g. by raising capacity, or investing in high-definition, interactivity and other capabilities. Unlike programming, platform investment is taken to be specific to the investing firm and cannot be transferred to another broadcaster, thus there is no scope for resale.[43] Platform investment incurs a fixed cost which is convex in the degree of quality improvement.

The game proceeds as follows. In the first stage, A chooses whether to supply its premium content v to B (contracting assumptions are as before). In the second stage broadcasters compete for consumers, simultaneously choosing both prices and platform quality. In choosing quality q_i, firm i incurs a fixed cost $\frac{1}{2}\gamma q_i^2$ and raises the utility provided to consumers according to the function

$$u_i = v_i + q_i - p_i. \tag{12}$$

Exclusivity: When A retains exclusive content, the firms' profit functions are given by

$$\begin{aligned} \pi_A &= \frac{1}{2t}\left(t + v + q_A - q_B - p_A + p_B\right) p_A - \frac{1}{2}\gamma q_A^2; \\ \pi_B &= \frac{1}{2t}\left(t - v + q_B - q_A + p_A - p_B\right) p_B - \frac{1}{2}\gamma q_B^2. \end{aligned}$$

[43] For programming, being transferable, fixed costs provide a strong incentive to resell to other broadcasters, as found in section 2. Since (in a static model) programming will always be resold, the incentive to invest in programming (including bidding for rights) depends on the total number of viewers that can be reached on all platforms, not just those on the operator's own platform.

One can calculate that equilibrium strategies are

$$\begin{aligned} p_A^{excl} &= t + \frac{tv\gamma}{3t\gamma - 1}; \quad q_A^{excl} = \frac{1}{2\gamma}\left(1 + \frac{v\gamma}{3t\gamma - 1}\right); \\ p_B^{excl} &= t - \frac{tv\gamma}{3t\gamma - 1}; \quad q_B^{excl} = \frac{1}{2\gamma}\left(1 - \frac{v\gamma}{3t\gamma - 1}\right). \end{aligned}$$

Note that as $\gamma \to \infty$ (raising quality becomes prohibitively expensive), quality investment falls to zero and outcomes approach the static equilibrium of section 2.1. The results contained in this section encompass those of the static model in this limiting case.

A's market share is given by

$$s_A^{excl} = \frac{1}{2} + \frac{\gamma}{2\left(3t\gamma - 1\right)}v.$$

For the market to be competitive the following condition is required, and is assumed throughout

$$3t\gamma - 1 \geq v\gamma. \tag{13}$$

Existence of the full range of equilibria described in Proposition 4 requires the further restriction $t\gamma < \frac{3}{8}$, which is also assumed.

Equilibrium profits under exclusivity are given by

$$\begin{aligned} \pi_A^{excl} &= \frac{1}{8\gamma}\frac{(4t\gamma - 1)}{(3t\gamma - 1)^2}\left(3t\gamma - 1 + v\gamma\right)^2; \\ \pi_B^{excl} &= \frac{1}{8\gamma}\frac{(4t\gamma - 1)}{(3t\gamma - 1)^2}\left(3t\gamma - 1 - v\gamma\right)^2. \end{aligned}$$

Non-exclusivity. If A supplies content v to B, charging per-subscriber fee c, firms' profit functions are given by

$$\begin{aligned}\pi_A &= \frac{1}{2t}(t+Q)\,p_A + \frac{1}{2t}(t-Q)\,c - \frac{1}{2}\gamma q_A^2;\\ \pi_B &= \frac{1}{2t}(t-Q)\,(p_B-c) - \frac{1}{2}\gamma q_B^2,\end{aligned}$$

where $Q = q_A - q_B - p_A + p_B$.

As before, A sets the per-subscriber fee $c = v$. Equilibrium outcomes are symmetric with $p^{ne} = t + v$ and $q^{ne} = \frac{1}{2\gamma}$; market shares are $\frac{1}{2}$ each. Profits of the two firms (ignoring the fixed fee) are given by

$$\begin{aligned}\pi_A^{ne} &= \frac{1}{8\gamma}(4t\gamma - 1) + v;\\ \pi_B^{ne} &= \frac{1}{8\gamma}(4t\gamma - 1).\end{aligned}$$

Contracting. Assuming that A supplies its content, it extracts a fixed fee F equal to the difference between π_B^{ne} and π_B^{excl}; i.e.,

$$F = \frac{1}{8}\frac{(4t\gamma-1)}{(3t\gamma-1)^2}(6t\gamma - v\gamma - 2)\,v > 0.$$

Equilibrium outcome. A's gain from exclusivity (compared with non-exclusivity) is given by

$$G_q = \frac{1}{4}\gamma\frac{(4t\gamma-1)}{(3t\gamma-1)^2}v^2 - v. \tag{14}$$

The following proposition describes the properties of G_q, from which firm A's incentives for exclusivity can be determined.

Proposition 4 ***(Exclusivity with endogenous platform quality).***

The content holder chooses exclusivity under the following circumstances.

(a) There exists a critical value $\widehat{v}_q = 4\frac{(3t\gamma-1)^2}{\gamma(4t\gamma-1)}$ *such that the content holder prefers non-exclusivity for* $v < \widehat{v}_q$ *and prefers exclusivity for* $v > \widehat{v}_q$.

(b) For sufficiently large γ*, the content holder prefers non-exclusivity.*

(c) For sufficiently large t*, the content holder prefers non-exclusivity.*

Proof. (a) The proposition follows from the properties of $G_q(v)$:

1. $G_q(v) = 0$ has two roots, 0 and $\widehat{v}_q = 4\frac{(3t\gamma-1)^2}{\gamma(4t\gamma-1)} > 0$;
2. For $v = 0$, $\frac{dG_q}{dv} < 0$;
3. $\frac{d^2G_q}{dv^2} = \frac{1}{2}\frac{\gamma(4t\gamma-1)}{(3t\gamma-1)^2} > 0$.

Thus $G_q > 0$ for $v > 4\frac{(3t\gamma-1)^2}{\gamma(4t\gamma-1)} > 0$.

(b) $\frac{dG_q}{d\gamma} = -\frac{1}{4}v^2\frac{(5t\gamma-1)}{(3t\gamma-1)^3} < 0$: thus $G_q < 0$ for sufficiently large γ.

(c) $\frac{dG_q}{dt} = -\frac{1}{2}\gamma^2v^2\frac{(6t\gamma-1)}{(3t\gamma-1)^3} < 0$: thus $G_q < 0$ for sufficiently large t. ■

Part (a) of Proposition 4 demonstrates existence: for sufficiently valuable content, the holder prefers exclusivity. Exclusivity is more attractive when platform quality can be varied at lower cost (i.e. lower γ). As before, exclusivity is more likely for less differentiated operators.

Welfare. Comparing consumer surplus under non-exclusivity and exclusivity, the difference is given by

$$\Delta CS_q = CS_q^{ne} - CS_q^{excl} = -\frac{1}{2}v - \frac{t\gamma^2v^2}{4\left(3t\gamma-1\right)^2} \leq 0.$$

Hence consumers (as a whole) are unambigously better off under exclusivity for all $v > 0$, regardless of the cost of quality. From this finding and Proposition 4, the following comparison can be drawn.

Proposition 5 ***(Consumer comparison).***

With $\widehat{v}_q$ as defined in Proposition 4,

(a) For $v < \widehat{v}_q$, the content holder chooses non-exclusivity while consumers (as a whole) prefer exclusivity.

(b) For $v > \widehat{v}_q$, both the content holder and consumers (as a whole) prefer exclusivity.

Comparing total welfare (defined as the sum of consumer and producer surplus) under non-exclusivity and exclusivity, the difference is given by

$$\Delta W_q = W_q^{ne} - W_q^{excl} = \frac{1}{2}v - \frac{1}{4}\gamma v^2 \frac{(5t\gamma - 1)}{(3t\gamma - 1)^2}.$$

It can be shown that $\frac{\partial \Delta W_q}{\partial \gamma} > 0$; i.e., as raising platform quality becomes more expensive, non-exclusivity is more likely to be the socially preferred option.

The following proposition compares social and private incentives for exclusivity.

Proposition 6 ***(Welfare comparison).***

Private and social preferences towards exclusivity depend on the value of premium content as follows, where $\overline{v}_q = 4\frac{(3t\gamma-1)^2}{2\gamma(5t\gamma-1)}$ and $\widehat{v}_q$ is as defined in Proposition 4:

(a) For $v \in (0, \overline{v}_q)$, non-exclusivity is both privately and socially preferred;

(b) For $v \in (\overline{v}_q, \widehat{v}_q)$, the content holder chooses non-exclusivity but exclusivity is socially preferred;

(c) For $v \in (\widehat{v}_q, \infty)$, exclusivity is both privately and socially preferred.

Proof. Private choices of the content holder follow directly from Proposition 4. Social preferences follow from the following properties of $\Delta W_q(v)$:

1. $\Delta W_q(v) = 0$ has two roots, 0 and $\overline{v}_q$;
2. At $v = 0$, $\frac{d\Delta W_q}{dv} > 0$;

3. $\frac{d^2\Delta W_q}{dv^2} = -\frac{1}{2}\gamma\frac{(5t\gamma-1)}{(3t\gamma-1)^2} < 0.$

Thus, $\Delta W_q(v)$ is a concave function, which is positive for $v \in (0, \overline{v}_q)$ and negative for $v > \overline{v}_q$. Noting that (since the denominator of the former expression is larger) $\overline{v}_q < \widehat{v}_q$, the proposition follows. ■

Hence, whenever the content holder chooses exclusivity this is also the socially preferred choice. However, interestingly, the social planner chooses exclusivity more often than the content holder.

Discussion. The desirability of exclusivity arises from economies of scale in platform investment. Investment incurs a fixed cost that is spread over the platform's subscribers. A broadcaster with exclusive content has a larger subscriber base (all else being equal) and invests more in platform quality. For consumers, taken as a whole, exclusivity is beneficial as market shares are asymmetric and overall they benefit from greater quality investment. The broadcaster without premium content offers lower quality than under non-exclusivity—as well as being unable to offer premium content, it invests less in its platform—but charges a lower price. The analysis assumes implicitly that exclusive content is the only means of inducing such an asymmetry: if this could be achieved another way it would be socially preferable to supply v to all consumers.

4.2 Competition with switching costs

Suppose that broadcasters compete for two periods. In the first period, all consumers are new to the market. Each consumer subscribes to the broadcaster that offers the highest utility after transport costs. Firms cannot make commitments regarding future prices. In period 2, firms compete again; but consumers now face switching costs: a consumer that wishes to change provider incurs a cost $\sigma \in [0, t)$.[44] It is assumed that broadcasters are able

[44] This may represent new receiving equipment that must be purchased and/or the time involved in switching. The incidence of the switching cost is irrelevant: the analysis would

to discriminate between their own and their rival's installed base, setting different prices if they wish.

There may be an initial asymmetry between the firms: the intrinsic quality of each firm, excluding premium content, is v_{i0} $(i = A, B)$. We use v_Δ to denote A's intrinsic advantage, $v_{A0} - v_{B0}$, and assume that $v_\Delta \geq 0$ (thus A may have an advantage over B, but not vice versa). To ensure that markets remain competitive in all cases (so that interior solutions can be used throughout), we impose the following parameter restriction on v_Δ

$$v_\Delta \leq \min\left(\frac{7}{5}t - \frac{9}{5}v, \frac{7}{3}(t-\sigma) - 6v, \frac{7}{6}t + \frac{7}{12}\sigma - \frac{4}{3}v\right). \tag{15}$$

At the start of each stage, A chooses whether or not to supply its premium content v to B (contracting assumptions are as before). Contracts last for a single period, thus an agreement to supply in period 1 does not necessarily imply supply in period 2 (or vice versa). To keep the analysis tractable it is assumed that there is no discounting of future profits.

The model is solved backwards; we start by deriving the period 2 equilibrium contingent on period 1 market shares, before solving A's period 1 contracting decision.

4.2.1 Period 2: competition with installed subscriber bases

At the start of period 2, firms inherit installed subscribers from period 1. We denote firm A's period 1 share as s_A; given the covered market assumption, $s_B = 1 - s_A$. Firms compete in prices. It is assumed that firms can discriminate between their own and the rival's installed base, creating two distinct sub-markets. Denote as $p_{j,i}$ the price offered by firm i to firm j's installed base.

Assuming that each sub-market remains competitive (necessary conditions for this are derived below), indifferent consumers in each sub-market

be similar even if suppliers choose to subsidise this.

are located at $x \in [0, s_A]$ and $y \in [s_A, 1]$ respectively, where

$$\begin{aligned} x &= \frac{1}{2t}\left(t + v_A - v_B + \sigma - p_{A,A} + p_{A,B}\right); \\ y &= \frac{1}{2t}\left(t + v_A - v_B - \sigma - p_{B,A} + p_{B,B}\right). \end{aligned}$$

where v_i is the quality of firm i, taking account of both intrinsic quality v_{i0} and premium content v. Thus, of A's installed base, period 2 demands are x and $(s_A - x)$ for A and B respectively; of B's installed base, demands are $(y - s_A)$ and $(1 - y)$ respectively. We derive outcomes under exclusivity and non-exclusivity in turn.

Exclusivity. Suppose that A refuses to supply premium content to B; thus $v_A - v_B = v_\Delta + v$. Combining the two sub-markets, firms' period 2 profits are given by

$$\begin{aligned} \pi_{A,2}^{excl} &= x p_{A,A} + (y - s_A)\, p_{B,A}; \\ \pi_{B,2}^{excl} &= (s_A - x)\, p_{A,B} + (1 - y)\, p_{B,B}. \end{aligned}$$

One can calculate that equilibrium prices under exclusivity are

$$\begin{aligned} p_{A,A}^{excl} &= \frac{1}{3}\left(2ts_A + t + v + v_\Delta + \sigma\right); \\ p_{A,B}^{excl} &= \frac{1}{3}\left(4ts_A - t - v - v_\Delta - \sigma\right); \\ p_{B,A}^{excl} &= \frac{1}{3}\left(3t - 4ts_A + v + v_\Delta - \sigma\right); \\ p_{B,B}^{excl} &= \frac{1}{3}\left(3t - 2ts_A - v - v_\Delta + \sigma\right). \end{aligned}$$

Hence under exclusivity, indifferent consumers are located at

$$\begin{aligned} x^{excl} &= \frac{1}{6t}\left(t + 2ts_A + v + v_\Delta + \sigma\right); \\ y^{excl} &= \frac{1}{6t}\left(3t + 2ts_A + v + v_\Delta - \sigma\right). \end{aligned}$$

Period 2 profit of each firm is given by

$$\begin{aligned}\pi_{A,2}^{excl} &= \frac{1}{18t}\left(t+v+v_\Delta+\sigma+2ts_A\right)^2+\frac{1}{18t}\left(3t+v+v_\Delta-\sigma-4ts_A\right)^2;\\ \pi_{B,2}^{excl} &= \frac{1}{18t}\left(t+v+v_\Delta+\sigma-4ts_A\right)^2+\frac{1}{18t}\left(3t-v-v_\Delta+\sigma-2ts_A\right)^2.\end{aligned}$$

Non-exclusivity. Suppose that A supplies its premium content to B for a per-subscriber fee v;[45] hence $v_A - v_B = v_\Delta$. Firms' period 2 profits are given by

$$\begin{aligned}\pi_{A,2}^{ne} &= xp_{A,A}+(y-s_A)\,p_{B,A}+v\left((s_A-x)+(1-y)\right);\\ \pi_{B,2}^{ne} &= (s_A-x)\left(p_{A,B}-v\right)+(1-y)\left(p_{B,B}-v\right).\end{aligned}$$

One can calculate that equilibrium prices under non-exclusivity are

$$\begin{aligned}p_{A,A}^{ne} &= \frac{1}{3}\left(3v+v_\Delta+t+\sigma+2ts_A\right);\\ p_{A,B}^{ne} &= \frac{1}{3}\left(3v-v_\Delta-t-\sigma+4ts_A\right);\\ p_{B,A}^{ne} &= \frac{1}{3}\left(3v+v_\Delta+3t-\sigma-4ts_A\right);\\ p_{B,B}^{ne} &= \frac{1}{3}\left(3v-v_\Delta+3t+\sigma-2ts_A\right).\end{aligned}$$

Hence, under non-exclusivity, indifferent consumers are located at

$$\begin{aligned}x^{ne} &= \frac{1}{6t}\left(t+2ts_A+v_\Delta+\sigma\right);\\ y^{ne} &= \frac{1}{6t}\left(3t+2ts_A+v_\Delta-\sigma\right).\end{aligned}$$

[45] As before it can be shown that $c = v$ is the equilibrium per-subscriber fee.

Period 2 profit of each firm (ignoring any fixed fee) is given by

$$\begin{aligned}\pi_{A,2}^{ne} &= \frac{1}{9t}\left(9tv - 2t\sigma + 4tv_\Delta + 6t\sigma s_A - 2ts_A v_\Delta\right) \\ &\quad + \frac{1}{9t}\left(5t^2 + \sigma^2 - 10t^2 s_A + v_\Delta^2 + 10t^2 s_A^2\right); \\ \pi_{B,2}^{ne} &= \frac{1}{18t}\left(4ts_A - v_\Delta - \sigma - t\right)^2 + \frac{1}{18t}\left(2ts_A + v_\Delta - \sigma - 3t\right)^2.\end{aligned}$$

For the two sub-markets to remain competitive in both the exclusive and non-exclusive cases, s_A must satisfy the following conditions, which are ensured by the parameter restriction (15)

$$\frac{t + v_\Delta + \sigma}{4t} \leq s_A \leq \min\left(\frac{3t + v_\Delta - \sigma}{4t}, \frac{3t - v - v_\Delta + \sigma}{2t}\right). \tag{16}$$

Contracting. If A supplies its content, it extracts a fixed fee F_2 equal to the difference between $\pi_{B,2}^{ne}$ and $\pi_{B,2}^{excl}$; i.e.[46]

$$F_2 = \frac{v}{9t}\left(2t + 2ts_A - v - 2v_\Delta\right) > 0.$$

Thus, A's gain from exclusivity (compared with non-exclusivity) is given by[47]

$$G_\sigma^{(2)} = -\frac{v}{9t}\left(7t - 2v + 4ts_A - 4v_\Delta\right) < 0.$$

Thus, in period 2 broadcaster A always wishes to supply premium content to B; this is unsurprising, the situation in the second period being equivalent

[46] The sign of F_2 follows from the lower bound of (16) and the (first) upper bound of (15). Results are qualitatively unchanged if we impose $F_2 = 0$.

[47] The sign of $G_\sigma^{(2)}$ follows from the lower bound of (16) and the (first) upper bound of (15). If $F = 0$, $G_\sigma^{(2,F=0)} = -\frac{v}{9t}\left(5t - v + 2ts_A - 2v_\Delta\right) < 0$.

to the static case of section 2. Period 2 equilibrium profits are given by

$$\begin{aligned}
\pi_A^{(2)} &= \frac{1}{18t}\left(t + v_\Delta + \sigma + 2ts_A\right)^2 + \frac{1}{18t}\left(3t + v_\Delta - \sigma - 4ts_A\right)^2 \\
&\quad + \frac{v}{9t}\left(11t - v - 2v_\Delta + 2ts_A\right); \\
\pi_B^{(2)} &= \frac{1}{18t}\left(t + v + v_\Delta + \sigma - 4ts_A\right)^2 + \frac{1}{18t}\left(3t - v - v_\Delta + \sigma - 2ts_A\right)^2.
\end{aligned}$$

Note that, for both firms, period 2 profit is convex in s_A; combined industry profit is minimised at $s_A = \frac{1}{2} + \frac{1}{10t}v_\Delta$. Thus, profits are increasing in asymmetry of period 1 market shares. Note further that convexity exists even when $\sigma = 0$: firms' ability to discriminate between their own and the rival's subscribers, which are located on distinct segments of the Hotelling line, softens competition even in the absence of switching costs.

4.2.2 Period 1: competition for new subscribers

In period 1, no consumer is locked in and each firm sets a single price (p_i, $i = A, B$). We now assess A's incentive to withhold its premium content from B in period 1, in order to build its installed base and raise its period 2 profit.

Exclusivity. Taking account of both periods, with no discounting, total profits of the two firms are given by

$$\begin{aligned}
\pi_A &= s_A p_A + \pi_A^{(2)}\left(s_A\right); \\
\pi_B &= \left(1 - s_A\right) p_B + \pi_B^{(2)}\left(s_A\right)
\end{aligned}$$

where $s_A = \frac{1}{2t}\left(t + v + v_\Delta - p_A + p_B\right)$. It can be shown that equilibrium prices under exclusivity are

$$\begin{aligned} p_A^{excl} &= t - \frac{2}{3}\sigma - \frac{23}{63}v + \frac{1}{7}v_\Delta; \\ p_B^{excl} &= t - \frac{2}{3}\sigma - \frac{5}{63}v - \frac{1}{7}v_\Delta; \end{aligned}$$

and firm A's period 1 market share is given by

$$s_A^{excl} = \frac{1}{2} + \frac{1}{14t}\left(9v + 5v_\Delta\right).$$

Firms' profits over the two periods are given by

$$\begin{aligned} \pi_{A,tot}^{excl} &= \frac{7}{9}t - \frac{2}{9}\sigma + \frac{1}{9t}\sigma^2 + \frac{16}{21}v_\Delta + \frac{113}{63}v + \frac{1}{441t}\left(82vv_\Delta + 113v^2 + 99v_\Delta^2\right); \\ \pi_{B,tot}^{excl} &= \frac{7}{9}t - \frac{2}{9}\sigma + \frac{1}{9t}\sigma^2 - \frac{16}{21}v_\Delta - \frac{64}{63}v + \frac{1}{441t}\left(278vv_\Delta + 211v^2 + 99v_\Delta^2\right). \end{aligned}$$

Non-exclusivity. Suppose that A supplies its premium content to B for a per-subscriber fee v. Taking account of both periods, total profits of each firm are given by

$$\begin{aligned} \pi_A &= s_A p_A + v\left(1 - s_A\right) + \pi_A^{(2)}\left(s_A\right); \\ \pi_B &= \left(1 - s_A\right)\left(p_B - v\right) + \pi_B^{(2)}\left(s_A\right) \end{aligned}$$

where $s_A = \frac{1}{2t}\left(t + v_\Delta - p_A + p_B\right)$. It can be shown that equilibrium prices under non-exclusivity are

$$\begin{aligned} p_A^{ne} &= t - \frac{2}{3}\sigma + \frac{7}{9}v + \frac{1}{7}v_\Delta; \\ p_B^{ne} &= t - \frac{2}{3}\sigma + \frac{7}{9}v - \frac{1}{7}v_\Delta. \end{aligned}$$

Firm A's period 1 market share is

$$s_A^{ne} = \frac{1}{2} + \frac{5}{14t}v_\Delta.$$

Firms' profits over the two periods are given by

$$\begin{aligned}\pi^{ne}_{A,tot} &= \frac{1}{9t}\left(7t^2 - 2t\sigma + \sigma^2 + 20tv - v^2\right) + v_\Delta\left(\frac{11}{49t}v_\Delta + \frac{16}{21} - \frac{2}{9t}v\right);\\ \pi^{ne}_{B,tot} &= \frac{1}{9t}\left(7t^2 - 2t\sigma + \sigma^2 - 4tv + v^2\right) + v_\Delta\left(\frac{11}{49t}v_\Delta - \frac{16}{21} + \frac{2}{9t}v\right).\end{aligned}$$

The first lower bound of (15) ensures that the market remains competition in both exclusive and non-exclusive cases.

Contracting. If A chooses to supply, it extracts a fixed fee F_1 equal to the difference between $\pi^{ne}_{B,tot}$ and $\pi^{excl}_{B,tot}$.[48]

$$F_1 = \frac{2}{49}\frac{v}{t}\left(14t - 9v - 10v_\Delta\right) > 0.$$

4.2.3 Equilibrium outcome

A's gain from exclusivity in period 1 is given by

$$G_\sigma = \frac{v}{49t}\left(36v - 49t + 40v_\Delta\right).$$

The following proposition describes the properties of G_σ, from which the content holder's incentives for exclusivity can be determined.

Proposition 7 ***(Exclusivity with switching costs).***

(a) Depending on the value of premium content v the content holder chooses exclusivity in period 1 under the following circumstances.

- *If $v_\Delta < \frac{49}{40}t$, there exists a critical value $\widehat{v}_\sigma = \frac{1}{36}\left(49t - 40v_\Delta\right) > 0$ such that the content holder chooses non-exclusivity for $v < \widehat{v}_\sigma$ and chooses exclusivity for $v > \widehat{v}_\sigma$;*
- *If $v_\Delta \geq \frac{49}{40}t$, the content holder chooses exclusivity for all $v > 0$.*

[48] The sign of F_1 follows from the lower bound of (16). As before, results are qualitatively unchanged if we impose $F_1 = 0$.

(b) For sufficiently large t, the content holder chooses non-exclusivity.

Proof. (a) The proposition follows from the properties of $G_\sigma(v)$:

1. $G_\sigma(v) = 0$ has two roots, 0 and $\widehat{v}_\sigma = \frac{1}{36}(49t - 40v_\Delta) > (<)0$ for $v_\Delta < (>)\frac{49}{40}t$;
2. At $v = 0$, $\frac{dG_\sigma}{dv} = -\frac{1}{49t}(49t - 40v_\Delta) < (>)0$ for $v_\Delta < (>)\frac{49}{40}t$;
3. $\frac{d^2G_\sigma}{dv^2} = \frac{72}{49t} > 0$.

Thus for $v_\Delta \geq \frac{49}{40}t$, $G_\sigma > 0$ for all $v > 0$; while for $v_\Delta < \frac{49}{40}t$, $G_\sigma > 0$ for $v > \frac{1}{36}(49t - 40v_\Delta) > 0$.

(b) $\frac{dG_\sigma}{dt} = -\frac{4}{49}\frac{v}{t^2}(9v + 10v_\Delta) < 0$: thus $G_\sigma < 0$ for sufficiently large t. ■

Discussion. The proposition shows that exclusivity is more likely when there is greater asymmetry, with the stronger firm choosing exclusivity. Numerical analysis shows that exclusivity can indeed arise for parameter values that satisfy (15).[49] Note that the gain from exclusivity is independent of the switching cost σ. However, a positive switching cost is required for exclusivity to occur keeping (15) satisfied; specifically, $\sigma \in \left(\frac{1}{10}t, \frac{19}{40}t\right)$.

The model has assumed (for simplicity) that firms do not discount future profits. If discounting were incorporated, the incentive for exclusivity would be increasing in the weight put on future profits, as there is profit sacrifice in period 1 in return for a gain in period 2.

The intuition for the result is as follows. In the presence of switching costs, a higher current market share results in both a higher share and a higher price in the future. This generates a convex relationship between current share and future profit (as in the reduced form of section 3). Such a functional form is commonplace in the switching costs literature: for example, in Beggs and Klemperer (1992) a firm's future value is quadratic in its current share.

[49] It should be noted that exclusivity might also arise for parameter values that do not satisfy (15); but in this case corner solutions arise in some instances, requiring the analysis to be adapted accordingly.

4.2.4 Welfare

Comparing consumer surplus under non-exclusivity and exclusivity in period 1 (period 2 is always non-exclusive), taking account of switching costs incurred in period 2,[50] the difference is given by

$$\Delta CS_\sigma = CS_\sigma^{ne} - CS_\sigma^{excl} = -\frac{v}{98t}\left(49t - 18v - 27v_\Delta\right).$$

The comparison is ambiguous: with period-1 exclusivity, consumers benefit from lower prices in period 1, but lose out from weaker competition in period 2. Define $\widetilde{v}_\sigma \equiv \frac{49}{18}t - \frac{3}{2}v_\Delta$; from the first upper bound of (15), which implies that $v_\Delta \leq \frac{7}{5}t$, it can be determined that $\widetilde{v}_\sigma > \widehat{v}_\sigma > 0$. Consumer surplus is higher under exclusivity for $v \in (0, \widetilde{v}_\sigma)$ and under non-exclusivity for $v > \widetilde{v}_\sigma$. Comparing consumer preferences with those of the content holder (described in Proposition 7), the next proposition follows.

Proposition 8 ***(Consumer comparison).***

(a) If $v_\Delta < \frac{49}{40}t$ *then*

- *For* $v \in (0, \widehat{v}_\sigma)$*, the content holder chooses non-exclusivity while consumers prefer exclusivity;*
- *For* $v \in (\widehat{v}_\sigma, \widetilde{v}_\sigma)$*, both the content holder and consumers prefer exclusivity;*
- *For* $v \in (\widetilde{v}_\sigma, \infty)$*, the content holder chooses exclusivity while consumers prefer non-exclusivity.*

(b) If $v_\Delta \geq \frac{49}{40}t$*, then the content holder always chooses exclusivity, while consumers prefer exclusivity for* $v \in (0, \widetilde{v}_\sigma)$ *and non-exclusivity for* $v > \widetilde{v}_\sigma$*.*

[50] Switching costs incurred in period 2 are in fact the same under period 1 exclusivity and non-exclusivity.

Combining producer and consumer surplus, the difference in welfare is given by

$$\Delta W_\sigma = W_\sigma^{ne} - W_\sigma^{excl} = \frac{v}{98t}\left(49t - 54v - 53v_\Delta\right).$$

The following proposition compares social and private preferences towards exclusivity.

Proposition 9 ***(Welfare comparison).***

Social preferences towards exclusivity depend on the value of premium content as follows, where $\overline{v}_\sigma \equiv \frac{1}{54}\left(49t - 53v_\Delta\right) < \widehat{v}_\sigma$*:*

(a) If $v_\Delta < \frac{49}{53}t$ *then non-exclusivity is socially preferred for* $v \in (0, \overline{v}_\sigma)$ *and exclusivity is socially preferred for* $v > \overline{v}_\sigma$*. Thus,*

- *For* $v \in (0, \overline{v}_\sigma)$*, non-exclusivity is both privately and socially preferred;*
- *For* $v \in (\overline{v}_\sigma, \widehat{v}_\sigma)$*, the content holder chooses non-exclusivity but exclusivity is socially preferred;*
- *For* $v \in (\widehat{v}_\sigma, \infty)$*, exclusivity is both privately and socially preferred.*

(b) If $v_\Delta \geq \frac{49}{53}t$ *then exclusivity is socially preferred for all* $v > 0$*. There are then two cases:*

- *If* $v_\Delta \in \left[\frac{49}{53}t, \frac{49}{40}t\right)$*, then for* $v < \widehat{v}_\sigma$ *the content holder chooses non-exclusivity but exclusivity is socially preferred, while for* $v > \widehat{v}_\sigma$ *exclusivity is both privately and socially preferred.*
- *If* $v_\Delta \geq \frac{49}{40}t$*, exclusivity is both privately and socially preferred for all* $v > 0$*.*

Proof. From the first upper bound of (15), which implies that $v_\Delta \leq \frac{7}{5}t$, it can be determined that $\widehat{v}_\sigma > \overline{v}_\sigma$. Social preferences follow from the following properties of $\Delta W_\sigma(v)$:

1. $\Delta W_\sigma(v) = 0$ has two roots, 0 and $\overline{v}_\sigma > (<)0$ for $v_\Delta < (>)\frac{49}{53}t$;

2. At $v = 0$, $\frac{d\Delta W_\sigma}{dv} = \frac{1}{98t}(49t - 53v_\Delta) > (<)0$ for $v_\Delta < (>)\frac{49}{53}t$;

3. $\frac{d^2\Delta W_\sigma}{dv^2} = -\frac{54}{49t} < 0$.

Thus for $v_\Delta \geq \frac{49}{53}t$, $\Delta W_\sigma < 0$ for all $v > 0$; while for $v_\Delta < \frac{49}{53}t$, $\Delta W_\sigma > 0$ for $v \in (0, \overline{v}_\sigma)$ and $\Delta W_\sigma < 0$ for $v > \overline{v}_\sigma$. For $v_\Delta < \frac{49}{53}t$, $\widehat{v}_\sigma - \overline{v}_\sigma = \frac{7}{108}(7t - 2v_\Delta) > \frac{637}{1908}t > 0$. ■

Discussion. The two propositions show that, although on a total welfare standard exclusivity is socially preferred whenever it is chosen by the content holder, consumer welfare may be lower. In particular, for highly attractive content ($v > \widetilde{v}_\sigma$) the content holder chooses exclusivity but consumers are better off under non-exclusivity.

5 Conclusion

This paper has examined incentives for exclusive distribution of programming content in television broadcasting. When contracting takes place on the basis of a two-part tariff (or a pure per-subscriber fee), static analysis suggests that non-exclusive distribution is chosen. This is an instance of the finding, familiar from the contracting literature, that a seller with sufficient instruments and commitment power implements the efficient allocation. The static outcome would imply that regulation to guarantee wide distribution of premium content is unwarranted. Although non-exclusivity is socially optimal, consumers are worse off than under exclusive distribution: the softening of downstream competition results in higher prices that outweigh the benefit to them of viewing the content. However, this should not be seen as an argument in favour of exclusivity: rather, regulation to reduce per-subscriber fees might be considered, depending on the implications for content production.

However, the static model omits an important dimension of competition in the television industry: competition between and within distribution platforms. The economic characteristics of distribution systems generate a

dynamic aspect to competition: future profits typically increase with current market share. When this feature is incorporated, a new motive for exclusivity emerges: exclusive content gives its owner an initial advantage that is amplified by dynamic competition. Under certain conditions this benefit outweighs the opportunity cost of forgone distribution revenues and the content holder chooses exclusivity. Such a dynamic mechanism arises when platform investment is important, or when consumers incur switching costs of changing operator. These mechanisms may be found to dominate at times of rapid platform development and uptake—which may currently be occurring in a number of countries, with the expansion of digital terrestrial and IPTV platforms, and the approach of digital switchover.

The model can explain observed instances of exclusive and non-exclusive distribution of television programming in a number of countries. Exclusivity is more likely when broadcasters operate on the same distribution platform (i.e., for intra- rather than inter-platform competition). In Italy, Scandinavia and the US, competing satellite broadcasters have retained exclusivity over premium programming. At the same time, in Italy, Scandinavia, the UK and elsewhere satellite broadcasters supply their channels to cable operators. In addition, exclusivity is desirable only for particularly valuable content. This accords with observed practice: it is the most valuable, "premium" programming that tends to be shown exclusively (although the threat of antitrust intervention may restrict this). Finally, the analysis explains why exclusivity over premium content is such an important instrument of competition in television broadcasting: this is the primary, perhaps only, means by which an initial advantage over one's rival(s) may be gained, in an industry where building market share may at times be critical.

The findings provide guidance to policymakers regarding the welfare effects of exclusive content distribution. In itself, exclusivity is socially undesirable: a group of consumers is inefficiently prevented from consuming the good. However, exclusive content heightens price competition to the benefit

of consumers. When platform competition is taken into account, welfare assessment depends on the nature of the dynamic mechanism. In the presence of switching costs, exclusivity intensifies price competition when consumers first make subscription decisions, but once they are locked in the resulting asymmetry in market shares worsens consumer outcomes. For particularly attractive content, the holder may choose exclusivity while consumers would be better off under non-exclusive distribution. If the dynamic mechanism stems from economies of scale in platform investment, however, exclusivity benefits consumers as well as the content holder.

The analysis in this paper assumes market structure to be fixed: i.e. there are, and continue to be, two broadcasters throughout. If this assumption were relaxed the following implications might be drawn. A content holder might benefit from excluding a rival: the increase in concentration would raise industry profit, giving rise to a similar dynamic mechanism. This would be harmful to consumers as competition is lessened in the longer-run. Alternatively, if exclusive content is employed as a market entry strategy,[51] it might be deemed pro-competitive since consumers benefit from greater competition in the long run.

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[51] This is arguably the case for DirecTV in the US, as an entrant in a market where cable incumbents are entrenched. Since greater competition reduces industry profit, this case would seem to conflict with the conclusion that exclusivity is chosen when it raises industry profitability. However, with incumbents unable (under antitrust laws) to make side payments to the entrant, the desired contract may be unavailable.

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