Strategic Differentiation by Business Models: Free-to-air and Pay-TV's

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Motivation

- **Fact:** In two sided markets we often observe platforms that compete adopting very different price structures (business models)
  - In the broadcasting industry: free-to-air and pay-TV's, in the press: traditional newspapers and the free press.
- **Positive issue**: which are the sources and incentives that lead broadcasters to adopt very different business models?
  - Existing papers show when *all* platforms choose to charge (mostly) one side or the other: relative importance of the cross-sides elasticities. In other words, equilibria which are symmetric across platforms and asymmetric across sides.
  - They explain price skewness rather than differentiated business models: we consider the case of equilibria that are asymmetric across platfoms *and* sides.
- **Normative issue**: do platforms adopting opposite business models belong to the same relevant market?
  - In antitrust traditionally free-to-air and pay-TV's are considered as acting in different relevant markets

This paper

- Duopoly competition between two ex-ante **symmetric** platforms that broadcast content to viewers and offer advertising space to advertisers
- Viewers and advertisers potentially **multi-home**
- **Viewers:**
  - **preference for variety**
  - are **heterogeneous** in the marginal disutility of ads (they get utility from airtime net of ad breaks);
  - they select the **channels** to subscribe, and then choose the optimal **viewing time** between the accessible channels
- **Advertisers**
  - **advertising technology** determines the probability that a viewer pays attention to the commercial (is informed)
  - they are ready to pay on each channel for the **incremental value** of the advertising messages (*increase* in the probability of purchase): exclusive viewers more valuable

This paper shows the condition for the existence of:

- **Asymmetric Business Model equilibria: strategic differentiation**
  - A platform (**pay-TV**) sets advertising to zero to maximize the viewers' surplus and charges them with a fee
  - A platform (**free-to-air**) sets the subscription fee to zero to maximize the size of exclusive (high ad incremental value) viewers and charges advertisers.
- **Symmetric free-to-air equilibria: strategic imitation.**

This paper

- **Relationship with the existing literature**
  - **Single-homing viewers** (competitive bottleneck): Anderson and Coate (2006), Arsmstrong (2006)
  - **Multi-homing viewers** (competition for advertisers, incremental value principle): Anderson, Kind and Foros (2013), Ambrus, Calvano and Reisinger (2013)
  - **Price skewness**: Rochet and Tirole (2006), Armstrong (2006), Bolt and Tienman (2008), Weil (2010), Schmalensee (2011)
  - **Free-to-air or pay-TV**: Peitz and Valletti (2008), Kind, Nielssen and Sorgard (2009), Arsmstrong and Weed (2007).
  - **Asymmetric price structures:** Ambrus and Argenziano (2009)
- No one, to the best of our knowledge, has studied generalized multi-homers and symmetric platforms generating asymmetric business models. Weeds (2013) addresses some of our issues.

Viewers

- **Preferences** (Levitan and Shubik (1980)). Viewers heterogenous in $\theta \in [0,1]$ with utility

$$U(v_1, v_2; \theta) = \theta b_1 v_1 + \theta b_2 v_2 - \frac{2-\sigma}{2}(v_1^2 + v_2^2) - \sigma v_1 v_2$$

  where v_i is the viewing time on channel i, $b_i = 1 - a_i$ is the airtime net of ads a_i, $\sigma \in [0,1]$ is the degree of substitutability between channels.
- Viewers decide which channel to **subscribe** and, upon subscription, how to distribute the **viewing time** between the accessible channels.
- Hence, although potentially multi-homers, viewers can watch no channel, one (single-homers) or both (multi-homers).

Advertising technology and Advertisers

- Probability ϕ that a θ-viewer pays attention to a message : increasing returns and decreasing own and cross marginal returns:
  - when the message is placed on **both** channels, the viewer spends time $v_i(\theta)$ and $v_j(\theta)$ on the channels and ads cover a fraction a_i and a_j of airtime:

$$\phi_{ij}(\theta) = 1 - e^{-\psi\left(a_i v_i(\theta) + a_j v_j(\theta)\right)}$$

  - when the message is placed **only** on channel i:

$$\phi_i(\theta) = 1 - e^{-\psi a_i v_i(\theta)}$$

  - $\psi \geq 0$ parametrises advertising effectiveness: a higher ψ corresponds to a higher probability that the viewer is informed
- Advertisers are homogeneous and gain k from each purchase.

Timing

- $t = 1$ The two platforms $i = 1, 2$ simultaneously set the subscription fee f_i and the advertising space a_i.
- $t = 2$ Viewers decide which platform to patronise, paying the subscription fee
- $t = 3$ Each platform posts an advertising fee t_i to broadcast the ads, and advertisers decide whether to accept or reject the contract.

Contracting stage

- Competition for advertisers implies that each platform can pretend a price not larger than the **incremental profits** it generates by broadcasting the message on its channel.

$$t_i^* = k \int_0^1 \left(\phi_{ij}(\theta) - \phi_j(\theta) \right) d\theta$$

- Hence, if a θ viewer is **exclusive** (she single-homes on channel i, i.e. $v_j(\theta) = \phi_j(\theta) = 0$, or the other channel does not offer advertising space ($a_j = \phi_j(\theta) = 0$), channel i can extract the **full value**.
- When both channels offer advertising space, they can extract from **multi-homers** only the **incremental value**
- **a more effective advertising technology (a larger ψ) increases the value of exclusive viewers and reduces the value of multi-homers.**

Viewers' choices

- Viewer θ's optimal viewing time

$$\widehat{v}_i^m(\theta) = \frac{\theta\left[(2-\sigma)b_i - \sigma b_j\right]}{4(1-\sigma)} \quad \text{for multi-homers}$$

$$\widehat{v}_i^s(\theta) = \frac{\theta b_i}{2-\sigma} > \widehat{v}_i^m(\theta) \quad \text{for single-homers}$$

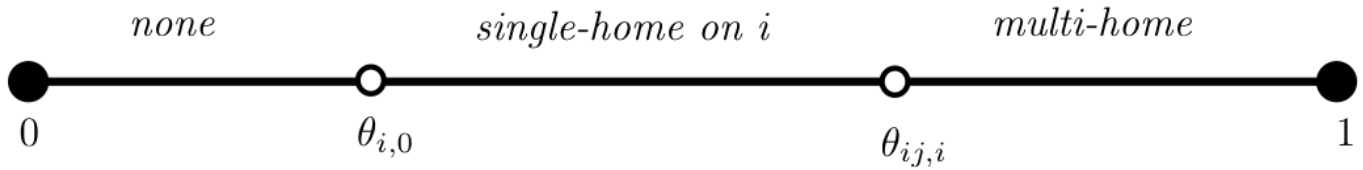
- Viewer θ's utility:

$$U_{ij}^m(\theta) = U(\widehat{v}_i^m(\theta), \widehat{v}_j^m(\theta)) \quad \text{for multi-homers}$$

$$U_i^s(\theta) = U(\widehat{v}_i^s(\theta), 0) \quad \text{for single-homers}$$

Viewers' choices

- A θ-viewer subscribes the channels to $\max\left\{0, U_1^s(\theta) - f_1, U_2^s(\theta) - f_2, U_{12}^m(\theta) - f_1 - f_2\right\}$.
- When $a_i > a_j$ and $f_i < f_j$, for $\theta \in [0,1]$ a relevant sequence of choices is:

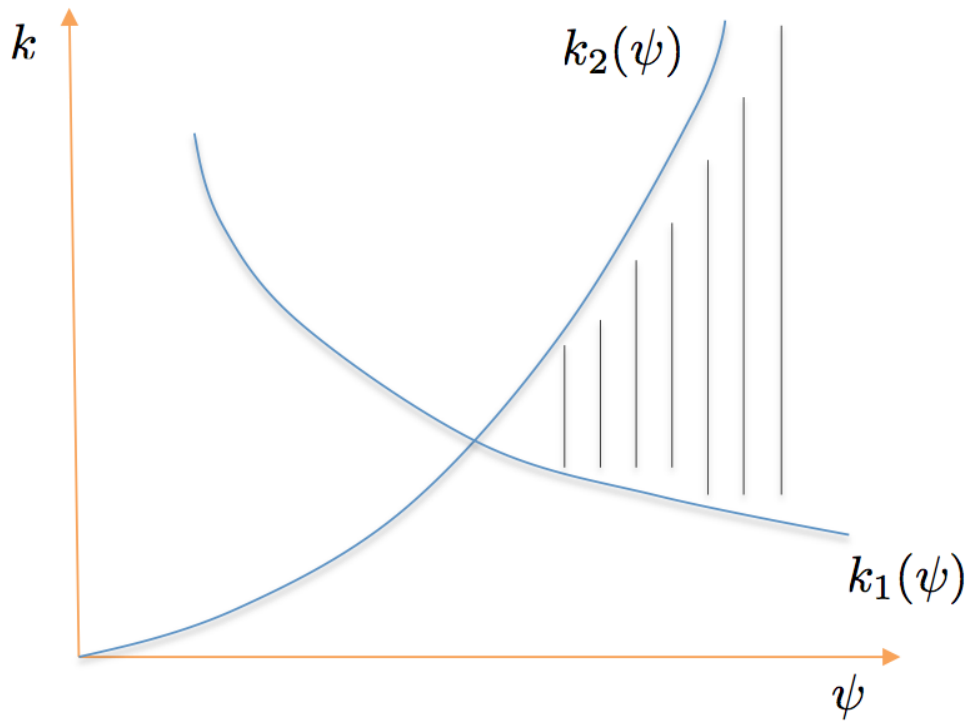


- The share of viewers of the two channels are $s_i = 1 - \theta_{i,0}$ and $s_j = 1 - \theta_{ij,i}$
- Given $\rho = ((a_i, f_i), (a_j, f_j))$ firm i's profits are

$$\Pi_i = f_i s_i(\rho) + t_i^*(\rho).$$

Asymmetric business model equilibrium (*AE*)

Proposition 1 (Strategic differentiation): *For k and ψ sufficiently large ($k_1(\psi) \leq k \leq k_2(\psi)$), an Asymmetric Business Model Equilibrium exists that satisfies $f_1^* = 0 < a_1^* < \frac{1}{2}$ (free-to-air) and $f_2^* > 0 = a_2^*$ (pay-tv)*



- **Why pay-tv is the best reply to free-to-air:**
  - Since $f_1^* = 0$, all viewers watch channel 1 and channel 2 is subscribed only by multi-homers.
  - **when advertising thecnology is effective (high ψ)**, multi-homers are of limited value for advertisers and generate **low profit opportunities on the advertising side .**
  - Since $a_1^* > 0$, multi-homers spend more time and obtain a higher surplus when watching channel 2: **high potential profits from subscription**
  - if channel 1 is free-to-air, the best reply for channel 2 is not to insert ads ($a_2 = 0$), maximise the surplus of viewers, and charge them ($f_2 > 0$).

- **Why free-to-air is the best reply to pay-tv**
  - Since $a_2 = 0$, channel 1 is potentially the only way for advertisers to reach viewers: high profit potential on the advertising side **when k is high**.
  - Since $f_2 > 0$, low θ-viewers do not watch channel 2 and possibly single-home on channel 1
  - Single-homers spend more time than multi-homers: higher advertising revenues.
  - Setting $f_1 = 0$ gives up subscription revenues, but maximises the size of the audience and the value of its composition for advertisers.
  - Channel 1 maximises the share of single-homing viewers by setting $f_1 = 0$ and getting revenue from advertisers only.
- **In an asymmetric business model equilibrium therefore channel 1 (free-to-air) offers high value (exclusive) eyeballs to advertisers while channel 2 (pay) offers high quality (ads-free) airtime to viewers.**

Symmetric equilibria: $a_i = a_j := a \geq 0$ and $f_i = f_j := f \geq 0$

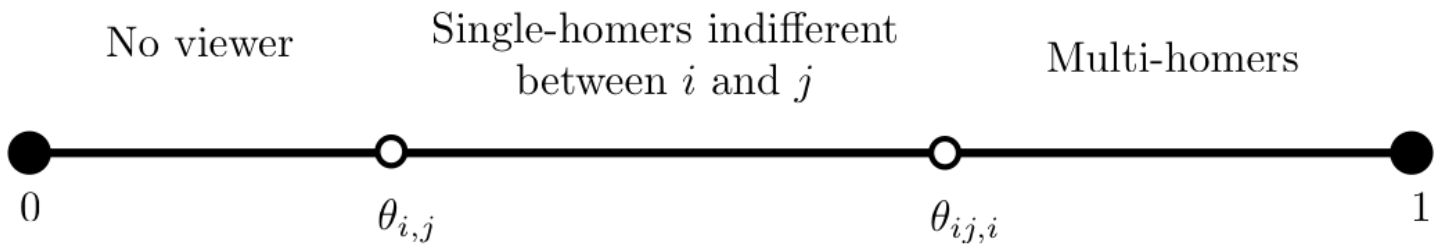
Three possible classes of symmetric equilibria:

- **Both free**: $a > 0$ and $f = 0$
- **Both pay**: $a = 0$ and $f > 0$
- **Both mixed**: $a > 0$ and $f > 0$

Symmetric equilibria: $a_i = a_j := a \geq 0$ and $f_i = f_j := f \geq 0$

Proposition 2 *If $\sigma > 0$, no symmetric pure strategy SPNE exist with strictly positive fees.*

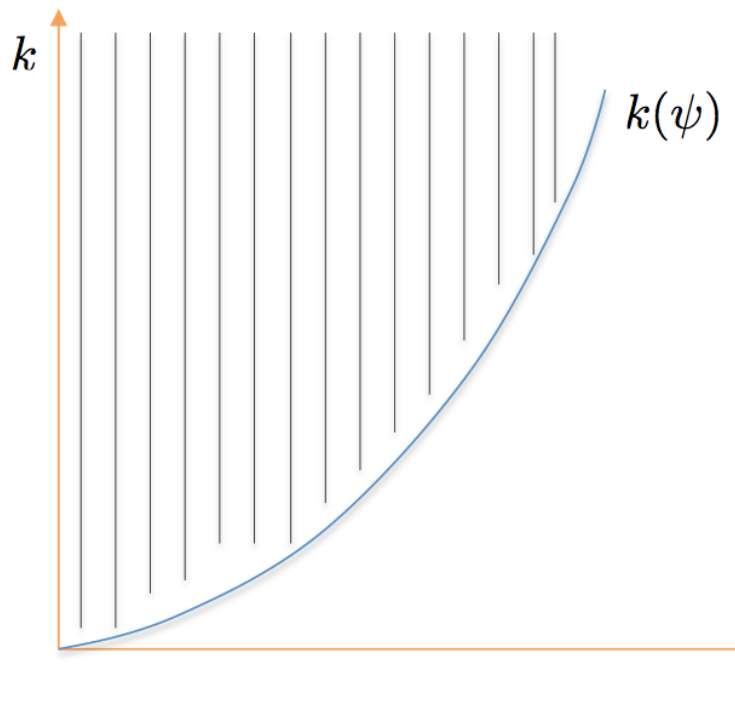
- Intuition: with symmetric platforms and positive fee $f > 0$, a subset of viewers prefers to single-home and is indifferent between the two stations: choose at random. Slightly undercutting the subscription fee, all subscribe the cheaper station



Symmetric equilibria: $a_i = a_j := a \geq 0$ and $f_i = f_j := f \geq 0$

Proposition 3 (Strategic imitation): *For k sufficiently large and ψ not excessively high ($k \geq \widetilde{k}(\psi)$) there exist a both-free symmetric equilibrium with $a < \frac{1}{2}$ and $f = 0$.*

- Intuition: when ψ is low multi-homers are still valuable to advertisers if k is sufficiently high. Then, it is better to give up subscription revenues and cash in advertising revenues.



Asymmetric vs. symmetric equilibria

- A very effective advertising technology (high ψ) increases the advertising revenues that can be extracted from exclusive viewers and reduce those from multi-homers
- When platform i adopts a free-to-air business strategy ($f_i = 0 < a_i$), imitating it allows to collect only multi-homers:
  - when ψ is high, this strategy is not profitable since multi-homers are not valuable to advertisers: it is convenient to opt for a pay-tv business model $>>$ strategic differentiation
  - when ψ is low, instead, multi-homers are valuable to advertisers: strategic imitation
- Hence, when advertising technology is less effective we observe more advertising in the market (strategic imitation).

Mergers and market definition

- Traditional view: a free-to-air tv does not compete for subscription, and a pay-tv does not compete for advertisers. Hence, they belong to different relevant markets.

Proposition 4: *For k and ψ sufficiently large, the monopoly equilibrium is an Asymmetric Business Model Equilibrium, that is it satisfies $f_1^m = 0 < a_1^m$ and $f_2^m > 0 = a_2^m$. Moreover, $a_1^m > a_1^*$ and $f_2^m > f_2^*$, where a_1^* and f_2^* are the equilibrium advertising and subscription fee in the duopoly case.*

- Interaction in duopoly even if apparently no competition for revenues on the same side.
- Differentiation by business model in case of a monopolist aims at maximising each side's surplus and extract it (discriminatory differentiation), whereas in a dupoly differentiation aims at relaxing revenue competition on the same side (strategic differentiation).