



# TiVoed: The Effects of Ad-Avoidance Technologies on Broadcaster Behaviour

Simon P. Anderson (Virginia)

Joshua S. Gans (Melbourne)



# Advertising and Consumers

- Do consumers like ads?
  - Information view: will pay to buy ads (e.g., trade mags)
  - Nuisance view: will pay to avoid ads (e.g., television)
- Traditional ad-avoidance
  - Going to the bathroom
  - Not paying attention
- Rise in ad-avoidance technologies
  - VCRs
  - DVRs (e.g., Tivo)
  - Download TV (e.g., iTunes) and DVDs



# The business of avoiding ads

- Independent suppliers
  - TiVo and computer-based recorders
  - Allow easy skipping of ads
  - No need to wait until program finished recording to start watching
- Cable television
  - Supplied DVRs
  - Can recover through subscription prices
  - Method of price discrimination (based on convenience/ad disutility)
- DVDs and iTunes
  - Content providers sell ‘ad free’ versions (sometimes without delay)
  - Alternative channel for distribution
  - But need not rule out ads (indeed, can make it difficult to skip)



# Substitution from Ads

*Ad-avoidance is a threat to the traditional two-sided model of selling content ... it unbundles the product.*

*Will it cause a 'death spiral'?*

- Conventional wisdom
  - In order to compete for viewers, broadcasters will have to reduce advertising levels
  - But, contrast with continual rise in advertising levels on television



# Research Question

How will broadcasters respond to DVR penetration?

- Informal response:
  - will move to reduce the ‘cost’ to consumers so as to limit incentives to purchase DVRs; decrease clutter
  - will try and target niche audiences to tailor more effective advertising
- Our formal result:
  - DVR penetration means that the marginal viewer has lower ad disutility so broadcasters will increase clutter
  - will try and broaden the appeal of programming



# Literature

- Anderson and Coate (2005)
  - How broadcasters compete and whether prices improve welfare?
- Wilbur (2005)
  - Demonstrates that rising AAT penetration as been associated with increases in advertising ‘clutter.’



# Outline

1. Model & Set-Up
2. AATs as durable goods
3. Extensions
  - Content
  - Competition
  - Pay television
4. Versus traditional ad avoidance
5. Conclusion



# Notation and Set-Up

- Broadcaster (& content provider)
  - Monopolist
  - No marginal costs
- Viewers
  - Located in  $(x, \gamma)$  space: Uniform on  $[0, \bar{x}] \times [0, \bar{\gamma}]$
  - Utility:  $U_{x,\gamma} = \theta + \lambda(1-x) - \gamma a$
- Advertisers
  - Price per viewer:  $r(a)$ ; various concavity assumptions
  - Revenue per viewer:  $R(a) = r(a)a$



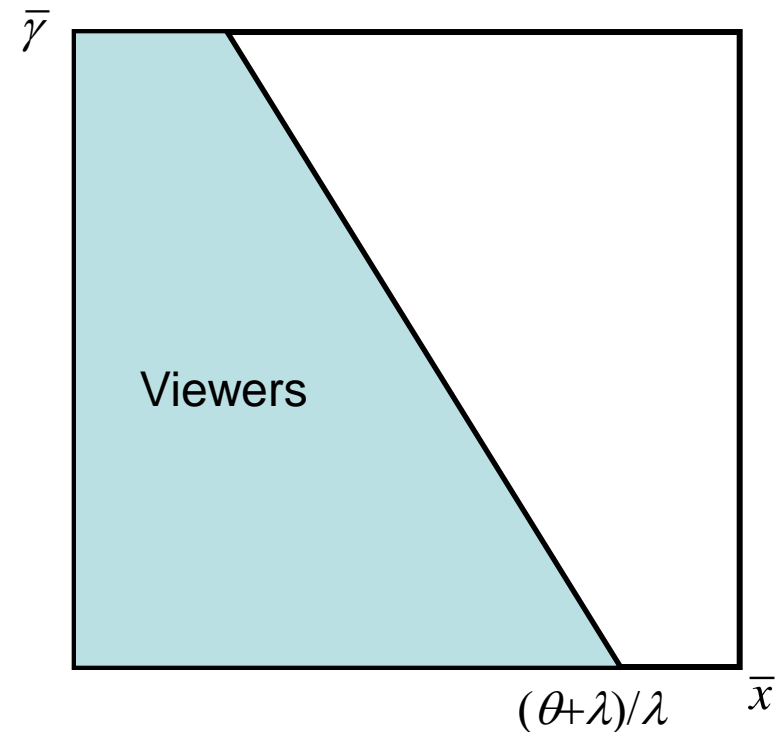
# Equilibrium without AATs

- Choose  $a$  to maximise  $R(a)N$

$$\varepsilon_a(a) = \varepsilon_N(a) < 1$$

$\frac{\partial R}{\partial a} \frac{a}{R}$        $-\frac{\partial N}{\partial a} \frac{a}{N}$

- Anderson-Coate condition
- When  $r$  is (-1) concave (weaker than concavity), the equilibrium is unique.





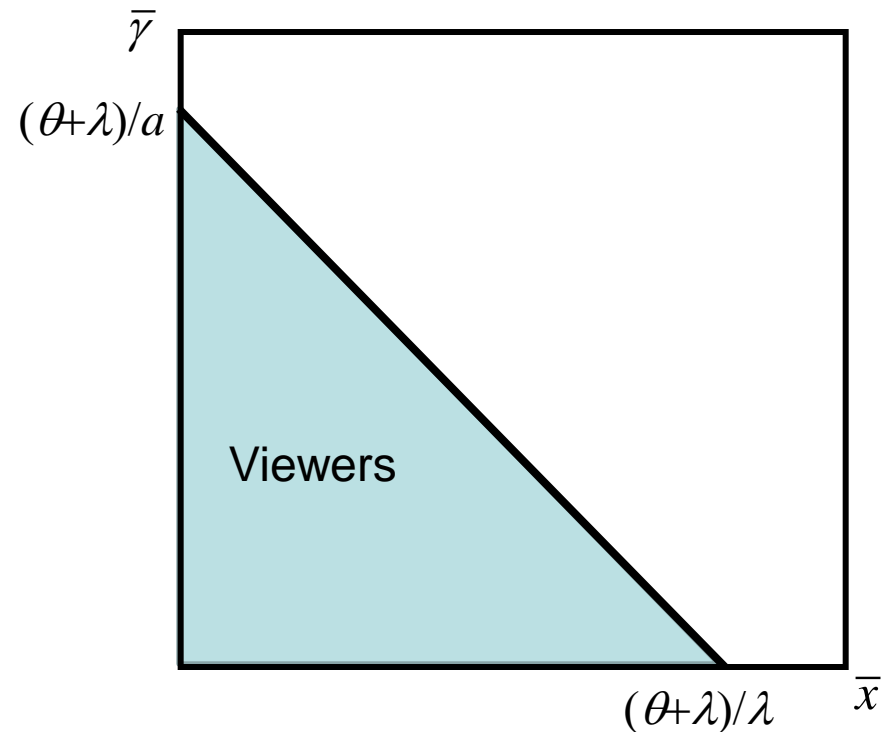
# Technical Issue

- Why don't we get?
- At this point,

$$N_{FTA} = \frac{(\theta + \lambda)^2}{2\lambda a \bar{\gamma} \bar{x}}$$

$$\varepsilon_N(a) = -\frac{\partial N}{\partial a} \frac{a}{N} = 1$$

- A percent increase in advertising decreases viewership by one percent
- But increases revenue by less than one percent
- So more profitable to decrease advertising.





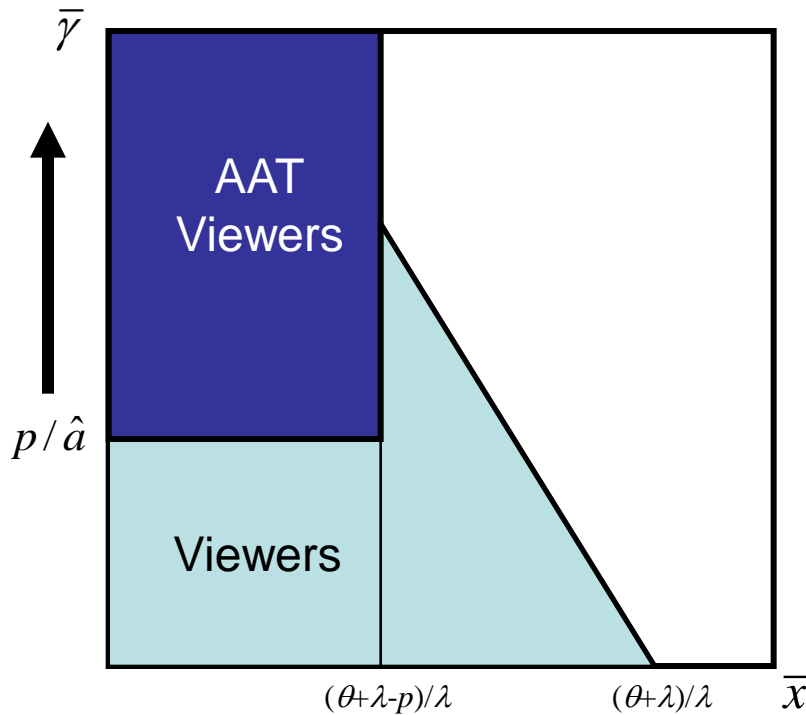
# Modeling AATs

- Durable good (timeline)
  1. Consumers purchase AATs – fixed price,  $p$
  2. Broadcasters observe AAT penetration
  3. Broadcasters choose advertising level
    - (Technical issue: look for rational expectations equilibrium)
- Rented good (also ‘going to the bathroom’)
  - Consumers rent AATs and adjust behaviour simultaneously with the broadcaster choice of advertising level
  - Later ...

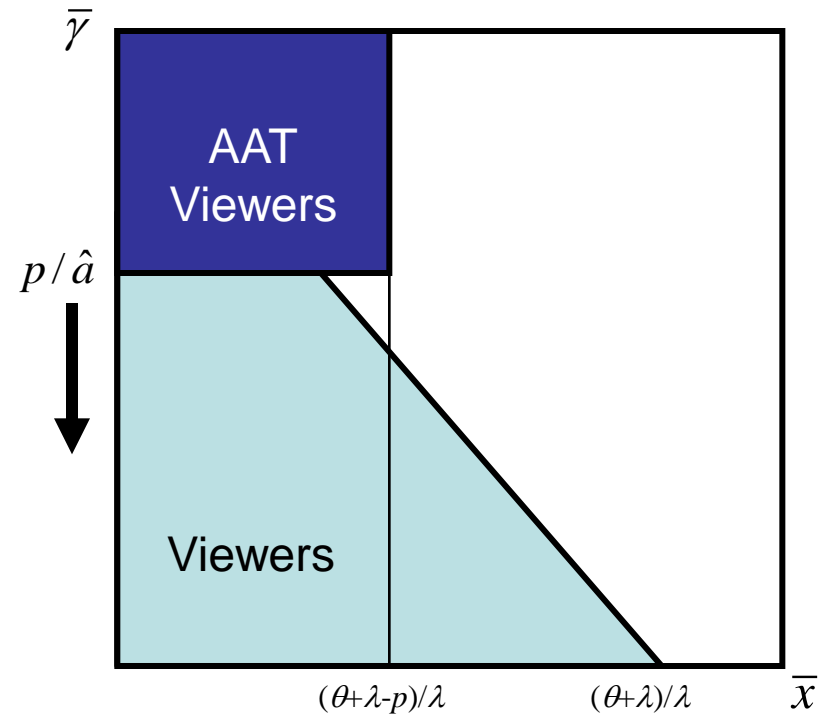


# Non-equilibrium Outcomes

$$a < \hat{a}$$



$$a > \hat{a}$$



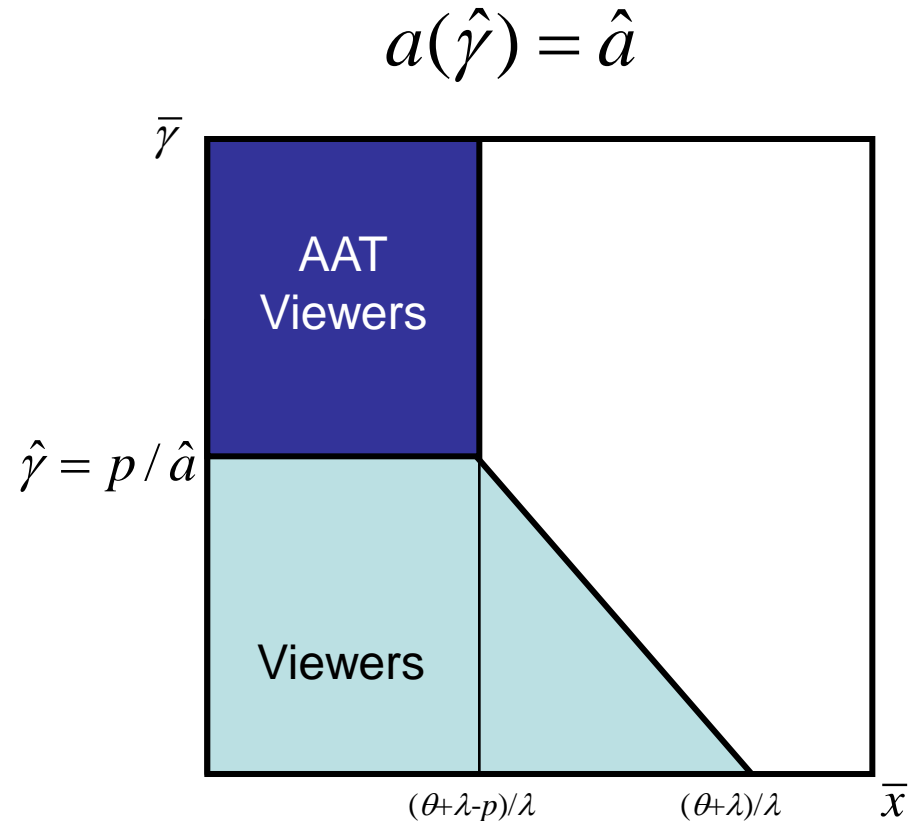
$\hat{a}$  = Advertising level anticipated by consumers



# Equilibrium with AAT

- Proposition 2: For a given  $p$ ,  
 $\{(x, \gamma) | \gamma \geq p / \hat{a}(p) \text{ and } x \leq \frac{\theta + \lambda - p}{\theta}\}$
- purchase an AAT
- The equilibrium is unique with:

$$\varepsilon_a(\hat{a}(p)) = \frac{p}{2(\theta + \lambda) - p}$$

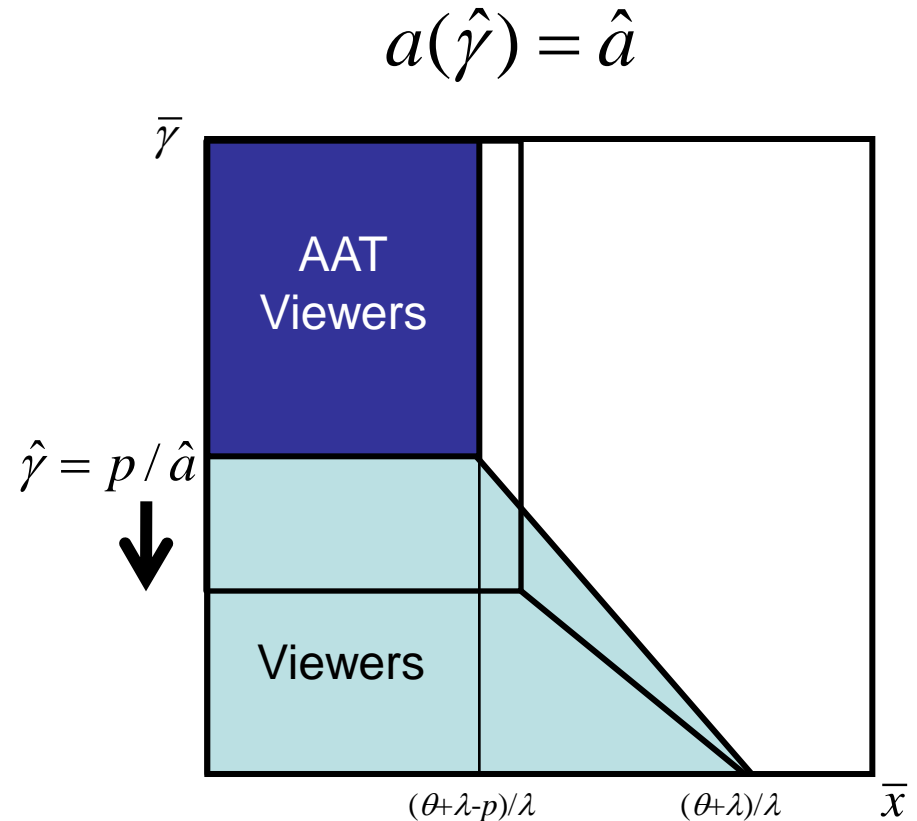






# Impact on Advertising

- Lower  $p$  makes viewership less advertising elastic
- Worthwhile to increase level of advertising (lose fewer viewers)





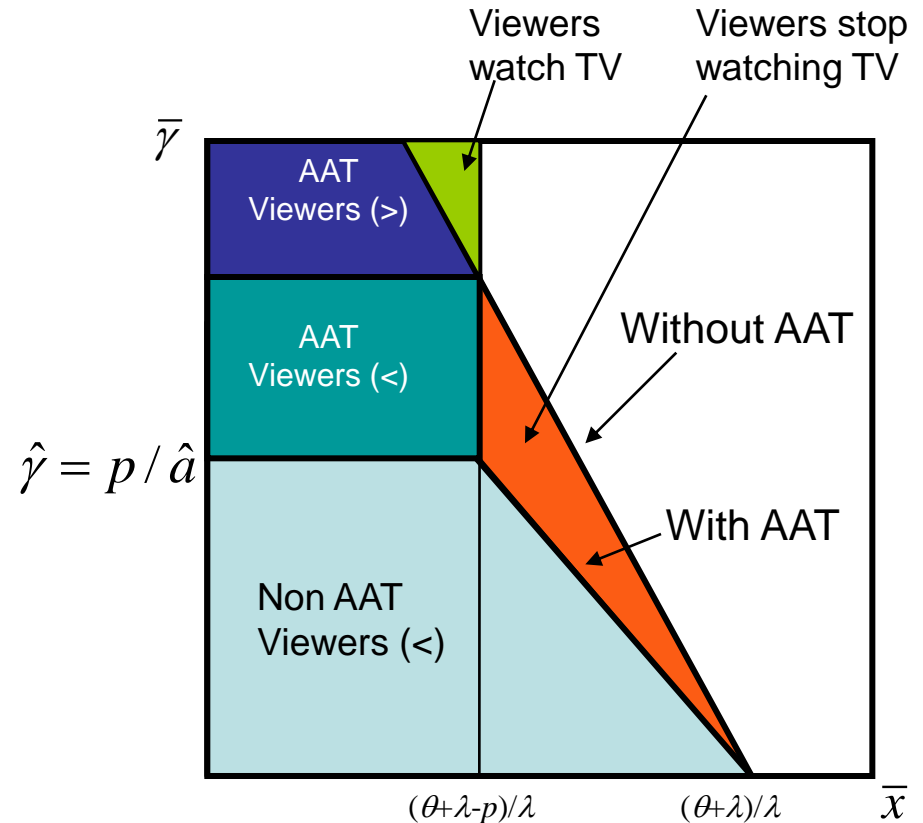
# Network Effects

- As increase AAT penetration
  - Broadcasters increased advertising clutter
  - Marginal consumers purchase AATs
- AAT purchases governed by a positive network effect
- Association of increased AAT penetration and increased clutter may be causal
- Demand for AATs more elastic than an ordinary good due to the negative externality imposed on non-purchasers



# Impact on Welfare

- Decreased welfare
  - low disutility viewers; including some who purchase AATs
  - Broadcaster
- Increased welfare
  - High disutility viewers; increased viewership
  - Advertisers? When there is low quality and mild AAT penetration





# Welfare Impact

- Broadcasters
  - Increased AAT penetration decreases profits
  - Possible death spiral if broadcasters have fixed costs
  - But in rational expectations equilibrium, marginal consumer will not purchase an AAT; just enough to keep the broadcaster in business.
- Advertisers
  - Reduced viewership but broadcaster increases advertising space and reduces rates
  - Proposition 5: with low quality (so viewer loss is small), increase AAT penetration can increase advertiser welfare.



# Endogenous Content

- Timeline:
  1. Broadcaster chooses  $\theta$  or  $\lambda$  (some cost)
  2. Consumers choose whether to purchase AAT or not for price,  $p$
  3. Broadcaster observe AAT penetration
  4. Broadcaster chooses advertising space



# “Time-shifted” content

## Top Rated Shows

- 1 AMERICAN IDOL-TUESDAY
- 2 AMERICAN IDOL-WEDNESDAY
- 3 DANCING WITH THE STARS
- 4 CSI
- 5 DANCING W/STARS RESULTS
- 6 NBC SUNDAY NIGHT FOOTBALL
- 7 CSI: MIAMI
- 8 DESPERATE HOUSEWIVES
- 9 HOUSE
- 10 DEAL OR NO DEAL-MON
- 10 WITHOUT A TRACE

*Source: Nielsen Media Research*

## Top “Time-shifted” Shows

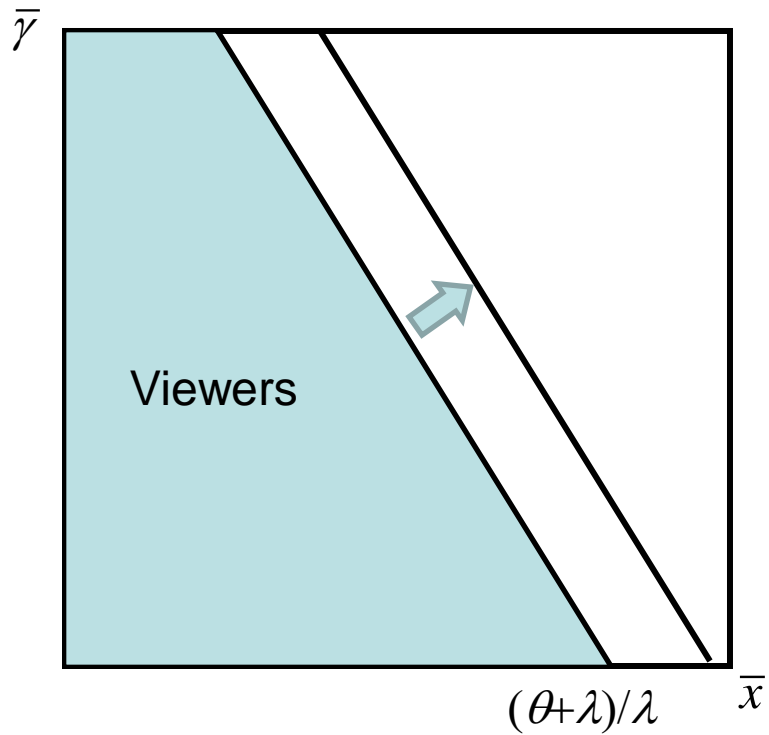
- 1 STUDIO 60
- 2 HEROES
- 3 GILMORE GIRLS
- 4 AMERICA’S NEXT TOP MODEL
- 5 30 ROCK
- 5 FRIDAY NIGHT LIGHTS
- 7 NINE, THE
- 7 SUPERNATURAL
- 9 KIDNAPPED
- 9 ONE TREE HILL
- 9 SMALLVILLE

*Source: Nielsen Media Research*

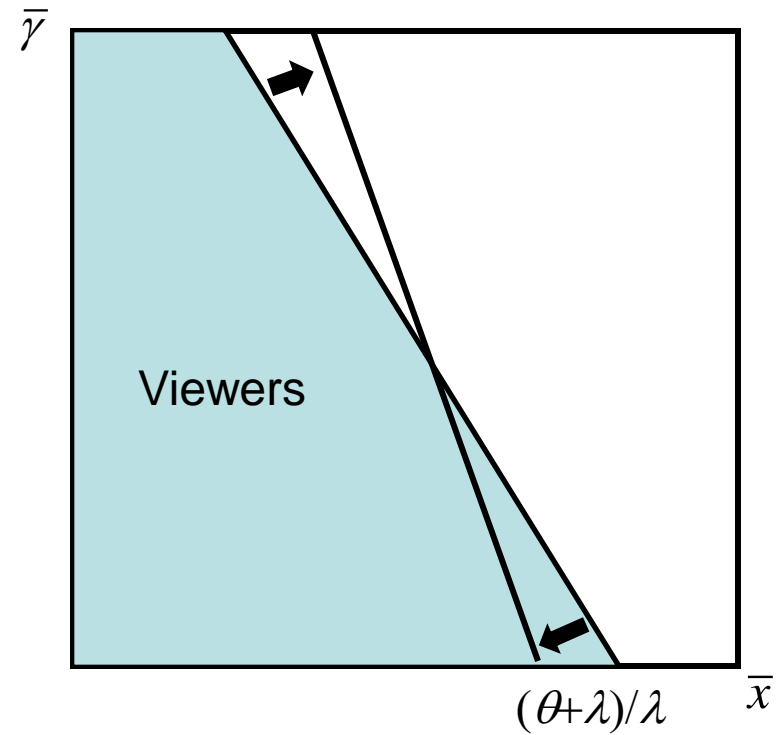


# Content Quality

Increased  $\theta$



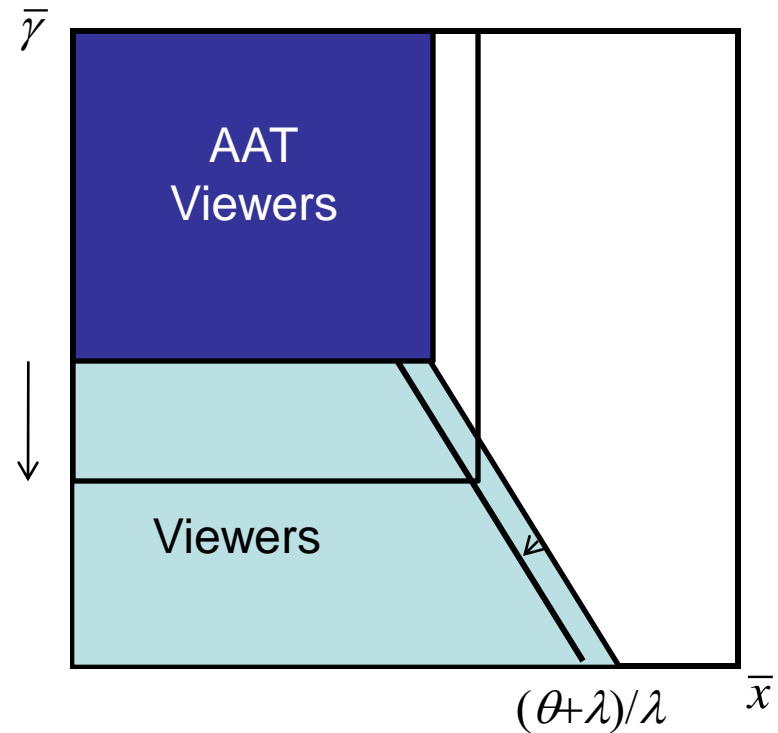
Increased  $\lambda$





# Vertical Quality ( $\theta$ )

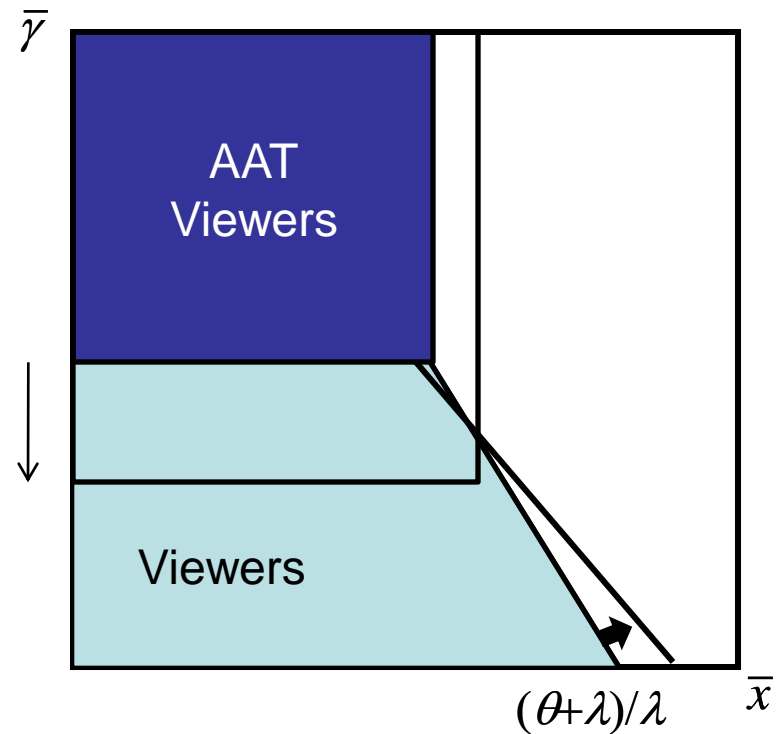
- Impact on advertising
  - Higher vertical quality increases the broadcaster's choice of  $a$  as viewership is less sensitive to increases in  $a$ .
- Impact of  $p$  (AAT affordability)
  - Decrease  $\theta$  and preserve advertising levels and rates





# Horizontal Quality ( $\lambda$ )

- Impact on advertising
  - Lower  $\lambda$  implies ‘flatter’ demand – switch to programming with more mass market appeal – profits convex in  $\lambda$  (Johnson-Myatt, AER, 2006)
  - Higher  $\lambda$  (more niche programming) increases the broadcaster’s choice of  $a$  as viewership is less sensitive to increases in  $a$ .
- Impact of  $p$  (AAT affordability)
  - Decrease  $\lambda$  as do not care about high disutility/TV loving viewers (they have AATs) any more
  - So increase advertising even further
  - Less targeted viewership

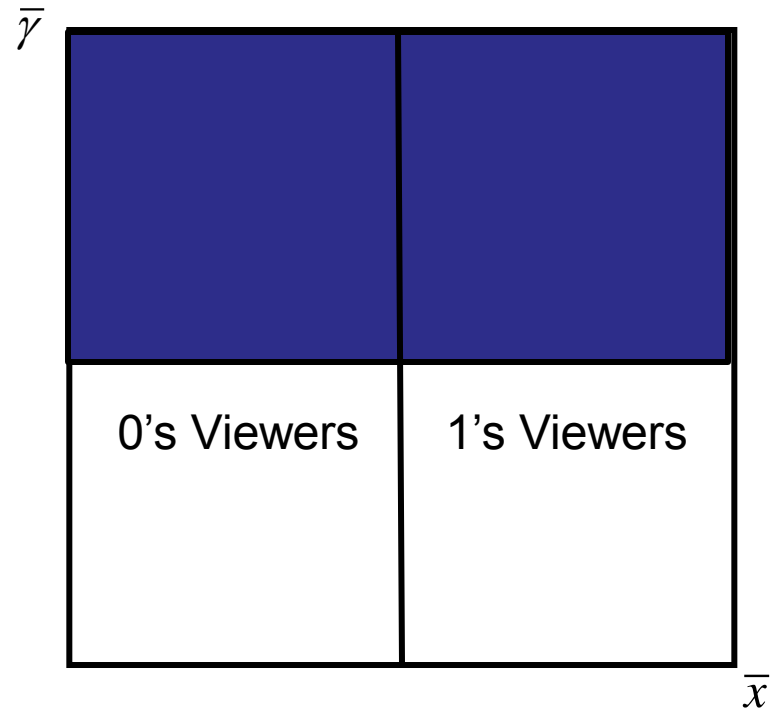




# Broadcaster Competition

- Suppose there are two broadcasters: one located at  $x = 0$  and the other at  $x = \bar{x}$ .
- Symmetric equilibrium

$$\varepsilon_a(\hat{a}) = \frac{p}{2\bar{x}\lambda}$$

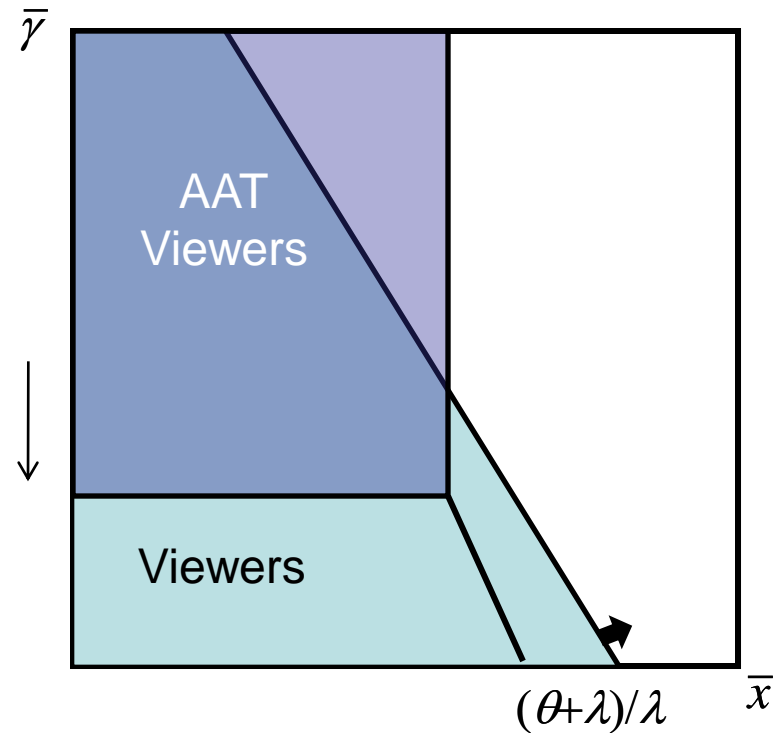




# Pay Television

- Suppose that viewers are charged a subscription fee,  $s$ , as well as seeing advertising content.
- The broadcaster faces a trade-off between  $s$  and  $a$ .
- Basic case: small AAT penetration,  $s$  falls and  $a$  rises
- Interesting case: large AAT penetration,  $s$  rises and  $a$  falls

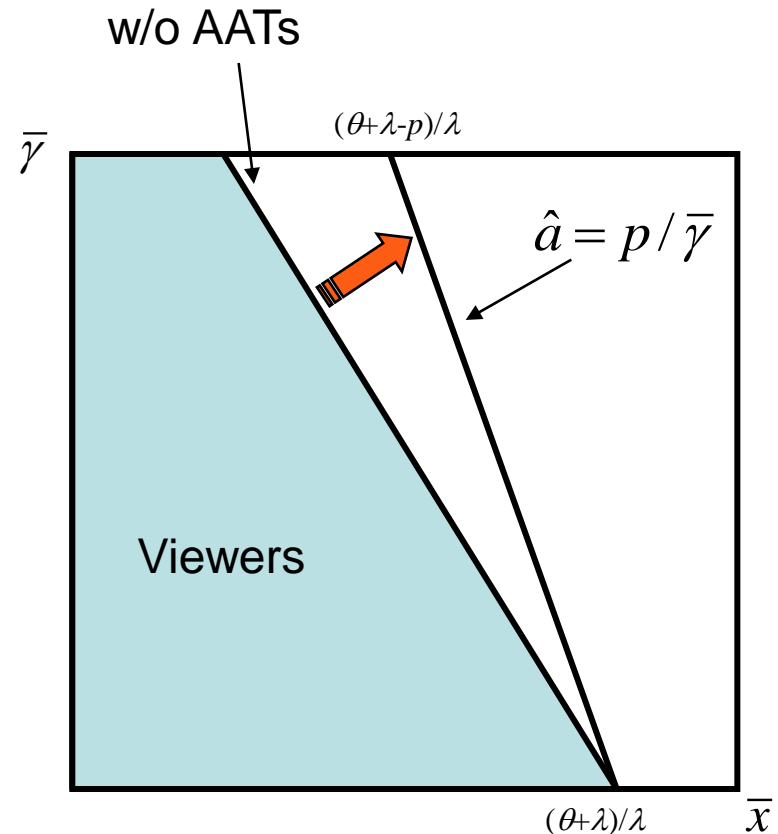
$$R'(a^s) = \frac{\bar{\gamma}}{2} < \frac{\hat{\gamma}}{2} \left( \frac{1}{\text{AAT free viewer share}} \right) = R'(\hat{a})$$





# Subscription-Based AATs

- Proposition: For low enough  $p$ , equilibrium advertising is set to shut out AATs.
- Always profit maximising to reduce advertising by a little bit to capture marginal AAT users.





# Conclusions

- Case of emerging substitutes on one side of a two sided market.
- Reaction to the substitute can be to accommodate rather than deter it.
- Suggests that two-sided markets cannot viewed in isolation of a broader strategic context.



# Future Directions

- Extensions
  - Multiple distribution channels (broadcast and download/DVDs)
  - Dynamic effects: addictive television
- Bigger Questions
  - Why don't we pay consumers directly to watch ads?
    - Welfare opportunity versus bundling/lemons effects
  - Accounting for concentration of advertising in media forms
    - Magazines versus books