Persuasive Advertising in Conformist and Snobbish Markets

Prateik Dalmia

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University of Maryland

MOTIVATION

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- Much advertising is uninformative. Advertisers try and brand products with a desirable social image, “influencing our tastes.”

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- Much advertising is uninformative. Advertisers try and brand products with a desirable social image, "influencing our tastes."
- Difficult to model persuasive advertising since economics is based on the assumption that preferences are fixed.

"Advertising is one of the topics in the study of industrial organization for which the traditional assumptions are strained most... For instance, ad agencies constantly try to appeal to consumers' conscious or unconscious desire for social recognition, a trendy lifestyle and the like."

- Jean Tirole, *The Theory of Industrial Organization* (1988)

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Goal

Provide micro-foundation for persuasive advertising that holds preferences fixed and studies these questions.

RECALL HOTELLING MODEL

- Consumers uniformly distributed along x on $[0, 1]$ and have unit demand.
- x defines a consumer's demand. Her most preferred product is one with horizontal characteristics $\ell = x$.

$$u_x(good) = \underbrace{v}_{\substack{\text{Good's}\\\text{Intrinsic}\\\text{Utility}}} - \underbrace{(\ell - x)^2}_{\substack{\text{Transportation}\\\text{Cost}}} - \underbrace{p}_{\text{Price}}$$

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Previous literature models persuasive ads as influencing i) v ii) transportation costs and iii) distribution of consumer tastes (Fehr and Stevik 1998; Sutton 1991; etc.).

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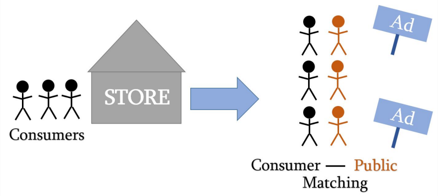
- x is an attribute of the consumer's identity.
  - e.g. measure of sophistication, or other latent social variable.
- Based on attribute, consumers exogenously assigned social status $s(x) : [0, 1] \to \Re$, representing a claim to esteem by others.
- Consumers receive reputational utility from signaling high social status to a group of non-consuming spectators called "the public." Public does not know x of consumer, but tries to infer it.
  - Reputational utility = public's expectation of $s(x)$ (Corneo and Jeanne 1997, Bernheim 1994, etc.).

MY APPROACH: ADVERTISING



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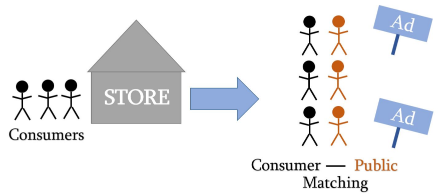

- After shopping, consumer randomly encounter someone from public.
- Ads go to public, bringing public's attention and powers of discrimination to products, so they may infer a consumer's x and $s(x)$ from her purchase. *Ads render brands a signal device.*
- Suppose consumer buys good a. $\rho(x) \in [0, 1]$ denotes public's posterior consumer is type x.
  - Member of public who receives ad: $\rho(x|a)$
  - Member of public who does not receive ad: $\rho(x)$

Signaling motives create a consumption externality.

MOTIVATION (CONFORMIST & SNOB EFFECTS)

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- **Conformist Markets:** goods made more attractive by greater popularity.
    - Not eager to go to Dunkin' Donuts, but more willing to go if all the rage.

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- **Snobbish Markets:** goods made more attractive by greater exclusivity.
  - Drink artesian water to seem sophisticated, but if everyone else does, then you'll move on to something else.

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  - Drink artesian water to seem sophisticated, but if everyone else does, then you'll move on to something else.
- Theory since Leibenstein (1950) studies these 2 types of demand. Little said in context of persuasive advertising.

Second Goal

In these two types of markets, what are the effects of persuasive advertising on the market structure and welfare?

STYLIZED FACTS (SNOBBISH MARKETS)

- Reusable water bottles status symbol among millenials in recent years.

How Fancy Water Bottles Became a 21st-Century Status Symbol

There's a reason Millennials will spend $50 on one.

The Best 'Status' Water Bottles Reviewed 2019 - New York Magazine

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As the public turns against plastic, celebrities and designers are making reusable bottles a fashion statement

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- **Price Premium for Prestigious:** $\$10$ to $\$1,500$ a bottle, even when physically similar (*failure of law of one price?*).
- S'well and competitors known for heavily advertising on social media.

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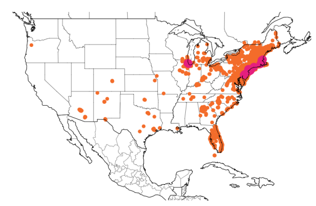
STYLIZED FACTS (CONFORMIST MARKETS)

- Often first-mover enters a market, advertises heavily, and dominates it for many years to come.
  - **Dunkin' Donuts:** Massachusetts in 1950. Dominates Northeast. **Krispy Kreme:** South in 1937. Dominates South. **Tim Hortons:** Canadian hockey player in 1964. Dominates Canada.

Bandwagon Appeal



Dunkin' Donuts Shops

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- First-mover dominance **over 100 years** in packaged-foods industry, many goods of which are considered conformist such as beer and soft drinks (Bronnenberg et al. 2007, 2009 and 2011).

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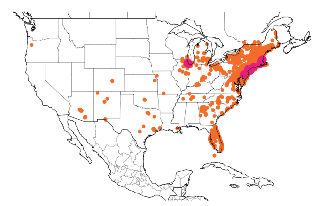

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LITERATURE (ADVERTISING)

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  - Similar strategic implications discussed: entry deterrence (Shaked and Sutton 1983, 1987; Sutton 1991, 2003), brand prestige, combative vs. mutually beneficial qualities, etc.

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    - Similar strategic implications discussed: entry deterrence (Shaked and Sutton 1983, 1987; Sutton 1991, 2003), brand prestige, combative vs. mutually beneficial qualities, etc.
- **Complementary:** "ads as a good." Allows welfare analysis. (Becker and Murphy, 1993)

Model of Persuasive Advertising

TIMELINE (SCHMALENSEE 1983)

$t = 0$: Firm A chooses location $\ell_a \in [0, 1]$ and advertising level $\lambda_a \in [0, 1]$. Public sees ad with probability λ_a. Convex cost $\frac{c}{2}\lambda_a^2$ to advertising.

Firm A:
ℓ_a, λ_a

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Firm A: ℓ_a, λ_a	Firm B: Entry, ℓ_b, λ_b
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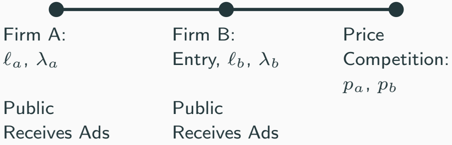
$t = 2$: Firms simultaneously set prices p_a and p_b. $\pi_a = p_a q_a - \frac{c}{2}\lambda_a^2$. $\pi_b = p_a q_b - \frac{c}{2}\lambda_b^2$.



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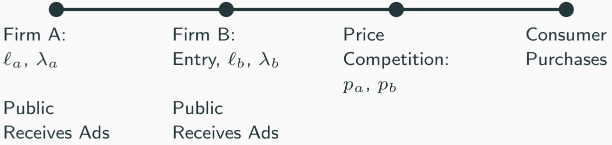

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$t = 4$: Consumer-Public matching (random). Partner infers $s(x)$.

Firm A: ℓ_a, λ_a	Firm B: Entry, ℓ_b, λ_b	Price Competition: p_a, p_b	Consumer Purchases	Consumer-Public Matching: Partner Infers $s(x)$
Public Receives Ads	Public Receives Ads			

ADVERTISING

- $\lambda = \lambda_a + \lambda_b - \lambda_a \lambda_b$ is probability a member of the public receives an advertisement from either firm. (Grossman and Shapiro, 1984)
- Ω denotes product characteristics
- Consumers maximize ex-ante expected utility over goods given λ probability they encounter someone who receives an ad.

CONSUMER EXPECTED UTILITY

The *expected utility* of consumer x when deciding purchase:

$$U_x(a) = v - (\ell_a - x)^2 - p_a + S_a$$
$$U_x(b) = v - (\ell_b - x)^2 - p_b + S_b$$
$$U_x(\emptyset) = S_\emptyset$$

where S_a, S_b and $S_\emptyset$ denote "signaling value" of each option.

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$$S_b = \lambda \int_0^1 \rho(x \mid b, \Omega)\, s(x)\, dx \;+\; (1-\lambda) \int_0^1 \rho(x)\, s(x)\, dx$$

$$S_\emptyset = \lambda \int_0^1 \rho(x \mid \emptyset, \Omega)\, s(x)\, dx \;+\; (1-\lambda) \int_0^1 \rho(x)\, s(x)\, dx$$

SIGNALING GAINS

Suppose $\ell_a < \ell_b$.

- In any equilibrium, there exists $n \in [0, 1]$ such that consumers to left of n buy a, and consumers to right of n buy b. Proof

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$$\begin{aligned} \Rightarrow S_{a/b}(n) &= \text{Signaling Gains of Good } a \text{ Over Good } b \\ &\equiv S_a(n) - S_b(n) \\ &= \lambda \left[\frac{1}{n} \int_0^n s(x)dx - \frac{1}{1-n} \int_n^1 s(x)dx \right] \end{aligned}$$

- Signaling gains from either good is function of the mass of purchasers!

SNOBBISM AND CONFORMISM

- Desire linearity of $S_{a/b}(n)$ for tractability.
- Desire monotonicity of $S_{a/b}(n)$ to focus on snobbish and conformist effects.

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Lemma (Corneo and Jeanne, 1997)

$S_{a/b}(n)$ is linear and *decreasing* if and only if $s(x)$ is quadratic and *convex*.

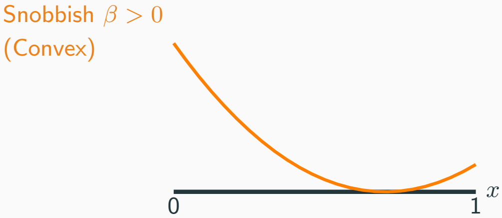
$S_{a/b}(n)$ is linear and *increasing* if and only if $s(x)$ is quadratic and *concave*.

Proof Sketch

SOCIAL STATUS FUNCTION

$$s(x) = \beta(x - \alpha)^2 \text{ where } \alpha \in [0, 1]$$

$S_{a/b}$



- Snobbish Example: x is scale of sophistication ($x = 0$) to ruggedness ($x = 1$). Increasing status returns to sophistication ($\beta > 0$). α signifies least desired x.

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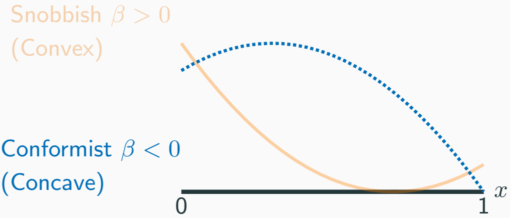
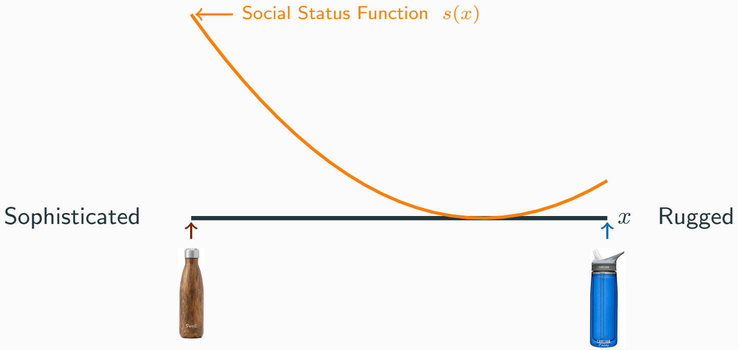


- Conformist Example: x measure of New England ($x = 0$) to Southern ($x = 1$) association. Decreasing status returns to New England identity ($\beta < 0$). α signifies most desired x.

SNOBBISH SOCIAL STATUS FUNCTION



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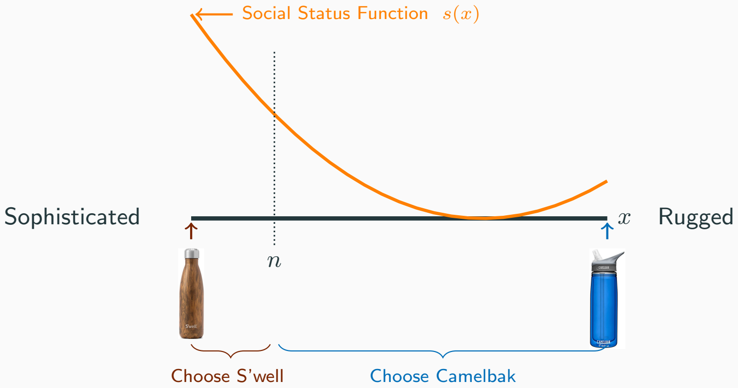

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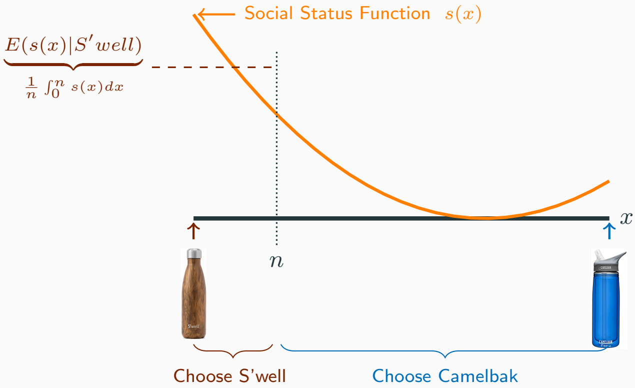

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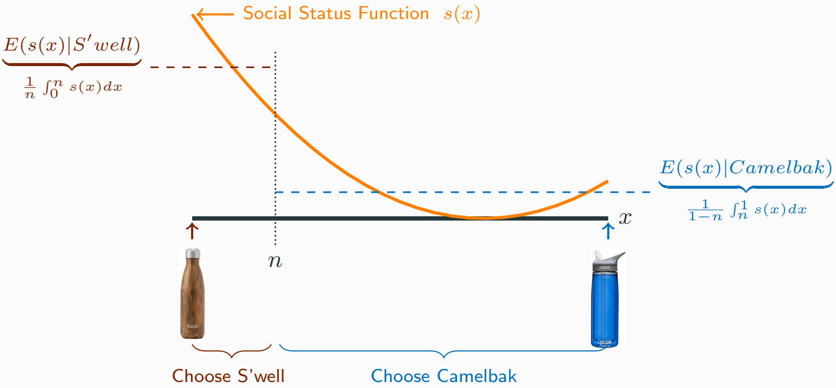
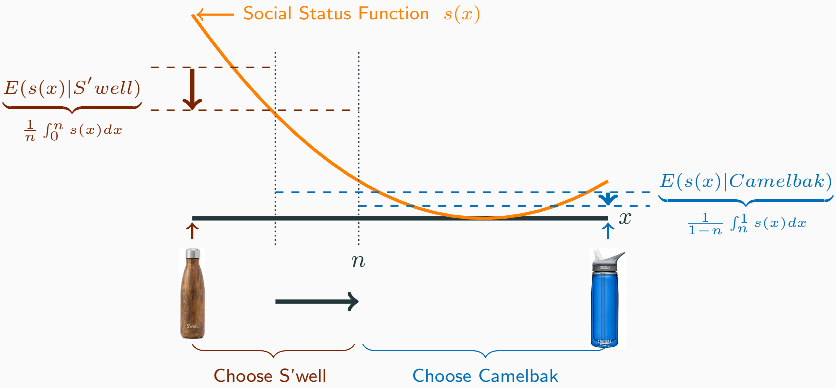


$$S_{\text{S'well/Camelbak}} = S_{S'well} - S_{Camelbak}$$

$$= \lambda[\, E(s(x)|S'well) - E(s(x)|Camelbak)\,]$$

$\Rightarrow$ Consider an increase in n

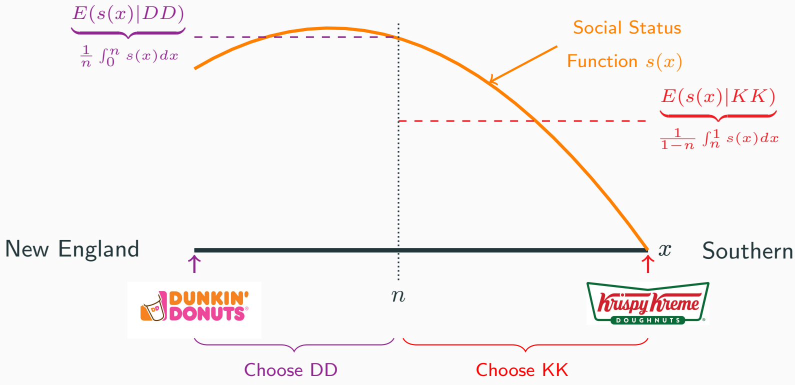
SNOBBISH SOCIAL STATUS FUNCTION



$$S_{\text{S'well/Camelbak}} = \lambda[\, E(s(x)|S'well) - E(s(x)|Camelbak)\,]$$

$S_{\text{S'well/Camelbak}}$ is decreasing in n due to convexity of $s(x)$

CONFORMIST SOCIAL STATUS FUNCTION



$$S_{DD/KK} = S_{DD} - S_{KK}$$
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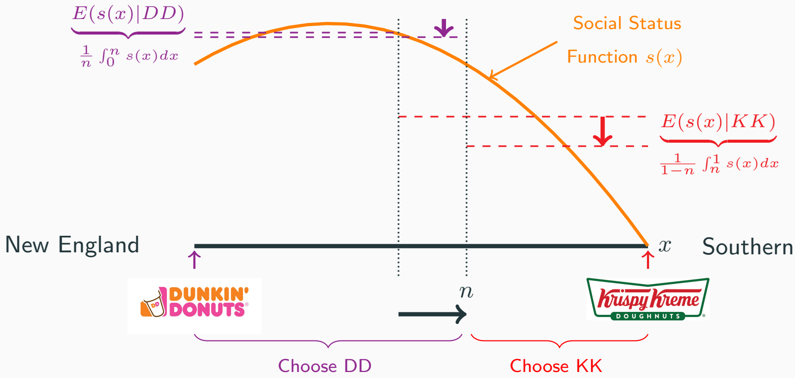
CONFORMIST SOCIAL STATUS FUNCTION



$$S_{DD/KK} = \lambda[\, E(s(x)|DD) - E(s(x)|KK)\,]$$

$S_{DD/KK}$ is increasing in n due to concavity of $s(x)$

Pricing in Snobbish and Conformist Markets (with entry)

SNOBBISH MARKET AT PRICING STAGE

Here, advertising...

SNOBBISH MARKET AT PRICING STAGE

Here, advertising...

- **(price effect)** weakly increases both firms' prices.
  - **intuition**: by strengthening snobbish motives, advertising reduces the elasticity of demand — when firms cut prices, not as many consumers rush in to buy, as the reputational gains decrease the more who buy. Induces firms to converge on inflated prices.

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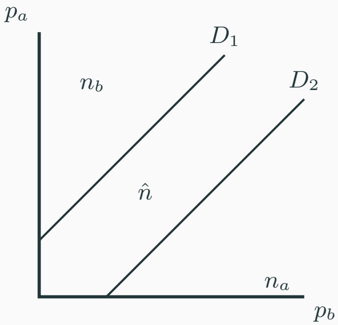
  - **intuition**: by strengthening snobbish motives, advertising reduces the elasticity of demand — when firms cut prices, not as many consumers rush in to buy, as the reputational gains decrease the more who buy. Induces firms to converge on inflated prices.
- **(prestige effect)** greater effect on price of firm closer to high types, and positive market share effect on that firm. Definition
- **(mutually beneficial)** increases revenues of one or both firms.

ANALYSIS SKETCH: SNOBBISH DEMAND

Demand given $\lambda = 0$, some $\ell_a < \ell_b$, $\beta > 0$, α and any prices..



$\hat{n} \in (0, 1)$

n_a: firm A wins all market share

n_b: firm B wins all market share

n determined by consumer who is just indifferent $U_n(a) = U_n(b)$

Calculation

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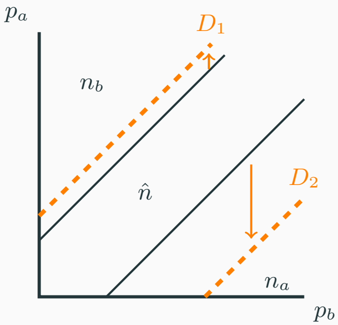


With Advertising $\lambda \uparrow$

$\hat{n} \in (0, 1)$

n_a: firm A wins all market share

n_b: firm B wins all market share

Consumers more likely to frequent both firms for given prices.

n determined by consumer who is just indifferent $U_n(a) = U_n(b)$

Calculation

ANALYSIS SKETCH: SNOBBISH PRICE EQUILIBRIUM

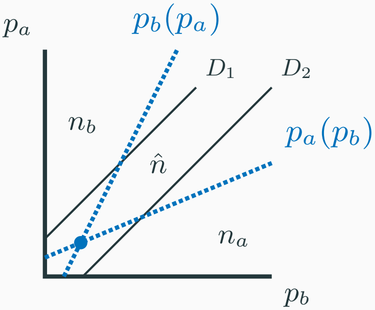
Firms A and B simultaneously solve

$$\max_{p_a} \; p_a \, n$$

$$\max_{p_b} \; p_b \, (1 - n)$$

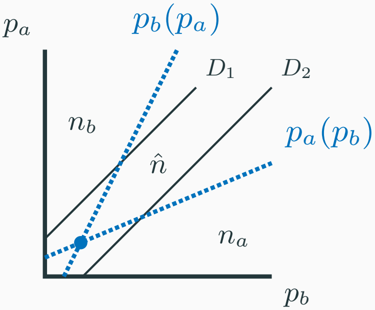
where n is function of (p_a, p_b) as well as $(\ell_a, \ell_b, \lambda, \beta, \alpha)$.

ANALYSIS SKETCH: SNOBBISH PRICE EQUILIBRIUM

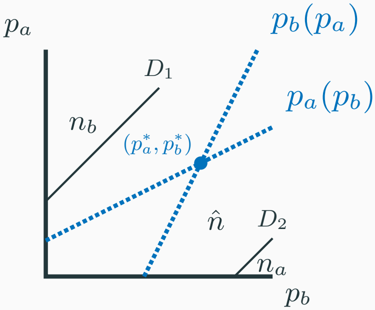


No Advertising

ANALYSIS SKETCH: SNOBBISH PRICE EQUILIBRIUM



No Advertising



With Advertising $\lambda \uparrow$

CONFORMIST MARKET AT PRICING STAGE

Here, advertising...

- **(price effect)** weakly decreases both firms' prices.
  - **intuition**: by strengthening conformist motives, advertising increases the elasticity of demand — when firms cut prices, more consumers rush in to buy, as the reuputational gains increase the more who buy. Induces firms to converge on deflated prices.

CONFORMIST MARKET AT PRICING STAGE

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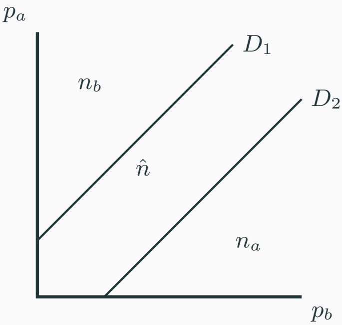
- **(prestige effect)** less harmful effect on price of firm closer to high types, and positive market share effect on that firm. Definition
- **(combative)** either i) increases one firm's revenues and decreases the other's or ii) decreases both firms' revenues.

ANALYSIS SKETCH: CONFORMIST DEMAND

Demand given $\lambda = 0$, some $\ell_a < \ell_b$, $\beta < 0$, α and any prices..



$\hat{n} \in (0, 1)$

n_a: firm A wins all market share

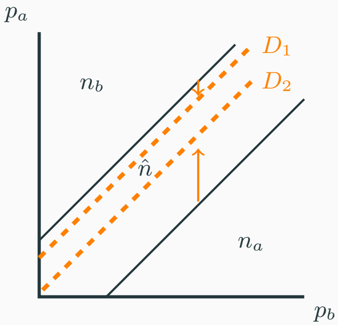
n_b: firm B wins all market share

n determined by consumer who is just indifferent $U_n(a) = U_n(b)$

Calculation

ANALYSIS SKETCH: CONFORMIST DEMAND

Demand given some $\ell_a < \ell_b$, $\beta < 0$, α and any prices..



With Advertising $\lambda \uparrow$

$\hat{n} \in (0, 1)$

n_a: firm A wins all market share

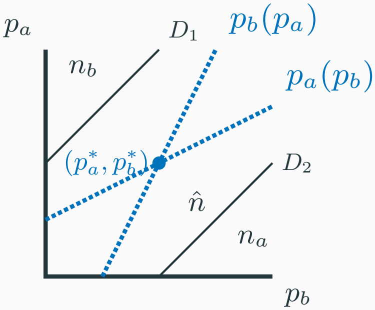
n_b: firm B wins all market share

*H*arder for firms to share market for given prices.

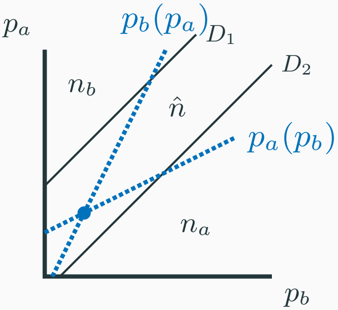
n determined by consumer who is just indifferent $U_n(a) = U_n(b)$

Calculation

ANALYSIS SKETCH: CONFORMIST PRICE EQUILIBRIUM



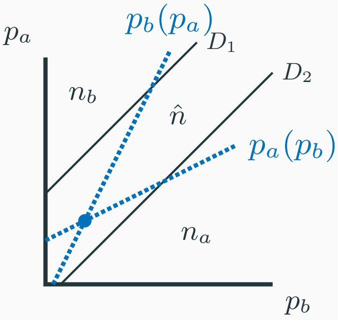
No Advertising



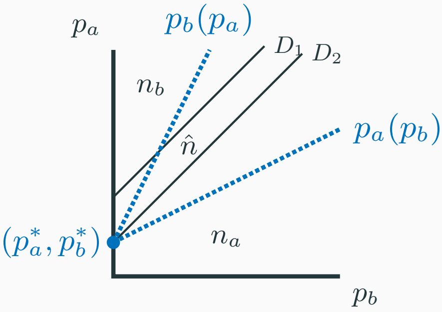
Some Advertising ($\lambda \uparrow$)

ANALYSIS SKETCH: CONFORMIST PRICE EQUILIBRIUM

If sufficient advertising ($\lambda \uparrow\uparrow$)
$\Rightarrow$ firm closer to high types takes over (limit pricing)!



Some Advertising ($\lambda \uparrow$)



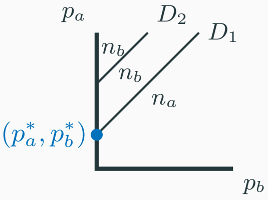
More Advertising ($\lambda \uparrow\uparrow$)
Firm A Takeover

ANALYSIS SKETCH: CONFORMIST PRICE EQUILIBRIUM

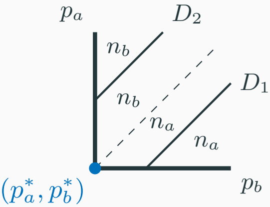
Even greater advertising ($\lambda \uparrow\uparrow\uparrow$)

$\Rightarrow$ D_1 and D_2 lines eventually cross, and there exists multiple price equilibria.

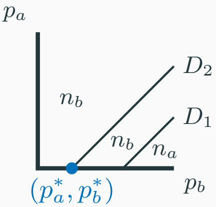
$\Rightarrow$ I introduce a refinement to select a unique price equilibrium.



Firm A Takeover



Bertrand Equilibrium



Firm B Takeover

Persuasive Advertising Equilibria

STANDARD MARKET EQUILIBRIA

Proposition (Standard Market)

If $\beta = 0$, then there exists a unique *symmetric* equilibrium.

- **Firm B enters.**
- Firms locate at opposite ends $\ell_a^* \in \{0, 1\}$ and $\ell_b^* = 1 - \ell_a^*$.
- **No advertising** takes place.
- Firms charge **identical** prices $p_a^* = p_b^* = 1$.
- Firms **split the market** $n^* = \frac{1}{2}$.

SNOBBISH MARKET EQUILIBRIA

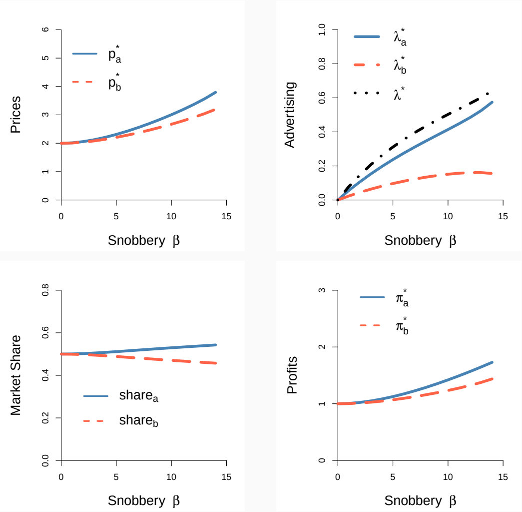
Proposition (Snobbish Market)

Suppose $\beta > 0$. If either $\alpha \in [\frac{1}{3}, \frac{2}{3}]$, or $\alpha \in [0, \frac{1}{3}) \cup (\frac{2}{3}, 1]$ and β is not too large, then there exists an equilibrium.

- **Firm B enters.**
- **Total advertising is positive.**
- Firms B locates at an end.
- **The firm closer to high types charges a higher price and earns greater market share.**

Existence Sketch

NUMERICAL SOLUTION SNOBBISH MARKET $\alpha = 0.4$



$\ell_a^* = 1$ and $\ell_b^* = 0$ in all equilibria. Assumes $c = \tau = 2$ and $\alpha = 0.4$.

CONFORMIST MARKET EQUILIBRIA

Proposition (Conformist Market)

If $\beta < 0$, then there exists an equilibrium.

- **If β and c are sufficiently low, then firm A advertises heavily $\lambda_a^* >> 0$ and chooses location ℓ_a^* close enough to high types such that firm B does not enter, allowing firm A to capture monopoly profits.**
- Otherwise, firms locate at opposite ends, $\lambda_b^* = 0$, and if $\alpha \in [\frac{1}{3}, \frac{2}{3}]$ then $\lambda_a^* = 0$.

Proof Sketch

(assumes firm B does not enter when implies 0 profits)

CONFORMIST MARKET EQUILIBRIA

- Ads like commitment to fight in the chainstore paradox.
- Holds with zero production cost or assumptions about returns to scale!
- Unlike much previous literature (Sutton 1991; Bain 1956; etc.), explains how persuasive ads influence demand to advantage of first-mover.

Welfare

WELFARE

$$\text{Consumer Surplus} = \begin{array}{c}\text{Good}\\\text{Value}\end{array} - \begin{array}{c}\text{Transportation}\\\text{Costs}\end{array} - \begin{array}{c}\text{Consumer}\\\text{Expenditures}\end{array} + \begin{array}{c}\text{Reputational}\\\text{Utility}\end{array}$$

$$\text{Producer Surplus} = \begin{array}{c}\text{Firm}\\\text{Revenues}\end{array} - \begin{array}{c}\text{Advertising}\\\text{Costs}\end{array}$$

$$\text{Total Surplus} = \begin{array}{c}\text{Good}\\\text{Value}\end{array} - \begin{array}{c}\text{Transportation}\\\text{Costs}\end{array} + \begin{array}{c}\text{Reputational}\\\text{Utility}\end{array} - \begin{array}{c}\text{Advertising}\\\text{Costs}\end{array}$$

Reputational Utility Independent of λ

$$\begin{aligned}
&\lambda n \, \frac{1}{n} \int_0^n s(x)\, dx \;+\; \lambda(1-n)\, \frac{1}{1-n} \int_n^1 s(x)\, dx \;+\; (1-\lambda) \int_0^1 s(x)\, dx \\
&= \int_0^1 s(x)\, dx \\
&= E(s(x))
\end{aligned}$$

WELFARE

- Since reputation is a **zero-sum game**, ads do not affect size of social identity pie, but which consumer get what portion (Frank 1985, Miller 2011).
  - **Social Planner Optimal:** $\lambda^o = 0$.
  - Could perturb result in several ways (e.g. model utility of public).

WELFARE

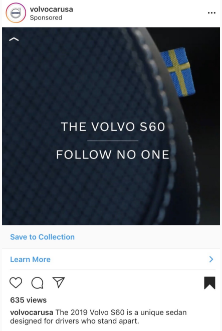
- Since reputation is a **zero-sum game**, ads do not affect size of social identity pie, but which consumer get what portion (Frank 1985, Miller 2011).
  - **Social Planner Optimal:** $\lambda^o = 0$.
  - Could perturb result in several ways (e.g. model utility of public).
- **Indirect Welfare Effects: prices**, **entry** and **transportation costs**.
  - **Prices:** when prices raised, advertising leads to a **transfer of welfare from consumers to firms**.
  - **Transportation Costs:** by limiting entry and inducing status concerns to overpower horizontal preferences, advertising can **increase transportation costs**.

Gives foundation to old contention that persuasive advertising is bad for consumers and society, providing insight into the channels through which this may operate (Dixit and Norman, 1978).

On a brighter note, if you're an entrepreneur entering an existing industry, there may be a lot of profits to be had in a snobbish market.

Thank You

SNOB APPEAL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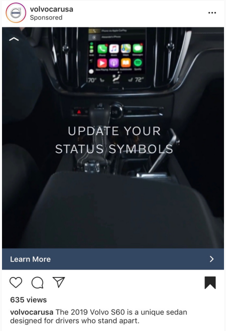
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volvocarusa The 2019 Volvo S60 is a unique sedan designed for drivers who stand apart.


Someone is going to stand out
IT MIGHT AS WELL BE YOU
essentia
overachieving H_2O

Backup Slides

CUT-OFF PROOF

Suppose $\ell_a < \ell_b$.

Suppose consumer $x' \in [0,1]$ purchases b while consumer $x'' > x'$ purchases a.

$$\Rightarrow U_{x''}(a) \geq U_{x''}(b) \text{ and } U_{x'}(b) \geq U_{x'}(a)$$

$$\Rightarrow U_{x''}(a) - U_{x''}(b) \geq U_{x'}(a) - U_{x'}(b)$$

$$\begin{aligned}\Leftrightarrow &\left(v - \tau(x'' - \ell_a)^2 - p_a + S_a \right) - \left(v - \tau(x'' - \ell_b)^2 - p_b + S_b \right)\\ &\geq \left(v - \tau(x' - \ell_a)^2 - p_a + S_a \right) - \left(v - \tau(x' - \ell_b)^2 - p_b + S_b \right)\end{aligned}$$

$$\Leftrightarrow -(x'' - \ell_a)^2 + (x'' - \ell_b)^2 \geq -(x' - \ell_a)^2 + (x' - \ell_b)^2$$

$$\Leftrightarrow x'' \leq x'$$

This is a contradiction.

Back

SIGNALING GAINS — SOCIAL STATUS GENERALIZATION

- Given any continuous $s(x)$:

$$S_{a/b}(n) = \frac{1}{n}\int_0^n s(x)dx - \frac{1}{1-n}\int_1^n s(x)dx$$

  - If $s(x) = a_1x^2 + a_2x + c$, then

$$S_{a/b}(n) = -\lambda[\ \frac{a_2}{2} + \frac{a_1}{3}(n+1)\ ]$$

  and $\frac{dS_{a/b}(n)}{dn}$ is only dependent on a_1 and λ

- A continuous and differentiable signaling gains function $S_{a/b}()$ can be rationalized by a social status function of the form

$$s(x) = (1-2x)S_{a/b}(x) + x(1-x)S'_{a/b}(x) + c$$

where c is an arbitrary constant.

Back

SIGNALING GAINS DERIVATION

Suppose $\ell_a < \ell_b$.

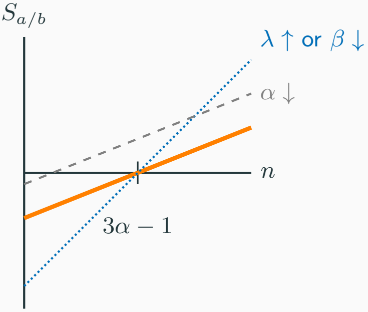
$$S_a(n) = \frac{\lambda}{n}\int_0^n s(x)dx \ + \ (1-\lambda)\, E(\, s(x)\,)$$
$$= \lambda\beta\,(\,\frac{n^2}{3} + \alpha^2 - \alpha n\,) \ + \ (1-\lambda)\, E(\, s(x)\,)$$
$$S_b(n) = \frac{\lambda}{1-n}\int_n^1 s(x)dx \ + \ (1-\lambda)\, E(\, s(x)\,)$$
$$= \lambda\beta\,(\,\frac{1+n+n^2}{3} + \alpha^2 - \alpha(1+n)\,) \ + \ (1-\lambda)\, E(\, s(x)\,)$$

$$\Rightarrow S_{a/b}(n) \equiv S_a(n) - S_b(n) = -\frac{\lambda\beta}{3}n + \lambda\beta(\alpha - \frac{1}{3})$$

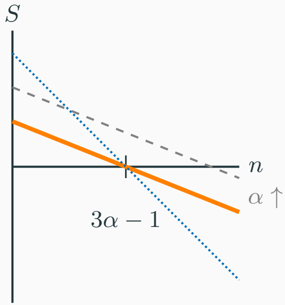
Back

SIGNALING GAINS

$$S_{a/b}(n) \equiv S_a(n) - S_b(n) = -\lambda\frac{\beta}{3}\,n + \lambda\beta\,(\alpha - \frac{1}{3})$$



Conformist $\beta < 0$



Snobbish $\beta > 0$

Back

DEMAND

Suppose $\ell_a < \ell_b$ and $\alpha = 0.4$.

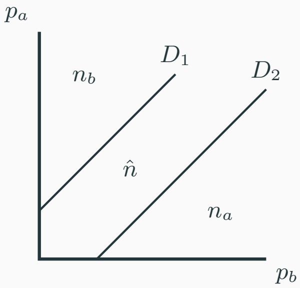
Given firm decisions, n is determined by consumer who is just indifferent between buying the two goods:

$$U_n(a) = U_n(b)$$
$$v - (\ell_a - n)^2 - p_a + S_a(n) = v - (\ell_b - n)^2 - p_b + S_b(n)$$
$$\hat{n} = \frac{p_b - p_a + (\ell_b - \ell_a)(\ell_a + \ell_b) + \lambda\beta\, 0.06}{2(\ell_b - \ell_a) + \lambda\frac{\beta}{3}}$$

- Denominator is positive if market is snobbish, or market is conformist and differentiation sufficiently large relative to conformity ("weak conformity").
- Denominator is negative if conformity overpowers differentiation ("strong conformity").

Back

DEMAND



"Snobbism\Weak Conformity"
$(2(\ell_b - \ell_a) > -\lambda \frac{\beta}{3})$

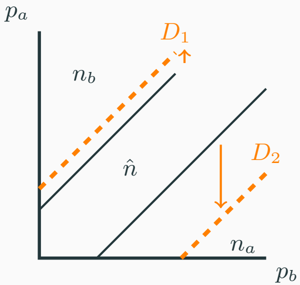
$$D_1: \; p_a = p_b + (\ell_b - \ell_a)(\ell_a + \ell_b) + \lambda\beta\, 0.06$$
$$D_2: \; p_a = p_b + (\ell_b - \ell_a)(\ell_a + \ell_b - 2) - \lambda\beta\, 0.266$$

where $n_a = 1$, $n_b = 0$ and $\hat{n} \in (0, 1)$.

Back

SNOBBISH DEMAND

Snobbery Increases $\lambda\beta \uparrow$

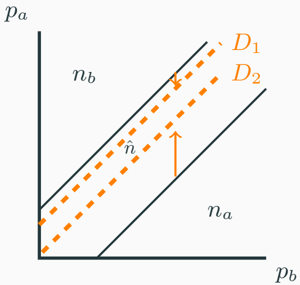


- Diagonals move further apart and $\hat{n}$ space increases.
- When $p_a = p_b$ (45 degree line), market share of firm with more prestigious position is increasing in advertising.
- n_a space decreases because firm B has prestige advantage.

Back

WEAKLY CONFORMIST DEMAND

Conformity Increases $\lambda\beta \downarrow$

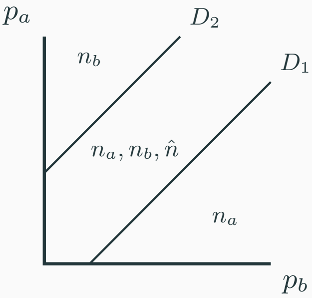


"Weak Conformity"
$(2(\ell_b - \ell_a) > -\lambda\frac{\beta}{3})$

- Diagonals move closer and harder to share market.
- Where diagonals cross market goes from weak conformity to strong conformity.
  - Diagonals cross above 45 degree line because firm A has more prestigious position.

Back

STRONG CONFORMITY DEMAND



"Strong Conformity"
$(2(\ell_b - \ell_a) \leq -\lambda \frac{\beta}{3})$

$$D_1 : \; p_a = p_b + (\ell_b - \ell_a)(\ell_a + \ell_b) + \lambda\beta \, 0.06$$
$$D_2 : \; p_a = p_b + (\ell_b - \ell_a)(\ell_a + \ell_b - 2) - \lambda\beta \, 0.266$$

where $n_a = 1$, $n_b = 0$ and $\hat{n} \in (0, 1)$.

Back

PRODUCT POSITIONING

Suppose $\ell_a < \ell_b$ and $\alpha < 0.5$.

- **Location Advantage:** Firm closer to greater quantity of consumers.
    - Firm A if $\ell_a + \ell_b > 1$
    - Firm B if $\ell_a + \ell_b < 1$
    - Symmetric if $\ell_a + \ell_b = 1$
- Unlike previous models, it matters not not just **how many** consumers a product appeals to, but also **which** consumers a product appeals to.
- **Prestige Advantage:** Firm on the side with highest types.
    - Firm A if $\beta < 0$
    - Firm B if $\beta > 0$
    - Symmetric if $\beta = 0$
    - Also define measure of which firm is closer to higher types on average ("more prestigious position"), and not just on same side of highest types. For illustrative purposes, just consider above.

Back

Suppose $\ell_a < \ell_b$ and $\alpha < 0.5$.

More Prestigious Position: If firms evenly split market ($n = \frac{\ell_a+\ell_b}{2}$), firm which holds greater signaling value has more prestigious position ($S_a(\frac{\ell_a+\ell_b}{2}) \gtrless S_b(\frac{\ell_a+\ell_b}{2})$).

	More Prestigious Position
Snobbish: $\beta > 0$ and $\ell_a + \ell_b < 6\alpha - 2$	Firm A
Snobbish: $\beta > 0$ and $\ell_a + \ell_b > 6\alpha - 2$	Firm B
Conformist: $\beta < 0$ and $\ell_a + \ell_b < 6\alpha - 2$	Firm B
Conformist: $\beta < 0$ and $\ell_a + \ell_b > 6\alpha - 2$	Firm A
$\beta = 0$ or $\ell_a + \ell_b = 6\alpha - 2$	Symmetric

SKETCH PROOF EXISTENCE IN SNOBBISH MARKET

$$\pi_a = \frac{\left(\frac{1}{3}(\ell_b - \ell_a)(2 + \ell_a + \ell_b) + \lambda\alpha\frac{\beta}{3} \right)^2}{2(\ell_b - \ell_a) + \lambda\frac{\beta}{3}} - \frac{c}{2}\lambda_a^2$$

$$\pi_b = \frac{\left(\frac{1}{3}(\ell_b - \ell_a)(4 - \ell_a - \ell_b) + \lambda(1-\alpha)\frac{\beta}{3} \right)^2}{2(\ell_b - \ell_a) + \lambda\frac{\beta}{3}} - \frac{c}{2}\lambda_b^2$$

Profit functions discontinuous at $\ell_a = \ell_b$.

Step 1: If $\alpha \in [\frac{1}{3}, \frac{2}{3}]$ or $\alpha \in [0, \frac{1}{3}) \cup (\frac{2}{3}, 1]$ and β is not too large, then firm B does not locate at discontinuity $\ell_b(\ell_a, \lambda_a) \in \{0, 1\}$, $\ell_b(\ell_a, \lambda_a) \neq \ell_a$.

- Berges Theorem of Maximum gives upper-hemicontinuity of $\lambda_b(\ell_a, \lambda_a)$ and continuity of $\pi_b^*(\ell_a, \lambda_a)$.

Step 2: Separate firm A's problem into locating to the left or right of firm B, and establish existence using extreme value theorem.

Back

CONFORMIST PROOF SKETCH

Step 1: If β is sufficiently negative, then $\exists$ compact space $\triangle \in [0,1]^2$ such that firm B cannot earn positive profits from entry if $(\ell_a, \lambda_a) \in \triangle$.

Step 2: Split into two modified games, game E in which firm B must enter, and game M in which firm B does not enter and firm A chooses from $(\ell_a, \lambda_a) \in \triangle$.

Step 3: Game M: $\exists$ solution (extreme value theorem), and firm A's profits at the optimum are strictly decreasing in c (envelope theorem).

Step 4: Game E: $\exists$ solution (Harris 1985). If $(\ell_a^*, \lambda_a^*) \notin \triangle$, then $\ell_b^* \in \{0,1\}$ and $\lambda_b^* = 0$.

Step 5: If $(\ell_a^*, \lambda_a^*) \in \triangle$ game E, then $(\ell_a^*, \lambda_a^*) \in \triangle$ in original game.

Finally, with some work, show that firm A's profits in game M decline more rapidly in c those in game E to establish unique cut-off $\overline{c}$. Back

SIMULTANEOUS VERSION

- Consider version of the game where firms choose ads, locations and entry decisions simultaneously.
- Existence of pure strategy equilibria is generally made more difficult here.
- However, existence can be guaranteed when $\alpha = \frac{1}{2}$.

SIMULTANEOUS SNOBBISH MARKET

Suppose $\beta > 0$ and $\alpha = 0.5$. When firms locate at opposite ends, profit functions of firms simplify to:

$$\pi_a = \frac{\tau}{2} + \frac{\lambda\beta}{12} - \frac{c}{2}\lambda_a^2$$

$$\pi_b = \frac{\tau}{2} + \frac{\lambda\beta}{12} - \frac{c}{2}\lambda_b^2$$

Firms locate at opposite ends, $p_a^* = p_b^* = \tau + \frac{\lambda^*\beta}{6}$, $n^* = \frac{1}{2}$ and:

$$\lambda_a^* = \lambda_b^* = \frac{\beta}{12c + \beta}$$

SIMULTANEOUS CONFORMIST MARKET

Suppose $\beta < 0$ and $\alpha = 0.5$.

If β is sufficiently negative and c is sufficiently low, then there exists two types of equilibria:

- One firm advertises, locates at $\frac{1}{2}$ and the other firm does not enter.
    - This equilibrium made easier by fact that when $\alpha = \frac{1}{2}$, the optimal monopoly location ($\frac{1}{2}$) happens to also be able to deter other firm's entry.
- Both firms enter, neither firm advertises, and firms locate at opposite ends.

If firms move sequentially, then only the former type of equilibria exists.