

Persuasive Advertising in Conformist and Snobbish Markets

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MOTIVATION

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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 $\ell = x$.

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

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

$$u(\text{good}) = v - (\ell - x)^2 - p$$

- x is an attribute of the consumer's identity.
 - e.g. measure of sophistication, or other latent social variable.

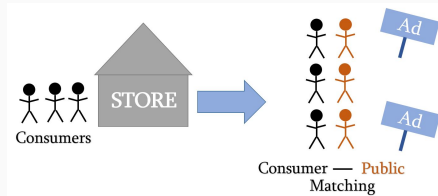
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$$u(\text{good}) = v - (\ell - x)^2 - p + \underbrace{\text{Public's Expectation of } s(x)}_{\text{Reputational Utility}}$$

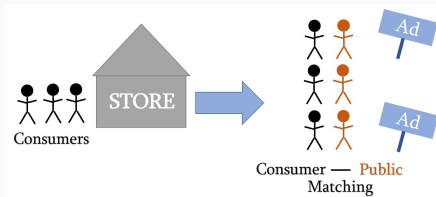
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- Based on attribute, consumers exogenously assigned **social status** $s(x) : [0, 1] \rightarrow \mathbb{R}$, representing a claim to esteem by others.
- Consumers receive **reputational utility** from signaling high social status to a group of non-consuming spectators called "**the public.**" Public does not know x of consumer, but tries to infer it.
 - Reputational utility equals public's expectation of $s(x)$.
(Corneo and Jeanne 1997, Bernheim 1994, etc.)

MY APPROACH: ADVERTISING



- After shopping, consumer randomly encounter someone from public.

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- 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: $\rho(x)$

MOTIVATION (CONFORMIST & SNOB EFFECTS)

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- **Snobbish Markets:** Goods made more attractive by greater exclusivity.
 - Might 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 about effects of conformity and snobbery on persuasive ads.

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](#)

That's not just a water bottle - it's a status symbol

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STYLIZED FACTS (SNOBBISH MARKETS)

- Reusable water bottles status symbol among millennials in recent years.
- **Abundance of Brands:** Dozens to hundreds of new water bottles.
- **Inflated Prices:** \$30 for 17 oz bottle of leading brand, S'well.
- **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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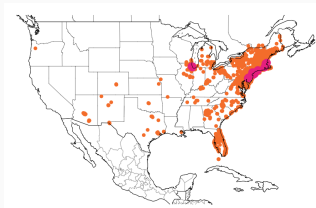
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STYLIZED FACTS (CONFORMIST MARKETS)

- 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



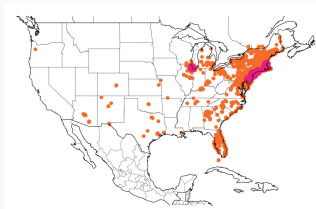
Dunkin' Donuts Shops

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 - **Dunkin' Donuts:** Massachusetts in 1950. Dominates Northeast. **Krispy Kreme:** South in 1937. Dominates South. **Tim Hortons:** Canadian hockey player in 1964. Dominates Canada.
- 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).



Bandwagon Appeal



Dunkin' Donuts Shops

3 Broad Camps (Bagewell, 2007)

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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

Public

Receives Ads

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$t = 1$: Firm B decides whether to enter, location $\ell_b \in [0, 1]$ and advertising level $\lambda_b \in [0, 1]$. Public sees ad with probability λ_b . Convex cost $\frac{c}{2}\lambda_b^2$ to advertising.

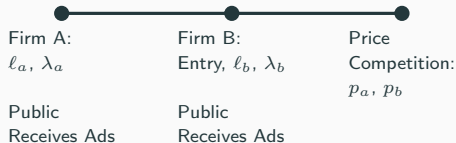


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$t = 2$: Firms simultaneously set prices p_a and p_b . $\pi_a = p_a q_a - \frac{c}{2}\lambda_a^2$.
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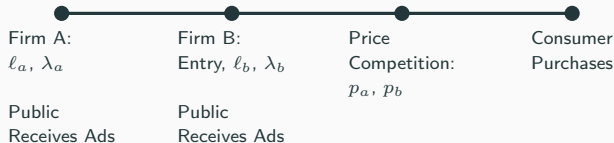
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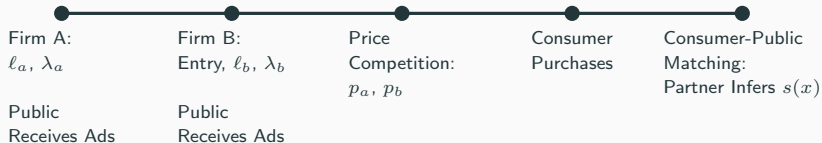
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$t = 3$: Consumers choose a , b or not purchase \emptyset .

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



- $\lambda = \lambda_a + \lambda_b - \lambda_a \lambda_b$ 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.

$$S_a = \underbrace{\lambda}_{\text{probability receives ad}} \underbrace{\int_0^1 \rho(x | a, \Omega) s(x) dx}_{\text{expected status of those choosing good a}} + \underbrace{(1 - \lambda)}_{\text{probability no ad}} \underbrace{\int_0^1 \rho(x) s(x) dx}_{\text{expected status random consumer}}$$

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

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

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 a good is a function of the mass of purchasers!

- 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*.

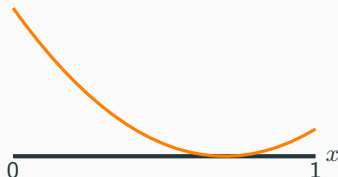
$S_{a/b}(n)$ is linear and *increasing* if and only if $s(x)$ is quadratic and *concave*.

Proof Sketch

SOCIAL STATUS FUNCTION

Let $s(x) = \beta(x - \alpha)^2$ where $\alpha \in [0, 1]$.

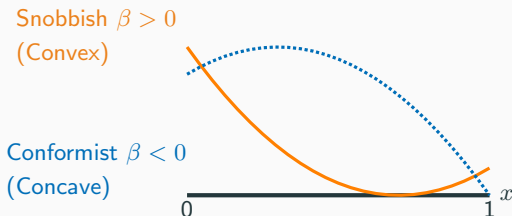
Snobbish $\beta > 0$
(Convex)



- **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 .

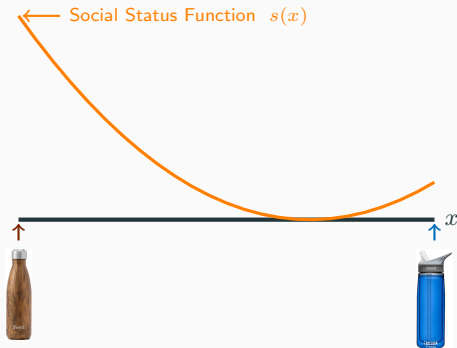
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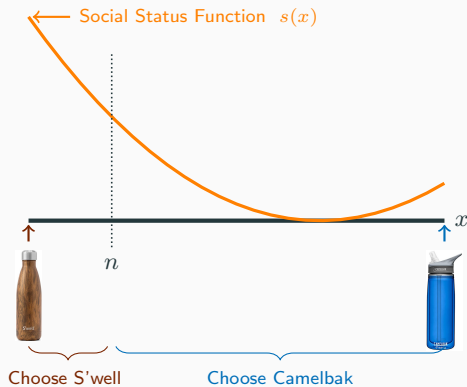
- **Snobbish Example:** x is scale of sophistication ($x = 0$) to ruggedness ($x = 1$). Increasing status returns to sophistication ($\beta > 0$). α signifies least desired x .
- **Conformist Example:** x measure of New England ($x = 0$) to Southern ($x = 1$) identity. Decreasing status returns to New England identity ($\beta < 0$). α signifies most desired x .

SNOBBISH SOCIAL STATUS FUNCTION



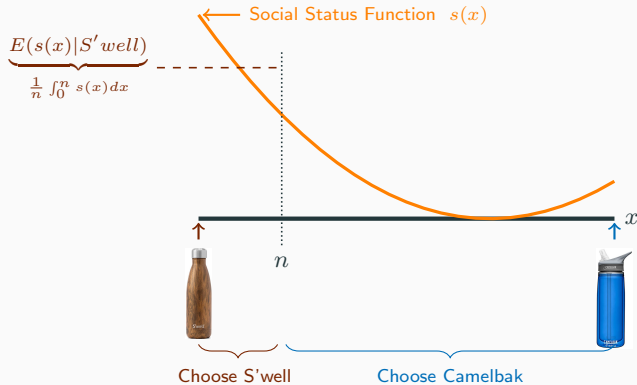
- Sophisticated ($x = 0$) versus rugged ($x = 1$).

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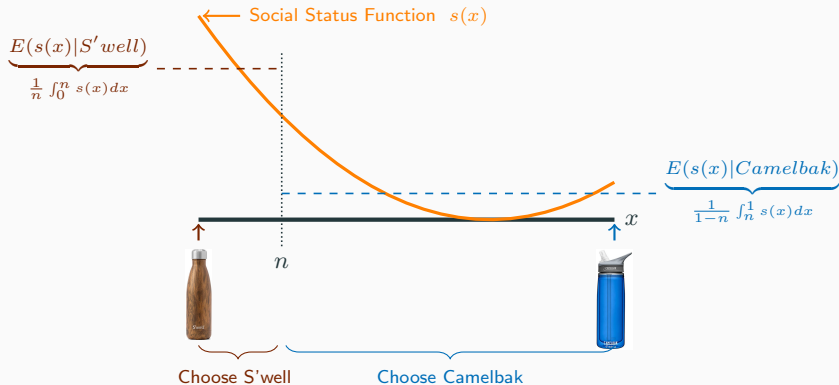
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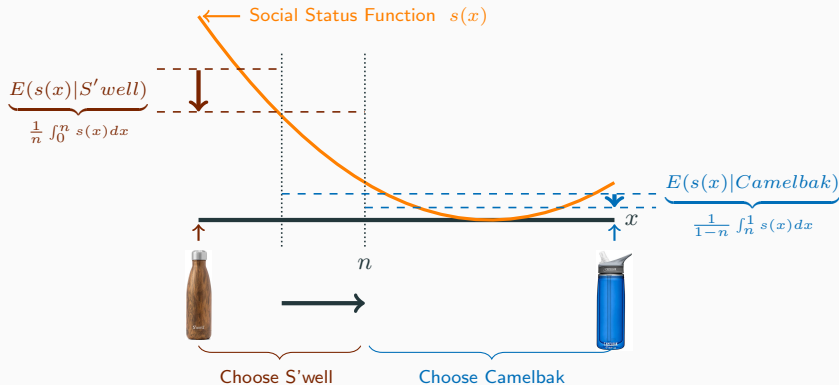


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$$\begin{aligned}
 S_{S'well/Camelbak} &= S_{S'well} - S_{Camelbak} \\
 &= \lambda [E(s(x)|S'well) - E(s(x)|Camelbak)]
 \end{aligned}$$

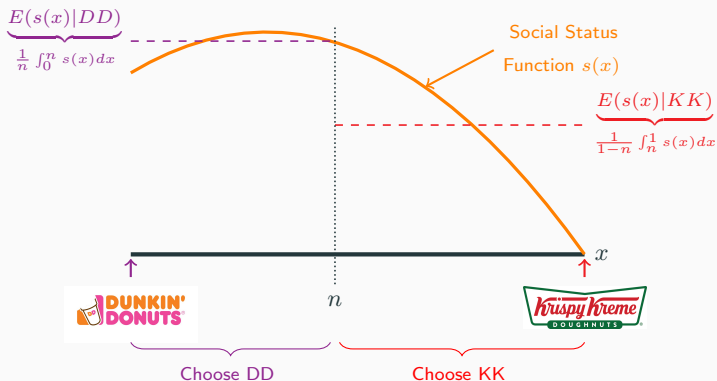
⇒ Consider an increase in n .

SNOBBISH SOCIAL STATUS FUNCTION



- $S_{S'well/Camelbak} = \lambda [E(s(x)|S'well) - E(s(x)|Camelbak)]$
- $S_{S'well/Camelbak}$ is decreasing in n due to the convexity.

CONFORMIST SOCIAL STATUS FUNCTION

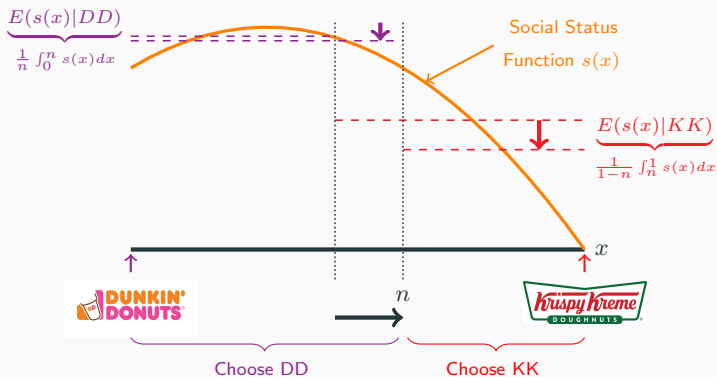


- x is scale of New England ($x = 0$) versus Southern identity ($x = 1$).

$$\begin{aligned}
 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.

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

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

Derivation

Persuasive Advertising Equilibria

Proposition (Standard Market)

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

- **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**: $n^* = \frac{1}{2}$.

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-
- Does not explain role of persuasive advertising, asymmetries in prices and market shares of physically similar goods, and barriers to entry in heavily advertised markets.

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.

Analysis Sketch

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- **(prestige effect)** greater positive effect on price of firm closer to high types, and positive market share effect on that firm.
- **(mutually beneficial)** increases revenues of one or both firms.

Analysis Sketch

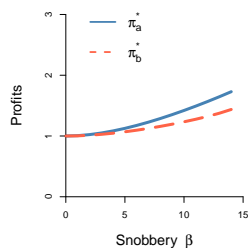
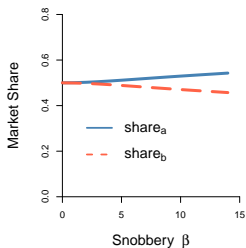
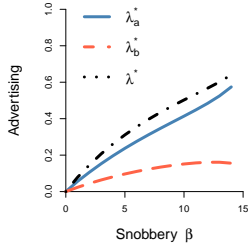
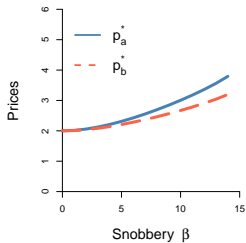
Proposition (Snobbish Market)

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. In this 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 $\alpha = 0.4$



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

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- **(prestige effect)** less negative effect on price of firm closer to high types, and positive market share effect on that firm.
- **(combative)** increases revenues of one or zero firms, and decreases revenues of one or both firms.

Analysis Sketch

Proposition (Conformist Market)

Suppose $\beta < 0$ and $\alpha \in [0, 1]$.

- If β is sufficiently negative and c is sufficiently low, then firm A advertises heavily λ_a^* and chooses a 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)

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

Welfare

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

$$\text{Producer Surplus} = \text{Firm Revenues} - \text{Advertising Costs}$$

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

Reputational Utility Independent of λ

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

- Since reputation is a **zero-sum game**, advertising does not affect size of the social identity pie, and only influences which consumer gets what portion (Frank 1985, Miller 2011).
 - **Social Planner:** Optimal level of persuasive advertising is **0**.
 - Result could be perturbed in several ways (e.g. model utility of the public).


- Since reputation is a **zero-sum game**, advertising does not affect size of the social identity pie, and only influences which consumer gets what portion (Frank 1985, Miller 2011).
 - **Social Planner:** Optimal level of persuasive advertising is **0**.
 - Result could be perturbed in several ways (e.g. model utility of the public).
- **Indirect Welfare Effects:** Influence through **prices**, **entry** and **transportation costs**.
 - **Prices:** When increasing prices, advertising leads to a **transfer of welfare from consumers to firms**.
 - **Transportation Costs:** By limiting entry and inducing consumers to respect their status concerns over their horizontal preferences, advertising can **increase transportation costs**.

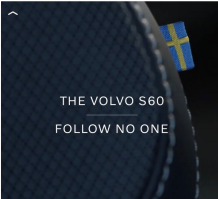
Gives foundation to old contention that persuasive advertising is bad for consumers and society, providing insight into the channels through which this may operate.

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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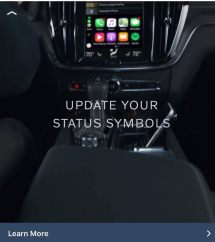
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Backup Slides

Suppose $\ell_a < \ell_b$.

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

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

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

$$\Leftrightarrow (v - \tau(x'' - \ell_a)^2 - p_a + S_a) - (v - \tau(x'' - \ell_b)^2 - p_b + S_b) \\ \geq (v - \tau(x' - \ell_a)^2 - p_a + S_a) - (v - \tau(x' - \ell_b)^2 - p_b + S_b)$$

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

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

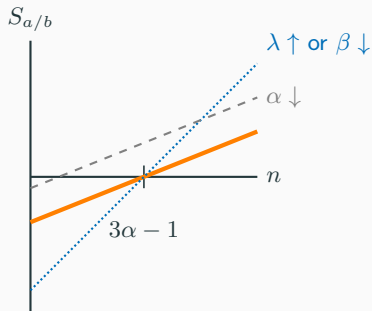
This is a contradiction.

Suppose $\ell_a < \ell_b$.

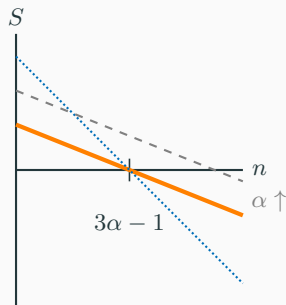
$$\begin{aligned}
 S_a(n) &= \frac{\lambda}{n} \int_0^n s(x) dx + (1 - \lambda) E(s(x)) \\
 &= \lambda \beta \left(\frac{n^2}{3} + \alpha^2 - \alpha n \right) + (1 - \lambda) E(s(x)) \\
 S_b(n) &= \frac{\lambda}{1 - n} \int_n^1 s(x) dx + (1 - \lambda) E(s(x)) \\
 &= \lambda \beta \left(\frac{1 + n + n^2}{3} + \alpha^2 - \alpha(1 + n) \right) + (1 - \lambda) E(s(x)) \\
 \Rightarrow S_{a/b}(n) &\equiv S_a(n) - S_b(n) = -\frac{\lambda \beta}{3} n + \lambda \beta \left(\alpha - \frac{1}{3} \right)
 \end{aligned}$$

SIGNALING GAINS

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



Conformist $\beta < 0$



Snobbish $\beta > 0$

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 $s(x) = a_1 x^2 + a_2 x + c$, then

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

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.

Consumption Subgame Equilibria

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 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.

PRODUCT POSITIONING

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

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

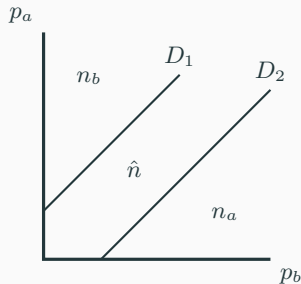
Given firm decisions, n is determined by consumer who is just indifferent between buying the two goods:

$$U_n(a) = U_n(b)$$

$$v - (\ell_a - n)^2 - p_a + S_a(n) = v - (\ell_b - n)^2 - p_b + S_b(n)$$

$$\hat{n} = \frac{p_b - p_a + (\ell_b - \ell_a)(\ell_a + \ell_b) + \lambda\beta 0.06}{2(\ell_b - \ell_a) + \lambda\frac{\beta}{3}}$$

- 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**”).



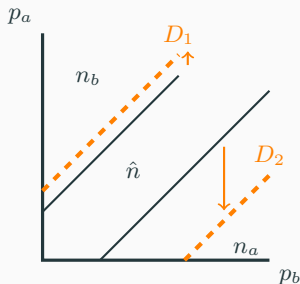
“Snobbism\Weak Conformity”
 $(2(\ell_b - \ell_a) > -\lambda \frac{\beta}{3})$

$$D_1 : p_a = p_b + (\ell_b - \ell_a)(\ell_a + \ell_b) + \lambda\beta \ 0.06$$

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

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

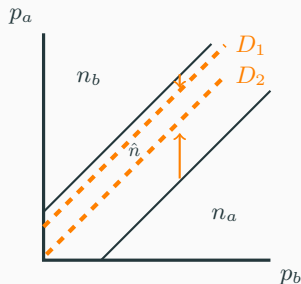
Snobbery Increases $\lambda\beta \uparrow$



- 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.

WEAKLY CONFORMIST DEMAND

Conformity Increases $\lambda\beta \downarrow$

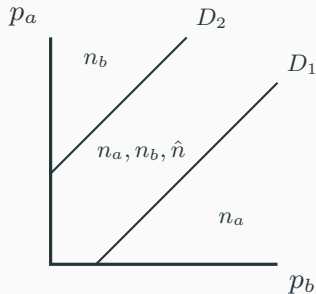


“Weak Conformity”
 $(2(\ell_b - \ell_a) > -\lambda \frac{\beta}{3})$

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

Price Subgame Equilibria

Firms A and B solve

$$\max_{p_a} p_a n$$

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

where n is function of $(p_a, p_b, \ell_a, \ell_b, \lambda, \beta, \alpha)$ as shown in demand maps.

Snobbish Market ($\beta > 0$):

$$p_a = \frac{1}{3}(\ell_b - \ell_a)(2 + \ell_a + \ell_b) + \lambda\beta \text{ 0.13} > 0$$

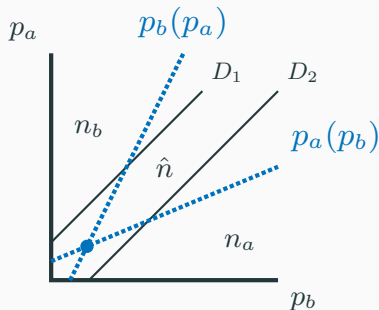
$$p_b = \frac{1}{3}(\ell_b - \ell_a)(4 - \ell_a - \ell_b) + \lambda\beta \text{ 0.2} > 0$$

$$n = \frac{\frac{1}{3}(\ell_b - \ell_a)(2 + \ell_a + \ell_b) + \lambda\beta \text{ 0.13}}{2(\ell_b - \ell_a) + \lambda\frac{\beta}{3}} \in (0, 1)$$

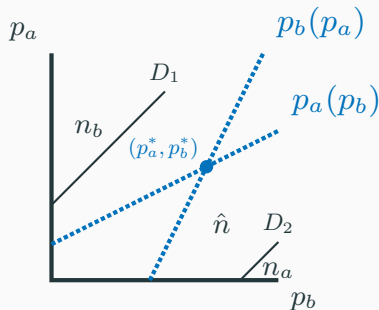
- Both firms earn positive revenues.
- Both prices are increasing in advertising.
- Advertising has greater positive effect on price of firm with prestige advantage.
- Advertising increases market share of firm with more prestigious position.

Intuition: By increasing snobbery, advertising reduces elasticity of demand, allowing firms to converge on higher prices.

SNOBBISH PRICE EQUILIBRIUM



(a) No Advertising



(b) With Advertising $\lambda\beta \uparrow$

$$p_a(p_b) = \frac{p_b}{2} + \frac{1}{2}(\ell_b - \ell_a)(\ell_a + \ell_b) + \lambda\beta \cdot 0.03$$

$$p_b(p_a) = \frac{p_a}{2} + \frac{1}{2}(\ell_b - \ell_a)(2 - \ell_a - \ell_b) + \lambda\beta \cdot 0.13$$

- Both prices increase in advertising, and p_b increases more.

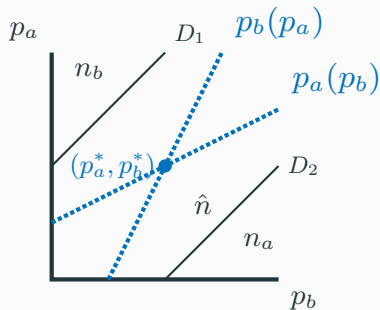
Weakly Conformist Market ($\beta < 0$ and $2(\ell_b - \ell_a) > -\lambda\frac{\beta}{3}$):

If conformity ($\lambda\beta$) is sufficiently small, then firms share the market and:

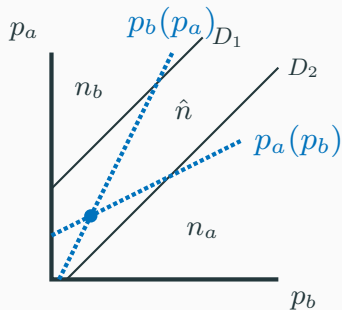
- Both prices are decreasing in advertising.
- Advertising has less negative effect on price of firm with prestige advantage.
- Advertising increases market share of firm with more prestigious position.

Intuition: By increasing conformity, advertising increases elasticity of demand, inducing firms to converge on lower prices.

WEAK CONFORMITY PRICE EQUILIBRIUM



(a) No Advertising

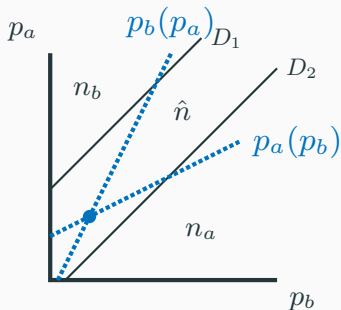


(b) With Some Advertising ($\lambda\beta \downarrow$)

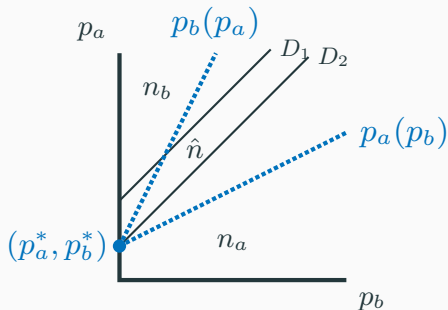
- Both prices decrease in advertising, and p_b decreases more.

WEAK CONFORMITY PRICE EQUILIBRIUM

However, if conformity is sufficiently large ($\lambda\beta \downarrow$), then one firm may take over the market.



(a) With Some Advertising ($\lambda\beta \downarrow$)



(b) With More Advertising ($\lambda\beta \downarrow\downarrow$)
Firm A Takeover

WEAK CONFORMITY PRICE EQUILIBRIUM

If conformity is sufficiently large ($\lambda\beta \downarrow$), then firm with more prestigious position takes over, charging a limit price just high enough to prevent other from earning positive revenues.

$$p_a = -(\ell_b - \ell_a)(2 - \ell_a - \ell_b) - \lambda\beta 0.266 > 0$$

$$p_b = 0$$

$$n = n_A$$

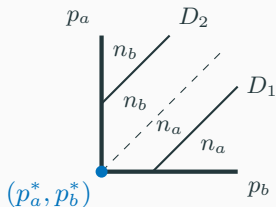
Could not get this result in standard horizontal market.

- Under strong conformity, there exists multiple price equilibria, and I introduce a refinement to select a unique price equilibrium.

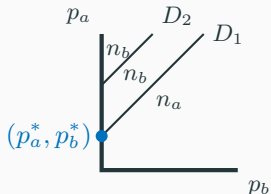
Strong Conformity ($\beta < 0$ and $2(\ell_b - \ell_a) < -\lambda \frac{\beta}{3}$):

- **Issue:** Multiplicity of equilibria of price subgame. (Grilo et. al, 2001)
- **Axiom (Cheaper is Better).** If i) price pair (p_b, p_a) can induce partitions n_a, n_b and $\hat{n} \in (0, 1)$ and ii) $p_a \neq p_b$, then consumers settle on the partition giving greatest market share to the firm with the lower price (n_a if $p_a < p_b$ and n_b if $p_a > p_b$).
- Under this refinement, firm revenues are uniquely determined in equilibrium.

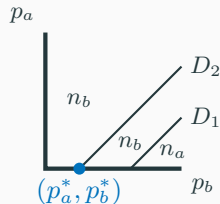
STRONG CONFORMITY PRICE EQUILIBRIUM



(a) Bertrand Equilibrium



(b) Firm A Takeover



(c) Firm B Takeover

- Which equilibrium results depends on position of D_1 and D_2 lines relative to 45 degree line.

SKETCH PROOF EXISTENCE IN SNOBBISH MARKET

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

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 $\ell_b(\ell_a, \lambda_a) \in \{0, 1\}$, $\ell_b(\ell_a, \lambda_a) \neq \ell_a$.

- Berge's 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.

CONFORMIST PROOF SKETCH

- Step 1:** If β is sufficiently negative, then \exists compact space $\Delta \in [0, 1]^2$ such that firm B cannot earn positive profits from entry if $(\ell_a, \lambda_a) \in \Delta$.
- 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 $(\ell_a, \lambda_a) \in \Delta$.
- 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 $(\ell_a^*, \lambda_a^*) \notin \Delta$, then $\ell_b^* \in \{0, 1\}$ and $\lambda_b^* = 0$.
- Step 5:** If $(\ell_a^*, \lambda_a^*) \in \Delta$ game E , then $(\ell_a^*, \lambda_a^*) \in \Delta$ in original game.

Finally, with some work, show that firm A 's profits in game M decline more rapidly in c than those in game E to establish unique cut-off \bar{c} . [Back](#)

- 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 $\alpha = \frac{1}{2}$.

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

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

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

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

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

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

Suppose firms move simultaneously. 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.