

# Graduate IO: Advertising

November 14, 2016

# Agenda

- ▶ advertising
  - ▶ informative advertising
  - ▶ persuasive advertising
- ▶ papers
  - ▶ Akerberg (2000)
  - ▶ Hasting, Hortacsu and Syverson (2013)

# Advertising

- ▶ advertising is ubiquitous and the amounts spent on it are staggering
  - ▶ in 2002, US firms spent 236.9 billion dollars (approximately 2.3% of GDP) on advertising
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- ▶ media (TV, radio, newspapers, magazines, yellow pages, Internet) advertising accounts for roughly 58% of total expenditures
- ▶ non-media include direct mailings, promotions, coupons, catalogs, business publications, sponsorship of special events

## More About Advertising

- ▶ advertising-to-sales ratio varies widely across industries and products within an industry
  - ▶ for example, it is 2% for expensive items like cars, but 14% on less expensive items like soaps and cleaners
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  - ▶ the variation is not easily explained
- ▶ the relationship between advertising and market power is also not clear
  - ▶ old theories argued that advertising was a source of product differentiation and represented a “barrier to entry”
  - ▶ these studies point to positive correlation between profit rates and advertising rates as evidence

# Problem

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  - ▶ newer theories and evidence suggest that advertising often makes people aware of new goods and hence makes entry easier and increases price competition
- ▶ main problem: we do not understand very well “when and how” advertising affects consumer demand

## Some Questions

- ▶ what is the interrelationship between price and advertising in particular goods?
  - ▶ example: ban on advertising of cigarettes to youths
  - ▶ implication: the lower advertising leads to lower prices (strategic complements), youths were more price sensitive, so net result was an increase in youth smoking

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- ▶ what is the role of price and advertising in introducing new goods? what is the role of advertising after everyone knows about product?
- ▶ what are the welfare implications of advertising?
  - ▶ example: in 1997, FDA changed the required content of prescription drug television ads which allowed drug companies to advertise drugs direct to consumers

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- ▶ informative advertising: provides consumers with information about price, characteristics, location of sale, use (e.g., recipes)
- ▶ this sort of advertising is pro-competitive: when consumers are aware of close substitutes, firms cannot charge high prices; also, reduces product differentiation due to lack of information (e.g., lowers search costs)

# Signalling Quality

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- ▶ he distinguishes between search goods and experience goods

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- ▶ experience goods: consumers can learn about the good only through consumption (e.g., books)
- ▶ producers of high quality experience goods know that consumers who purchase these products are more likely to buy the product again
  - ▶ thus, present value of sales from an ad for a high quality product is higher than that of a low quality product

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- ▶ advertising is a signal about product quality
- ▶ consumers infer from the advertising the quality of the product and buy products that are heavily advertised
  - ▶ Milgrom and Roberts (JPE, 1986) formalized this argument



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- ▶ the signaling argument is a “money-burning” story, what matters is the amount of money spent on advertising, not the content of the advertising which may be completely uninformative
- ▶ Spence offered a similar story to explain the role of higher education
  - ▶ advertising that enable more efficient matching between consumers and products

## Remarks (Conts.)

- ▶ much of what marketing is about is figuring out how to direct advertising to consumers who will “find it useful”
  - ▶ for example, online retailers frequently respond to purchases by providing buyers with information on “similar” products

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  - ▶ for example, online retailers frequently respond to purchases by providing buyers with information on “similar” products
- ▶ advertising may “jog one’s memory” about the existence of a good: memory loss is one possible explanation for why continual advertising is necessary for a good whose characteristics do not change
  - ▶ an example is prescription drugs, it appears that advertising increases compliance rates

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- ▶ just as in R&D, advertising may generate big spillovers, when one firm advertises its product, it may make consumers aware of a range of products and the benefits are not captured by the advertiser
  - ▶ advertising of drugs often fall to zero after generics enter
  - ▶ Pepsi and Coke advertising wars may have been mutually reinforcing



## Remarks (Cont.)

- ▶ when advertising expands the choice set of individuals, demand becomes more elastic and prices fall; on the other hand, one can also write down models where advertising make consumers less elastic with respect to prices
  - ▶ Beham finds prices of eyeglasses fall after firms were allowed to advertise
  - ▶ Waldfogel and Mylos find no change in prices after liquor advertising was allowed in Rhode Island

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- ▶ there is a real issue of whether advertising is “mis-informative”: the FTC is charged with responsibility of monitoring truthfulness of advertising claims but there is a large gray area

# Persuasive Advertising

- ▶ early view was that image advertising is an attempt by a firm to differentiate its product: the idea is to convince consumers that its product provides more utility than products of its rivals
  - ▶ this leads to conclusion that advertising is socially wasteful, consumers who buy the product may believe that it generates more utility than rival products and hence are willing to pay higher prices but their belief is not correct
  - ▶ but, need to assume that consumers are consistently fooled!

## Persuasive Advertising (Cont.)

- ▶ another possibility is that advertising changes preferences rather than beliefs
  - ▶ problematic for economists who typically take preferences as fixed
  - ▶ example: without advertising, consumers are willing to pay \$6 for Brand X detergent, the box costs \$2 and firm charges \$4, thus, total surplus is \$4; with advertising, consumers are convinced the box is worth \$10 and firm sells the box for \$6; consumer surplus has increased to \$4 and if advertising costs are less than \$2, the firm's profits have also increased, total surplus increases

## Persuasive Advertising (Cont.)

- ▶ the modern version of this story is that advertising has a psychological or social component that generates utility
  - ▶ advertising makes the product appear more prestigious and desirable because consumers enjoy knowing that the brands of products they buy are widely seen and recognized
  - ▶ example: if I drink the “in” beer and wear the “in” brand of clothing, the group will think I am an “in” person

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  - ▶ example: if I drink the “in” beer and wear the “in” brand of clothing, the group will think I am an “in” person
- ▶ in this view, advertising does not dupe consumers or does it change preferences, rather advertising is complement that enhances the value of the product, very much like a nice view is a complement to a hotel room
  - ▶ it explains why firms may continue to advertise even after consumers know the quality of consumption experience

## Persuasive Advertising (Cont.)

- ▶ consumption of some goods like movies and albums have a social component: people want to buy what others buy in order to be part of the social conversation, for these goods, advertising provides a signal that others will buy the product
  - ▶ difficult to distinguish from advertising as a signal of unobserved product quality

## Akerberg (2000): Empirically Distinguishing Informative and Prestige Effects of Advertising

- ▶ main idea: suppose advertising is primarily informative, then it affects choice probability of inexperienced consumers (i.e., those who have not bought the good previously) but not the choice probability of experienced consumers (those who have bought the good previously)



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- ▶ advertising for search goods informs consumers of their existence and characteristics: affects only uninformed/inexperienced consumers
- ▶ advertising for experience goods is a signal of quality: to extent that quality is revealed through consumption, advertising only affects inexperienced consumers

## Hypothesis and Data

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- ▶ if advertising is primarily persuasive, it should affect the choice probabilities of experienced and inexperienced consumers more or less equally
- ▶ data: consumer-level panel data on purchase of Yoplait 150
  - ▶ Nielsen scanner data: shopping trips and grocery purchases by 2000 households in Sioux Falls, South Dakota and Springfield, Missouri over three years (1986-1989)
  - ▶ summary: when and what each household bought and the prices at which they bought
  - ▶ Yoplait 150 was introduced in April 1987, avoids the initial condition problem, cannot observe who bought the product prior to the sample period
  - ▶ Nielsen TV meters collected information on household TV advertising exposures for 50% of the households for last year (1989)

## Data (Cont.)

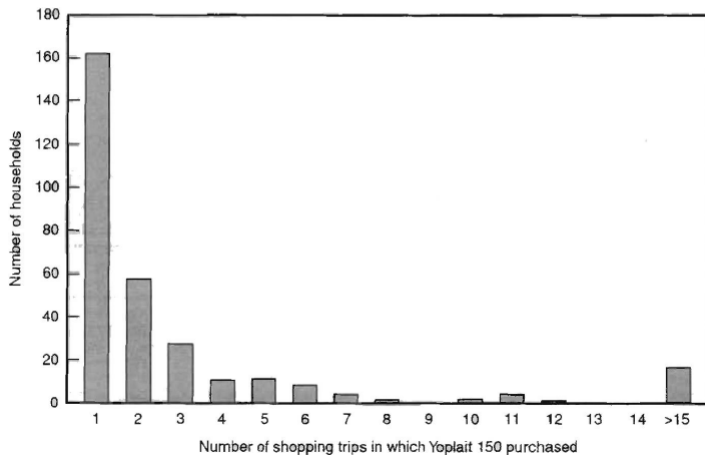
- ▶ the following table provides summary stats following introduction of Yoplait 150

**TABLE 1**      **Summary Statistics**

Variable	SF	SP
Households	950	825
Average shopping trips per household	70.58 (33.39)	65.82 (31.82)
Average price of Yoplait 150 (cents)	.645 (.060)	.663 (.079)
Shopping trips with Yoplait 150 purchase	302	656
Manufacturers' coupons redeemed for Yoplait 150	16	238
Shopping trips with other Yogurt purchase	5,432	3,863
Households trying Yoplait 150	123	184
Households trying other yogurts	648	512
Commercial exposures per household	13.60 (10.81)	15.22 (9.96)
Advertising share of Yoplait 150	.35	.37
Market share of Yoplait 150	.05	.14

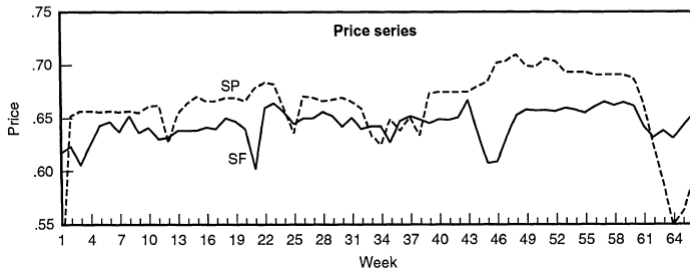
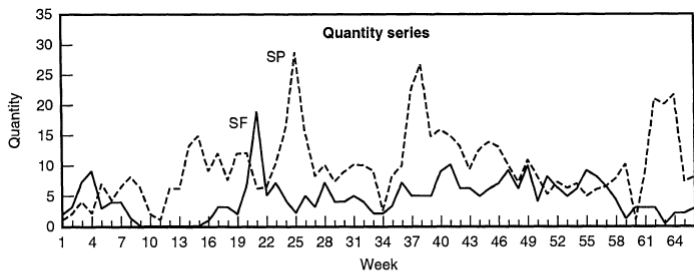
Note: Standard deviations in parentheses.

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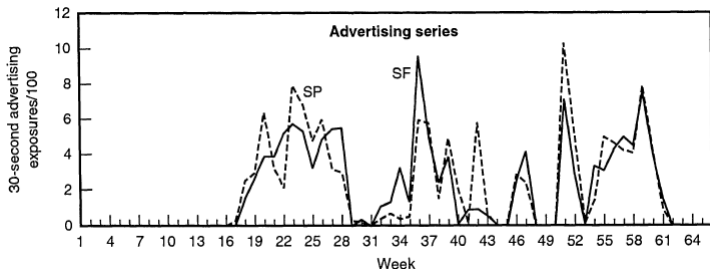


- ▶ 307 households purchased Yoplait 150, the figure gives the pattern of repeat purchases: most households purchased the product only once

# More Patterns



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- ▶ remark: typically lots of time variation in monthly advertising (pulse advertising strategy) but not much time variation in prices



## Data Issues

- ▶ do not observe whether consumers have access to manufacturing coupons - only observe redeemed coupons, coupons more prevalent in SF than in SP - use dummy as proxy for availability

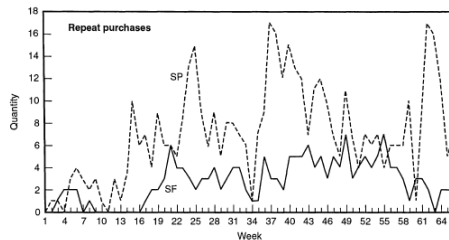
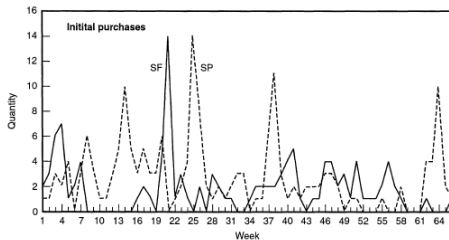
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- ▶ store coupons were widely available and used if available
- ▶ advertising exposures only measured in the last year, 3 months in which Yoplait was available but advertising not measured, assume zero ads

# Initial vs Repeated



- ▶ the variation suggests that advertising drives initial purchases but not repeat purchases, OLS regressions confirms this story

# Empirical Model

- ▶ discrete choice model

$$c_{it} = 1 \text{ iff } \alpha_i + X_{it}\beta_1 - \gamma p_{it} + \epsilon_{1it} > Z_{it}\beta_2 + \epsilon_{2it}$$

- ▶  $X_{it}$ : variables that affect the utility of consumer  $i$  from consuming Yoplait 150 on shopping trip  $t$ , including consumer characteristics (income, family size, city), functions of household's previous purchases of Yoplait 150, store coupon, time trend, prices, interactions between advertising and experience
- ▶  $P_{it}$ : price that consumer  $i$  faces for Yoplait 150 on shopping trip  $t$
- ▶  $Z_{it}$ : index of prices of other yogurts

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- ▶ random effect to allow for persistent unobserved tastes
- ▶ static, discrete choice, ignore learning dynamics



# Main Results

Parameter	Simple Logit	Normal Random Effect
Advertising * Inexperienced	2.04073 (.72313)	2.30566 (.77561)
Advertising * Experienced	.90371 (.63504)	.43304 (1.21180)
<i>t</i> -statistic on difference Advertising	1.47662 —	1.58703 —

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- ▶ advertising affects inexperienced households but not experienced households
- ▶ conclusions:
  - ▶ advertising for Yoplait 150 is informative, not persuasive
  - ▶ implication: advertising should decline as fraction of inexperienced consumers fall

## Hasting, Hortacsu and Syverson (2013)

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- ▶ question: did advertising make investors more price-sensitive or less price-sensitive in Mexico's privatized social security market?
- ▶ strategy: use administrative data on investors' choices of fund manager combined with data on advertising exposure (based on locations of sales agents) to see if individuals who were exposed to more advertising were more responsive to differences in funds' fees

# Background

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- ▶ workers choose from 17 account management firms
- ▶ regulations  $\Rightarrow$  homogeneous products ( $\Rightarrow$  competition?)
- ▶ fees are “strikingly high”: high loads, relatively high annual fees
  - ▶ a 100 peso contribution earning 5% per year was worth 95.4 pesos after 5 years



# Fees and Advertising

- ▶ fees
  - ▶ load fees: quoted as a percent of salary, ranged from 0 to 26.1%
  - ▶ balance fees charged as a percent of balances under management, ranged from 0 to 4.75%
  - ▶ for a given individual, best firm depends on wage-to-balance ratio

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- ▶ advertising
  - ▶ no government information provision - left up to the firms
  - ▶ advertising by firms: media ads (mostly said nothing about fees), sales agents (recruited and trained as salespeople, not financial experts)

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- ▶ location of sales agents from agent registration database
  - ▶ for each month, know location (zip code) of each agent, and which firm she was working for
  - ▶ use these data to construct measures of advertising exposure

## Firm Choice Model

$$u_{ij} = \lambda_i (a_{mj}, \theta_i) C_{ij} + \delta_{ij} (a_{mj}, X_{mj}, \theta_i) + \epsilon_{ij}$$

- ▶  $C_{ij}$ : expected management costs
- ▶  $\lambda_i$ : dis-utility from management costs
- ▶  $\delta_{ij}$ : preferences for non-price characteristics (e.g. perceived quality)
- ▶  $a_{mj}$ :  $j$ 's sales force in  $i$ 's market  $m$
- ▶  $\theta_i$ :  $i$ 's demographic characteristics
- ▶  $X_{mj}$ : characteristics of bank  $j$  in market  $m$
- ▶  $\epsilon_{ij}$ : logit error

# The Effects of Advertising

- ▶ how to measure the separate effect of advertising ( $a_{mj}$ ) on cost-sensitivity ( $\lambda_i$ ) and perceived quality ( $\delta_{ij}$ ) ?

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- ▶ how to measure the separate effect of advertising ( $a_{mj}$ ) on cost-sensitivity ( $\lambda_i$ ) and perceived quality ( $\delta_{ij}$ ) ?
- ▶ estimate utility models separately for cells defined by demographic group  $\times$  municipality: get estimated  $\lambda$ 's and  $\delta$ 's for each cell
- ▶ regress  $\lambda$ 's on  $a_{mj}$  to get effect on cost-sensitivity
- ▶ regress  $\delta$ 's on  $a_{mj}$  to get effect on brand value
- ▶ in each case, use instruments for  $a_{mj}$ 
  - ▶ average cost for individuals in market  $m$
  - ▶ fraction of market  $m$  population who are private sector workers
  - ▶ rivals' number of bank branches in market  $m$

# Results: Price Sensitivity

TABLE III: REGRESSIONS OF PRICE SENSITIVITIES ON MEASURES OF LOCAL SALES FORCE

Dependent variable	(1)	(2)
	OLS	OLS
	$\alpha_c$	$\alpha_c$
Municipality total agentes per 1000 social security accounts	4.57e-05*** (1.19e-05)	9.36e-05** (4.16e-05)
(Municipality total agentes per 1000 social security accounts) <sup>2</sup>		-3.97e-06 (2.72e-06)
Constant	-0.000606*** (8.13e-05)	-0.000719*** (0.000141)
Observations	3,699	3,699
R-squared	0.01	0.012
Impact of 1 SD increase in sales force	0.294	0.317
SE of Impact	0.0638	0.0803
Peak		11.80

Note: Standard errors clustered at the Municipio level. Significance levels denoted by: \*\*\* $p < 0.01$ , \*\* $p < 0.05$ , \* $p < 0.1$ . Impact of 1 SD increase in sales force is measured as the percentage change in the price-sensitivity parameter ( $\alpha_c$ ) with an increase in mean agentes by 1 SD. Peak is the value that maximizes  $\alpha_c$  given the quadratic fit.

- ▶ more advertising, less sensitive to fee (positive coefficient denotes less price sensitivity, because a negative value of  $\lambda$  indicates investors get dis-utility from higher management costs)



# Results: Brand Value

	(1)	(2)	(3)	(4)
	OLS	OLS	IV	IV
Dependent variables	$\delta_{c,j}$	$\delta_{c,j}$	$\delta_{c,j}$	$\delta_{c,j}$
Municipality agentes for Afore j per 1000 social security accounts	7.601*** (0.538)	17.99*** (0.873)	10.37*** (0.221)	33.18*** (1.253)
(Municipality agentes for Afore j per 1000 social security accounts)^2		-8.196*** (0.685)		-19.93*** (1.053)
Municipality agentes for Afore j per 1000 social security accounts X cell level mean wage				
Constant	-4.892*** (0.140)	-6.316*** (0.134)	-5.612*** (0.0606)	-8.441*** (0.168)
Observations	59184	59184	59184	59184
Number of cells	3,699	3,699	3,699	3,699
R-squared	0.243	0.329	0.145	0.0671
Impact of 1 SD increase in sales force	0.859	1.759	1.196	6.883
Impact of 1 SD increase in wage				
Peak		1.097		0.832
Cell FEs	Y	Y	Y	Y
Instruments			Neighbor cell revenue by afore	Neighbor cell revenue by afore

- ▶ more advertising, greater brand preference for that firm, higher demand

# Conclusions

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- ▶ 17 firms + homogeneous products  $\neq$  fierce competition in a market with “advertising-driven differentiation”
- ▶ (through counter-factual) insertion of a government-run low-price competitor in the market won't solve the problem without policies aimed at increasing price sensitivity on the demand side