GENERIC PRODUCT ADVERTISING, SPILLOVERS, AND MARKET CONCENTRATION

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Generic Advertising, Spillovers and Concentration 1

- Goals:
  - Consideration of market outcomes when advertising has positive spillovers due to product homogeneity
  - Exploration of alternative modeling of advertising as a “creative industry” and the impact of advertising on consumer demand
- Note
  - Creative aspect of advertising implies that the more firms doing advertising the better as the chance of “creating” a winning campaign rises
  - Advertising bought as a “campaign” for a given price τ

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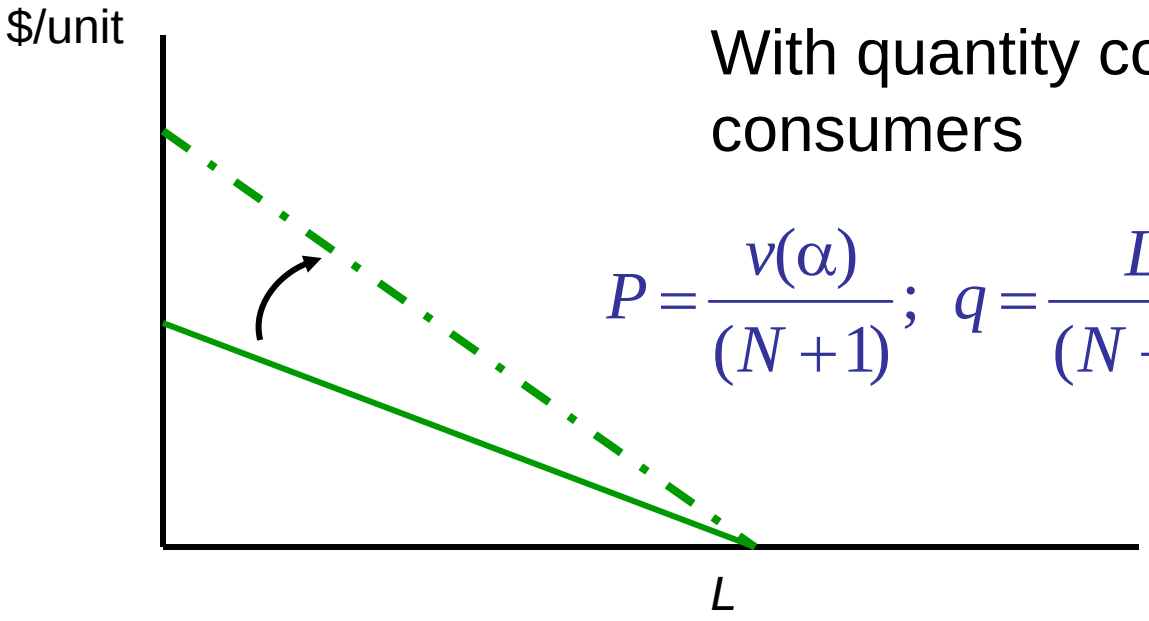
- Advertising and Consumer Demand: Building Value

$$Q(P,\alpha)=\left(1-\frac{P}{v(\alpha)}\right)L$$

Advertising enhances the value of consumption; v'(α) > 0

With quantity competition and L consumers

$$P=\frac{v(\alpha)}{(N+1)};\ q=\frac{L}{(N+1)};\ \pi=\frac{v(\alpha)}{(N+1)^2}L$$



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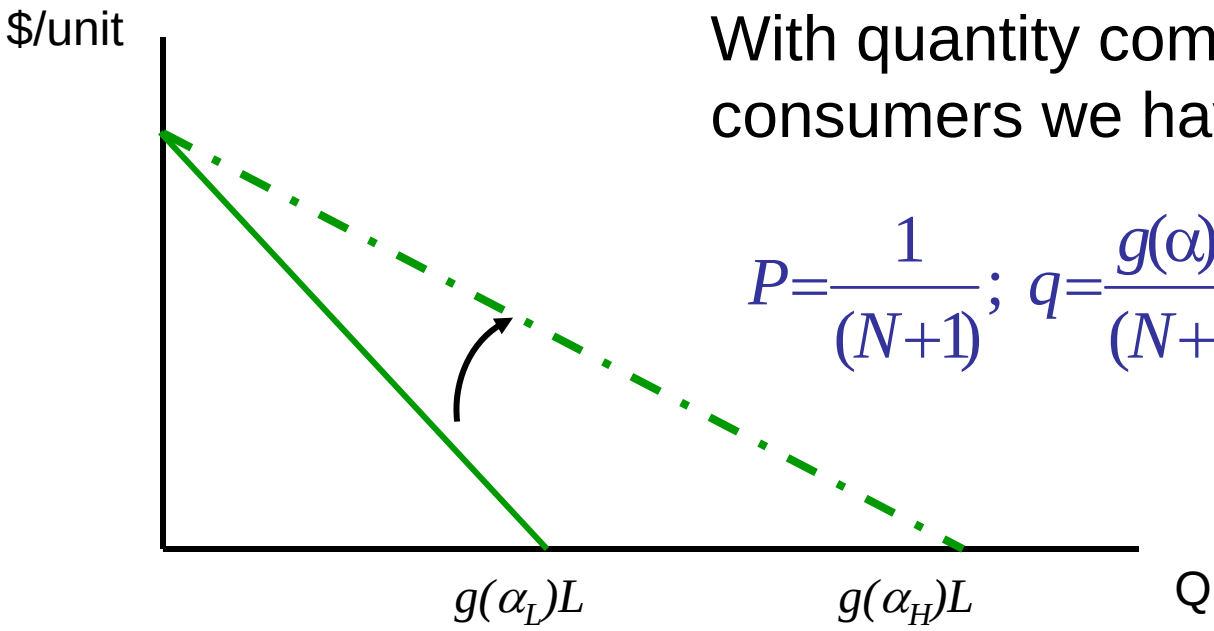
- Advertising and Consumer Demand: Extending Reach

$$P(Q,\alpha)=\left(1-\frac{1}{g(\alpha)L}Q\right)$$



Advertising provides information about availability; g'(α) > 0

With quantity competition and L consumers we have

$$P=\frac{1}{(N+1)};\ q=\frac{g(\alpha)L}{(N+1)};\ \pi=\frac{g(\alpha)}{(N+1)^2}L$$

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- Building value case:
  - $v(\alpha) = 1 + \alpha$
  - Impact of advertising campaign by firm *i* is a random draw a_i from uniform distribution [0,A]
  - Total effect of *n* firms advertising is ***maximum*** draw so expected value is $\left(\frac{n}{n+1} \right) A$
- Extending Reach Case
  - $g(\alpha) = 1 + \alpha$
  - Impact of advertising campaign by firm *i* is a random draw a_i from uniform distribution [0,A]
  - Total effect of *n* firms advertising is ***sum*** of draws, so expected value is $1 + nA/2$

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- Build Value Case—
  Expected Profit when firm i advertises with probability x and N-1 rivals advertise with probability x

$$E(\pi_1(x,\bar{x},A,\tau,L,N)) = \frac{L}{(N+1)^2}\left[1+A\left[x\bar{x}^{N-1}\frac{N}{N+1}+\right.\right.$$

$$\left.\left.\sum_{j=1}^{N-1}\left(x\binom{N-1}{j}\bar{x}^{N-1-j}(1-\bar{x})^{j}+(1-x)\binom{N-1}{j-1}\bar{x}^{N-j}(1-\bar{x})^{j-1}\left(\frac{N-j}{N-j+1}\right)\right)\right]\right]-x\tau.$$

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- Extend Reach Case—
  Expected Profit when firm i advertises with probability x and N-1 rivals advertise with probability x

$$E(\pi_1(x,\bar{x},A,\tau,L,N)) = \frac{L}{(N+1)^2}\left[1+A\left[x\bar{x}^{N-1}\frac{N}{2}+\sum_{j=1}^{N-1}\left(x\binom{N-1}{j}\bar{x}^{N-1-j}(1-\bar{x})^{j}+(1-x)\binom{N-1}{j-1}\bar{x}^{N-j}(1-\bar{x})^{j-1}\left(\frac{N-j}{2}\right)\right)\right]\right]-x\tau.$$

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- Define
  - $\rho = \tau/AL$ = campaign cost/maximum campaign revenue
  - H = 1/N = index of concentration
  - H_U 1s solution to: $\frac{H^4}{(1+H)^3} = \rho$
  - $H_L = \sqrt{2\rho}/[1 - \sqrt{2\rho}]$;
- Extending Reach Case
  - If $\rho \geq 1/8$, no advertising independent of H; x* = 0
  - If $0 \leq \rho < 1/8$
    - if $H \leq H_L$; then x* = 0; no firms advertise
    - If $H \geq H_L$ then x* = 1; all firms advertise: x* = 1
  - Constant Returns feature leads to all or nothing behavior

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- Again
  - $\rho = \tau/AL$ = campaign cost/maximum campaign revenue
  - H = 1/N = index of concentration
  - H_U 1s solution to: $\frac{H^4}{(1+H)^3} = \rho$
  - $H_L = \sqrt{2\rho}/[1 - \sqrt{2\rho}]$;
- Builds Value Case
  - 1) if $\rho \geq 1/8$, no advertising independent of H; x* = 0
  - 2) if $0 \leq \rho < 1/8$; x* depends on H:
    - **if $H \leq H_L$; then x* = 0**
    - **For $H_L < H(\rho) < H_U$; 0 < x* < 1 See Table**

H = 1/N

		0.500	0.333	0.250	0.200	0.167	0.143	0.125	0.111	0.100
ρ=τ/AL	0.0001	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.8668
	0.0002	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.9259	0.7453	0.6127
	0.0003	1.0000	1.0000	1.0000	1.0000	1.0000	0.9644	0.7560	0.6082	0.4989
	0.0004	1.0000	1.0000	1.0000	1.0000	1.0000	0.8352	0.6543	0.5252	0.4292
	0.0005	1.0000	1.0000	1.0000	1.0000	0.9858	0.7469	0.5841	0.4671	0.3797
	0.0010	1.0000	1.0000	1.0000	0.9623	0.6956	0.5211	0.3990	0.3102	0.2435
	0.0020	1.0000	1.0000	1.0000	0.6750	0.4720	0.3360	0.2410	0.1725	0.1218
	0.0030	1.0000	1.0000	0.8144	0.5323	0.3537	0.2353	0.1537	0.0957	0.0534
	0.0040	1.0000	1.0000	0.6955	0.4349	0.2716	0.1649	0.0925	0.0418	0.0054
	0.0050	1.0000	1.0000	0.6057	0.3598	0.2080	0.1103	0.0450	0.0000	0.0000
	0.0060	1.0000	0.9311	0.5324	0.2980	0.1557	0.0655	0.0061	0.0000	0.0000
	0.0070	1.0000	0.8582	0.4698	0.2453	0.1112	0.0274	0.0000	0.0000	0.0000
	0.0080	1.0000	0.7950	0.4147	0.1990	0.0722	0.0000	0.0000	0.0000	0.0000
	0.0090	1.0000	0.7385	0.3654	0.1577	0.0374	0.0000	0.0000	0.0000	0.0000
	0.0100	1.0000	0.6870	0.3204	0.1203	0.0061	0.0000	0.0000	0.0000	0.0000
	0.0110	1.0000	0.6392	0.2791	0.0859	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0120	1.0000	0.5946	0.2406	0.0542	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0130	1.0000	0.5525	0.2047	0.0247	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0140	1.0000	0.5125	0.1709	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
	0.0150	1.0000	0.4744	0.1389	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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- Mandatory Advertising and Concentration
  - Define Advertising Intensity, *ai,* as industry ratio of advertising expenditure to sales
  - Relationship between *ai* and market structure will depend on ρ as we saw in the earlier table
  - The relationship is shown for the building value case in the next slide
  - Extending reach case is qualitatively similar but less interesting as a result of bang-bang all or nothing behavior
- Note:
  - Non-monotonic relationship (inverted U) between concentration and *ai*
  - In each case, there is a minimum/maximum concentration level at which no/all firms advertise

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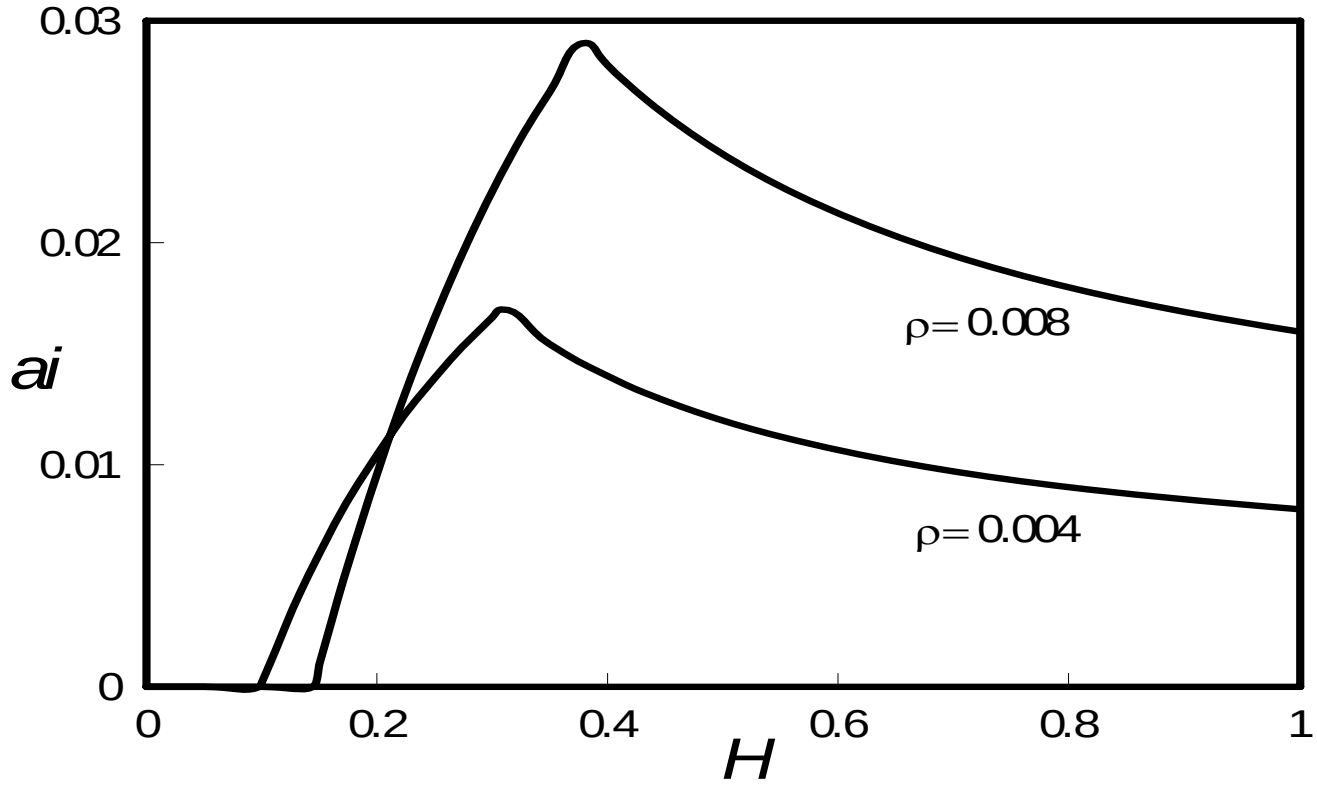
Advertising and Concentration: The Building Value Case



Advertising intensity is zero for low concentrated industries and then rises sharply as concentration increases peaking at around 3%. In then falls slowly with further increases in concentration

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- Mandatory Advertising and Welfare
  - Effect of requiring each firm to contribute τ to finance an advertising campaign will have different welfare effects depending on
    - Whether advertising builds value or extends reach
    - Whether entry is blockaded or free
- Free Entry
  - This is the easiest case is because there is no producer surplus and we can focus on the change in consumer surplus
  - Here, a necessary condition for mandatory advertising to reduce welfare is that it induce exit. If it induces entry, mandatory advertising always raises social welfare regardless of whether it builds value or extends reach

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- Mandatory Advertising & Welfare—Blockaded Entry
  - Extends Reach Case
    - Mandatory Advertising will always raise the total surplus
    - Moves from $x^* = 0$ [$H \leq H_L$] to $x^* = 1$
    - It will also raise each firm's profit *unless* industry concentration H is really low
  - Builds Value Case
    - Mandatory Advertising will raise the total surplus if concentration is not *too* low
    - Mandatory Advertising much less likely to raise each firm's profit
    - Diminishing Returns limits the gains from mandatory advertising

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- Inferences about Advertising Outcomes and Impact of Mandatory Advertising Programs, e.g., Check-Offs, Depends Critically on How Advertising is Modeled
  - Nature of Advertising Expenditure Decision
  - How Advertising Affects Demand
  - Constant or Diminishing Returns to Advertising Efforts
- In a Model with Homogenous Goods and Positive Spillovers
  - Advertising Intensity has a nonmonotonic relation with concentration—first rising and then falling as *H* rises
  - Advertising can be suboptimally low
  - Mandatory Advertising Programs more likely to raise welfare if
    - Entry is easy
    - Advertising is not subject to Diminishing Returns