Industrial Organization and Product Differentiation

Ian Sheldon (Ohio State University)

FAMPS Track Session, Symposium on "Agricultural Product Differentiation and Public Policy", AAEA Annual Meeting, Providence, Rhode Island, July 24-27, 2005

THE OHIO STATE UNIVERSITY

Introduction

- **Early analysis of industrial organization of food industry based on the Bain (1951) SCP paradigm**

- **Levels of concentration (*structure*), determine pricing behavior (*conduct*), which in turn affects profits (*performance*)**

- **Key assumption that structure is determined by exogenously given *barriers to entry***

  - **Economies of scale**

  - **Product differentiation measured by advertising outlays relative to sales**

Introduction

- **Connor *et al*. (1985) concluded in their study of US food manufacturing:**

  - **Highest rates of advertising intensity in concentrated industries**

  - **Entry barriers high due to cumulative effects of advertising**

- **SCP paradigm questioned in IO literature:**

  - **NEIO focus on estimating conduct**

  - **Focus on *simultaneous* determination of structure and performance**

Evolution of Market Structure

- Literature has returned to old question of what determines market structure? (Baumol *et al*, 1982; Panzar, 1989; Sutton, 1991)

- Focus on cases where product differentiation is determined endogenously as of part industry equilibrium

- Industries split into those with either *exogenous* or *endogenous sunk costs*

- Allows useful classification of food industries as regards product differentiation

Exogenous Sunk Costs and Market Structure

- Product is *homogeneous*, and firms incur sunk cost σ of acquiring plant of minimum efficient scale, then compete in price

- Market structure (C) function of:
  - Market size S relative to σ
  - Intensity of price competition
  - Markets contestable if $\sigma = 0$ (Baumol *et al.*)

- With *horizontal* product differentiation, sunk cost of producing specific variety, and price competition mitigated
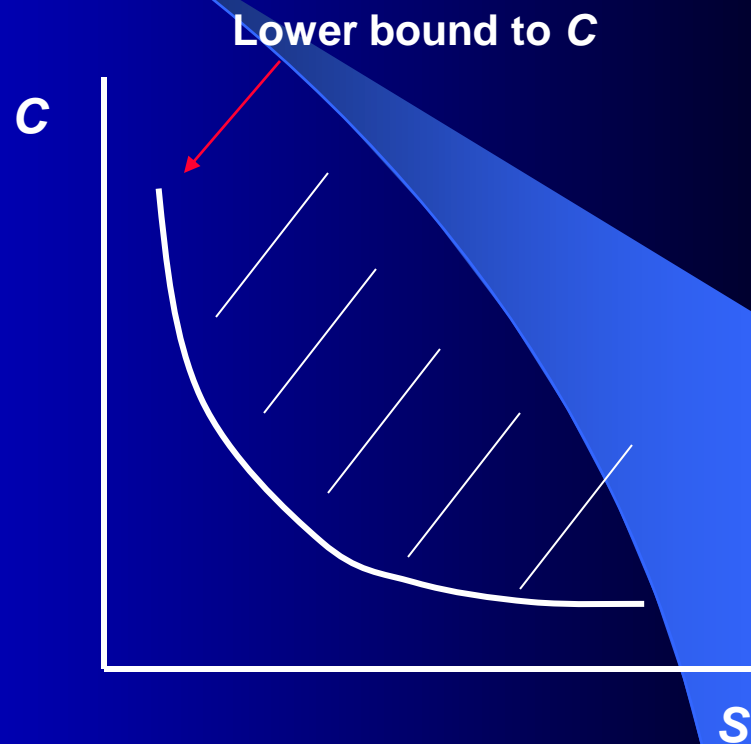
Exogenous Sunk Costs and Market Structure

- **Possibility of *multiple equilibria* if firms can produce several different varieties**

- **Market structure depends on whether different firms enter each sub-market, same group of firms enter all sub-markets, or firms occupy several niche markets**

- **Function of: demand effects (*market expansion* vs. *competition*), costs (*economies of scope*), and possibility of first-mover advantage (*product proliferation*)**

Exogenous Sunk Costs and Market Structure

Lower bound to *C*

C

Mergers/exit

X ●
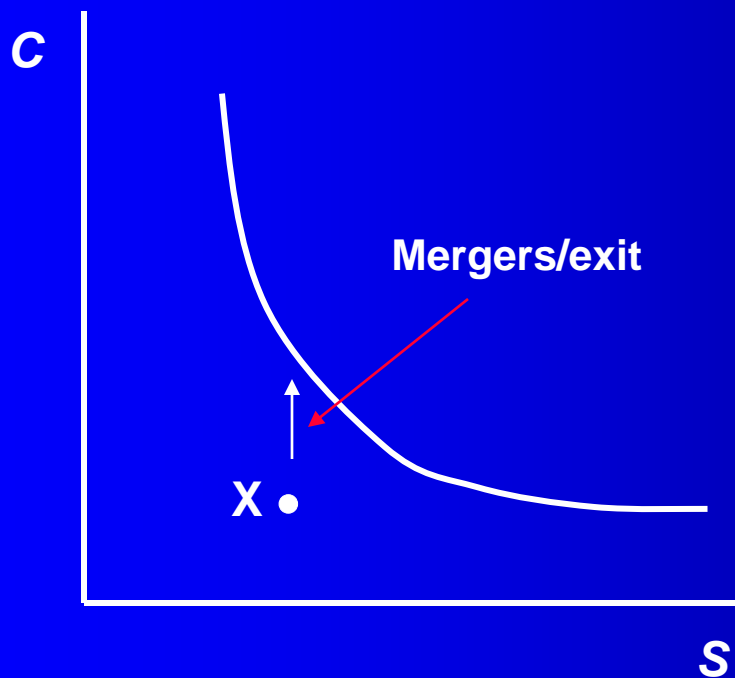
Homogeneous Goods

S

C

S

Differentiated Goods

Endogenous Sunk Costs and Market Structure

- With *vertical* product differentiation, each product has single attribute *u* – its *brand image*, all consumers having same tastes

- Firms incur sunk cost σ, but now choose *u*, at an additional sunk cost $A(u)$, before competing in price

- If consumer willingness to pay increases with advertising, $A(u)$ can be thought of as an advertising response function

Endogenous Sunk Costs and Market Structure

- Link between increased market size S and structure C is broken

- Competitive escalation of $A(u)$, raises equilibrium level of sunk costs $\{\sigma + A(u)\}$ as S increases, offsetting tendency toward fragmentation – advertising is an *endogenous barrier to entry*

- If saturation level of advertising, A_{α}, fragmentation still occurs as S increases – advertising is as an *exogenous barrier to entry*
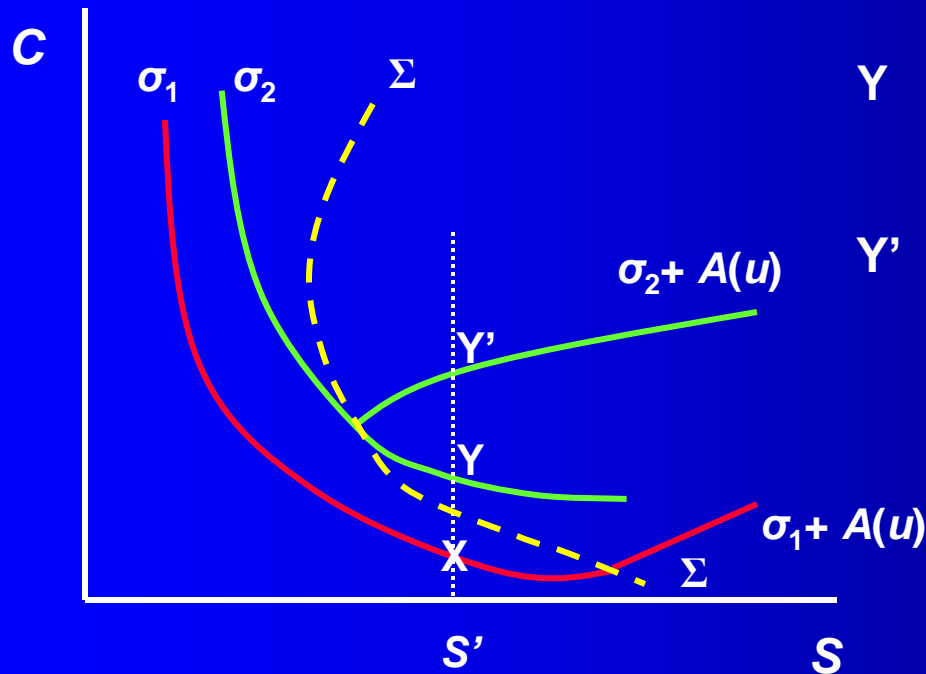
Endogenous Sunk Costs and Market Structure
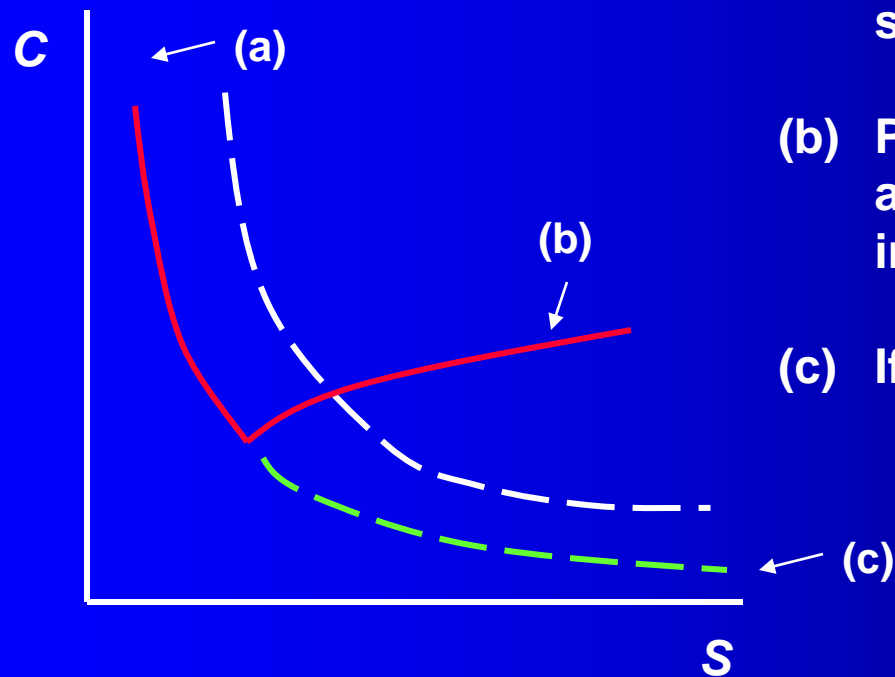
(a) Increased product differentiation dampens price competition for small levels of S

(b) Product differentiation makes advertising more effective, C increases with S

(c) If A_α, fragmentation as S increases

Vertical Product Differentiation

Market Structure, Sunk Costs and Advertising

X   **Initial market structure**

Y   **Structure with new plant, but ineffective advertising**

Y'   **Structure with new plant and more effective advertising**

σ_1 = **sunk costs of initial minimum efficient scale**

σ_2 = **sunk costs of new minimum efficient scale**

$\Sigma\Sigma$ = **separation no-advertising/advertising – function of unit cost of advertising**

Asymmetric Advertising

- **Advertising levels may differ across firms:**

- *Consumer tastes* **vary (different levels of** *u***), creating dual market structure, e.g., retail markets and non-retail markets**

- *Income effects* **such that high (low) income consumers purchase high (low) quality** *u*

- *Sequential entry*, **first entrant can "monopolize" by setting** *u* **so high that other firms only find it profitable to enter with lower** *A*(*u*)

Strategic Groups in Food Manufacturing

Producer goods markets

Flour (48)*, sugar (85), soybean milling (80), wet-corn milling (72)

Homogeneous products

Exogenous sunk costs?

Advertised brands

Frozen food (31)*, soft drinks (47)(99)** RTE cereals (83)(85), chocolate (80), soup (85)(92), coffee (53)(73), beer (90)(82)

Advertising, product development, issue of shelf-space

Endogenous sunk costs?

Foodservice market

Typically small food manufacturers

Brands not important – except soft drinks, alcoholic drinks and candy

Price, quality and service critical

Part of dual market structure?

Private-label, generic, and unbranded products sold via retail stores

Emphasis on price, advertising and labeling by retailers

Part of dual market structure?

Source: Porter (1976), Connor *et al*. (1985). * 1997, 4-firm concentration (US Census of Production, 2001); ** 1999, share of advertising by top-3 firms (USDA/ERS, 2001)

Does Vertical Structure Matter?

- How do food retailers affect evolution of market structure and product differentiation?

- If there are *vertical externalities* in marketing chain, likely to be *vertical restraints*, e.g., RPM, slotting fees, exclusive dealing/territories

- Type of vertical restraint depends on who has bargaining power

- Affects price competition upstream, and role of endogenous sunk costs

Summary

- **Recent theory indicates a key connection between evolution of market structure and notion of endogenous sunk costs**

- **Allows food manufacturing to be divided into producer goods and advertised brands**

- **As balance of power shifts to food retailers, likely to affect equilibrium expenditures on product differentiation in equilibrium**

- **Dual market structure will become the norm**