The Economics of Network Industries: Social Interactions

Week 19

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Outline

- Introduction
- A model of Status-Seeking
- A model of Conformism
- Conformity, Vanity, and Price Competition
- The Economics of Entertainment Places

Introduction

- Each society is characterized by its collection of *social norms*.
- Consumer choices are also affected by the consumption choices of others (Veblen 1899).
- Effects as bandwagon congestion, or snob/conformity effects (Leibenstein (1950)).

Introduction

- *Social decisions* are those decisions that depend on others' decisions and also influence decisions of others.
- They vary among individuals.
- Among many, Akerlof (1997) offers some utility functions that are consistent with social choices.

Status Seeking

- Economy with n individuals who each has to choose a real number $x \in \mathbb{R}_+$.
- The utility of i when he chooses x_i and all the other individuals $j \neq i$ choosing $\hat{x}$ is

$$U_i|_{x_j=\hat{x}} = -\delta(\hat{x} - x_i) - \alpha(x_i)^2 + \beta x_i$$

where the parameters α, β, δ are strictly positive.

Status Seeking

- The FOC and SOC are given by

$$\frac{\partial U_i}{\partial x_i} = \beta + \delta - 2\alpha x_i = 0$$
$$\frac{\partial^2 U_i}{\partial x_i^2} = -2\alpha < 0$$

Since all individuals are assumed identical, they all behave in the same way as i. Hence, in equilibrium, each individual i chooses

$$x_i^* = \frac{\beta + \delta}{2\alpha}$$

Status Seeking

- Is x^* optimal w.r.t. the social welfare?

Status Seeking

- Is x^* optimal w.r.t. the social welfare?
- Utilitarian social welfare function:

$$W = \sum_i U_i = n[-\delta(\hat{x} - x_i) - \alpha(x_i)^2 + \beta x_i] = n(-\alpha x^2 + \beta x)$$

assuming $x_i = x \; \forall i$.

Status Seeking

- The FOC and SOC are given by

$$\frac{\partial W}{\partial x} = -n(2\alpha x + \beta) = 0$$
$$\frac{\partial^2 W}{\partial x^2} = -2\alpha n < 0$$

Therefore, the social optimal choice is that each individual chooses

$$x_i^e = \frac{\beta}{2\alpha}$$

which is lower than x_i^*.

Status Seeking

Proposition

A competitive race for status is inefficient, since it induces individuals to choose a higher-than-optimal level of x.

Conformism

- Individual wants to minimise the social distance between himself and the others.
- The utility of each conformist i when $j \neq i$ chooses $x_j = \hat{x}$ is given by

$$U_i|_{x_j=\hat{x}} = -\delta(x_i - \hat{x})^2 - \alpha(x_i)^2 + \beta x_i$$

Conformism

- The FOC and SOC are given by

$$\frac{\partial U_i}{\partial x_i} = -2(\alpha + \beta)x_i + \beta + 2\delta\hat{x} = 0$$
$$\frac{\partial^2 U_i}{\partial x_i^2} = -2(\alpha + \beta) < 0$$

Again, since all individuals are identical, in equilibrium we obtain,

$$x_i^* = \frac{\beta}{2\alpha}$$

Conformism

- To compute the socially optimal level, the social planner chooses x^e which maximise the utilitarian welfare function

$$W = \sum_i U_i = n[-\delta(x_i - \hat{x})^2 - \alpha(x_i)^2 + \beta x_i] = n(-\alpha x^2 + \beta x)$$

We obtain the same level as (4): $x^e = \beta/2\alpha$.

Conformism

Proposition

There is no market failure when all individuals have identical utility functions and exhibit conformism.

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The intuition is that each individual equates her choice to the choice of the others and this coincides with the maximisation problem solved by the social planner. We remark that, in a more general setting, where products are differentiated and/or individuals are heterogeneous, it can happen that conformism leads to a market failure by having all individuals choosing the "wrong" standard.

Conformism, Vanity, and Price Competition

- Consumers who can choose between two products, A and B.
- Utility of a product i oriented consumer, $i = \{A, B\}$, is given by

$$U_i = \begin{cases} \alpha q_i - p_i & \text{if he buys product } i \\ \alpha q_j - \delta - p_j & \text{if he buys product } j \neq i \end{cases}$$

where $\alpha < \delta/n$ and $n > 0$ is the number of i oriented consumers (total population is $2n$). The variable q_i is the number of consumers buying the product i and α is a parameter measuring the network effect.

Conformism, Vanity, and Price Competition

Definition

Consumer preferences are said to exhibit

- **conformity**, or positive network effects, if $\alpha > 0$.
- **vanity**, or negative network (bandwagon) effect, if $\alpha < 0$.

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Conformism, Vanity, and Price Competition

- The two firms are competing. In particular, firm B maximises p_B subject to

$$np_A \geq 2n[p_B - \delta + \alpha(2n - n)]$$

  The last two terms measure the effect of increasing the network of B-users when firm A undercuts firm B. Similarly, firm A maximises p_A subject to

$$np_B \geq 2n[p_A - \delta + \alpha(2n - n)]$$

Conformism, Vanity, and Price Competition

- Solving these two conditions yields the equilibrium prices and profit levels

$$p_A = p_B = 2(\delta - \alpha n) \qquad \text{and} \qquad \pi_A = \pi_B = 2n(\delta - \alpha n)$$

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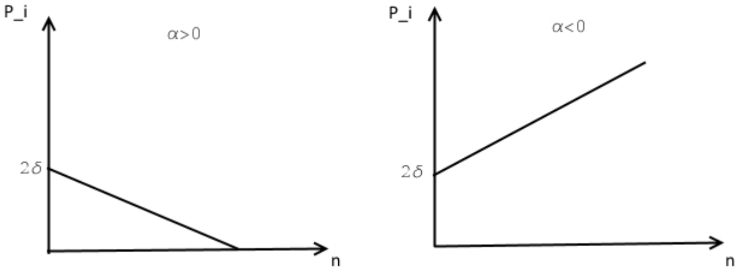

Figure: Equilibrium prices vs population under conformity (left) and vanity (right).

Conformism, Vanity, and Price Competition

- The indirect utility functions are

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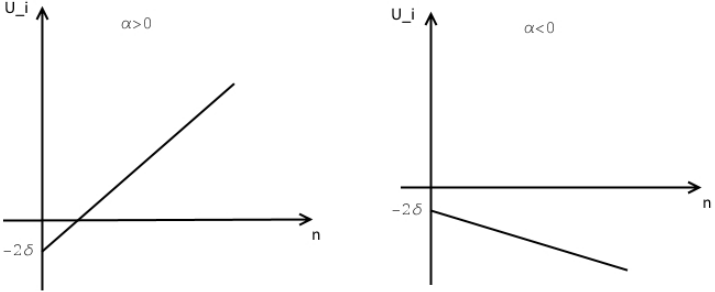

Figure: Equilibrium utility vs population under conformity (left) and vanity (right).

Conformism, Vanity, and Price Competition

Proposition

(a) *When consumer preferences exhibit conformity, an increase in the consumer population will (i) decrease the equilibrium prices, and (ii) increase the equilibrium utility levels.*

(b) *When consumer preferences exhibit vanity, an increase in the consumer population will (i) increase the equilibrium prices, and (ii) decrease the equilibrium utility levels.*

The Economics of Entertainment Places

- Why do we queue outside restaurants, bars, clubs, etc?

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- Why do they not raise prices in presence of queues?

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- Why do they not raise prices in presence of queues?
- Becker (1971, 1991) and Karni and Levin (1994) propose a solution for this puzzle: network externalities.

The Economics of Entertainment Places

- Monopoly restaurant with $2n$ potential heterogeneous consumers. Let q denote the number of consumers going to this restaurant, and let p the price of a meal set by the restaurant's owner.
- n customers are called H-type, and the remaining n consumers are called type L-type.
- The utility function of a i-type consumer is given by

$$U_i = \begin{cases} \alpha_i q - p & \text{if she goes to the restaurant} \\ 0 & \text{if she does not go to the restaurant} \end{cases}$$

where $\alpha_H > 2\alpha_L > 0$.

The Economics of Entertainment Places

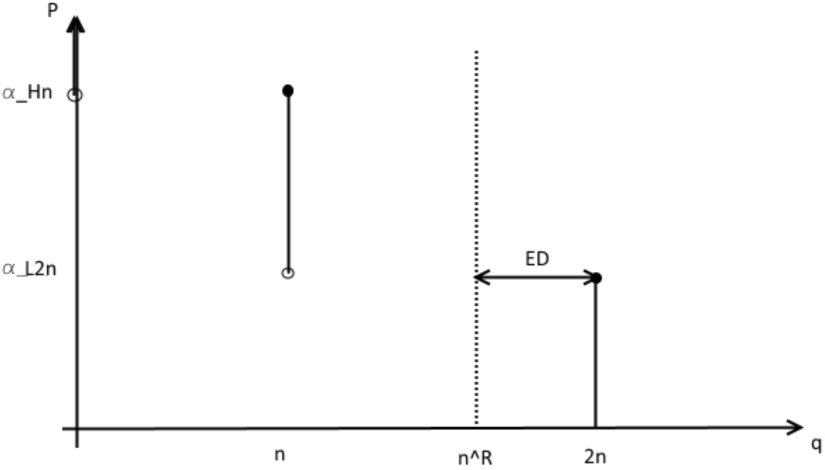

Figure: Demand and supply for meals at the restaurant. n^R is the place's seating capacity and *ED* measures excess demand.

The Economics of Entertainment Places

- The restaurant cannot supply more than n^R meals at a given time. Assume that $n < n^R < 2n$.
- $ED = 2n - n^R$ are the consumers waiting outside the restaurant.

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Proposition

Suppose that

$$n^R > \frac{\alpha_H n}{2\alpha_L}$$

Then, the profit-maximising price of a meal is $p = 2\alpha_L n$, thereby maintaining a steady excess demand for meals at this restaurant.

The Economics of Entertainment Places

- Consumers gain from a network of $2n$ even if only n^R consumers are actually served, since the consumers consider both those who are eating and those who are waiting outside as part of the network of restaurant goers. Hence, at full capacity each consumer is willing to pay $p = \alpha_L 2n$ although only n^R are actually being served. In other words, queues enhance the profit of restaurant owners since they enhance the popularity and the social value of their establishments.

Gift-giving and receiving

- Economy with λ goods, $\{1, ..., \lambda\}$, indexed by j. There are $n \geq 2$ individuals.
- The utility of i of receiving a gift is given by

$$V_i^R = \begin{cases} \beta & \text{if he receives } k = j \\ \beta - \delta & \text{if he receives } k \neq j \end{cases}$$

What is the expected utility of receiving a random gift?

Gift-giving and receiving

$$EV_i^R = \frac{1}{\lambda}\beta + \frac{\lambda - 1}{\lambda}(\beta - \delta) = \beta - \frac{\lambda - 1}{\lambda}\delta$$

Gift-giving and receiving

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- The utility from giving a gift is given by

$$V_i^G = \begin{cases} 0 & \text{if he does not give and does not receive} \\ -p & \text{if he gives but does not receive} \\ -\gamma & \text{if he does not give but receives} \end{cases}$$

Assume *social pressure*, or $\gamma > p$.

Gift-giving and receiving

Proposition

(a) *Any individual who receives a gift will return a gift.*
(b) *Any individual who does not receive a gift will not give a gift.*

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(a) *Any individual who receives a gift will return a gift.*
(b) *Any individual who does not receive a gift will not give a gift.*

Proof: If a gift is received, the utility of giving is $-p > -\gamma$, which is the utility of not returning a gift. If a gift is not received, the utility of not giving is $0 > -p$ which is the utility of giving. □

Gift-giving and receiving

How many gift will be exchanged if all individuals are exchanging gifts?

Gift-giving and receiving

How many gift will be exchanged if all individuals are exchanging gifts?

...$n(n-1)$

Proposition

Each individual is better off in an economy with no exchanging than in an economy where everybody exchanges gifts with everybody.

Gift-giving and receiving

Proof: Suppose n individuals and nobody is exchanging gifts. Then, each individual has an option of purchasing $n-1$ for herself, thereby getting $(n-1)(\beta - p)$ utility since he is going to choose her ideal good. In contrast, when n individuals exchange reciprocally gifts, the expected utility of each person is

$$EU = (n-1)(EV_i^R + V_i^G) = (n-1)\left(\beta - \frac{\lambda - 1}{\lambda} - p\right)$$

which is lower than $(n-1)(\beta - p)$. □

Gift-giving and receiving

- The proposition implies that there are two equilibria: one in which all individuals exchange gifts and one where no one exchanges gifts.
- The first equilibrium is inefficient.

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- The first equilibrium is inefficient.

What is the utility loss per gift?

Gift-giving and receiving

- From $(n-1)\left(\beta - \frac{\lambda - 1}{\lambda} - p\right)$, we can see that $\frac{\lambda - 1}{\lambda}$ is the loss per gift. Since $n(n-1)$ gifts will be exchanged, the loss function is given by

Gift-giving and receiving

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$$L(\lambda, n, \delta) = n(n-1)\frac{\lambda-1}{\lambda}\delta$$

Gift-giving and receiving

Proposition

The social loss associated with gift-giving increases quadratically with n*, increases at a declining rate with* λ*, and increases linearly with* δ*, the tastes' mismatch parameter.*