Organization of the course

3 topics:

1) Two-sided Markets

2) Design of Matching Markets

3) Market Evolution

After the introductions, 2-4 seminar presentations plus papers for each of the topics:

1i) Multi-homing

1ii) Media and Two-sided Markets

2i) Market for Physicians

2ii) Market for Kidneys

2iii) School and Course Allocation

3i) Centralized vs Decentralized Markets

3ii) Multiplicity of Markets

3iii) Market Evolution and Market Clearing

Literature (as starting point): see course description

Seminar paper: variation or extension of existing model

Two-sided Markets

1. Definition

2 sides of a transaction (e.g. buyers and seller), denoted by 1 and 2

transaction mediated by a platform, demands membership fees p_1, p_2

transaction beneficial for both sides

positive externalities between the users of the platform

defining characteristic of two-sidedness: not only overall size, but also structure of fees determines membership to platform and volume of trade

necessary condition: Coase theorem does not hold - users do not have the possibility to compensate each other for positive externalities

Examples:

Telephone network: The more people have a phone, the better for each user.

Credit card: The more shops accept is, the better for a particular costumer. The more costumers have a credit card, the better for a shop. Furthermore, user might directly benefit from not having to take money with him.

Platform for computer games: The more user use a particular platform, the more profitable for a game designer to design a game for the platform. The more games are designed for the platform, the better for the user.

Two different forms of externalities:
membership externalities: 1,2,3
Usage externalities: e.g. 2 - not analyzed here

2. Social optiumum and monopoly benchmarks

n_1, n_2 mass of agents of both sides who are members of platform

utility of agent of type i at

$$u_i = \alpha_i n_j - p_i$$

with $j \neq i$.

Whether an agent chooses the membership depends on the utility offered, u_i, and on the reservation utility

Agents differ in reservation utilities. Distributed such there exist increasing "demand" functions ϕ_i with

$$n_i = \phi_i(u_i).$$

f_i: cost of platform for serving mass one customers of type i.

Platform profits when offering utilities u_i:

$$\pi(u_1, u_2) = \sum_{i \in \{1,2\}} \phi_i(u_i) \left[\alpha_i n_j - u_i - f_i\right],$$

since $p_i = \alpha_i n_j - u_i$

Aggregate consumer surplus of group i, $v_i(u_i)$ fulfills $v_i'(u_i) = \phi_i(u_i)$.

Social welfare w

$$w(u_1, u_2) = \pi(u_1, u_2) + v_1(u_1) + v_2(u_2)$$

Social optimum characterized by conditions

$$u_i^O = (\alpha_1 + \alpha_2)n_j - f_i.$$

Hence in social optimum

$$p_i^O = f_i - \alpha_j n_j.$$

Optimal price for agent of type i equals costs he generates minus the positive externality he brings to all type j agents - optimal prices below costs.

Monopolist's profit maximization leads to

$$p_i^M = f_i - \alpha_j n_j + \frac{\phi_i(u_i)}{\phi_i'(u_i)}$$

Monopoly price above the social optimum, but not necessarely above costs

Price depends of elasticity of "demand": The higher, the lower the monopoly price

3. Platform competition - single homing

Mass one of both types of agents.

Each agent active at exactly one of two platforms, l or k

Utility of agent of type i active at platform l

$$u_i^l = \alpha_i n_j^l - p_i^l$$

with $i, j \in \{1, 2\}$, $j \neq i$.

Choice of platform depends on the difference of utilities offered by both platforms, and on some ideosyncartic preferences

Hotelling specification of ideosyncratic preferences leads to market shares of

$$n_i^l = \frac{1}{2} + \frac{u_i^l - u_i^k}{2t_i}$$

with t_i measuring the strenghts of the ideosyncaric preferences (and the "weakness" of competition).

Hence

$$n_i^l = \frac{1}{2} + \frac{\alpha_i(n_j^l - 1) - (p_i^l - p_i^k)}{2t_i}$$

An extra agent of type j attracts α_i / t_i more type i agents - price for type j agents has an impact of demand from type i agents.

Solving equation system leads to market shares for given prices of

$$n_i^l = \frac{1}{2}\left[1 + \frac{\alpha_i(p_j^k - p_j^l) + t_j(p_j^k - p_i^l)}{t_i t_j - \alpha_i \alpha_j}\right]$$

Costs f are assumed to be the same for both platforms.

For given prices of both platforms, profits of platform l are given by

$$\pi^l = \sum_{i \in \{1,2\}} (p_i^l - f_i)\frac{1}{2}\left[1 + \frac{\alpha_i(p_j^k - p_j^l) + t_j(p_j^k - p_i^l)}{t_i t_j - \alpha_i \alpha_j}\right]$$

To get market sharing equilibria, differention parameters t have to be large compared to externalities α. We assume $4t_i t_j > \alpha_i \alpha_j \Rightarrow$ profit function concave

Both platforms choose simultaneously prices and profits are concave $\Rightarrow$ first order conditions for profit maximization characterize best responses

Since cost and externality parameters are the same for each platform, no assymmetric equilibrium exists.

First order conditions with symmetry are

$$p_i = f_i + t_i - \frac{\alpha_j}{t_j}(\alpha_i + p_j - f_j).$$

Compared to standard Hotelling model ($\alpha = 0$), prices are lower, since now a price increase for one group has also a negative impact on the demand of the other group:
α_j / t_j: extra group j agents attracted by a marginal p_i decrease
$(\alpha_i + p_j - f_j)$: additional profit from an extra group j agent

Solving the FOCs leads to the equilibrium prices for single-homing

$$p_i^S = f_i + t_i - \alpha_j$$

Prices increase in the costs and the differentiation (standard hotelling effect) and decrease in the positive externality.

Externalities increase the competition and decrease the "local monopoly power" of the platforms.

Direct comparison with monoploy case impossible due to differentiation.

For appropriate definitions, market shares more price elastic in duopoly than in monopoly case: In monopoly a price increase for one type decreases the market participation agents of this type. In duopoly, agents of this type switch to the other platform, making the other platform also more attractive for agents of the other type.