

1 Introduction

1.1 A semi structural Model

In this section we develop a differentiated Cournot duopoly where two platforms chose quantity simultaneously. Given utility functions of consumers, we derive demand of the two sides of the market. After that we obtain optimal quantities from the assumption that two platforms maximize their profit by choosing their quantity simultaneously, taking into account that the demand on both market sides are interdependent.

hildebrand: After specifying this structural model, I derive the reduced-form revenue equations from equilibrium prices and number of users, explain how they can be estimated by Ordinary Least Squares and turn to the most important problem of identification in order to draw conclusions on the coefficients of the original structural model, in particular on the existence of network effects.

1.2 Utility and Demand

We adapt the model of a two-sided market developed by Armstrong(2006) with two competing platforms assuming for exogenous reasons that each agent chooses to join a single platform.¹ There are two groups of agents, $j = a, b$ and two platforms, $i = 1, 2$, which enable the two groups to interact. The utility of each group of consumers if they join platform i is respectively given by

$$u_i^a = ds_i - \theta p_i + \nu^a + \epsilon_i^a - t_1 * x \quad (1)$$

and

$$u_i^b = gq_i - \mu r_i + \nu^b + \epsilon_i^b - t_2 * x \quad (2)$$

where p_i and r_i are the platform's prices for the two sides a and b respectively, q_i and s_i are the number of users on the other market side of platform i and d and g measure their impact on the utility. d and g therefore describe the network effects while the intensity of competition is measured by the parameters θ and μ . ν^a and ν^b represent the unobserved fixed-effect of a consumer. t is a measure of the individual transport cost which captures the influence of product differentiation and the error term ϵ_i is i.i.d.. Assuming x is uniformly distributed between 0 and 1 and using the fact that $q_j = 1 - q_i$ and $s_j = 1 - s_i$, gives the implicit Hotelling expression for market shares.

$$q^i = \frac{1}{2} + \frac{d(2s_i - 1) + \theta * (p_j - p_i)}{2t_1} \quad (3)$$

and

$$s^i = \frac{1}{2} + \frac{g(2q_i - 1) + \mu * (r_j - r_i)}{2t_2} \quad (4)$$

Keeping everything fixed, platform i 's market share on market side a increases if the number of users in market side b by factor d/t . With a stronger indirect network effect d , the effect of size on the other market side increases. The opposite is true for t which measures the influence of product differentiation. To keep things simple, we assume $t_1 = t_2 = 1/2$. Rational expectations imply unique demands, which are the simultaneous solutions to (1)-(2).

¹See also Kaiser and Wright (2006) for a similar approach.

The profits of platform i are assumed to be

$$\pi_i = (p_i - f_i)q_i + (r_i - c_i)s_i - F_i \quad (5)$$

where f_i and c_i are the marginal cost on market side a and b respectively, and F_i is other fixed cost. Each platform maximizes its profits by setting p_i and r_i given the choice of the rival. Taking the first order conditions after substituting the unique demands for $i = 1, 2$ into (5) following equilibrium conditions hold.

$$p_i = \frac{d(s_i - s_j) + \theta(p_j + f_i) + \frac{1}{2}}{2\theta} \quad (6)$$

and

$$r_i = \frac{g(q_i - q_j) + \mu(r_j + c_i) + \frac{1}{2}}{2\mu} \quad (7)$$