UBB Competition from a 2-Sided Market Perspective

April 2008
Beong Choi

KT Management Research

Contents

I. Introduction

New Strategic Approach

■ Background

○ 2-Sided Markets are abundant around us if we think about it. Due to inter-market externality, pricing strategies by the intermediate platform should be based on fundamentally different thinking from the traditional one.

○ This will become more evident as we develop into the UBB environment.

■ About this Talk

○ Network infrastructure firms like KT typically face markets on both sides of the platform. In the past, PSTN was characterized by 1-sided externality. However, nowadays, it is very important that we explore this relatively new field of 2-Sided Markets in order to have a competitive edge.

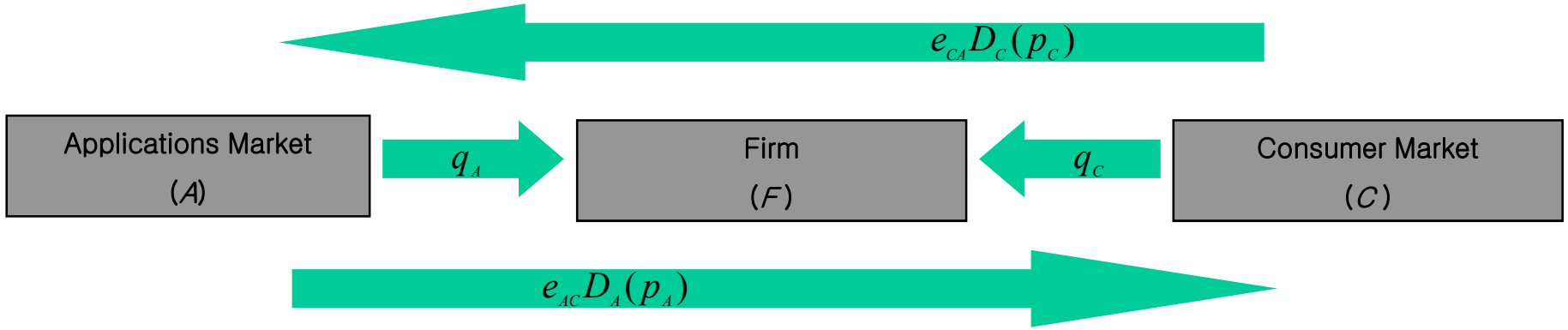
○ Today, I will present an overview of this model and a game theoretic result for duopoly competition.

Basic Framework

■ Model Specification

- ○ C represents the general consumer market; A represents the applications(or contents) market.
- ○ $D_i(p_i)$ denotes the no-externality demand function of price p_i for market i .
- ○ Internetwork externality e_{ij} measures the effect of market i on market j .
- ○ Denoting q_i as the overall demand for market i accounting for externality, we have the following linear model:

$$q_C = D_C(p_C) + e_{AC} D_A(p_A)$$
$$q_A = D_A(p_A) + e_{CA} D_C(p_C)$$



II. 2-Sided Market (continued)

Some Insight

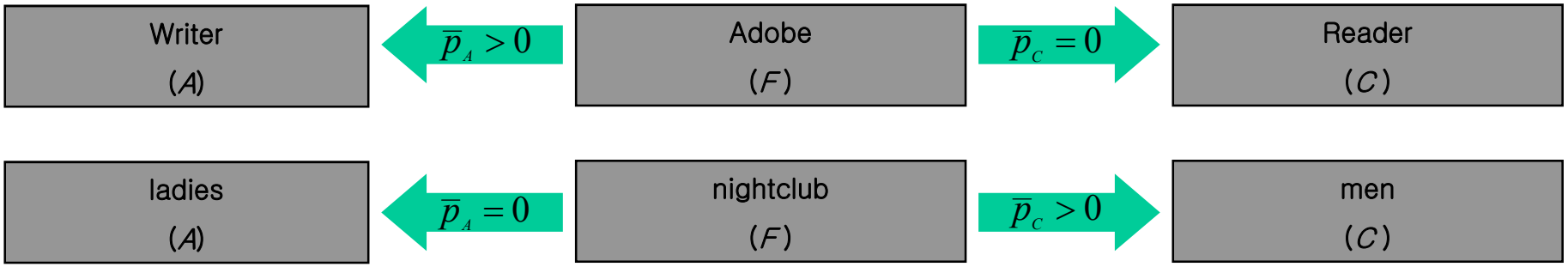
■ Model Specification (continued)

○ Assuming negligible marginal cost, profit for the firm: $\pi = \pi_C + \pi_A = p_C q_C + p_A q_A$.

○ Let $\bar{p}$ and $\hat{p}$ denote the optimal price (profit maximizing) coordinated across both markets and independently applied for each market, respectively.

○ In general, $\bar{p} \neq \hat{p}$ unless $e_{AC} = e_{CA} = 0$.

○ The overall profit maximizing pricing scheme might be such that the firm loses on one side of the market. Simple examples are free "Adobe Readers" and free "ladies admission" to nightclubs. The losing side contributes to the overall profit through raising demand on the other side, where the firm is able to apply a higher price.



II. 2-Sided Market (continued)

More Insights

■ Some Results: Parker and Van Alstyne ("Two-Sided Network Effects: A Theory of Information Product Design", *Management Science*, 2005)

○ If $\partial q_A / \partial p_C = \partial q_C / \partial p_A$, then $\overline{p} \leq \hat{p}$.

- that is, independent profit maximizing leads to equal or higher prices in both markets.

○ Consumer surplus is equal or higher in the coordinated case than in the independent case for both markets. Also, $\overline{\pi} \geq \hat{\pi}$. Thus, social welfare should improve under the firm's coordinated pricing across both markets as compared to the case where two different firms each deal with the other single market only and price independently. This result is somewhat counterintuitive.

III. Competition

More to Explore

■ Research on Platform Duopoly

○ Economides and Tag, *Net Neutrality on the Internet: A Two-sided Market Analysis*, Net Institute Working Paper, 2007

○ Rochet and Tirole, *Platform Competition in Two-Sided Markets*, Working Paper, 2001

○ Both papers derive noncooperative optimal pricing based on the price variable; however, is not a Nash Equilibrium in the sense that any firm can take away the other's customers by lowering its price.

IV. Cournot-Nash Equilibrium

Optimizing in Terms of Quantity

■ A Different Model

$$q_C = a - bp_C - ep_A$$
$$q_A = c - dp_A - ep_C$$

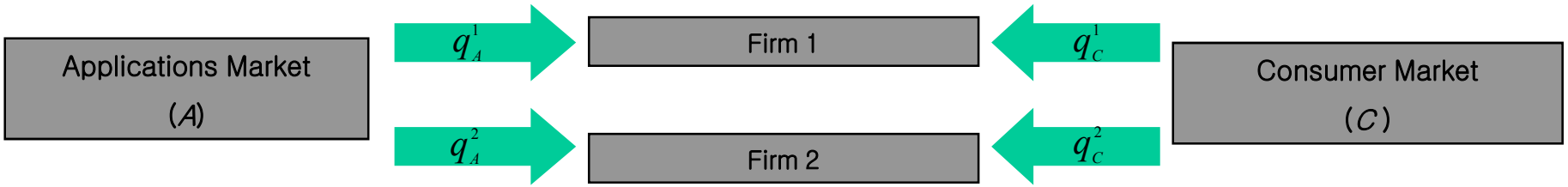
○ a, b, c, d and e are positive constants and $b, d > e$.

○ Above can be rearranged with renamed positive constants A, B, C, D and E to become:

$$p_C = A - Bq_C + Eq_A$$
$$p_A = C - Dq_A + Eq_C$$

○ We will work with this set-up to arrive at a Cournot-Nash Equilibrium for 2 competing firms.

$$q_C = q_C^1 + q_C^2$$
$$q_A = q_A^1 + q_A^2$$



IV. Cournot-Nash Equilibrium (continued)

2-Sided Market Duopoly

■ The Duopoly Situation

○ Assuming negligible marginal cost, profit for Firm 1 (concave in q_C^1 and q_A^1) is

$$\pi^1 = q_C^1 p_C + q_A^1 p_A$$

○ First order necessary conditions are $\dfrac{\partial \pi^1}{\partial q_C^1} = \dfrac{\partial \pi^1}{\partial q_A^1} = 0$

producing best response functions $q_C^1 = \dfrac{AD + EC - q_C^2\left(BD - E^2\right)}{2\left(BD - E^2\right)}$, $q_A^1 = \dfrac{CB + EA - q_A^2\left(BD - E^2\right)}{2\left(BD - E^2\right)}$

○ Cournot-Nash Equilibrium: $q_C^1 = q_C^2 = \dfrac{AD + EC}{3\left(BD - E^2\right)}$ and $q_A^1 = q_A^2 = \dfrac{BC + EA}{3\left(BD - E^2\right)}$

V. Conclusion

Complex Environment

■ Future Work and Implications

○ Further analysis of the 2-Sided Market model should produce more valuable insights into the otherwise counterintuitive framework.

○ Present and future results from the 2-Sided Market model should not only be understood by platform firms in forming optimal business strategies, but also by policy makers since seemingly straightforward directives can often run counterproductive under this complex environment.