ΘΕΜΑΤΑ ΑΝΤΑΓΩΝΙΣΜΟΥ ΣΤΙΣ ΤΗΛΕΠΙΚΟΙΝΩΝΙΕΣ ΚΑΙ Η ΕΛΛΗΝΙΚΗ ΠΡΑΓΜΑΤΙΚΟΤΗΤΑ

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BASIC PRINCIPLES – MODELS THAT HAVE BEEN STUDIED

Two-Way Interconnection and the role of Access Charge

Introduction:

In the policy debate the desirability of asymmetric regulation has been recognized

- European Commission, 2000
- Oftel, 2000.

Introduction :

The European Union distinguishes between operators with significant market power and operators without significant market power.

- Fixed operators with significant market power are required to charge cost-based access prices (see Article 7 of the interconnection directive, European Parliament and Council, 1997)
- Fixed operators without significant market power are not required to base their access prices on costs.

This means that interconnection charges do not have to be the same between two operators even if operators have the same cost structure.

Introduction :

Example:

- the Dutch incumbent KPN, which was considered to possess significant market power, was forced to charge a cost-based access price.
- The entrant Enertel, an operator without significant market power, charged an access markup to KPN. KPN complained to the Dutch regulator Opta arguing that Enertel should also provide cost-based access for calls originating from KPN's network.
- The Dutch regulator Opta decided in favor of the entrant Enertel basing its decision on European legislation (see Opta, 1999).

Introduction :

Two-way interconnection:

- Competing service providers are typically interonnected, and part of their service consists of terminating calls that originate on their rivals' networks.

- Since this is costly, firms collect per-minute access charges (or interconnection fees) from each other for termination.

Introduction :

Double Marginalization Problem:

- By unilaterally increasing its termination charge, a network can raise the marginal call costs of the rival network. This translates into a higher rival's retail price, leading to a lower rival's market share and a higher market share of the own network.
- In a noncooperative, symmetric equilibrium then, two equal networks will both charge high access fees and high call prices, which may exceed the monopoly price, if substitutability between networks is low.
- In sum, profits as well as consumer surplus are low

Introduction :

Solution of the problem:

- To impose reciprocity of access charges, i.e. to demand that both networks charge the same unit access fee.

(This can be achived by a regulator setting an appropriate reciprosal access charge (i.e. European Commission))

or

- To let networks freely negotiate over the access charge, subject only to reciprocity

Introduction :

Solution of the problem:

- In many OECD countries, interconnection arrangements are indeed handled in the latter way, with regulatory intervention only if negotiations fail

- Now, while collusion over retail prices is illegal in general, cooperative agreement on the access charge is allowed an doften encouraged.

Introduction :

One wrong assumption on two-way access:

- Consumers do not benefit from receiving calls.

This is not only unrealistic, but also assumes away a potentially significant effect, which arises if firms can set different prices for calls terminating on-net and off-net, i.e., if they use termination-based price discrimination – what e.g. mobile telephony providers typically do.

Introduction :

- With termination-based price discrimination, if consumers care about being called, their total surplus does not only depend on the prices offered by the network they are subscribed to, but also on the price the rival sets for calls into this network.

- Without this call externality, a network raising its price for off-net calls would only reduce volume demand of is own customers. Taking into account the call externality makes clear that this also hurts the rival's customers, and hence makes the rival less attractive to subscribe to.

Introduction :

Result:

- Both networks set higher off-net prices than without the call-externality.
- Indeed, if receivers' utility is sufficiently great, with linear pricing this may lead to equilibrium off-net prices above the monopoly level, accompanied by rather low on-net prices, even if the access charge is equal to marginal cost.

4.2 Literature Overview

- The first to show the negative welfare effects of cooperatively determined access charges within an explicit model were Armstrong (1998), Laffont, Rey and Tirole (1998a), henceforth LRTa, and Carter and Wright (1999).

- They employ models were two networks are differentiated in the Hotelling style and compete for customers in linear, nondiscriminating prices.

<u>Basic assumptions of LRTa's model:</u>

- Consumers do not benefit from receiving calls and
- Calling patterns are balanced

4.2 Literature Overview

Conclusions of LRTa's model:

- The negotiated access charge may be used as a collusive device and
- Will definitely exceed the marginal cost of access

4.2 Literature Overview

4.2.1 Nonlinear Pricing

e.g. Two part tariffs

- That means that the networks charge a fixed fee (constant), and one charge (price) that depends of the number of calls made by the customer.

- Although usage fees (those prices that maximize the profits of the providers) still increase with the access charge, networks can counterbalance the negative impact on market share by lowering the fixed fee.

Thus, competition remains strong, and the access charge looses its collusive function

4.2 Literature Overview

4.2.2 Termination-Based Price Discrimination

- Different prices are charged for calls terminating in different newtorks.

- Usually the price for calls terminating in the same network where they originate (on-net calls) is lower than the price for calls leaving the network (off-net calls).
- Price discrimination of this type creates positive newtork externalities despite interconnection

4.2 Literature Overview

4.2.2 Termination-Based Price Discrimination

To sum up:

- While under nonlinear pricing networks are either indifferent about the access charge or prefer an access charge below marginal cost,
- In the case of linear pricing networks will negotiate a high access charge to maximize joint profits

4.2 Literature Overview

4.2.3 Call Externalities

- An increase in a network's market share raises the number of calls received by (and hence benefits the) subscribers of this network. In their subscription decision, consumers compare the net utilities they receive from joining either network.

- If a network raises its off-net price, this has two effects:

4.2 Literature Overview

4.2.3 Call Externalities

1. The net utility of this network's customers decreases, and
2. Since these customers' demand for off-net calls falls, also the rival network's customers suffer, because they less frequently enjoy the benefit of being called.

This second effect lowers customers' incentives to switch to the rival network

4.2 Literature Overview

4.2.3 Call Externalities

Jeon, Laffont and Tirole (2002) show something impressive: if receivers' utility is high enough (equal to callers' utility), then for any given level of the access charge, the price for off-net calls in a symmetric equilibrium becomes infinite, resulting in connectivity breakdown

Intuition: any off-net call made generates utility for the caller and the receiver. However, since only the caller pays for the call, if receivers' utility is high, net surplus is higher for the receiver than for the caller.

4.2 Literature Overview

4.2.3 Call Externalities

This means that while raising the off-net price may decrease the direct profit from off-net calls, at the same time it makes the own network more attractive, resulting in an increase in market share. The total efect on profit becomes positive, if receivers' utility is high. Furthermore, if receivers' utility is high enough, the total effect on profit is positive, regardless of the levelof the off-net price. This, of course, means that the only equilibrium has an infinite off-net price.

4.3.1 The Model - Introduction

- We address the question of network competition between telecommunications operators when they have to invest in their own facilities.

- Is one two-way access, in the sense that each operator needs access to the rival's network in order to terminate calls originated by its own customers but destined to subscribers belonging to the other network.

4.3.1 The Model - Introduction

The model that we propose builds on the framework of ALRT

But:

- This paper analyzes the incentives that operators have to invest in facilities with different levels of quality. A network of better quality is more expensive but may give an important edge to an operator when competing against a rival.

- We study the role of access charges with asymmetric firms, where the asymmetry derives from quality choices that affect the amount of calls that customers are willing to make at a given price.

4.3.1 The Model - Introduction

- In particular, we study a basic model where quality influences all the calls made both on-net and off-net

- We extend the framework of ALRT by introducing an investment stage, prior to price competition. We show that the incentives to invest are influenced by the way termination charges are set.

4.3.2 The Model

Demand structure

Network i offers a two-part tariff:

$T_i(q) = F_i + p_i q$, $i = 1,2$

where the fixed fee F_i can be interpreted as a subscriber line charge and p_i as the marginal price for a call or usage fee

4.3.2 The Model

Demand structure

- we introduce a parameter k, k > 0, that is increasing in the operator's investments and affects quantities and utilities. *k* is some minimum quality level that operators have to supply.

- We assume that both quantity and indirect utility are increasing in *k* in particular we assume that they can be expressed in a multiplicative form:

$$q_i(p) = k_i q(p)$$

$$v_i(p) = k_i v(p)$$

4.3.2 The Model

Market shares

The consumer indifferent between the two networks determines the market share of the two firms. In particular firm *i*'s share is α_i where:

$$\alpha_i = \alpha(p_1,p_2,F_1,F_2) = \frac{1}{2} + \sigma(w_i - w_j) \text{ ή } \alpha_i = \alpha(w_1, w_2) = \frac{1}{2} + \sigma(w_i - w_j) \quad (1)$$

where

$w_i = v_i(p_i) - F_i = k_i v(p_i) - F_i$, $i = 1,2$.

is the net surplus for customers connected to network *i*.

4.3.2 The Model

Cost structure

Serving a customer involves a fixed cost *f* of connection and billing. Each call has to be originated and terminated. The marginal cost is *c* per call at the originating end and *t* at the terminating end. The total marginal cost for a call is thus $c + t$. Networks pay each other an exogenous negotiated or regulated two-way access charge, denoted by *a*, for terminating each others calls.

Finally, each network incurs a fixed cost $I(k)$ to provide a service of quality *k*, with $I(k) >= 0$

4.3.2 The Model

Solution

Network 1 has to solve:

$$\max \Pi_1 = \max \pi_1 - I(k_1)$$

$$\pi_1 = \alpha(w_1,w_2)\{[p_1 - c - t - (1-\alpha(w_1,w_2))(\alpha - t)]k_1 q(p_1) + v_1(p_1) - w_1 - f\}$$
$$+ \alpha(w_1,w_2)(1-\alpha(w_1,w_2))(\alpha - t)k_2 q(p_2)$$

Rearranging, we have:

$$\pi_1 = \alpha(w_1,w_2)\{[p_1 - c - t)k_1 q(p_1)] + v_1(p_1) - w_1 - f\} +$$
$$+ \alpha(w_1,w_2)(1-\alpha(w_1,w_2))(\alpha - t)[k_2 q(p_2) - k_1 q(p_1)]$$

4.3.2 The Model

Solution

Thus, it results:

$$\frac{\partial \pi_i}{\partial p_i} = \alpha_1 k_1 [q(p_1) + q'(p_1)(p_1 - c - t) - q(p_1)] - \alpha_1 (1 - \alpha_1)(\alpha - t) k_1 q'(p_1) =$$

$$= 0$$

and so we have at equilibrium:

$$\mathbf{p^*_1 = c + t + (\alpha - t)(1 - \alpha^*_1),} \qquad \mathbf{(2)}$$

i.e. the usage fee is equal to the perceived marginal cost. This is a typical result when firms compete in two-part prices.

4.3.2 The Model

Solution

From equation **(2)** $\mathbf{p^*_1 = c + t + (\alpha - t)(1 - \alpha^*_1)}$, it is immediate to observe that:

1. when access charges (α) are set above cost, then both firms would charge above marginal cost.

2. the firm with a market share above 50% would charge less than the rival. This is because, being the larger firm, it would terminate more calls on-net than the rival, hence the perceived marginal cost for the larger firm would be smaller.

4.3.2 The Model
Solution

Example for (1):

If c = 10 euro (cost of originating a call)
and t = 10 euro (cost of terminating a call)
and $\alpha_1 = 0,5$ (or 50% market share)

Then from (2) we have:

$$p^*_1 = c + t + (\alpha - t)(1 - \alpha^*_1) = 10 + 10 + (\alpha - 10)(1 - 0,5) = 20 + (\alpha - 10)0,5$$

This means that if the access charge α is higher than 10 euro, then the whole usage fee p^*_1 is higher than the marginal cost of the call c + t = 10 + 10 = 20 euro

4.3.2 The Model
Solution

Example for (2):

If c = 10 euro (cost of originating a call)
and t = 10 ευρώ (cost of terminating a call)
and α = 15 (access charge that both networks pay each other)
and $\alpha_1 = 0,7$ (or 70% market share)
Then from (2) we have:

$$p^*_1 = c + t + (\alpha - t)(1 - \alpha^*_1) = 10 + 10 + (15 - 10)(1 - 0,7) = 21,5 \text{ euro}$$

While if $\alpha_1 = 0,3$ (or 30% market share) then from (2) we have:

$$p^*_1 = c + t + (\alpha - t)(1 - \alpha^*_1) = 10 + 10 + (15 - 10)(1 - 0,3) = 23,5 \text{ euro}$$

4.3.2 The Model

Solution

We have the following expression for the market share of firm 1 at equilibrium:

$$\alpha^*_1 = \frac{1}{2} + [k_1 v(p^*_1) - k_2 v(p^*_2) + (p^*_1 - c - t) k_1 q(p^*_1) - (p^*_2 - c - t)\, k_2 q(p^*_2)]$$

or

$$\alpha^*_1 = \frac{1}{2} + \frac{\sigma}{3} (k_1 W(p^*_1) - k_2 W(p^*_2)) \qquad (4)$$

where $W(p) = v(p) + (p - c - t)\, q(p)$ is total welfare generated by a network of unit quality.

4.3.2 The Model
Solution

One of the following conditions is sufficient for the firm with the higher investment to always have more than 1/2 of the market, independently from the way access charges are set:

1. Access charges are sufficiently close to termination costs;
2. Products are sufficiently differentiated;
3. Demand is sufficiently rigid.

4.3.2 The Model
Solution

Access is regulated at cost

Suppose that the access charge is fixed by regulator (or negotiated by the parties) at its marginal cost: $a = t$.

From **(2)** $\mathbf{p^*_1 = c + t + (\alpha - t)(1 - \alpha^*_1)}$, we have $p^*_1 = p^*_2 = c + t$, since the perceived marginal cost is equal to the true marginal cost for both firms, independently from their market shares.

In fact, we have:

$$\alpha^*_1 = \frac{1}{2} + \frac{\sigma}{3} v(c + t)(k_1 - k_2).$$

4.3.2 The Model
Solution

Access is regulated at cost

If the quality of the two networks differs, market share is not equally shared between the two
operators, in line with Proposition 1:

Because $\alpha^*_1 = \frac{1}{2} + \frac{\sigma}{3} v(c + t)(k_1 - k_2)$.

- If $k_1 > k_2$, then $\alpha^*_1 > 1/2 > \alpha^*_2$
- If $k_1 = k_2$, then $\alpha^*_1 = 1/2 = \alpha^*_2$
- If $k_1 < k_2$, then $\alpha^*_1 < 1/2 < \alpha^*_2$

4.3.2 The Model

Λύση

Access is regulated at cost **- Example**:

If c = 10 euro (cost of originating a call)
and t = 10 euro (cost of terminating a call)
Then the utility of consumers which depends on c+t, i.e. v(c+t) is the same for both the networks και για τα 2 δίκτυα.

But, if the quality between the two networks differs, i.e. if we set
$k_1 = 2$ (quality factor for network 1),
$k_2 = 1$ (quality factor for network 2)
and $\sigma = 1/2$ (substitution between networks), then we have:

$$\alpha^*_1 = \frac{1}{2} + \frac{\sigma}{3} v(c+t)(k_1 - k_2) = \frac{1}{2} + \frac{1}{6} v(10+10)(2-1)$$ clearly above 50%

4.4 ΣΥΜΠΕΡΑΣΜΑ

Η ποιότητα κοστίζει αλλά είναι επωφελής για πελάτες που θα καλούν περισσότερο. Όταν η ποιότητα ενός δικτύου επηρεάζει τόσο τις εντός όσο και τις εκτός δικτύου κλήσεις, τότε αποδείξαμε ότι:

- Για δεδομένα επίπεδα επενδύσεων (ποιότητας), μια μικρή επιχείρηση θα επωφελούνταν από μια χρέωση πάνω από το κόστος ενώ το αντίθετο θα ίσχυε για μια μεγάλη επιχείρηση

- Αν η ποιότητα των 2 δικτύων διαφέρει, το μερίδιο αγοράς δεν μοιράζεται ισομερώς μεταξύ των 2 παρόχων. Συγκεκριμένα, το δίκτυο που παρουσιάζει καλύτερη ποιότητα, αποκτά μερίδιο αγοράς μεγαλύτερο του 50%

4.4 ΣΥΜΠΕΡΑΣΜΑ

Επομένως, η ρύθμιση των χρεώσεων πρόσβασης (αλλά και τερματισμού) είναι καίριας σημασίας, όταν αναλύουμε θέματα ανταγωνισμού μεταξύ δύο τηλεπικοινωνιακών παρόχων. Η συνήθης πρακτική μεταξύ των παρόχων είναι η (ιδιωτική) διαπραγμάτευση των χρεώσεων πρόσβασης, κάτι που πολλές φορές δεν είναι και πολύ αποτελεσματικό, οπότε οδηγούμαστε συχνά στο φαινόμενο οι χρεώσεις πρόσβασης να είναι πάνω από τα κόστη τερματισμού (ενν. των κλήσεων).

Αντ' αυτού, όμως, θα μπορούσαμε να πείσουμε τις επιχειρήσεις να επενδύουν με έναν αποτελεσματικό τρόπο πάνω στην ποιότητα, κι έτσι οι χρεώσεις πρόσβασης θα μπορούσαν να τίθενται κάτω από τα κόστη

4.4 ΣΥΜΠΕΡΑΣΜΑ

Πολλές χώρες (συμπεριλαμβανομένων και των Η.Π.Α. από την Πράξη Τηλεπικοινωνιών του 1996) έχουν υιοθετήσει στην πράξη ρυθμίσεις όπου το δίκτυο που καλεί θα πρέπει να πληρώνει το «καλούμενο» δίκτυο μια αμοιβή (χρέωση) τερματισμού που θα βασίζεται στο Μακροχρόνια Αυξητικό Κόστος (Long Run Incremental Cost – LRIC) των «ευαίσθητων» ευκολιών – δυνατοτήτων (facilities) κυκλοφορίας του αποδέκτη δικτύου που χρησιμοποιείται για να τερματίζει τις κλήσεις.

Με την εργασία μας δείξαμε ότι το LRIC μπορεί (από μόνο του) να μην αποτελεί καλό δείκτη όταν λαμβάνονται κίνητρα για επένδυση (στην ποιότητα)

4.4 ΣΥΜΠΕΡΑΣΜΑ

Με όλα αυτά, ακούγεται ενδιαφέρον ένα σύστημα όπου θα έδινε μηδενική επιβάρυνση διασύνδεσης.

- Κάτι τέτοιο, εφαρμόζεται εύκολα στην πράξη και από την άλλη πλευρά δίνει υψηλότερα κίνητρα για επένδυση (σε ποιότητα).

- Από την άλλη είναι και κοινωνικά πιο αποδεκτό. Η Federal Communication Commission (FCC) πρόσφατα ξεκίνησε μια διαδικασία για την υλοποίηση ενός τέτοιου συστήματος διασύνδεσης.