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Free Internet Access and Regulation: a Note

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Abstract

This paper we consider the impact of the regulation of telephony on Haan's [2001] analysis of the economics of free internet access. Haan considers an unregulated market, and finds that free internet access is compatible with an efficient outcome and avoids the double marginalization problem. We find that if there is binding price cap regulation, then free internet access is never efficient: ISP access charges will be strictly positive. This suggests that either price-cap regulation is non-binding in the ISP access market, or that some other explanation is required.

Keywords: Free access, internet, efficient, regulation.

JEL Classification: L12, L22, L42.

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1 Introduction

Haan [2001] provides an interesting and innovative analysis of free-internet access. In many European countries, Internet Service Providers (ISP) and telephone companies (TC) have an arrangement whereby access to the ISP is via the telephone line at a standard rate and the user pays nothing directly to the ISP (it is "free" from the point of view of the consumer-subscriber). The ISP and telephone company TC agree to a division of the revenue generated by people connecting to the ISP. The basic argument is that this arrangement means that a *double marginalization* problem is avoided. If the ISP has a charge based on time connected, this will be a markup on the markup on the price of telephony. Clearly, in general this situation will not be efficient[1] from the point of view of the ISP and TC. Free internet access is an arrangement which ensures that the efficient outcome can be attained, which maximizes the joint profits of the ISP and TC.

In this note, we show that when the price of telephony is regulated this result may no longer hold. In particular, if there is binding price-cap regulation, then the efficient outcome can only be attained if there is an access charge to the ISP over and above the price of telephony.

2 The model

Haan considers several modelling options. We will adopt the simplest possible case in order to illustrate the argument. Demand for ISP services q is linear in final price $p : q = 1 - p$. The (marginal) cost of production of telephony and

[1] Throughout the paper, pareto-optimality and efficiency are taken from the perspective of the TC and ISP only (implying the maximization of joint-profits). The interests of the consumer are not considered. Clearly, the maximization of joint-profits is at the expense of reduced consumer surplus From the societal perspective the competitive outcome is Pareto-optimal.

ISP is assumed to be zero. Without loss of generality, this is consistent with a positive unit cost of telephony, if we regard all variables as net of the unit cost of telephony. The price charged by the TC to the ISP is p_T. The price charged by the ISP is p_A : the total price paid by the consumer is $p = p_T + p_A$. Hencethe profits of the TC and ISP are determined in the following way. The total industry profit is simply the total revenue, determined by the total price p

$$\Pi(p) = p(1-p).$$

This total revenue is then divided between the ISP and TC: the share of the ISP is $\mu = \frac{p_A}{p_A+p_T}$. If there is a lump-sum transfer of L from the TC to the ISP we have:

$$\begin{aligned} \pi_{ISP} &= \mu\Pi(p) + L \\ \pi_{TC} &= (1-\mu)\Pi(p) - L \end{aligned}$$

The efficient outcome involves joint-profits being maximized. The monopoly profits and corresponding final price thus defined are

$$\Pi^M = 1/4 \quad p^M = 1/2$$

Any distribution of monopoly profits between the ISP and TC can then be obtained by choosing prices and lump-sum transfer. We can think of this as a contract $\{L, p_T, p_A\}$. A contract is efficient *iff* $p_A + p_T = p^M$.

Clearly, if the two prices are set independently, then we have a double marginalization problem. Assuming, as is reasonable, that the TC sets p_T first, followed by the ISP, the solution is $p_T = 1/2$, $p = 3/4$. In this case $\Pi(3/4) = 3/16 < \Pi^M$. The profits are lower than the joint-profit maximum because the price is too high: the TC earns the same (a larger share of a smaller total) and the ISP earns less, $\pi_{TC} = 1/8, \pi_{ISP} = 1/16$, with $\mu = 1/3$.

So, if we take double marginalization to represent the non-cooperative default outcome, the option of free internet access enables a Pareto improvement

to occur. The TC sets the final price (there is free internet access), to maximize joint profits. This will be incentive compatible if the TC pays a lump-sum transfer (possible zero) as in Haan, or a fixed share of total revenue. We will say that there is *free-internet access* if $p_A = 0$ and hence $p_T = p$. A free access contract is efficient iff $p_T = p^M$. That is, the TC charges the monopoly price, the ISP service is free, and there is a lump-rum transfer $L \geq 0$ from the TC to the ISP.

3 Regulated telephony.

In this section, we assume that telephony is regulated with a price-cap $\bar{p} \geq 0$ set by the regulator, so that $p_T \leq \bar{p}$. In this case, we have

Proposition 1 *Price cap regulation. Let $\bar{p} \geq 0$.*

(a) Free internet access is efficient only if $\bar{p} \geq p^M$.

(b) If $\bar{p} < p^M$, then efficiency occurs iff

$$p_A = p^M - p_T > 0$$

Proof. (a) Efficiency occurs iff $p = 1/2$. If $\bar{p} \geq p^M$, then we can choose a free access efficient contract $\left\{L, p^M, 0\right\}$, where $\pi_{TC} = \Pi^M - L$ and $\pi_{ISP} = L$.

(b) If $p_A \neq p^M - p_T$, then $\Pi < \Pi^M$. If $p_A = p^M - p_T$, then $\Pi = \Pi^M$. Since $p_T \leq \bar{p} < p^M$, $p_A > 0$. ■

Part (a) means that free ISP can only be efficient if the regulation is non-binding in the sense of setting a price-cap at or above the monopoly price. This may be the case if the price-cap is set for the general telephony market rather than the specific ISP access market. Part (b) states that if regulation is biting in the sense of restricting the telephony price below the monopoly level, then efficiency can only happen if the ISP is not free: the end-user price is set at the monopoly price with the internet access price p_A being the difference between the monopoly price and the telephony price P_T.

In fact, in the case of binding regulation of the telephony price, double marginalization might actually be a way of increasing joint profits. This case will be of particular relevance where transfer payments are not permitted under the regulatory regime ($L = 0$), since the ISP will then automatically choose p_A to maximize its own profits. Under double marginalization the ISP chooses the monopoly markup given the access price $p_T = \bar{p} < p^M$:

$$p = p^D = \frac{1 + \bar{p}}{2}$$

Proposition 2 *(a) For for $\bar{p} \in [0, 0.215]$, double marginalization increases joint profits over free ISP access.*

(b) Double marginalization is efficient iff $\bar{p} = 0$.

Proof. With Double marginalization, we have

$$\Pi^D(\bar{p}) = \Pi(\frac{1 + \bar{p}}{2}) = \frac{1}{4} - \frac{1}{4}\bar{p}^2$$

With free ISP: $\Pi^{Free}(\bar{p}) = \bar{p} - \bar{p}^2$. Hence

$$\Pi^D(\bar{p}) - \Pi^{Free}(\bar{p}) = \frac{1}{4} - \bar{p} - \frac{3}{4}\bar{p}^2$$

$\Pi^D(\bar{p}) - \Pi^{Free}(\bar{p}) = 0$ when $\bar{p} = -\frac{2}{3} + \frac{1}{3}\sqrt{7} = .215$ (to 3 s.f.). Hence $\Pi^D(\bar{p}) - \Pi^{Free}(\bar{p}) \geq 0$ for $\bar{p} \in [0, 0.215]$. ■

Hence, we have the result that for a low price-cap, double marginalization can actually increase joint profits relative to the free-access case. It results in a higher price, but industry profits fall only if the end-price p is *too* high. Nevertheless, double marginalization will only be efficient if there is a zero price-cap: $\bar{p} = 0$, which results in $p = p_A = p^M$.

Under regulation, efficiency will only be attained under three circumstances:

- $\bar{p} \geq p^M$:the case of a non-binding price-cap, where the regulator sets a price-cap at or above the monopoly price. Free internet access is among the efficient outcomes.

- $\bar{p} = 0$. If the price-cap is zero[2], the ISP can then extract the full monopoly profit and $p_A = p^M$. Here double marginalization is efficient.
- $\bar{p} \in (0, p^M)$, there is costly ISP access: $p_A = p^M - \bar{p}$.

Haan [2001] considers the case of regulated telephony in section 2.6. p369. However, he does not consider the issue of *efficiency*. He considers the question of *wether free internet access will lead to higher total profits compared to double marginalization*. Whilst free internet access may Pareto dominate double marginalization, it will not generally be efficient as Proposition 2 demonstrates.

4 Conclusion.

We have focused on the efficient outcome in a situation where there is an upstream firm providing telephony, and a downstream ISP selling services to customers. In a cooperative game, these two firms will want to attain an efficient outcome, with some division of the total surplus either through a lump-sum transfer, revenue sharing or suitable access price agreement.

We find that in an unregulated industry, the efficient outcome includes the case of "free access". That is, the end-user price is the joint-profit maximizing price paid to the telephone company, with no additional markup by the ISP. There is then an agreed transfer from the TC to the ISP, to be determined by an underlying bargaining or contract model. This is essentially the point in Haan's model.

In the case of regulated telephony, with a price cap restricting the price the TC can charge to the ISP matters are somewhat different. If the regulation is binding, then free internet access is no longer efficient. A Pareto improvement is possible if the final price is increased to the efficient price. This can only

[2] This need not mean literally zero, since we can interpret price variables as net of the unit cost of telephony. However, we do often observe zero priced local rates.

occur if there is a strictly positive ISP access price direct to the consumer, with profits redistributed by a lump-sum transfer. Furthermore, if we compare free access with double-marginalization (the TC moves first followed by the ISP), industry profits are larger than with free internet access when the price-cap is low enough, because the final price is closer to the monopoly price.

The results of this paper suggest one of two possible conclusions.

- If the regulation of telephony is non-binding in the internet access market, free internet access is amongst the efficient outcomes. If the price-cap is set with reference to the general market for telephony, which is predominantly voice traffic, it be non-binding for the internet access market.

- If the regulation of telephony is binding in the internet access market, then free internet access is not efficient and cannot be explained by the attempt to avoid double marginalization as described by Haan.

In either case, it suggests that we need a fresh look at regulation of telephony in this important and growing market.

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5 Reference.

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