USAGE OF RAMSEY PRICING IN COMMUNICATIONS SECTOR

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Summary:This paper is focused on Ramsey pricing usage in practice, concretely Ramsey pricing nowadays has found out usage in mobile networks sector. Paper points out certain problems with implementation of this pricing into practice as well regarding also character of communications sector as network sector. Ramsey approach is used also within gradient method application for increase of operator´s economical effect and social utility considering served locality largeness.

Key words: Ramsey pricing, incremental costs, mobile network, network sector, Gradient method.

INTRODUCTION

Many enterprises ordinarily do not distribute common cost equally among services. They make own effort to set prices according to demand for various services on competitive market. They try to sell certain service to consumers willing to pay the highest price. There is significant difference between incremental and total costs by existing high common cost (costs expended by enterprise for some services constant by change of only one service provided volume). Thus prices of two same services can significantly differ.

1. INITIAL PRESUMPTIONS

Incremental and total costs are considered as extreme points of particular service cost function. If revenues from provision of this service do not cover nor incremental costs for this service, service provider will have to use cross subvention. Thus incremental costs can give us information of cross subvention usage by producer or provider of certain service. Therefore in case of imposing a ban on cross subvention to enterprise by regulator, he should check also incremental costs. Mutually regulator can be interested in provided services total costs as well. Due to this monitoring, he can discover case of competitive sector. In case of risk sector, expected revenues from service provision probably do not exceed total costs of this service in longer-term horizon. Otherwise the strong motivation does exist for entrance of other competitors to sector. Clear indication of insufficient competition in sector is situation, when price of certain service is higher than total costs of this service in long-term horizon.

2. SPECIFICS OF COMMUNICATIONS AS NETWORK SECTOR

Network construction in these sectors requires high initial costs, it usually becomes the biggest barrier for entrance to sector. Mutually real actors can be influenced by sunk costs,

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which were expended and it is not possible to get them back or increase their value in near time horizon. It is because built network is not able to be moved or used by other way. These specifics are key aspects, because they can create conditions for establishment of natural monopoly situation.

The next characteristics of network sector is network effect, when network determinates specific attributes of certain product. If product represents input to next processes and devices, it will be necessary to ensure compatibility of these devices and mechanisms with mentioned product (energy sectors). Consequence of this network effect is homogenous product, due to it competitive conditions in these network sectors are limited.

Additional utility for users or network providers appears with entrance to network of another user. Subsequently thus costs usually decrease with assumption of existing economies of scale, when production costs decrease with increasing output volume. This fact leads to natural monopoly existence in network sectors.

Enterprise becomes natural monopoly, when total average costs curve of this firm has declining inclination. Causes of this situation are just high initial costs expended by enterprise before entrance on market for network construction, and relatively low variable costs. Total average costs decrease with output volume increase, mutually economies of scale appear. This natural monopoly can be regulated by various more and less appropriate methods.

By usage of price regulation on the level of marginal costs, enterprise would become unprofitable, btw. losing due to decreasing average costs, which are higher than marginal costs and price set on marginal costs level thus would not cover average costs.

We can thus use price regulation on average costs level. In this case, price covers average costs and enterprise is not unprofitable, btw. losing (it generates zero economical profit). This way of regulation is subsequently modified for generation at least of part of profit.

The most used method of regulation in practice is regulation of revenue rate. Prices by this method are set for achievement of revenues by enterprise, which would be achieveable by other way as well. Other possible used way is price cap regulation. There is maximum price increase set for certain time regulation period.

3. PRINCIPLES OF RAMSEY OPTIMAL PRICING

In mobile networks sector of Czech Republic, Czech Telecommunication Office, from its position of national regulative authority, uses method of Long-Run Incremental Costs for regulation of termination price (ending of call). It is about difference of operator costs providing all services including termination and operator providing all services less termination. But this methodology faces up to problem of all expended costs allocation impossibility to all provided services. These costs are thus afterwards allocated by surcharges. There are two types used in practise:

- level surcharge – costs are allocated proportionally to provided services volume,
- Ramsey surcharge – procent surcharge is inversely related to demand elasticity.

Operators prefer just Ramsey surcharge, which enables to allocate higher part of common costs on services with low demand elasticity. For absolute most of products, we can trace the rule, that price increase mutually causes demand decrease for these products. But demand decrease rate is not same for all products, it depends on demand elasticity. Call termination can be classified as service with very low demand elasticity.

For optimal way of common costs covering, method of higher prices setting than marginal costs seems as effective just for services with low demand elasticity. This way comes from Frank Ramsey works and we can speak about Ramsey prices.

Thus let us consider two services provided by operator – termination service and origination service (call origin). Termination service price increase for 40 percent can cause consumption decrease of this service for 10 percent. The same price increase of origination service causes consumption decrease this time for same 40 percent. Demand decrease rate of call termination by price increase is significantly lower than by call origination just due to its very low elasticity. Enterprise with high common costs can set Ramsey price as sum of marginal costs and surcharge. Surcharge is in inverse relation to demand elasticity of particular services. It means that services with low demand elasticity can use above-average high surcharge over incremental costs.

Coverage of more common costs of services with low demand elasticity minimizes deformation of allocation efficiency. Thus we can say, that Ramsey prices increase allocation efficiency.

4. RAMSEY APPROACH USAGE IN GRADIENT METHOD

Gradient method is used in pricing by management of price changes considering initial level in case of equal profit from service providing but social utility of service grows in region. This method sets local optimal routing of price fluctuation. Wider scope with consider to locality largeness can cause changes in profit level and social utility of service as well.

Rate of utility change ΔU is indicator for revenues changes in consequence of realized price adjustments. If aggregate profit function is the second step curve, then it will be possible to identify local Ramsey optimum.

Gradient method is based on standard metric of Euklides by specifications of price changes rates in percents. It means, that equal percentage change in various prices can be determined directly and higher percentage changes are recalculated considering smaller changes.

The best local solution of price changes is such one, by which price of service with increasing (decreasing) volume, has so called Ramsey number RN_k (see eq. 1) smaller (bigger) than critical Ramsey number RN_c (see eq. 2). Critical Ramsey number is calculated as weighted arithmetic mean of Ramsey numbers of all mentioned services n:

$$RN_k = \frac{p_k - mc_{kR}}{p_k} \cdot e_{dp}^k \qquad (1)$$

$$RN_c = \frac{\sum_{k=1}^{n} w_k \cdot RN_k}{\sum_{k=1}^{n} w_k} \qquad (2)$$

where:

p_k is price of k-th service provided by communications operator,

mc_{kR} are marginal (incremental) costs of R-th firm (consumer) for k-th service,

$e_{dp}{}^k$ is demand price elasticity for k-th service,

w_k is weight for Ramsey number defined by change of provided service volume.

Rate of utility change ΔU expresses dispersion of Ramsey numbers of particular services in relation to critical Ramsey number, which is the main determinant of ΔU rate. If demand price elasticities and percentage deviations between prices and marginal costs are small in case of highly appraised services, then critical Ramsey number and also ΔU will have small value, although particular Ramsey numbers show significant dispersion. If demand price elasticity is high, then ΔU will have high value, although dispersion of particular Ramsey numbers is equal as in case of low demand price elasticity value.

5. RAMSEY PRICING IN PRACTICE

Ramsey prices setting usually makes in practice certain objections. One of these problems by Ramsey prices setting can be demand elasticity setting with truly reliable estimation. In sector of mobile networks, it can be especially problematical considering complicated tariff plans and quick development in this sector.

Nevertheless allocation of common costs on various services can be based on setting prices Ramsey theory. If services with the lowest demand elasticity appear in this sector, more common costs will be able to be covered of them. If price of one service influences demand for other service, it will be necessary to reflect this fact to pricing as well. Level Ramsey surcharge can be used in case of similar demand elasticities of more services, e.g. in case of the lowest elasticities.

The next argument can represent different opinion on welfare maximization by Ramsey prices usage. Ramsey prices minimize allocation nonefficiency, but it is not the same idea as welfare maximization. Allocation efficiency can be objective measure, but welfare can be perceived by various ways for more subjects. Everybody has different opinion on viewpoint maximizing this welfare.

6. CONCLUSION

Price setting according to Ramsey optimal pricing is actually used in mobile network sector. Nowadays method of Long run average incremental costs (LRAIC) is prefered by national regulational authority in communications sector in compliance with recommendation of European Comission. This methodology however faces to problem, that it is not able to allocate all expended costs on all provided services. These costs are subsequently allocated by surcharges.

Operators prefer just Ramsey surcharge, which enables to allocate higher part of common costs on services with low demand elasticity. Surcharge is in inverse relation to demand elasticity of particular services. Ramsey prices setting usually makes in practice

certain objections. Demand price elasticity is not simply and standardizely calculative. Ramsey prices can enable certain maximization of allocation efficiency, but in questions of welfare maximization, results have not to be so definite.

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