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Local- versus global price cap: A comparison of foreclosure incentives

by

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Critical comments to the author are welcome!

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Abstract: This paper compares two regulatory devices for handling (access to) bottlenecks in deregulated network industries: (1) a local price cap and (2) a global price cap, the latter of which applies the efficient component pricing rule. The local price cap restricts profit regulation to the bottleneck, whereas a complementary set of measures intends to curb the resulting incentives for foreclosure of the competitive markets. The global price cap extends regulation to the entire firm, which should take away the foreclosure incentives. This major advantage of the global price cap is contrasted to possible disadvantages, which centre around renewed foreclosure incentives.

JEL classification: L43, L51, L9.

1. Introduction

Worldwide, *network* industries are opened up to allow for competition. Important examples are telecommunications, electricity, gas and transport markets. Whereas formerly, entry had been legally prohibited in these sectors overall, nowadays, a more refined approach takes a disaggregated view of these sectors. Some production stages may be considered as monopolistic bottlenecks, whereas other stages allow active and potential competition. This *disaggregated regulatory* approach attempts to demarcate the monopolistic bottlenecks in the respective sectors and concentrate regulatory attention to these parts only [see e.g. Knieps, 1997]. Among other things, two developments have pushed this trend towards opening up these markets. First, in several parts economies of scale have been exhausted due to the growth in demand and technological progress. Consequently, active competition is likely to be successful in these parts. Second, new theoretical insight has stressed the disciplinary role of potential competition. Developed in particular, by Baumol, Panzar and Willig [1982], this so-called theory of contestable markets argues that a natural monopoly alone is not sufficient for market power. Without entry barriers, potential entrants discipline the incumbent monopolist; consequently, it has no market power. Sunk investment raises an entry barrier and thereby destroys the contestability. The demarcation of the bottlenecks

with market power thus searches for monopolistic elements combined with sunk investment; all other stages may be considered competitive or contestable if legal entry barriers are abolished.

In the network industries under consideration, the distinction between monopolistic bottlenecks and contestable parts, can roughly be approximated by a distinction in (local) *infrastructure* and *service*. Infrastructure normally has both monopolistic elements and sunk costs, while *service* may or may not be monopolistic, but normally lacks sunk investment. The infrastructure therefore still justifies regulation, whereas both active and potential competition can be relied upon to "regulate" the service. This is the main characteristic of opening up these markets; where possible, allow market pressure to find efficient production and allocation.

The regulation flowing from this setting combines two objectives. First and most obvious, the market power of the monopolistic bottleneck should be regulated. This may be called profit-regulation.¹ This mainly concerns allocative efficiency. Second and less obvious, is to forestall that the market power of the bottleneck is transferred to competitive markets. The monopolistic bottleneck provides a necessary input for the competitive parts; in other words, the service providers need access to the infrastructure. The fear is that the monopolistic bottleneck provider is able to transfer its market power, through this physical "channel" of complementarity, to the competitive parts. The transfer might then result in foreclosure of the competitive service markets. It depends heavily on the regulatory framework whether this is possible and whether there is an incentive to do so.

In this paper, two regulatory approaches, which recently get attention in both theory and practice, will be compared in their effectiveness to handle the two regulatory objectives. These approaches are the *local price cap* and the so-called *global price cap*. The former restricts the profit-regulation to the bottleneck only, irrespective of whether the bottleneck provider also owns a service department. A package of complementary regulatory measures should secure that the bottleneck

¹ This is not to mean that excess profit as such is the problem. It means that regulation should set incentives such that the regulated firm sets efficient output and prices. This normally is associated with zero excess profits.

provider cannot transfer its market power to the competitive parts. The local price cap will refer to this regulatory package and will be described in section 2. Global price capping refers to regulation of an (integrated) firm, which owns and operates the bottleneck by a simultaneous price cap for *both* the bottleneck *and* its service department. In contrast, service firms which do not own a bottleneck are not regulated.² Underlying the global price cap is the so-called *efficient component pricing rule* (further abbreviated with ECPR); this rule stresses a laissez-faire approach towards access questions and has been put forward by especially Baumol [1983] and Baumol & Sidak [1994]. The global price cap (with application of the ECPR) will be described in section 3. In a comparative institutional analysis in section 4, a tradeoff will be stressed. The question will be: which of these systems will be better able to secure or promote competition on the service stages and at what expenses, given that the nirvana with an omniscient regulator does not exist? The local price cap creates the incentives to foreclose the service markets. The incentives are straightforward and the device has been designed to handle these. Nevertheless, given informational imperfectness, complicated antitrust cases will arise. The global price cap seems to take away these incentives at the expense of "over"-regulation. However, to the extent that foreclosure incentives do remain, the global price cap is not weaponed to handle them. Much seems to depend on the precise specification of the price-capping rule. Consequently, only where it can be argued convincingly that the foreclosure incentives under a global price cap are only minor, the global price cap seems to gain an advantage over the local price cap.

An alternative approach would be *structural separation*; that is, the monopolistic bottleneck provider is simply not allowed to participate on the competitive parts. Whereas indeed the regulatory problem is simplified in this scheme, it will lose possible economies of vertical integration. Moreover, since this is a quite severe regulatory constraint, it should be justified by convincingly showing that less severe alternatives inhibit major defects. Interesting and important as it may be, structural separation will not be taken into consideration in this paper. A comparative sector-specific study of possible economies of vertical integration is simply beyond the scope of this paper.

² For an excellent paper on global price caps, see Laffont & Tirole [1996].

2. The local price cap

The local price cap restricts profit regulation to the bottleneck only; the competitive service markets are unregulated. However, this creates an incentive for the monopolistic bottleneck provider to transfer its market power to the competitive service stages.³ In practice, especially in the UK, a set of regulatory measures can be observed.⁴ Below, this regulatory package will be described; that is, the minimum set of the necessary measures. The setting is the following. There is a monopolistic bottleneck provider with market power (due to sunk costs). Call this the (bottleneck) infrastructure. It will be assumed that the bottleneck cannot or only at prohibitively high costs be by-passed. The bottleneck's product is access to the infrastructure; its consumers come from the competitive parts in the sector, on which new entry is allowed and which are unregulated. Call the competitive stages the service stages. The price for access to the infrastructure is the access charge. Moreover, the monopolistic bottleneck provider is principally allowed to participate on the competitive parts, if it wishes to; i.e. as mentioned above, by assumption the sector is not structurally separated. If the bottleneck provider also owns a service department, it may be called the *integrated* firm, in contrast to the competitors on the service stages, which are not integrated by definition.

As described in the introduction, the regulatory objectives are (1) to regulate the market power of the bottleneck, and (2) simultaneously ensure that the bottleneck provider does not transfer its market power from the infrastructure stage to the service stage. This is not a trivial problem. If the integrated bottleneck provider cannot turn its market power into excess profits on the bottleneck because of binding profit regulation, it will try to do so on the competitive unregulated service stage. The local price cap attempts to handle both these aspects simultaneously. It will be useful to demarcate the minimally necessary ingredients and call the resulting package local price cap. Below I would like to argue that there are four such ingredients, which are fairly obvious in themselves, but only work in

³ The informed reader will notice the similarity with a concept called *accounting separation*. For a good discussion on accounting separation, see Cave & Martin [1994].

⁴ Compare to OFTEL [1994] and PES licence [1990].

combination. Without any of these ingredients the regulatory problem sketched above cannot be handled.

i. Profit regulation of the bottleneck

The bottleneck should be profit regulated. Note that profit regulation is reduced to the bottleneck, in contrast to regulating final-product prices; this is stressed by the disaggregated approach mentioned above. It will be convenient to think of this profit regulation as a "modern" incentive mechanism; a regulatory frame sets a weighted average of the price *level*, but within which the regulated firm decides about the price *structure*. A practical example, and important for section 3, is the price-cap regulation as heavily applied in the United Kingdom [see further Beesley & Littlechild, 1989]. Quite similar but more theoretical is the incentive mechanism designed by Vogelsang & Finsinger [1979]. Of course, these examples have their theoretical and practical drawbacks, but illustrate the meaning of the concept profit regulation used here; the regulation sets constraints within which the firm decides and optimizes. Thus it will not be assumed that an "omniscient" regulator simply sets the access charges. The regulator will not have the required information to do so properly.

ii. Third Party Access

Third Party Access means that the bottleneck provider is obligated to allow access to the bottleneck if so desired by an independent service firm (= a third party). The reason for this obligation may be obvious. If the integrated firm cannot make excess profits on the bottleneck because of the regulation, it will do so on the service stage by simply not allowing any competitors on the service stage. In other words, it will foreclose the competitive service market by refusing access to the bottleneck. Effectively, it transfers its market power from the monopolistic but regulated bottleneck to the competitive service markets. Consequently, TPA should be warranted. Mind that the transfer would be successful, because service competitors cannot by-pass the bottleneck; the output of the bottleneck and the output of the service are complements. Obvious as the obligation may seem, in

practice it may raise difficulties. Implementing TPA may contradict the constitutional right to decide over one's property. More practical, TPA is normally complemented with a series of exceptions. For example, capacity may not be "sufficient" to provide access at will. Such exceptions will increase the discretionary power of the bottleneck provider to foreclose the service markets. This is not to say that there should not be exceptions. It merely says that implementing TPA may not so easy as it may seem.

iii. Non-discriminatory access charges

The third element says that the access charges should be non-discriminatory. A narrow interpretation of this requirement, which is appropriate for the local price cap means that the access charges set by the integrated bottleneck provider should be the same for third parties as for its own service department. Thus, in its narrow meaning it means that the integrated firm may not discriminate between its own service department and independent service firms. The reason is again fairly obvious. Above it has been argued that the bottleneck provider could transfer its market power to the service stage by simply denying access to the bottleneck for third parties, if TPA were not warranted. Extend this argument; formally denying access is equivalent to prohibitively high access charges, which would in effect also exclude competitors on the service stage. It may be expected that monitoring this requirement will be the hardest in the entire package.

The point of this requirement is subtle and essential. The combination with the profit regulation of the bottleneck should be considered carefully here. If the bottleneck provider sets relatively high access charges for third parties, and if these would nevertheless enter and pay these access charges, the profit of the bottleneck might be higher than allowed by the profit regulation.⁵ Consequently, prohibitively high access charges only work if they are indeed prohibitively high; entry would not occur and the access charges would not be paid, so that they would not be included in the bottleneck's profit. Recall that due to the binding profit regulation

⁵ The profit regulation used here may be interpreted as the asserted zero-profit result of price-cap regulation. Relaxing this assumption, the same but slightly more complicated line of reasoning would apply for price-cap regulation without zero profits.

of the bottleneck, the integrated firm wants to make its profits on the unregulated service stage by transferring its market power. Now the non-discrimination-constraint binds. If the access charges are prohibitively high, so that the integrated firm creates a monopolistic position on the service stage for its own service department, then its own service department has to pay these high access charges to the bottleneck department as well. Although at first glance, it seems as if this only constitutes an internal stroke of the pencil, this internal payment does contribute to the bottleneck's profit which is regulated. Consequently, too high internal access charges violate the bottleneck's profit-regulatory constraint. If alternatively, there were no non-discrimination-constraint in the narrow sense defined above, the bottleneck provider could simply set prohibitively high access charges for third parties and low access charges for its own service department, which would fulfil the profit-regulation constraint.

This illustrates the dilemma for the integrated bottleneck provider. Low access charges will fulfil the profit-regulation constraint, while they (or more precisely, a large gap between final-good prices and access charges) will invite new entry on the service stage. High access charges foreclose the service market, but may violate the profit-regulation constraint on the bottleneck. It is important to be aware of the internal mechanism created by the combination of the profit-regulation constraint and the non-discrimination constraint.

iv. Separate accounts

Above it has been argued that the heart of the local price cap is the combination of the profit regulation of the bottleneck and the non-discriminatory access charges in the narrow sense. This implicitly assumes that the regulator can observe the bottleneck's profits, independent of the service department's profits, which are irrelevant. To this end, it should be required that different departments of the integrated firm keep separate books; i.e. separate accounting. The reason for separate accounts may now be obvious. It is simply a necessary measure to be able to control the other constraints. In particular, the bottleneck provider could always fulfil the profit-regulation constraint by simply shifting costs from the service department to the bottleneck department or shifting revenue from the bottleneck

department to the service department.⁶ In effect, the profit regulation would be non-binding. As simple as this may sound, in practice it may raise difficulties. Bookkeeping is not unambiguous. Determining proper rules will be a matter of negotiation. Moreover, even if the rules are unambiguous, monitoring application of the rules may be difficult.

To summarize, the local price cap may be defined as a regulatory package which contains (1) (profit-)regulation of the bottleneck, (2) third party access, (3) non-discriminatory access charges in a narrow sense, and (4) separate accounts between the monopolistic and competitive departments.⁷ The first concentrates on the regulation of the actual market power, whereas the latter three attempt to secure that the market power stemming from the bottleneck is not transferred to the competitive stages.

Each of these four requirements is necessary. Separate accounting is simply necessary to control the other requirements in the package; it has no interest in itself. Both the non-discrimination constraint and warranted Third Party Access are requirements to forestall foreclosure of the service markets. It must be stressed that the incentive to foreclose the competitive service market is caused by the (disaggregated) profit regulation of the bottleneck; if the bottleneck provider cannot make excess profit on the bottleneck, it will try to do so on the unregulated service markets. It would succeed in doing so by simply not allowing competitors on the service market, completely irrespective of whether they are more efficient or not. The point to stress is that even if they would be more efficient, in this regulatory scheme the bottleneck provider would not gain from the increased efficiency.

As for the profit-regulation requirement, suppose the contrary; that is, suppose that the bottleneck is not profit regulated. The action of the bottleneck provider is simple. It will maximize its bottleneck profits by setting monopolistic access

⁶ If the profit regulation under consideration is indeed price-cap regulation, then only control of the revenue side is necessary. The costs only play an indirect role in a price cap.

⁷ It is possible to capture the second and third requirement in only one requirement saying that access should be non-discriminatory in general. I prefer separating them, because it is more explicit.

charges. It will be indifferent between participating on the service market or not, since all the rent to be made in the market is already made on the bottleneck.⁸ Consequently, lack of the profit-regulation condition makes the other conditions redundant. This is the central idea of global price capping; "no profit regulation" can be replaced by a "global price cap", and still the other three requirements are redundant. This redundancy is stated by the efficient component pricing rule. It will be described extensively in section 3.

To conclude, the local price cap, as defined above, reduces the profit regulation to the source of market power and may therefore be expected to have fairly accurate results. On the other hand, the relation within one integrated firm of a regulated monopolistic part and an unregulated competitive part creates strong incentives for market foreclosure on the competitive parts. This creates the necessity of complementary regulatory measures, as described above. It may be asserted that antitrust cases concerning foreclosure will be frequent and the informational requirement, concerning the three complementary measures, to deal with these antitrust cases will be substantial.

3. The global price cap with application of the ECPR

In a highly recommendable paper, Laffont & Tirole [1996] discuss the virtues of a global price cap. The setting is as above. There is a monopolistic bottleneck, which cannot or only at prohibitively high costs be by-passed. The bottleneck, say infrastructure, provides as its output a necessary input for other stages, say service stages; these stages will be assumed to be competitive. The intermediate product thus may be seen as access to the infrastructure, and subsequently, the price for the intermediate product, an access charge. As before, the bottleneck provider is principally allowed to participate on the competitive service stages, which will then be the integrated firm. The global price cap now means that *all* externally sold products of the firm, which owns the bottleneck, are included in the price

⁸ This points to what might be called the "indifference result" of vertical integration [see Posner, 1976, p.172 ff.]. There are however reasons, such as price discrimination, which would violate the indifference result.

cap.⁹ Firms, which do not own a bottleneck (independent service firms) are not regulated. Moreover, the price cap only concerns externally sold products; internal transactions are not included in the price cap. The three complementary regulatory measures discussed under the local price cap (TPA, non-discrimination and separate accounts) do not exist in the regulatory device of global price capping.

The philosophy underlying the absence of these three complementary measures is their redundancy; this is captured by the idea of the so-called *efficient component pricing rule* (ECPR), or alternatively, *parity principle*, developed especially by Baumol [1983] and Baumol & Sidak [1994]. The background is a regulatory dispute in which an entrant wanting access to a bottleneck complained that the access charges demanded by the bottleneck provider were "too high". The bottleneck provider claimed that the access charge should include its opportunity costs foregone due to new entry. The claim of Baumol is that the claim of the bottleneck provider is correct and corresponds to a "normal" bargaining outcome; this principle has come to be known as the ECPR. Not surprisingly, this has raised much criticism and effectively, the parity-principle has come to be interpreted as regulatory ECP-rule. This section will first describe the principle and interpret it. It is not intended to add the next criticism¹⁰; the issue of this paper is to compare the global price cap, including the ECPR, with the local price cap, not criticize them separately.

The regulatory frame of Baumol [1983] and Baumol & Sidak [1994] is not so clear and exactly this lack of clarity raises a lot of criticism. Apparently, the setting of Baumol [1983] and Baumol & Sidak [1994] is characterized by contestable markets or intermodal competition. That is, even the bottleneck provider apparently has no market power. Another interpretation is that the bottleneck provider may be able to make excess profits, but that it has not been the main issue of Baumol and others to concentrate on the resulting allocative inefficiencies. Instead, they stressed the productive efficiency resulting from applying the ECPR, taking the final-good prices for granted. What is clear, however, is that there is no

⁹ Stated as it is here, it is a simplification. Not *all* products need to be included in the price cap; this will be explored in more depth in section 4.

¹⁰ Instead the reader may be referred to Tye [1994], Economides & White [1995], Laffont & Tirole [1994], Kahn & Taylor [1994] and Armstrong & Doyle [1995].

separate profit regulation of the bottleneck as under the local price cap as described above. As a result, the regulation of the market should appropriately be seen as *overall* (or, *global*) regulation; that is, regulation of final-good prices, be it through market pressure, be it by a regulator. For the purpose of showing the intention of the ECPR, it is convenient to consider no-regulation-at-all as non-binding regulation; i.e. the regulatory constraint is simply set too high and allows all the available rents to be made. The important point is that the available rent of the sector is predetermined and fixed. Considered this way, the outcome of the sector overall is capped, and attention concentrates on the outcome within the sector. The ECPR then states that if the rents *of* the sector are predetermined, the outcome *within* the sector will be arranged efficiently by voluntary negotiations between the market parties and no further intervention is necessary. Ergo, if, under this scheme, the bottleneck provider claims that the access charges are appropriate, then it will be right; apparently, the entrant just wants to skim off a bit of the remaining (predetermined) rents, which is "merely" a bargaining problem. It is essential to be aware of this difference between the allocative (in)efficiency resulting from the overall regulation and the productive efficiency resulting from voluntary bargaining.

A good explanation of the ECPR can be found in Armstrong & Doyle [1995]; their notation will be followed below. The bottleneck provider is called SR¹¹. The corresponding bottleneck may be called AB. The bottleneck provider also owns a service department, which uses access to the bottleneck as an essential input. Now, an independent entrant, called PR, wants to compete SR on this service market (= a component) and demands access to the bottleneck AB, which it cannot provide itself by assumption. The essential assumption is that the output quantities of the final good (service) are given, irrespective of whether SR or PR provides this. Consequently, the final-good prices are given as well. This illustrates that the total rent in the sector is predetermined be it through intermodal competition, be it by regulation of the final-good prices. This rent is not necessarily zero; it is simply fixed.

¹¹ Baumol [1983] uses railways as an illustration. This is followed by Armstrong & Doyle [1995].

The price of the final good is set at $p = \$250$. The incremental costs of the bottleneck infrastructure are $c_I = \$50$, and the (incremental) costs of the service $c_{SR} = \$50$ as well. The difference between the final-good price and the sum of the incremental costs is used to finance fixed costs of the infrastructure, which cannot be attributed unambiguously to this particular service. That is, $p - (c_I + c_{SR}) = \$250 - (\$50 + \$50) = \150 . These are considered as opportunity costs when the incumbent misses its revenue from the final-good price, in case an independent third party provides the service. In other words, if the access charge would only include the incremental costs, $c_I = \$50$, the incumbent would save $c_{SR} = \$50$ by not supplying the service itself, but would forego $\$150$ which had been used to finance the fixed costs. Consequently, access charges which only cover incremental costs, do not cover total costs. Moreover, with an access charge of only $\$50$, given that the final-good price is fixed at $p = \$250$, an entrant would enter and supply the service even if its incremental service costs were up to $c_{PR} = \$200$. It can be seen that such an access charge would invite inefficient entry, i.e. $c_{PR} > c_{SR}$.

How high then should the efficient access charge be? Denote this access charge by a^0 . It is now important to mention that efficient means that the access charge should be exactly so high that entry only occurs if and only if the entrant is more efficient than the incumbent firm; i.e. $c_{PR} < c_{SR}$. Given this criterion, which focuses on productive efficiency, the efficient access charge a^0 is quickly derived. The efficient access charge should include both the incremental costs of the bottleneck $c_I = \$50$ and the opportunity costs caused by entry, $\$150$, as derived above. This sums up to $a^0 = \$50 + \$150 = \$200$. It can easily be seen that entry on the service market will only take place if $c_{PR} < c_{SR}$: entry is only profitable if $c_{PR} < p - a^0$; that is, if $c_{PR} < \$250 - \$200 = \$50 = c_{SR}$. Furthermore, an access charge of $a^0 = \$200$ leaves the bottleneck provider indifferent. In case it supplies the service itself it receives $p - c_{SR} = \$250 - \$50 = \$200$ to cover the opportunity costs and the incremental costs of the bottleneck, c_I . On the other hand, if the entrant provides the service using the bottleneck, the bottleneck provider receives $a^0 = \$200$, again to cover the opportunity costs and the incremental costs of the bottleneck.

To summarize, the ECPR states that the efficient access charge should include the incremental costs of the bottleneck, i.e. those costs of the bottleneck which can

unambiguously be attributed to the use of this particular service (component), *and* the opportunity costs associated with entry on the service stage.

This simple derivation need not stir that much excitement. What seems to get the bulk of criticism is that the rent in the sector (derived, of course, from the market power of the bottleneck) is included in the term "opportunity costs". In other words, if the bottleneck provider was making excess profits before entry, it will continue to do so after new entry on the service stage. The initially foregone excess profits are compensated by the entrant in the access charge under the header of opportunity costs. Although this is most certainly true, nevertheless, both issues are to be separated. As explicitly mentioned, the setting of the ECPR assumes that the rent in the sector is predetermined (final-good prices are fixed) and leaves the access questions to the market parties. The rule then determines given this setting and thus given the rents in the sector, which access charge would just allow efficient entry. Moreover, and more importantly, it shows that the voluntary bargaining will arrange this outcome; there is no need for further intervention. As shown above in the stylized example, at the margin both parties are exactly indifferent. Should the entrant be somewhat more efficient than the incumbent, a bargaining process will determine which of the two parties receives how much of the efficiency gain. This and only this is the important implication of the ECPR: given that the rent in the sector is predetermined, the market itself will determine whether entry takes place and how the access condition are determined. In still other words, given that the rent in the sector is predetermined and thus given allocative (in)efficiency, by e.g. regulation of the final-good prices, the market outcome will be productively efficient.

A global price cap predetermines the rent in the sector as well. With competition on the service markets, the globally price-cap regulated incumbent will always set its access charges exactly so that entrants make exactly no profit and must adjust to the final-good prices set by the incumbent. For the available rent in the sector it is totally irrelevant whether the incumbent produces the final goods or equally efficient entrants. This is caused by the internal trade off of the global price cap. Consequently, the ECPR can be readily applied to this situation. If rents in the sector remain then this is caused because apparently the price cap is set too high, not because the service markets are foreclosed. As the ECPR states, under quite

plausible conditions, the service markets will not be foreclosed. This as well is the reason that under global price cap the three complementary regulatory measures of the local price cap are redundant. They attempt to curb the bottleneck provider's incentives to foreclose the service markets if profit regulation is restricted to the bottleneck. Under global price capping there are no such incentives.

The link between the theory on vertical integration and the ECPR may be clear. For the same setting, the theories on vertical integration examine the incentives of the disintegrated firm with market power for vertical integration. In contrast, the ECPR can be interpreted as examining the incentives for the vertically integrated firm to allow access to third parties; that is, to (partially) vertically disintegrate. The underlying principle is equivalent, but both approaches come from different sides; it is mirror reverse. Given this link and equivalence, it can be seen that the large literature on vertical integration¹² can be readily applied to the questions concerning the ECPR. The ECPR then is the mirror reverse of the reference result of the theory on vertical integration. This reference solution is the "indifference result" [see e.g. Posner, 1976, p.172]. With especially the assumptions of constant returns to scale and fixed input proportions on the competitive stage, the reference result says that the firm with market power will be indifferent between vertical integration or not; in other words, it will be indiffereent between participating on the competitive market or not.

Applying the theories on vertical integration, it gets straightforward when the asserted indifference result of the ECPR, derived above, does not apply. Variable input proportions on the service stage would be an incentive for the bottleneck provider to foreclose the market [Vernon & Graham, 1971]. Similarly for decreasing returns to scale on the service market [Brunekreeft, 1997, or Quirnbach, 1986]. More importantly, should there be some market power on the service stage as well as on the bottleneck, vertical disintegration would result in the highly inefficient double marginalization [Spengler, 1950]. Again, this would create an incentive for the bottleneck provider to foreclose the service market. Last, and probably most important, vertical integration (and reversely, foreclosure) can be a means of (implicit) price discrimination, if price discrimination in a

¹² For a survey, see Perry [1989].

vertically disintegrated setting is impossible [Williamson 1971; Perry, 1978; Fremdling & Knieps, 1993].

The point to be stressed here, is that concerning the questions surrounding the application of the ECPR, the focus should be directed towards well-known theories of vertical integration, not on the rents of the market. If the opinion should be that the available rent is too high, then the price-regulation -if at all- should be stronger; this does not affect what happens within the sector. In other words, this does not affect the application of the ECPR. For the latter, the search should be for things like price discrimination and double marginalization as possible explanations for foreclosure and the welfare effects should be carefully examined.

4. A comparison of the foreclosure incentives

For the following comparison of the local and the global price cap it is important to keep in mind that it is a comparative institutional analysis; the nirvana solution set by an omniscient regulator is not considered. Moreover, it may give the impression of being a little one-sided where this is not intended to be. To recall, the proper question is: which device deals the best with the foreclosure incentives and at what expenses? As may be clear from the sections 2 and 3, the disaggregated bottleneck regulation of the local price cap creates the foreclosure incentives, whereas these are seemingly hardly present under the global price cap. In the light of this major advantage of global price capping, the comparison below will focus on disadvantages of global price capping. Here these disadvantages concentrate on remaining or newly created foreclosure incentives. In contrast, the informational problem of the global price cap may be clear. Consider the following simple presentation of the price-cap rule:

$$\sum_{i=1}^N p_{i,t} \cdot q_{i,t-1} \leq \sum_{i=1}^N p_{i,t-1} \cdot q_{i,t-1} \cdot (1 + RPI - X).$$

For $i=1, \dots, N$ products $p_{i,t}$ is the price of product i in period t and $q_{i,t}$ the quantity. RPI is the retail price index and X represents an estimated productivity growth; in

the rule they form a "correction" factor. As may be noticed, prices in the current period are capped, weighted against quantities from the previous period. A global price cap directly implies that more products are taken up in the price cap than when the price cap is restricted to the bottleneck. In e.g. telecommunications, many different services use more or less the same access. All these different services, as long as they are complements to the bottleneck, should be taken up in the global price cap. That requires that they should be defined and initial prices should be set. Furthermore, the productivity changes included in the price cap (X) extend to a larger base. Especially the latter may be considered as a complication as compared to the local price cap. In a sector as dynamic as telecommunications, one would like to avoid having to estimate future productivity changes. Negotiations on future productivity changes tend to use historic cost developments as a benchmark. If now the service markets are included in the price cap, the informational requirement concerning the underlying costs may dramatically increase. In contrast, in the local price cap, the service markets can be left completely on their own. As a principle, if regulation is not perfect, enlarging the base on which the price cap rests will tend to increase direct (and probably indirect) costs of regulation.

Handling new or disappearing products in the price-cap rule

Laffont & Tirole [1996, p.16] already mention that the introduction of new products in the price cap is problematic; theoretically unsolved, regulators seem to take a rather pragmatic approach. Merely mentioning it as a problem as Laffont & Tirole do, may be a bit of an underestimation of the problem though. Under global price capping it need not be an innovation. If the regulated firm enters a service market on which it was not active previously, this service will show up as a new product in the price cap. The product (service) may have existed already, but was supplied by an unregulated firm. If the regulated firm takes over the entire market for this service, the product labelled "access to the infrastructure needed for this service" will drop out of the price cap, because it is no longer sold externally, but is instead an internal transaction.

The incentives stemming from this problem of indeterminacy be may illustrated with the following extreme example. Assume that a new product is simply taken up in the price cap; the quantity of the previous period then is equal to zero. Assume furthermore, that a product, which is no longer sold is taken out of the basket. Suppose there are two products, (1) access and (2) service; these are complements. Assume furthermore that the service is offered either by the regulated firm or by an independent; that is, the regulated firm can withdraw completely from the service market, leave this to an entrant and concentrate on access instead. In this admittedly extreme setting, the regulated firm is able to bypass the price cap, whenever it likes. Suppose in period 1 the regulated firm supplies the entire service market. Consequently, the amount of access sold externally is zero; it only sells access to itself. The regulated price of the service in period 1 may be assumed on a zero-profit level. In period 2, the firm's strategy will be to withdraw from the service market, leave this to an unregulated entrant and set monopolistic access charges. Since the amount of access offered in period 1 was zero, monopolistic access charges in period 2 do not violate the price cap; i.e. in the left-hand side of the price-cap rule above the monopolistic access charge will be multiplied by zero. This suffices. The reverse however also holds. Suppose in period 1 the regulated firm only offers access and no service. And suppose the regulated access charge is on a zero-profit level. The firm will enter the service market in period 2 and set a monopolistic service price. By assumption (again admittedly extreme), in period 2 access is no longer externally sold and thus drops out of the price cap. Since the amount of service offered in period 1 was zero, the monopolistic service price does not violate the price cap. Again, in only one step the zero-profit level is blown up to a monopolistic-profit level. Mind that in period 2 the regulated firm cannot set prohibitively high access charges to secure that independent service firms do not demand access; prohibitively high access charges in period 2 would violate the price cap, because these are weighted against the amount of access of period 1. Instead, the firm should leave the access charges as they were (or even lower them) and simply refuse access to third parties.

This setting is very extreme and apparently, as the last sentence argues, the firm may have to explicitly refuse access to third parties to be able to reach this result, but this is exactly the point. As argued in section 3, the major advantage of global

price capping, with the underlying ECPR, is that foreclosure incentives are not present. Well, apparently, they are. Apparently, antitrust agencies should see to it that access is not refused, and thus warranted-TPA creeps into this device through the back-door.¹³ The underlying reason is different from the one underlying the local price cap. The foreclosure incentive of the local price cap follows from the lack of regulation of the service markets; the regulated firm tries to make its excess profits there if it cannot do so on the regulated infrastructure. Under a global price cap, the incentive to foreclose the service market is an undesirable by-product of an attempt to by-pass the price cap, as has been illustrated above. If it can be argued that such incentives are present as well in more realistic settings, the major advantage of the global price cap vanishes quickly. Moreover, whereas under the local price cap, the foreclosure incentives are recognized as such and the device designed to handle these, the foreclosure incentives under a global price cap are not so clear at all. Above, only an extreme illustration has been described and it may be noticed that much will depend on how the specific price cap rule is designed to handle new or disappearing products. This lack of clarity increases the danger of misdirected intervention by regulators or antitrust agencies.

The two products, access and service, have been chosen so deliberately. It is tempting to think that the same problem arises under the local price cap where the infrastructure is price cap regulated. There is an essential difference, though. Reformulate the problem in access 1 and access 2 and adapt the same line of argument. If now, one of the two products is not offered by the regulated firm, it will not be offered at all. This follows from the assumption that the infrastructure is a monopolistic bottleneck, which cannot be by-passed. Thus, under a global price cap, withdrawal from the service market means that the service will be provided by an independent firm. If the same argument is adapted to the infrastructure alone (as it is under the local price cap), parts of the infrastructure would not be offered at all. This implies an essential difference in the identification of rationing.

¹³ Mind that this argument is only valid if the regulation is binding; with no regulation at all, this perverse incentive would not exist. There would be no price cap to be by-passed.

Defining the firm and demarcating the price-cap's base

Normally the firms under consideration will be large multinational, multiproduct conglomerates, with complex administrative and ownership structures. Holding companies and joint ventures will present themselves in many variations. Ownership participation in "other" firms will vary from 1% to 100%. This will create an interesting problem in defining "the firm", which is to be price-cap regulated globally. Several issues arise.

Is it necessary to regulate the entire firm after it has properly been defined? Strictly speaking, the answer is no. The products to be included into the global price cap must have a complementarity relation to the bottleneck. The non-complementary market cannot be foreclosed by refusing access to the bottleneck or setting prohibitively high access charges; the competitors on the non-complementary market do not need access to the bottleneck by assumption. Including non-complementary products in the price cap thus gains nothing, while it will increase direct and indirect costs of regulation. Consequently, the global price cap can be restricted to products which are strictly complementary to the bottleneck and the base of the global price cap need not necessarily be extended over the entire firm. Then, however, as under the local price cap, the regulated firm will have a regulated and an unregulated part and separate accounts will be introduced into the regulatory device. This implies that global price cap would converge towards the local price cap in this respect. Moreover, a non-complementary relation can be made complementary by *tying* the products. Of course, this "abuse of market power" can be dealt with by antitrust agencies, but the point is that again the incentive is present and problems arise. The tying argument as explained above is valid also for the local price cap, but in this case, the regulatory device anticipates such problems and has been designed to deal with them.

The ownership issue is the next item which is apt to raise problems. The problem is the following. The firm owning the bottleneck is globally price cap regulated. Principally, it could make excess profits for another firm. For example, the bottleneck owner may refuse access needed for a service to all firms, but one. In effect, this last firm would have a monopoly on this service market and can make monopoly profits there. It is not regulated, because it does not own the bottleneck. Thus the market power of the bottleneck is transferred to another firm. The

principle of the global price cap heavily relies on the lack of incentives to "subsidize" other firms in this way. This may be valid in the extreme and unrealistic case that firms are not related among each other, but may be sincerely doubted if the ownership structures are not so clear, which will be the more normal case. If the bottleneck owner has only a 1% interest stake in another firm, will the bottleneck owner have an incentive to transfer its market power to this firm? Principally, the answer is yes. Its choice is between having no excess profits at all and 1% of monopoly profits. More perverse is the following illustration. Assume two firms, 1 and 2, both owning a bottleneck and both globally price cap regulated on their markets complementary to their respective bottlenecks. They can easily come to the agreement that they make the monopoly profits for each other. Firm 1 exclusively supplies the service market complementary to the bottleneck of firm 2, and vice versa. If the respective markets 1 and 2 are not related among each other, the firms need not be regulated on the activities they undertake on the service markets of the other. Thus they can refuse access to their bottleneck to all firms but to each other. As before, such issues can be dealt with in antitrust cases, but it illustrates that it is not too hard to find foreclosure incentives under a global price cap, which modifies the major advantage of this device considerably. The essential point lies in the possibility to refuse access, which lies at the heart of the ECPR. Exactly this property of the global price cap is explicitly prohibited under the local price cap.

5 Conclusions

The local price cap has been defined as a regulatory package containing four elements: (1) profit regulation of the bottleneck, (2) Third Party Access, (3) non-discriminatory access charges, and (4) separate accounts for monopolistic versus competitive departments of the integrated bottleneck provider. It has been argued that this set of four elements contains the minimally necessary requirements to handle the profit regulation of the bottleneck and forestall foreclosure of the competitive stages simultaneously.

The ECPR is a principle which allows the negotiation over access (prices) by the market parties, without state intervention, after the rent of the sector has been

predetermined. The latter is achieved by a concept called a global price cap. This means that a firm which owns a bottleneck is price cap regulated for all (complementary) products it supplies and not only the bottleneck.

These two regulatory devices have been compared. The resulting foreclosure incentives have dominant attention in the comparison. Under the local price cap the bottleneck provider cannot or only to a limited extent make excess profits on the bottleneck. As a result it will try to do so on the competitive service stages by attempting to transfer its market power. Due to the assumed (binding) regulation of the bottleneck, the integrated bottleneck provider will not be indifferent between participating on the service stage or not. On the contrary, the bottleneck provider will have a strong incentive to foreclose the competitive stages and make the excess profits there. To the extent that this attempt is successful, efficient entry will not take place where actually it should. This is the major and straightforward drawback of the local price cap. It *creates* the incentive for forward integration and market foreclosure. It has been shown in section 2 that the four elements of the local price cap as a regulatory package are designed to handle these incentives. Nevertheless, complicated antitrust cases may be expected in practice.

This drawback of the local price cap is the advantage of the global price cap, where such foreclosure incentives are absent; at least they are not so clear. This is stated by the ECPR, which underlies the global price cap. In turn, the problem with the global price cap is that it seems to regulate more products than strictly necessary; i.e. the price-cap base is extended over markets where market power is absent. This fact alone increases the regulatory requirement and thereby direct (and probably indirect) costs of regulation. Moreover, and more importantly, it has been argued that foreclosure incentives may as well be present under this device. They just come in disguise. They would come with the possible defects of the price cap concerning new and disappearing products, demarcation of the base of the price cap and complicated ownership structures. This would be a more severe drawback of a global price cap, because it contradicts the underlying philosophy. The underlying philosophy says that once the global price cap has been determined, the access question within the sector can be left to the market; abuse of market power will be exception rather than rule. If this abuse turns out to be rule rather than exception, global price capping is not weaponed to handle it.

References

- Armstrong, M. & Doyle, Ch., 1995, "The economics of access pricing", unpublished.
- Baumol, W.J., Panzar, J.C. & Willig, R.D., 1982, *Contestable markets and the theory of industry structure*, Harcourt Brace, New York.
- Baumol, W.J., 1983, "Some subtle pricing issues in railroad regulation", *International Journal of Transport Economics*, Vol. 10, Nr. 1-2, pp. 341-355.
- Baumol, W.J. & Sidak, J.G., 1994, "The pricing of inputs sold to competitors", *Yale Journal on Regulation*, Vol. 11, pp. 171-202.
- Beesley, M.E. & Littlechild, S.C., 1989, "The regulation of privatized monopolies in the United Kingdom", *Rand Journal of Economics*, Vol. 20, No. 3, pp. 454-472.
- Brunekreeft, G., 1997, "Open access versus common carriage in electricity supply", *Energy Economics*, Vol. 19, pp. 225-238.
- Cave, M. & Martin, I., 1994, "The costs and benefits of accounting separation", *Telecommunications Policy*, Vol. 18, No. 1, pp. 12-20.
- Economides, N.S. & White, L.J., 1995, "Access and interconnection pricing: how efficient is the "efficient component pricing rule"?", *Antitrust Bulletin*, Vol. 40, No. 3, pp. 557-577.
- Fremdling, R. & Knieps, G., 1993, "Competition, regulation and nationalization: the Prussian railway system in the nineteenth century", *Scandinavian Economic History Review*, Vol. XLI, No. 2, pp. 129-154.
- Kahn, A.E. & Taylor, W.E., 1994, "The pricing of inputs sold to competitors: a comment", *Yale Journal on Regulation*, Vol. 11, pp. 225-240.
- Knieps, G., 1997, "Phasing out sector-specific regulation in competitive telecommunications", forthcoming in *Kyklos*.
- Laffont, J.-J. & Tirole, J., 1994, "Access pricing and competition", *European Economic Review*, Vol. 38, pp. 1673-1710.
- Laffont, J.-J. & Tirole, J., 1996, "Global price caps and the regulation of interconnection", *mimeo*.
- OFTEL, 1994 (March), *Interconnection and accounting separation; the next steps*, OFTEL, London.

- Perry, M.K., 1978, "Price discrimination and forward integration", *Bell Journal of Economics*, Vol. 9, pp. 209-217.
- Perry, M.K., 1989, "Vertical integration, determinants and effects", in: Schmalensee, R. & Willig, R.D. (eds.), *Handbook of Industrial Organization*, Vol. I, Ch. 4, pp. 183-255.
- PES licence, 1990, *Public Electricity Licence for Southern Electric plc.*, OFFER, Birmingham.
- Posner, R., 1976, *Antitrust law; An economic perspective*, University of Chicago Press, Chicago.
- Quirnbach, H.C., 1986, "Vertical integration: scale distortions, partial integration, and the direction of price change", *Quarterly Journal of Economics*, Vol. 101, pp. 131-147.
- Spengler, J.J., 1950, "Vertical integration and antitrust policy", *Journal of Political Economy*, Vol. 58, pp. 347-352.
- Tye, W.B., 1994, "The pricing of inputs sold to competitors: a response", *Yale Journal on Regulation*, Vol. 11, pp. 203-224.
- Vernon, J.M. & Graham, D.A., 1971, "Profitability of monopolization by vertical integration", *Journal of Political Economy*, Vol. 79, pp. 924,925.
- Vogelsang, I. & Finsinger, J. 1979, "A regulatory adjustment process for optimal pricing by multiproduct monopoly firms", *Bell Journal of Economics*, Vol. 10, No. 1, pp. 157-170.
- Williamson, O.E., 1971, "The vertical integration of production: market failure considerations", *AEA Papers & Proceedings*, Vol. 61, No. 2, pp. 112-123.

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