Global Price Caps and the Regulation of Access[1]

Jean-Jacques Laffont[2]

Jean Tirole[3]

Abstract

It is generally agreed that an intelligent interconnection policy is the key to an harmonious development of competition in the telecommunications industry. The paper first warns against some hazards associated with the dominant regulatory paradigms. By treating retail and wholesale prices asymmetrically, these paradigms may distort the structure of relative prices. They may further provide incumbents with incentives to exclude and to cross-subsidize. These perverse incentives generate a legitimate suspicion and lead regulators or courts to substitute their judgment fot the operators' business judgment.

Second, the paper explains the intellectual underpinnings of an alternative mode of regulation, which consists in putting the operator's retail and wholesale activities into a single basket and thus in subjecting the firm to a global price cap. It provides an extensive discussion of the costs and benefits of global price caps, and shows that they do not distort the structure of retail and wholesale prices. Last, global price caps eliminate or substantially reduce the incentives for exclusionary behaviors and cross-subsidies, and thus allow a light-handed regulation.

Resumo

É conhecimento comum que uma política de acesso inteligente é fundamental para garantir a competição na indústria de telecomunicações. O artigo, inicialmente, alerta para as distorções associadas à política regulatória tradicional. Ao tratar o preço de acesso e a tarifa ao consumidor de maneira assimétrica, a política tradicional provoca distorções nos preços relativos. Conseqüentemente, tais distorções fornecem incentivos às empresas incumbentes a adotarem um comportamento de exclusão à concorrência e promoverem subsídios cruzados entre o preço de acesso e a tarifa ao consumidor. Tal comportamento resulta na necessidade legítima de limitar a ação empresarial através de decisões arbitrárias por parte dos agentes reguladores e dos tribunais.

[2]Institut d'Economie Industrielle, Toulouse, and Institut Universitaire de France.

[3]Institut d'Economie Industrielle, Toulouse, CERAS, Paris, and MIT.

Adicionalmente, o presente trabalho expõe os aspectos conceituais de uma política alternativa de regulação para o setor, que consiste em criar uma tarifa única, agregando o preço de acesso e a tarifa ao consumidor. O artigo promove uma extensa discussão acerca dos custos e benefícios associados à tarifa única e fornece evidências de que esta não produz distorções. A tarifa única, ao eliminar os incentivos para o comportamento de exclusão e adoção de subsídios cruzados, permite uma política de regulação caracterizada por menor intervenção.

1. Introduction.

It is generally agreed that an intelligent access (or interconnection) policy is the key to an harmonious development of competition in the telecommunications industry and a number of other industries. To this end, access charges must reflect multiple objectives. They must induce an efficient use of networks, encourage their owners to invest while minimizing cost, generate an efficient amount of entry into infrastructure and services, and all of this at a reasonable regulatory cost.

Regulators, courts and lawmakers may strike many rocks. High access charges erect barriers to entry and maintain the incumbents' monopoly position in their potentially competitive segments. They also may induce an inefficient bypass or duplication of the incumbent's bottleneck segments. Conversely, low access charges may generate entry by inefficient entrants. They may also induce incumbents to foreclose access to their bottleneck and discourage them from investing in their networks.

The choice of the overall *level* of access charges is thus delicate. So is the determination of the relative *structure* of these charges. An inadequate rate structure provides the wrong signals for the incumbents' choices of investment in infrastructure and for the entrants'

decisions of which segments to enter. For example, incumbents often complain about the entrants' choice to "skim the cream".

Two factors make it difficult for regulators to set interconnection charges. First, regulators generally lack the information required for a good access policy. Being understaffed, they know too little about the incumbents' and entrants' cost structures, about demand functions, and about the intensity of competition. Or, they may not have sufficient incentives, experience, or day-to-day contacts to obtain this information and put it in perspective. Second, the high stakes attached to the interconnection policy generate in most countries intense lobbying by incumbents and entrants as well as political intervention. These "political economy considerations" matter more, the more discretionary the interconnection policy and the wider the divergence between policy and sound economic principles.

This paper has two goals. First, section 2 warns against some (often poorly understood) hazards of "asymmetric regulations" such as those set in place in the US and the UK, and which represent the dominant paradigm within the European Commission. Second, and relatedly, section 3 develops the intellectual underpinnings of a global price cap regulation, namely the mode of regulation consisting in putting the operator's retail and wholesale activities into a single basket, thus treating product lines symmetrically.

While stressing the potential drawbacks of a global price cap regulation (which can be decomposed into the general drawbacks of price caps and the issue of predatory behavior), we explain why global price caps have two key benefits over current regulations. First, drawing their legitimacy from economic theory, they provide incumbents and entrants with the right signals. In particular, they promote efficient entry, and eliminate or substantially reduce the incumbents' current incentives for foreclosure and cross-subsidies. Second, and relatedly, global price caps allow a lighter regulation with respect

to the monitoring of cross-subsidization and foreclosure. While economic theory underlies the concept of a global price cap, the prospect of a light-handed[1] and transparent regulation is an important supplementary benefit in view of the Anglo-Saxon experience with the deregulation of telecommunications.

2. Coherence and perverse incentives under fragmented regulations.

2.1 Outline of the argument.

Section 2 stresses the consistency problems raised by regulations that handle product lines separately. Using a rough taxonomy of existing and contemplated reforms, it shows that they create two types of asymmetries among product lines :

- asymmetric reward structures, in that the fraction of profit kept by regulated operators depends on the product line,
- asymmetric pressures on prices, in that the marginal private benefits of raising prices differ across product lines.

These two asymmetries provide incumbents with incentives for practicing (accounting or allocative) cross-subsidies and for excluding competitors. These perverse incentives in turn raise a legitimate suspicion and forces regulators (or courts) to inquire into a large number of business decisions. However, as we shall see, the substitution of regulatory intervention for business judgement is a complex and hazardous matter, if only because the potentially detrimental behaviors might receive an efficiency defense. In our view, one should eliminate the perverse incentives in the first place, rather than create them through the regulatory policies and then engage

---

[1]The setting and the revision of price cap formulas still requires substantial regulatory work despite the decentralization of pricing to firms.

in heavy-handed and lobbying-prone regulation in order to eliminate them.

2.2 A taxonomy of American and British reforms.

Regulators have undertaken a large-scale revamping of the regulatory framework. The February 1996 Telecommunications Act and the ensuing FCC documents in the US[2], and the December 1995 Oftel Consultative document for the regulation of BT from 1997 on for example have delineated a new approach to designing access policies. To the risk of oversimplifying, we will classify current reform proposals along the following dividing lines:

- **Access charges**

  Two main paradigms for the setting of access charges are prominent in the reform proposals[3] :

  – MC_a : The access charge is prescribed to match the marginal (or incremental) costs of interconnection. In some cases, a markup may be added to marginal cost. Also, the marginal cost may be computed at a more or less disaggregated level.

  The marginal cost in question is meant to depart from the traditional and flawed numbers drawn from fully-distributing embedded costs. Rather, it is to be derived from engineering estimates of what it currently costs to provide the relevant element or service. It is thus a "forward-looking long-run incremental cost" (also called "total element long-run incremental cost" or TEL-

---

[2]In particular, the August 8, 1996 First Report and Order "In the Matter of the Local Competition Provisions in the Telecommunications Act of 1996," CC Docket nø96-98, known as the *Local Competition Order* and the May 16, 1997 First Report and Order "In the Matter of Access Charge Reform" are closely related to the topic of this paper.

[3]Intermediate methods may also be used in the future, for instance earnings sharing schemes such as the ones developed in the US by the FFC for InterLATA calls and by some states for IntraLATA calls.

RIC in the US). Important work is currently being done, in the US and the UK to obtain measures of marginal costs from engineering estimates in an optimized network. The rationale for such computations is sound, as forward-looking costs do not create the same incentives for cost inefficiency as historical costs. But this methodology still faces conceptual and empirical snags.[4]

– PC_a : the second regulatory paradigm for interconnection charges is the imposition of a price cap on a basket of or all interconnection charges.

- Retail prices

Two paradigms are also commonly considered for the regulation of retail or final prices :

- PC_f : The firm faces a price cap on residential and business services[5].

- NR_f : Retail services are not regulated, and so the operator can freely choose its final prices.

- Simplifying somewhat, current regulatory proposals in the US offer to let most retail services be unregulated.[6]. Access was first meant to be regulated on the basis of forward-looking long-run incremental cost ("MC_a"): See the February 1996 Telecommunications Act and the August 1996 Local Competition Order. Recently, though, the price cap solution ("PC_a") has gained support (FCC May 16, 1997 First Report and Order). The Decem-

---

[4]On this see Hausman (1997) and the May 16, 1997 FCC First Report and Order.

[5]Again, one can think of variants of this regulatory paradigm, for example "subcaps" on residential or small business subscriber charges may be imposed, as has often been the case in the past.

[6]This is the most common interpretation of the Act regarding retail rates, although the FCC subsequently issued a Notice of Proposed Rulemaking on implementing the non-accounting safeguards of sections 217 and 272, in which one question concerns the issue of whether regulation should be extended to cover interLATA services offered by the BOC's affiliates.

ber 1995 Oftel consultative document envisions a more hybrid reform for the UK. Interconnection charges are split into two categories. First, the regulation of terminating access would occur at a very disaggregated level. It would be based on marginal costs and would therefore not reflect demand considerations. Second, BT would face a price cap on the basket of all interconnection services (origination and termination), thus giving the operator more freedom to affect the structure of relative access charges at the originating end. The rationale for distinguishing origination and termination is that origination is more easily bypassed and therefore more competitive[7]. The reform in the UK also distinguishes two categories of retail services : those deemed competitive which, like in the US, would be left unregulated, and those for which competition is still emerging, which would be subject to a separate price cap. To sum up :

> *Rough description of contemplated reforms* :
> US : MC_a or PC_a cum NR_f
> UK : mixture $\{MC_a, PC_a\}$
>   cum mixture $\{PC_f, NR_f\}$.

2.3 Drawbacks of a cost-based regulation of access ($\mathrm{MC_a}$).

It is by no means easy for regulators to obtain precise engineering estimates of long-run incremental costs. A number of discretionary steps must be taken with respect to the elements' future usage, network configuration, terrain and demographic assumptions, depreciations, technological progress, and uncertainty. Here, we focus rather on the conceptual questions that are raised by the pricing of access at long-run incremental cost.

---

[7]This argument is stressed by Bernheim and Willig (1994).

Telephone networks have substantial joint and common costs (local loop, part of digital switches, part of transport facilities). Such costs must be recouped through markups above the services' marginal costs. Two routes have been considered in this respect. One consists in putting the entire burden of joint costs recovery on non-access services (MC_e stricto sensu). Another route aims at recovering some of the joint costs through a markup on access services (MC_a plus markup).

- MC_a strictu sensu.

A poorly understood point is that an efficient recovery of fixed costs involves markups on access as well as retail prices[8] ; for, an operator providing access to another company is in fact offering a retail service through the production of complementary inputs by that company. There is conceptually no reason to treat interconnection and retail prices asymmetrically. By shrinking artificially the "tax base", the regulator is likely to generate high retail markups on services with little competition and low or no markups on competitive retail services. The two categories of services need not correspond to low- and high-elasticity segments, respectively. Furthermore, the incumbent is unable to recoup its investment cost if most of its retail segments are exposed to competition.

- MC_a plus markup. Alternatively one can allow the incumbent to charge a markup above the marginal cost of access. This raises issues concerning both the level and structure of this markup.

Economists have, always and almost unanimously, been quite

---

[8] This result might seem to contradict Diamond and Mirrlees' 1971 production efficiency theorem, according to which prices within the productive sector should not be distorted away from marginal costs. An underlying assumption of the production efficiency theorem is that consumption prices can be perfectly disconnected from production prices. The markup on access could be replaced by a specific tax on retail goods produced by competitors and using access as an input. Thus, our observation is consistent with the production efficiency theorem, *in the absence of appropriate (in level and structure) taxes on retail services.*

critical of the way regulators compute and allocate fixed costs[9] . They advance two arguments. First, these determinations are generally unrelated to economic principles. For instance, there does not seem to be a rationale for Oftel's proposed exclusion of the cost of connecting a customer to the local exchange from the computation of the fixed cost (which in turn serves to compute possible markups on access). And, as is well-known the allocation of the fixed cost among services is an artificial accounting construct and does not reflect properly the demand and competitive environment.

Second, and relatedly, the accounting procedures, precisely because they are arbitrary, are likely to be subject to debates and revisions. Since the regulation of access generally occurs at a disaggregated level, it may be subject to political intervention and intense lobbying by interest groups[10].

Let us now turn to the structure issue. Proponents of prescribed markups generally envision a uniform, or at least not demand-based markup. It is here useful to recall the theoretical principles for an efficient recovery of fixed costs. These, developed by Ramsey (1927) and Boiteux (1956), can be applied to the determination of access charges[11]. Mark-ups must be higher on those (low-elasticity) segments where they distort consumption the least. They must also reflect the complementarity or substitutability among services. For example, a price increase on a service may boost the demand for a substitute service and therefore may be less damaging to welfare than if the service had no impact on the operator's other sales. It

---

[9]See, in particular, Baumol-Willig (1987).

[10]Truly enough, a *regulatory* determination of Ramsey-Boiteux prices would also be subject to intense lobbying as demand elasticities are hardly verifiable. In contrast, under a global price cap lobbying is confined to the determination of the weights in the price cap, since prices are determined by a profit maximizing private entity.

[11]See Laffont-Tirole(1994). Further investigations of the structure of optimal access prices include Armstrong-Doyle-Vickers (1996), Baumol-Ordover-Willig (1997), and Laffont-Tirole (1996).

is also useful to remind the reader that these two precepts (charging according to elasticities, internalizing externalities across services) underlie the sophisticated pricing strategies of unregulated firms.

The optimality of elasticity-based pricing applies to all services, including wholesale services. A purely cost-based determination of access charges leads to an inefficient recovery of fixed costs as it contracts demand on final services with high elasticity of demand and undercharges services with low elasticities of demand, for which higher retail prices would have led to small distortions in consumption. That is, purely cost-based access charges create creamskiming (excessive competitive pressure on profitable segments and insufficient one on less profitable ones) by not obeying Ramsey-Boiteux precepts. A similar point can be made regarding potential entry into the bottleneck segment. It is optimal to charge lower access charges where bypass is easy. Otherwise inefficient bypass will occur[12].

The standard counterargument to this critique of cost-based access charges (see, e.g., Oftel's december 1995 consultative document) is that the access charge computed from the marginal cost of access with a mark-up defines only a ceiling and so the operator is free to respond to competition by lowering its access charges (subject to some predation test, such as the Areeda-Turner marginal cost floor). This downward flexibility of access charges introduces market considerations and therefore constitutes a useful move in the direction of Ramsey-Boiteux prices. It still provides the regulator a fair amount of discretion in the setting of the level and structure of access charges.

---

[12] It has for instance been argued that part of the entry of CAPs (Competitive Access Providers) in the US was motivated by the existence of a regulatory price umbrella linked with articially high access charges. Local Exchange Companies now have some downward price flexibility which enables them to compete with bypass providers.

2.4 Coherence of fragmented regulations: the threat of fore-closure

2.4.1 The theoretical argument

We argue that foreclosure is more likely in the presence of asymmetric constraints on retail and wholesale prices. When facing a stringent ceiling on access charges and a looser constraint on final services, an operator has a strong incentive to deprive its rivals on the final segments from access to the bottleneck through non-price methods.

The reforms that are contemplated in the US and the UK create such asymmetries among product lines. In our rough taxanomy, such asymmetries occur in the following circumstances :

$$NR_f \text{ cum } \{\text{either } MC_a, \text{ or } PC_a\}$$

or

$$\text{loose } PC_f \text{ cum stringent ceiling on access charges.}$$

To illustrate the theoretical argument, let us consider the simple case of an unregulated retail market, long-distance say, together with a price cap on the access charge to the local bottleneck. The access charge a must not exceed a cap $\bar{a}$ that lies below the monopoly price on access that the operator would charge if interconnection were not regulated :

$$a \leq \bar{a}.$$

Suppose further, and to simplify the exposition, that the operator and its long-distance competitors produce perfect substitutes at equal and constant marginal cost c. [The reasoning extends straight-forwardly to differentiated services and efficiency disparities.]

Long distance

c

Local

access
charge a

c

Long distance competitors
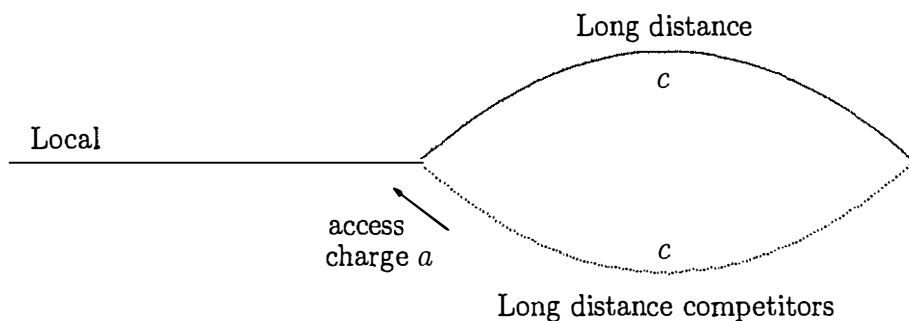
The cap on the access charge prevents the operator from exploiting its monopoly power on access to long-distance. As Ersatz the operator would then want to charge the monopoly price, p^m say, on long distance. The long-distance price however is constrained by competition. That is, the operator must charge a long-distance price p that is constrained by the total marginal cost of its competitors :

$$p \leq \bar{a} + c.$$

In other words, competitive pressure on the final market prevents the operator from translating its untapped monopoly power on access to the competitive segment. The operator therefore has an incentive to deny access to its competitors or to raise their costs, in order to loosen the competitive pressure on the final segment. This incentive is stronger, the lower the cap on the access charge.

Behaviors that deny or limit access to competitors are said to foreclose the latter. The private rationale for foreclosure can be to *exclude* competitors in order to reduce competition while exclusion is practiced, or to *prey* on them so as to trigger their long-term exit.

Remark 1 : Distinction between exclusion and predation

Unfortunately, the academic literature and the policy debate often mix exclusion and predation. The common features of these two behaviors are that they are profit maximizing and that they hurt rivals.

The rationales for the two behaviors are however quite different, and a regulatory environment may well generate incentives for one but not the other, as we will see.

The purpose of exclusion is not per se to hurt rivals. Rather, exclusion is meant to loosen the regulatory constraint. That is, hurting the competitor is an instrument, not a goal. In contrast, predation can only be profitable if it leads competitors to durably exit the market, for example because their financial health does not allow them to incur necessary investments or to pay for operating expenses. Exclusion increases the operator's profit while it is practiced. Predation lowers the operator's profit and therefore can be rational only if creates sufficient losses for the rivals that they durably exit the market and if future monopoly gains offset current predation losses.

Remark 2 : Deregulation of competitive markets: A sophism?

It is now almost universally accepted that a segment that is subject to strong competition should be deregulated. The two starting points for this belief are well-taken : On the one hand competition usually substitutes favorably for regulation in competitive markets. On the other hand, past experiments, in particular in the telecommunications industry, with the mixture of regulation and competition have often been unsatisfactory. For example, regulators have generated some inefficient entry by fixing prices on competitive segments and by preventing operators from offering price discounts.

When one of the competitors owns a bottleneck it is less clear that a flexible regulation, in which the operator enjoys downward flexibility in the competitive segments and thus can respond to competitive moves, is dominated by deregulation. The situation described above shows that the operator would have much less incentives to exclude rivals if its final price itself were constrained ; for, he would not be able to exploit its monopoly power on the competitive

segment once the rivals are excluded.

2.4.2 Examples of exclusionary behaviors

This theoretical argument has very practical implications for the telecommunications industry. Indeed it provides a unifying framework to analyze a number of concerns that have been expressed relative to the entry of the RBOCs into the US long-distance market[13].

In particular, the long-distance incumbents and part of the Clinton administration have listed a number of exclusionary behavior that the RBOCs, the owner of the local network, have practiced or especially could practice once they are allowed to enter the long-distance segment.

It is worth stressing that we do not take side on whether these accusations are grounded. Besides, incentives to exclude are likely to depend on the extent of regulatory oversight as well as the operators' desire to preserve goodwill (as with the prospect of the revision of the Modification of Final Judgement for the RBOCs before February 1996, and after that date, that of being authorized to enter the long-distance segment under the entry standards of #271 of the Telecommunications Act.)[14]. So, past experience may lead us to under -or over- estimate the relevance of exclusionary behaviors. Rather, we use the American debate to illustrate one of our key points : *Asymmetric regulations create perverse incentives and generate a suspicion towards the integrated operator. They then call for heavy-handed regulatory monitoring.*

Even though all exclusionary practices described in the American

---

[13]There are too many references for them to be listed here. The readers may in particular want to consult Bernheim-Willig (1994) which contains many of the long-distance companies' concerns and, on the RBOCs' side the memorandum of BellAtlantic, BellSouth, NYNEX and Southwestern in support of their motion to vacate the MFJ.

[14]See Schwartz (1997) for a discussion of the incentives effect of entry standards.

debate are fundamentally related, it is useful to break them into three categories :

- **Refusals and delays in interconnection :**
  - invocation by the operator of a high cost of providing supplemental capacity or of modernizing existing facilities to accommodate the demand for access by rivals ;
  - staggering of the upgrade of switches so as to delay the introduction of a new service by a competitor until the operator is technologically able to provide a similar service.

- **Raising rivals' costs :**
  - tie-ins or refusal to unbundle, thereby forcing the rivals to purchase functionalities that they don't need ;
  - requirement that the rivals purchase costly interface equipment ;
  - high interconnection rates ;
  - price discrimination that hurts fiercest rivals ;
  - technological choices (network configuration, standards, interface equipment) that favor the operator over its rivals ;

- **Lowering rival's demand :**
  - refusal or delays in providing number portability ;
  - imposing long access codes on the rivals' customers ;
  - insufficient maintenance of the network.
  - requirements for rivals to disclosure business plans or commercial information.

2.4.3 Exclusion or efficient behavior?.

A natural response to this long list of potential exclusionary behaviors would be a *per se* prohibition of such practices. Such an

attitude is however unwarranted as most of these practices can be justified by efficiency considerations. For example, it may be that the new technologies demanded by rivals indeed require a costly upgrade of the network, and that rivals attempt to build a market niche that is profitable only if the operator bears part of the upgrade costs. Number portability may be costly to install in the short run. The disclosure of the rivals' business plans may allow a better dimensioning of the operators' network capacity. And so forth.

Thus, the regulator can assess the grounding of accusations of exclusionary behaviors only through a detailed analysis of the operator's technological and commercial environment, and to some extent by substituting her judgement for the operator's business judgment. A *rule of reason* approach, which we have seen is conceptually far superior to a per se stance, requires sufficient regulatory staffing, a good knowledge of the technology, and independence vis--vis the lobbies.

2.5 Coherence of fragmented regulations: Cross-subsidies.

2.5.1 The theoretical argument.

Incentives for cross-subsidies stem from a differential in the sharing of earnings across product lines. An operator gains from transferring costs from a segment in which it keeps a sizeable fraction of its profits to another segment where consumers share a higher fraction of costs. This transfer often operates between a competitive segment that is deregulated or lightly regulated and a strictly regulated segment that is less competitive.

Cross-subsidies are particularly attractive for the operator when some segment is fully deregulated while a substantial fraction of costs on another segment (for example regulated through some cost of service or profit-sharing methodology) is reimbursed. For example, if

50% of the operator's cost on one segment is reimbursed, a $1 cross-subsidy with a deregulated segment increases the operator's profit by 50 cents. The incentive for cross-subsidies also exist, albeit in a weaker form, when access is subject to a price cap and retail markets are deregulated. As is well-known, the ratchet effect implies that a high profitability today leads to a more stringent cap tomorrow, thus inducing profit sharing. Conversely, there sometimes exists an explicit or implicit regulatory insurance against a low profitability, which adds a further mechanism for profit sharing.

We again observe that the deregulation of retail markets may create bad incentives, here due to the asymmetry in profit sharing schemes.

Remark: The FCC in May 1997 opted for the removal of the profit-sharing schemes it designed for long-distance access in 1990. While profit-sharing schemes have attractive properties (rent extraction, credibility, flexibility to individual situations through the offer of a menu), the FCC rightly noted that in the absence of sharing or other segments, the scheme could give strong incentives for cross-subsidization by the Local Exchange Companies.

2.5.2 Examples.

There are two main categories of cross-subsidies (the literature has focused on the first and neglected the second):

- **Accounting cost allocation**

  The telecommunications technology gives rise to many joint and common costs. The allocation of these costs among products lines is by and large arbitrary and may be used to "cross-subsidize" some product lines.[15]. For example an operator has

---

[15] We put "cross-subsidize" in quotes because the relevant notion of cross-subsidy is debatable (see Laffont-Tirole (1993) p.202–203).

an incentive to allocate expenses relative to maintenance personnel, product development, marketing, connection between the customer's home and the first switch, etc., to those services for which profit sharing is the strongest.

Cross subsidies may also have an intertemporal dimension through the depreciation of investment expenditures. For example, it has been argued that US Local Exchange Companies can install a fiber optic network that is currently useless to provide plain old telephone services but will later be a valuable asset when introducing new and innovative services such that interactive TV and video-on-demand. To the extent that the investment is (partly) depreciated before the new services are introduced, there may be a cross-subsidy from (current) regulated services to (future) unregulated ones.

- **Managerial cost allocation**

In the presence of asymmetric profit sharing, the operator also has an incentive to allocate *real* resources strategically, thus generating a social waste. The operator can allocate its best engineers and marketing agents to the competitive segment, and leave its less efficient or yet untrained personnel with its regulated segments. The CEO and top executive team may devote most of their attention to competitive segments and neglect regulated ones, for which high costs are sanctionned more lightly. Investments choices may be distorted toward low marginal cost on competitive segments and (substantially) high marginal cost on regulated ones.

It is thus clear that managerial decisions are not geared to the minimization of the production cost but rather to the minimization of the cost perceived by the operator. The operator will minimize cost only if his reward is based on total cost. In an optimal regulatory scheme, the reward depends solely on total co...

only (under some assumptions which ensure that the trade-offs between underprovision of effort and rent protection are identical for all product lines.) Then, a *uniform* power of the operator's incentive scheme is socially optimal even when accounting separation and detailed supervisory monitoring prevents accounting cost manipulations. That is, the sharing of profit between the operator and the consumers should be based solely on the operator's overall cost and thus make no use of disaggregated information about cost at the product line level (Laffont-Tirole 1990).

2.5.3 Can cross-subsidies be prevented ?

It is by no means easy to prevent cross-subsidies once one has created incentives for them. One can require accounting separation and invest regulatory resources into checking that actual cost allocation follows clearly defined accounting principles. This accounting supervision, although costly, bars the most flagrant accounting cross-subsidies. Accountants however cannot substitute their judgment for business judgment. They have neither the training nor the information necessary to evaluate investment and personnel allocation within the firm. It is thus difficult to measure and prevent cross-subsidies.

2.6 Possible attitudes toward the threats of exclusion and cross-subsidies.

The previous observations may lead to various points of view[16]. We saw that a per se prohibition is untenable. There are therefore two possible options. Either one sticks to modes of regulation that create incentive for exclusionary practices and cross-subsidies and one sets up a heavy-handed regulation that control them. In our view this stance (i) involves substantial regulatory cost for the government

---

[16] We here ignore the possibility of divestiture of the bottleneck segment (as for AT&T in 1984).

and the firms, (ii) is limited by the need to substitute for business judgment, and possibly (iii) is subject to strong lobbying pressures.

Or one eliminates the perverse incentives set up by the regulatory framework in the first place and one reorients regulatory resources toward the monitoring of more circumscribed behaviors, such as predation. This brings us to a discussion of the notion of a global price cap, which aims at reestablishing the symmetry between product lines and thus provides incentives for a better allocation of resources.

Remark on the "double price cap" $(PC_a$ **cum** $PC_f)$ A move toward a global price cap consists in setting two separate caps on wholesale and retail services. This intermediate step is not been currently considered by American and British regulatory authorities ; it however serves as a conceptual framework for the British regulatory reform despite the fixing of individual access prices for termination services. As discussed in chapter 5 of Oftel's december 1995 consultative document, a double price cap reduces the coherence problem to a single dimension. The tradeoff then goes as follows: An access cap set too high relative to that for retail services erects barriers to entry in retail and further induces the operator to devote excessive attention to access activities, say to raise demand for access (despite the fact that it is mutilated by high access prices), relative to retail services perceived as less profitable. Conversely, a tight cap on access services creates inefficient entry and limits the operator's incentive to invest in the network. And, a generalization of our previous argument, it also creates incentives for exclusion of rivals as serving the retail segments becomes quite profitable (the counterpart of a tight cap on access is necessarily a loose cap on retail services if the firm is to break even). In our view, an in-depth investigation is called for, that will develop methods of ensuring coherence between the two caps and will compare the resulting regulation with a global price cap cum some safeguard against predation.

3. Global price caps.

3.1 The theoretical argument.

As is well-known, optimal prices for a regulated firm are Ramsey-Boiteux prices. These reflect marginal costs and demand elasticities so as to minimize the distortions brought about by the recovery of fixed costs. Reinterpreting demand as a residual demand given competitive offers, one immediately infers that Ramsey-Boiteux prices must also reflect competitive pressure on the firm's various segments. For instance, it is inefficient to tack a substantial mark-up over marginal cost into the price of a wholesale or retail service if this induces customers to purchase from a less efficient competitor or a product less adapted to their needs. Concretely, Ramsey-Boiteux prices reflect the possibility of bypass and creamskimming, which make the (residual) demand for the operator's services more elastic. Last, Ramsey-Boiteux prices take into account the complementarity or substitutability between services. For example, the price of a service should be higher when a price increase boosts demand for another service ; that is the division in charge of the former service should internalize the mark-up over marginal cost on the latter service. Conversely, the prices of complementary services should be set below the "myopic" levels that result from looking at the demand of individual products in isolation.

Both economists and non-economists often argue that regulators generally do not have the information to set Ramsey-Boiteux prices. One leg of the argument, namely the widespread shortage of relevant information, is correct. But taken as a whole, this argument should look suspicious to any observer of unregulated businesses. The latter indeed engage in sophisticated marketing strategies. They offer discounts to high-elasticity-of-demand customers, adjust their prices to competitive pressure and carefully coordinate the pricing of sub-

stitutes or complements. The *structure* of unregulated firms' prices
(although not the level if the firms have substantial market power)
thus reflects Ramsey-Boiteux precepts.

This suggests that the most promising alley for implementing
Ramsey-Boiteux prices in a regulatory context is to decentralize pric-
ing decisions to the operator. The standard way of doing so is to
impose a constraint on its overall level of prices and to let it se-
lect the price structure within the basket of services defined by the
constraint. One can show that a global price cap, that is a price
cap covering retail *and* wholesale services, leads the operator to se-
lect a Ramsey orientated price structure. In fact, a global price cap
yields precisely the social optimum in the idealized case in which
the weights of the cap are exact forecasts of the volumes of services
covered by the cap[17].

The intuition for this result is straightforward : An unregulated
firm with market power does not maximize social welfare since it
does not internalize the increase in consumer net surplus brought
about by a price reduction. A \$1 decrease in the price of a service
increases consumer net surplus by an amount equal to the consump-
tion of that service. Let us now look at profit maximization by a
regulated operator subject to a price cap covering all its services.
The global price cap forces the firm to internalize the increase in
consumer net surplus in proportion to the weights in the cap (the
coefficient of proportionality is the shadow cost of the price cap con-
straint). Therefore, if the weights in the global price cap are equal
to realized consumptions and the level of the cap is chosen appropri-
ately, the operator perfectly internalizes net consumer surplus when
maximizing profit.

---

[17]See Laffont-Tirole (1994,1996) and also Crew and Kleindorfer (1994), Baumol-Ordover-Willig
(1996), Schwartz (1997).

3.2 A global price cap eliminates or substantially reduces the incentives for exclusion and cross-subsidies.

- Let us begin with cross-subsidies. A global price cap makes the operator residual claimant for its profit until the next regulatory review. Any cross-subsidy can only reduce profit during that period. But we should also ask whether the intertemporal profit sharing associated with the ratchet effect (see above) can recreate incentives for cross- subsidies. To the extent that the revision of the global price cap at the regulatory review is based on the operator's overall profitability, the operator cannot gain by reducing its current profit through cross- subsidies (otherwise, it could alternatively gain by "burning money").

- Let us turn to exclusionary behaviors. Under a global price cap, the operator manages its product lines "symmetrically" as it has no built-in incentive to favor one over another. In particular, excluding buyers of interconnection amounts to mutilating a potentially quite profitable activity. A global price cap provides the operator with the flexibility to choose which product lines are profitable. The theoretical analysis confirms that behaviors that exclude rivals, raise their costs or limit their demand, tend to reduce the operator's profit[18]. One should therefore not

---

[18]This is particularly clear in the case where rivals have no market power and the exclusionary practice consists in raising the rivals' cost. The exclusionary practice then is tantamount to the operator's raising its own cost of providing the retail service to the competitive rivals. In contrast, we saw that even in this simple case the operator has a strong incentive to exclude under fragmented regulation.

It can be shown that a price *floor* on access charges may need to be added to the global price cap to avoid exclusionary behaviors aiming at diverting the rivals' demand (the price floor then serves to prevent the operator from charging a very low price on access to relax the price cap constraint and then to deny interconnection). The price floor may possibly be set by the operator's rivals, who have incentives to avoid exclusion.

hastily transpose concerns that are legitimate under fragmented regulatory schemes to global price cap regulation.

- Last, we should stress that global price caps enable regulation to be more light-handed ; for, global price caps (fully or partly) eliminate perverse incentives and therefore diminish the need for regulatory oversight of the operator's decisions. A global price cap scheme is therefore more compatible with deference to the operator's business judgment than existing schemes. A global price cap still involves discretion with respect to the weights in the cap and to their revision process.

3.3 The global price cap scheme inherits general advantages and drawbacks of price caps.

While an idealized global price cap implements the social optimum, frictions imply that its implementation is likely to be less efficient than the theoretical analysis predicts. It has been pointed out that the implementation of global price caps raises some problems that also arise for price caps more generally, and (for some) for purely cost-based regulations as well. These concerns are legitimate, but their relevance may be limited by the fact that existing schemes raise similar concerns. Let us briefly recall a few difficulties encountered when regulating firms with price caps :

- **Treatment of nonlinear tariffs.** As is well-known, nonlinear prices have desirable properties. They can be used to prevent inefficient bypass of the bottleneck facility or to provide an efficient menu of retail choices to final customers[19]. Even though one knows how to include nonlinear prices into a price cap at a theoretical level (since nonlinear prices are specific instances

---

[19]On the other hand, nonlinear pricing may enable favoritism when competitors, or a competitor and the operator, have different sizes on the competitive segment. See Rey-Tirole (1997) for an overview of the argument.

of Ramsey-Boiteux prices), the transposition of these principles to practice is still quite rough (in practice regulators often take price averages or ignore discounts for the purpose of monitoring compliance with the price cap).

- **Treatment of new services and of upgrades, and phasing out of existing services.** Again, innovations in the spectrum of services of a regulated firm are treated in an essentially pragmatic way (such as the exclusion of new services from the price cap during the year of their introduction). Too little theoretical work has been devoted to providing reasonable guidance to regulators in the matter.

- **Lack of intertemporal price cap.** Price caps are defined over some limited period. They therefore imperfectly deal with the intertemporal dimension of some contracts (such as guarantees on future prices) or of investments in goodwill through low prices.

- **Ratchet effect.** As we discussed above, there is no pure price cap. Regulatory reviews imply some form of profit sharing (which, incidentally, is not equivalent to contemporaneous profit sharing). Conversely, a price cap may not be credible if it leads to financial losses and jeopardizes the operator's survival.

- **Setting of weights in case of substantial demand and cost uncertainty.** Weights should equal realized quantities in an idealized price cap. Uncertainty about cost, about market demand and about the competitors' market share may however make it difficult to forecast these quantities accurately. We of course can avail ourselves of mechanisms for updating weights on the basis of past outcomes[20]. Yet the properties of such mecha-

---

[20]See, e.g., chapter 2 of Laffont-Tirole (1993) and the early work of Vogelsang-Finsinger and Sappington discussed therein.

nisms (whether they converge to the socially optimal prices) are known only for simple situations.

- **Need for monitoring the provision of a service priced below marginal cost.** All price caps that involve bundles give rise to the following hazard : The operator may charge a very low price of a service and ration consumers of that service. The price cut allows the operator to raise prices on other services and still comply with the requirement defined by the price cap. Rationing consumers is profitable in particular when the price of the service falls below marginal cost.

  Even though such behaviors may not be quite as profitable in the long run (rationing leads to a lower weight for the service in future regulatory reviews), they can substantially enhance profit in the short run. Two regulatory responses to this hazard are conceivable. First, the regulator can monitor rationing perhaps using consumers as whistle blowers. Second, (as is already the case under some regulatory schemes), prices can be required to exceed marginal costs.

3.4 Drawbacks specific to global price caps.

- It is sometimes feared that a global price cap may prevent regulators from openly encouraging entry. This is not the case since the regulator can, and quite transparently, raise the weight of interconnection prices in the global price cap in order to provide the operator with an incentive to lower its access charges. [We do not here take a position on whether the level playing field should be abandonned in order to favor entrants. The possibilities that inefficient entrants be durably maintained in operation by regulatory protection and that such policies create strong incentives for lobbying must be confronted with the potential gains of favoring entry.]

- It can be (correctly) observed that a global price cap does not address the issue of entrants' market power on final segments. Indeed, their optimality relies on competitive behavior by the entrants. Three points are in order in this respect. First, alternative schemes for regulating access also do not account for the existence of entrant market power. Second, it is possible to reduce the distortion on the entrant's (final) price by setting high weights on the corresponding access charge and thereby inducing the operator to charge low access prices to the entrant. Third, it is unclear that entrant market power is a central issue in the determination of access charges.

- We observed that too little is known concerning the dynamics of weight updating in general. In the context of a global price cap, it would in particular be desirable to further our theoretical knowledge and run simulations for situations in which two services (wholesale and retail) can be fairly good substitutes.

- Last and foremost, global price caps raise a concern about the possibility of predation. To the extent that predation is often mingled with exclusion, a more common practice, this fear may be exaggerated ; for, we have observed that a global price cap tends to eliminate, rather than create, incentives for exclusion.

  A price squeeze however is easy to perform under a global price cap : The operator can increase the access charges and reduce its final prices while keeping the price cap constraint satisfied. It thereby considerably hurts its rivals on the retail markets. One can then conceive a use of this strategy for predatory purposes. That is, the operator reduces its profit until the next price review, but may eliminate rivals who may be used by the regulator as benchmarks in the future. The profitability of such predatory behaviors unfortunately has not yet been analyzed ; one can only presume that a) the threat of predation is more

relevant when competitors do not have a long purse and when their assets cannot easily be purchased and managed by another company in case of bankruptcy. b) predation is less costly to the firm under a global price cap than to an unregulated firm, and the prospective gains are less too, because the future price will be regulated and thus probably below the monopoly level.

As is the case in antitrust, rules against predation in the context of a regulated firm subject to a global price cap are imperfect and require further analysis. *In our current state of knowledge,* we feel that the Efficient Component Pricing Rule (ECPR) designed by Baumol and Willig is a reasonable rule against predation (see Baumol-Ordover-Willig (1997) and Laffont-Tirole (1996) for further discussions of predation). This rule defines a ceiling on an access charge equal to the difference between the price and the marginal cost of the operator on the corresponding retail segment using the access facility.

Given the likely concern about the possibility of predation, we devote the next two sections to the adequacy of ECPR as a protection against price squeezes.

3.5 Adjustments to ECPR as a predation test.

Is ECPR consistent with a global price cap and the social optimum and, if not, how should ECPR be adjusted ? Simplifying somewhat, it can be shown that the social optimum satisfies ECPR when i) demands facing the operator and its rivals on the retail markets are symmetrical, ii) the operator's and the rivals' costs on the retail segments are equal, iii) the costs for the operator of providing interconnection to itself and to its rivals are equal and iv) entrants behave competitively. Under these "symmetry assumptions", ECPR is redundant in the absence of predatory behavior (a global price cap induces a price structure satisfying ECPR), but is the proper test of

predation (from an optimal pricing viewpoint).

In practice, various asymmetries may imply that ECPR must be adjusted to be consistent with the social optimum and thus be a good test of predation. For instance :

- If providing access to competitors is more costly than providing it to oneself, the predation test based on ECPR must be modified so as to reflect the cost differential. That is, the access charges can exceed the operator's lost margin on the competitive segment.

- On the demand side, the operator, which usually is the incumbent telephone company, may face an inelastic demand curve due to consumer inertia. One can show (at least in the case of linear demand curves) that the predation test based on ECPR must be strenghthened due to the fact that Ramsey-Boiteux final prices must reflect elasticities of demand. A similar argument probably holds in the absence of number portability.

  Conversely, the ECPR test should be relaxed when the operator installs new functionalities that enable a technologically advanced rival to offer a service that is superior in quality to that of the operator. It is then socially optimal that the operator sets prices below those of its rivals so as to reflect quality differentials. Such prices may well violate ECPR, which therefore must be interpreted more loosely to be consistent with Ramsey-Boiteux pricing.

- Last, one can show that ECPR must be modified in the presence of a cost differential in the competitive segment. For instance, in the case of linear demands, ECPR must be relaxed (tightened) if competitors are more (less) efficient than the operator in the competitive segment.

3.6 Further thoughts about ECPR as a predation test.

We conclude with a few thoughts concerning the application of ECPR to predation.

- A well-known flaw of antitrust in the matter of predation is that it may take years for the victim to win a case while its survival may be a matter of months. A regulated industry in this respect has the benefit of having a permanent regulator who, although imperfectly informed, still has much more information and knowledge about the industry than a court. One may thus imagine that tests of predation be run relatively swiftly, with the possibility of further resort to Courts in case of disagreement. On the other hand, Courts usually have superior enforcement powers, for example with respect to fines.

- ECPR may be (and has been criticized as being) informationally demanding. The operator's marginal cost on the competitive segment may not be measured precisely. And to the extent that its computation is based on accounting data (which will likely to be the case), the operator has an incentive to bias its investment choices so as to reduce its marginal costs on the competitive segments and thus to comply more easily with ECPR, assuming of course that it wants to prey on its rivals. For the same reason, it also has an incentive to exert a high effort to reduce its costs in the competitive segments.

4. Conclusion.

The notion of a global price cap is a logical consequence of economic reasoning. A global price cap creates a more efficient price structure and avoids the exclusionary behaviors and the cross-subsidies generated by unbalanced regulatory schemes. There exists two types of concerns relative to the implementation of a global price

cap. A first set of concerns is shared by other modes of regulation of access. The second concern is the possibility of predation. These difficulties must be compared with those faced by alternative regulatory schemes. In particular, predation seems to be less of a concern than exclusion and cross-subsidies, due to its lower frequency, to its more ambiguous incentives, and to the possibility of using ECPR as a predation test. These thoughts lead us to conclude that an in-depth reflection on ways to remedy the shortcomings of global price caps is likely to be more fruitful than taking refuge in schemes that have proved or will be hard to master.

Submitted on May 2000. Revised on February 2001.

References

Armstrong, M., Doyle, C. & J. Vickers 1996. "The Access Pricing Problem : A Synthesis", *Journal of Industrial Economics*, 44(2):131-150.

Baumol, W. & G. Sidak 1994a. "The Pricing of Inputs Sold to Competitors", *Yale Journal of Regulation*, **11**:171-202.

Baumol, W. & G. Sidak 1994b. *Toward Competition in Local Telephony*, Cambridge, MIT Press.

Baumol, W. & R. Willig 1987. "How Arbitrary is 'Arbitrary'" ? or Toward the Deserved Demise of Full Cost Allocation", *Public Utilities Fortnightly*, 120.

Baumol, W., Ordover, J. & R. Willig 1996. "Parity Pricing and Its Critics: A Necessary Condition for Efficiency in the Provision of Bottleneck Services to Competitors," *Yale Journal on Regulation*, **14**:145-163.

Bernheim, D. & R. Willig 1994. "An Analysis of the MFJ Line of Business Restrictions", affidavit submitted relative to the pe-

tition of Bell Atlantic Corp., Bell South Corp., NYNEX, and Southwestern Bell Corp. to vacate the Modified Final Judgment.

Boiteux, M. 1956. "Sur la Gestion des Monopoles Publics Astreints l'Equilibre Budgtaire", *Econometrica*, **24**:22-40.

Diamond, P., & J. Mirrlees 1971. "Optimal Taxation and Public Production I: Production Efficiency and II: Tax Rules," *American Economic Review*, **61**:8–27 and 261–278.

Hausman, J. 1997. "Valuation and Regulation of New Services in Telecommunications," paper prepared for the Brookings Micro Conference.

Laffont, J.J. & J. Tirole 1990. "The Regulation of Multiproduct Firms : I and II", *Journal of Public Economics*, **43**:1-66.

Laffont, J.J. & J. Tirole 1994. "Access Pricing and Competition", *European Economic Review*, **38**:1673-1710.

Laffont, J.J. & J. Tirole 1996. "Creating Competition through Interconnection : Theory and Practice", *Journal of Regulatory Economics*, **10**:227-256.

Laffont, J.J. & J. Tirole 1993. *A Theory of Incentives in Regulation and Procurement*, Cambridge : MIT Press.

Ramsey, F. 1927. "A Contribution to the Theory of Taxation", *Economic Journal*, **37**:47-61.

Rey, P. & J. Tirole 1997. "Foreclosure," forthcoming in *Handbook of Industrial Organization. II*, ed. by T. Bresnahan and J. Vickers, North Holland.

Schwartz, M. 1997. "Competitive Implications of Bell Operating Company Entry into Long-Distance Telecommunications Services," Affidavit commissioned by the US Department of Justice Antitrust Division, May 14.

NOTE

ADRIANO ROMARIZ DUARTE AWARD

In 1994 the Brazilian Econometric Society instituted the Adriano Romariz Duarte Award. Since then, the award has been given every even year to the best article published in the *Brazilian Review of Econometrics*. The next award will be given to the articles published in volumes 19 and 20.

According to the to the rules governing the Award, the Editor will appoint aı award commission which will select the winnning article. The Award will bɛ given, exceptionally, at the XXIII Encontro Brasileiro de Econometria, in 2001.

A list of previous award winners is:

1994

"Strategic Behavior in Ascending-Price Multiple-Object Auctions", by Flávio Marques Menezes.

1996

"Déficit Público, A Sustentabilidade do Crescimento das Dívidas Interna e Externa, Senhoriagem e Inflação: Uma Análise do Regime Monetário Brasileiro", by Affonso Celso Pastore.

"Mecanismos de Admissão de Candidatos à Instituições. Modelagem e Análise à Luz da Teoria dos Jogos", by Marilda Sotomayor.

1998

"Estimadores Corrigidos para Modelos SUR Não-Lineares", by Gauss M. Cordeiro and Klaus L.P. de Vasconcellos.

"Cournotian Competition under Knigthian Uncertainty", by Sérgio Ribeiro da Costa Werlang and Hugo Pedro Boff.

Ficha de Inscrição

Para se tornarem assinantes da Brazilian Review of Econometrics – Revista de Econometria, os interessados deverão preencher esta ficha, e enviá-la para:

SBE The Brazilian Review of Econometrics – Revista de Econometria
A/C: Angela Maria Bevilacqua
Praia de Botafogo, 190 – 10° andar – sala 1032
22253-900 Botafogo, Rio de Janeiro, RJ., Brasil
Tel. (5521) 2551-4658
Fax (5521) 2552-4898
sbe@fgv.br – http: //www.sbe.org.br

Assinaturas

US\$ 50 / R\$ 100,00
Sócios Institucionais e Novos Sócios

US\$ 25 / R\$ 50,00
Renovação de Assinatura Pessoa Fisica

US\$ 13 / R\$ 25,00 Estudantes

Nome_____

Instituição_____

Endereço_____

Cidade _____

Estado _____

Código Postal _____

Pais _____

Telefone_____

Fax_____

E-Mail _____

Ano da Assinatura _____

Valor em US\$ ou R\$_____