Parity Pricing and Its Critics: A Necessary Condition for Efficiency in the Provision of Bottleneck Services to Competitors

William J. Baumol,[†] Janusz A. Ordover,[††] and Robert D. Willig[†††]

This paper discusses proper pricing of a monopoly input needed by both its owner and its owner's competitors in the final-product market. This issue is central to current litigation in courts and regulatory agencies throughout the world's industrial nations as competitive entry, deregulation, and privatization proceed. A new, simplified proof shows that only pricing based on what has come to be called the parity-pricing formula or efficient component-pricing rule ("ECPR") permits economic efficiency and competitive neutrality—giving neither the bottleneck owner nor its rivals a competitive advantage in final-product sales, aside from any derived from superior productive efficiency. This paper comments on a number of recent discussions of ECPR, showing that the bulk of their reservations, while valid, do not undermine ECPR, but, instead, call for supplementary rules that we have advocated all along.

† Professor and Director, C. V. Starr Center for Applied Economics, New York University.
†† Professor of Economics, New York University.
††† Professor of Economics and Public Affairs, Princeton University.

Introduction

More than a decade has passed since two of the current authors proposed to the ICC a pricing rule necessary for efficiency in the allocation of bottleneck input resources where such resources must be used by both the monopoly proprietor of the bottleneck and its competitor in the supply of perfect substitute final products. The issue has grown to be of critical importance in the deregulation of telecommunications, where the bottleneck is access to the local loop by suppliers of long distance service; in electricity, where rival generators must have access to the utility-owned transmission facilities; and in a variety of situations in railroading, the character of which is fairly obvious. The pricing rule we proposed, called the "parity-pricing formula" or the "efficient component-pricing rule" ("ECPR"), has been and continues to be argued before courts and regulatory agencies throughout the U.S. and abroad. Until recently the rule seemed to command general acceptance among economists. However, in the last few months, a number of distinguished colleagues have expressed reservations about the rule or, more frequently, have proposed modifications or supplements. The purpose of this Article is to describe the issues and to show that, with the exception of one outright attack on our analysis, the bulk of the reservations expressed by these commentators do not conflict with the position we have taken on the matter, a position that has been accepted by a number of courts and regulatory commissions.

Part II of this paper describes the parity-pricing formula and the problem with which it was meant to deal. Part III summarizes what we take to be the main arguments of a representative set of commentators and critics, and presents our observations on their discussions. The reader will hardly be surprised by our conclusion that parity pricing emerges unscathed from the discussion, and that its role as a necessary condition for efficiency in the competitive process is, if anything, strengthened. Indeed, with the exception of the paper by Tye and Lapuerta,[1] any disagreement between us and our discussants stems largely from their adoption of goals that go beyond attainment of economic efficiency in supply, the objective on which economists usually base their positions before courts and regulatory agencies.[2] Such supplementary goals may well be defensible. However, we emphatically question whether distortion of the prices of bottleneck inputs is

1. WILLIAM B. TYE & CARLOS LAPUERTA, *The Economics of Pricing Network Interconnection: Theory and Application to the Market for Telecommunications in New Zealand*, 13 YALE J. ON REG. 421 (1996). *See* discussion *infra* Part III.D.

2. Here, for simplicity of discussion, we think of economic efficiency in supply as consisting solely of the requirement that access prices do not preclude an efficient firm that is either the owner of the bottleneck or one of its rivals in the final-product market from participating in the supply of the end-user product that utilizes the monopolized input.

the best way to promote those objectives despite the demonstrable efficiency costs.

I. Efficiency in the Pricing of Access to Monopoly Facilities Needed by Rivals: The Parity-Pricing Solution

A. *The Issue*

When several firms compete with one another in the sale of an identical final product, where one of the firms is the monopoly owner of an input that is indispensable in the supply of that product, the problem is how competition *in the final product market* can be preserved and not tilted to favor either the owner of the input or the owner's rivals. That is, assuming that natural-monopoly attributes or other influences effectively prevent competition in the bottleneck subarena of the market in question for at least some period of time, the issue is how the terms of usage of the bottleneck can be prevented from impeding competition in the remainder of the supply side of that market. The simple answer, in principle, is that the input should be made available to all of the competitors, including the bottleneck owner, on comparable terms, with an appropriate price being charged for it by the proprietor of the bottleneck input. But what is the appropriate price? And is adoption of that price enough to preserve and promote competition and to ensure efficiency?

In the ensuing discussion, it is convenient to think of the final product, F, as being composed of two inputs: the bottleneck input, B, and the remaining input (or set of inputs), R. The objective is to preserve and promote competition and efficiency in the competitive market for R, even if the market for B retains its monopoly character.[3] This immediately suggests that consumer welfare also requires that the quantity of the monopoly input supplied somehow be made consistent with the necessary conditions for efficiency.

The discussion that follows will show that a bottleneck-input service sold by its owner to competitors in the supply of final product must be priced in accord with ECPR if inefficiency in resource allocation is to be prevented. The recent critics have argued, correctly, that the rule, by itself, is certainly *not sufficient* to ensure efficiency, a reservation we have been at pains to emphasize since two of the authors of this Article first enunciated the rule some years ago.[4] However, it will be shown here that the recent discussions of

3. Of course, we do not advocate continuation of monopoly over the bottleneck services, though scale economies, subadditivity, or other considerations may impede or prevent its termination. It is our position, however, that distortion of access prices *is the wrong instrument* for elimination of monopoly power or monopoly profits.

4. As a matter of fact, the (baseless) claim that we (including A. E. Kahn) had retreated from our views on ECPR became something of a *cause celebre* in the litigation between New Zealand Telecom and Clear Communications. The Privy Council in London, in delivering the final judgment on the matter, felt it appropriate to note that our emphasis on the insufficiency of the rule in the absence of something

the rule cannot possibly have demonstrated that the rule was *unnecessary* for efficiency, since the contrary is patently true. Here, the inefficiency to which we refer occurs if the bottleneck input is priced in such a way that sales of the final product are diverted to a supplier that incurs in the process real incremental costs higher than those that would be incurred by a rival.

We show that among uniform, non-negotiated, and non-discriminatory pricing mechanisms, *only* pricing of access to the bottleneck-input service satisfying ECPR can ensure avoidance of any such inefficiency. In this sense, ECPR is indeed a necessary efficiency requirement.[5]

If the provider of bottleneck inputs were not also a supplier of final products, it would be relatively easy to determine what terms for the supply of bottleneck input constitute no competitive impediment to one final-product provider *vis-à-vis* any other. Thus, if the supplier of the bottleneck input were to charge exactly the same price to all final-product providers *that compete with one another*, such rival final-product providers would be left free to compete for customers strictly on the merits. Specifically, since any two rival final-product suppliers would then be paying the same price for the bottleneck input, the firm that could provide the remaining inputs of the final product more cheaply could always afford to undercut its rival in the long run. Indeed, since we are thinking of the supply of final product as composed of two components, bottleneck input and the remainder, *when both firms pay the same price for bottleneck input, the firm with the lower cost for the remaining inputs can afford to undercut its competitor by precisely the amount of the difference between their costs.* If firm A can provide the remaining inputs of the final product at a cost that is lower than B's by X

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capable of preventing monopoly pricing of the final product constituted no "recantation" on our part, but was, rather, the position we had taken all along. Telecom Corp. of New Zealand Ltd. v. Clear Communications Ltd., [1995] 1 N.Z.L.R. 385 (P.C.) (LEXIS, Enggen library, Cases file).

As an incidental matter, it may be appropriate here to clear up two minor points on the origins of the pertinent ideas. So far as we have been able to determine, the ECPR proposal stems from Willig's work. Robert D. Willig, *The Theory of Network Access Pricing, in* ISSUES IN PUBLIC UTILITY REGULATION 109 (H. M. Trebbing ed., 1979). Though Baumol has been credited with coauthorship, he only joined in providing exposition of the rule some years later. On the other hand, Baumol appears to be the originator of the price cap proposal that is mentioned later in this Article, having twice proposed it in detail. William J. Baumol, *Reasonable Rules for Rate Regulation: Plausible Policies for an Imperfect World, in* PRICES: ISSUES IN THEORY, PRACTICE AND PUBLIC POLICY 112 (Almarin Phillips & Oliver E. Williamson eds., 1968); William J. Baumol, *Productivity Incentive Clauses and Rate Adjustment for Inflation*, PUB. UTIL. FORT., Jul. 1982, at 11. Both of these works appeared before Littlechild's oft cited piece. STEPHEN C. LITTLECHILD, REGULATION OF BRITISH TELECOMMUNICATIONS PROFITABILITY (1983).

5. Here, we interpret ECPR to require the owner of the bottleneck input to leave unextracted any (quasi) rents that may accrue to the unintegrated competitor. Obviously, as long as the owner of the bottleneck does not extract *more* than the available (quasi) rents, a more efficient entrant will not be foreclosed from the provision of R. Component prices that depend on the magnitude of any available (quasi) rents stemming from a competitor's efficiency advantages must, of course, be nonuniform and discriminatory, by definition.

cents per unit of final product, A's charge for final product can also be X cents per unit cheaper than B's.[6]

Reality, however, does not provide such an easy solution to the handicapping-avoidance issue. The difficulty stems from the fact that the bottleneck input is often sold by a firm that uses it to supply final products of its own in competition with those of other users. In other words, the bottleneck owner may sell the bottleneck input both to itself in its role of final-product provider, as well as to its rivals in final-product sales. This immediately raises the possibility that the bottleneck supplier will be tempted to favor itself over its rivals in the pricing of bottleneck input. However, the problems go deeper than that, for it is not even obvious at what bottleneck price the owner would be treating every final-product supplier, including itself, equally.

The obvious solution—which is, unfortunately, not very helpful—is to require the bottleneck owner to charge itself for bottleneck input exactly the same price it charges all rival final-product providers. This statement is correct and underlies the parity-pricing formula. However, the price that the bottleneck owner really charges itself for bottleneck input is far from obvious. Such a price may be specified in the firm's accounting records. But that price is an artificial and arbitrary number that tells us nothing about what the owner really gives up financially, that is, the real cost to the firm when it supplies bottleneck input to itself. After all, a rise in the accounting figure that purports to be the interdivision bottleneck-input price can be raised or lowered arbitrarily without any financial consequence to the firm as a whole. Such a rise in the accounting access price simply means that a correspondingly smaller profit contribution is credited to the non-bottleneck division of the firm in the company's books. Yet that cost must be offset precisely by an equal increase in the profit imputed to the company's bottleneck division. It is necessary to search further in order to determine what price the bottleneck owner is really charging itself for the bottleneck input it provides to itself.

B. *ECPR, the Critics' Contentions, and the Ancillary Efficiency Requirement*

The answer to this issue, we assert, is provided by ECPR. In brief, as will be demonstrated presently, ECPR requires the price of the bottleneck input to satisfy either—and, therefore, both—of two equivalent rules. The first is expressed in the following formula:

6. We recognize that if downstream firms differ in some ways that affect their demand for the bottleneck input, volume-sensitive pricing may be superior to uniform pricing. *See, e.g.*, Janusz A. Ordover & John C. Panzar, *On the Nonlinear Pricing of Inputs*, 23 INT'L ECON. R. 659 (1982).

$$(1)\ P_b = P_{f,b} - IC_{r,b}$$

where P_b is the ECPR price of the bottleneck input; $P_{f,b}$ is the bottleneck owner's price of the final product; and $IC_{r,b}$ is the bottleneck owner's incremental cost of the remaining inputs required to supply the final product.[7]

Alternatively and equivalently, as will be shown, the ECPR price of the bottleneck input must satisfy:

$$(2)\ P_b = IC_b + (\textit{the contribution to fixed and common costs and to profits of the bottleneck owner per unit of final-product output})$$

where IC_b is the incremental cost to the bottleneck supplier of providing a unit of bottleneck input to its rivals.

Equation (1) tells us that ECPR establishes a tight link between the price the bottleneck owner charges for its final product and the price it charges its rivals for the bottleneck input. If production costs do not change, a rise in one of these prices must be matched dollar for dollar by a rise in the other. Equation (2) tells us that the efficient price of B is its direct incremental cost plus the incremental *opportunity cost* that the bottleneck owner incurs when it loses a sale of a final product to a rival, a loss made possible because the bottleneck input has been sold to the rival. Thus, ECPR asserts that the price of the bottleneck input should equal the direct costs incurred in supplying it to a competitor, plus any opportunity cost incurred as a result of that transaction. Standard economic analysis tells us that this is a proper way to price; consequently, at least at first, this result should elicit no surprise.

The opportunity cost element of this result is a main focus of the current debate over the desirability of ECPR. A key problem is that the bottleneck owner is a monopolist, albeit a regulated one, and its final product price may therefore be set at a level that yields monopoly profits. Such monopoly profits may be among the profits forgone as a result of a lost sale of final product and, consequently, constitute a part of opportunity cost for which, according to (2), the bottleneck owner should be compensated when it sells bottleneck input to a rival.

Aside from any equity issues this raises, we have long emphasized that such overpricing of both final product and bottleneck input (in accord with (1)) must lead to resource misallocation and inefficiency. We have consequently always maintained that efficiency requires *both* ECPR and some

7. This formulation assumes that the incremental cost to the bottleneck supplier of the provision of a unit of bottleneck service to its rivals is equal to that of providing a unit of bottleneck input to itself. Otherwise, the difference between the two unit costs must be included as an additional term on the right side of (1).

Note that the calculation of the bottleneck price in (1) is relatively straightforward and avoids the controversies over the appropriate measure of opportunity cost that have constituted much of the discussion of the subject in the literature.

arrangement that prevents overpricing of both final product and bottleneck input and, consequently, that removes all monopoly profit from the opportunity cost component of (2).[8] Much of the current discussion is over the perils of using an improper opportunity cost figure,[9] a reservation with which we heartily agree.

C. *The Parity-Pricing Formula for Access Prices*

The analysis underlying the parity principle solves the problem of determining a competitively-neutral price for bottleneck input. It tells us that the price the bottleneck owner charges itself for bottleneck input is simply the price the firm charges to the final-product customer, minus the incremental cost to the firm of the remaining inputs of the final product, including the requisite capital. The parity principle tells us that this price that the bottleneck owner implicitly charges itself for bottleneck input is the price at which competing final-product providers should be entitled to purchase bottleneck input.

The logic of the proof that the parity-pricing formulas satisfy this requirement is not difficult to understand. For it is obvious that if the remaining input cost of the competitor is X cents less per unit of final-product output than that of the bottleneck owner, then both are paying the same bottleneck-service price when the rival can afford to provide the final product exactly X cents more cheaply than can the bottleneck owner. The relationship of this observation to the parity-pricing formulas is easily proven systematically:

1. *Level Playing Field (Competitive Neutrality) Proposition*
   The parity price for a bottleneck input is both necessary and sufficient in order for the maximum difference between the remunerative *prices of the perfect-substitute final products* of the two firms—the bottleneck-input provider, B, and its final-product competitor, C—to be exactly equal to the difference between the *incremental costs for the remaining input* portions of their competing final-product supply.

2. *Notation*
   $P_{f,b}$ = bottleneck owner's actual price of final product;
   $\min P_{f,c}$ = competitor's minimum viable price of final product;
   P_b = price of bottleneck input per unit of final product;

8. *See, e.g.*, WILLIAM J. BAUMOL & J. G. SIDAK, TRANSMISSION PRICING AND STRANDED COSTS IN THE ELECTRIC POWER INDUSTRY 108 (1995). Perhaps the earliest example is Willig's study of efficient component prices along with Ramsey optimal prices for final products. Willig, *supra* note 4.

9. *See, e.g.*, Nicholas Economides & Lawrence J. White, *Access and Interconnection Pricing: How Efficient is the 'Efficient Component Pricing Rule'?*, 1995 ANTITRUST BULL. 557.

$IC_{r,b}$ = the incremental cost of the *remaining* final-product inputs to the bottleneck owner, per unit of final product; and

$IC_{r,c}$ = the corresponding figure for the competitor.

3. *Proof*
By definition,

$$(3)\ \min P_{f,c} = P_b + IC_{r,c}.$$

The level playing field is defined by

$$(4)\ \min P_{f,c} = P_{f,b} - IC_{r,b} + IC_{r,c}.$$

That is, the lowest compensatory price the competitor can charge should differ from the bottleneck owner's exactly by the amount that the former's remaining-input costs fall short of the latter's.

Comparing the two equations, we see at once that the level playing condition (4) will be satisfied if and only if

$$(5)\ P_b = P_{f,b} - IC_{r,b}.$$

But this is the parity-pricing formula (1). Thus, parity pricing is both *necessary and sufficient* for a level playing field. QED.[10] The parity-pricing formula (5) is also identical to the opportunity cost variant of the rule (2), since (letting IC_b be the incremental cost of supplying the bottleneck service), by definition,

$$(6)\ P_{f,b} = IC_b + IC_{r,b} + (B\text{'s profit per unit of final-product output});$$

or, by (5),

$$(7)\ P_b = P_{f,b} - IC_{r,b} = IC_b + (B\text{'s profit per unit of final-product output}).$$

This completes our proof that parity pricing is *necessary* for economic efficiency: if it is violated, a less efficient supplier of the remaining inputs for

10. For simplicity, the preceding argument has assumed that the business in question is to go exclusively to one or another of the competing firms. It is easy to extend the argument to the case where it is efficient for each of the competitors to supply part of the output.

the final product can win the competition for the business of supplying those inputs, instead of the task going to its more efficient rival. That is, violation of (5) or (7) permits the less-efficient supplier of non-bottleneck inputs to underprice its more efficient competitors.[11]

D. *Augmented ECPR*

So far we have treated ensuring competitive neutrality and preventing monopoly profits as distinct problems. However, it is possible to devise supplements to ECPR that deal with both. This is illustrated by a simple set of rules, which we can call "augmented ECPR." In addition, this set of rules adapts itself to the fact that the bottleneck facility typically is needed in the supply of a *multiplicity* of competitive services, which services differ in the incremental profits they yield to the owner of the bottleneck and, hence, in the opportunity cost incurred by the bottleneck owner when it sells bottleneck services to competitors.

The regulator can ensure the absence of monopoly profits by requiring the bottleneck-proprietor firm to select any price, $p_{f,i}$* (the "declared price"), that it desires for each of its final products requiring bottleneck services in its production, provided that this set of declared prices yields revenues no higher than the corresponding "stand-alone costs"; that is, only so high that if entry costs were zero it would still be profitable for entry by an efficient rival producer of the set of products in question.

The bottleneck owner would then be left free to charge final-product prices that differ from these declared prices. However, for each product, I, of the bottleneck owner, a separate bottleneck-service ECPR price, $p_{b,i}$*, would be calculated in accord with either of the ECPR formulas—(5) or (7)—on the basis of the declared final product price, $p_{f,i}$*, of that same end product. That input price would be applicable to any sale of the bottleneck service to a rival where the service is to be used in the production of final product I. Thus, if there are two such final products, I and J, and I yields a large incremental profit contribution while J yields a small one, exactly the same will be true of the calculated ECPR prices for the bottleneck service, depending on which of the final products the service will be used to produce.

The bottleneck owner would be free to *reduce* any final-product price below the declared final product price, $p_{f,i}$*. But then the ECPR price for the

11. Here we should pause to admit that where scale economies mean that marginal-cost pricing is not feasible, theory calls for the adoption of a Ramsey price for the bottleneck input as well as for the final product, and that the Ramsey price can be expected to violate ECPR. It should be noted, however, that a frequent complaint against ECPR is that it yields bottleneck-input prices that are disturbingly high. Yet, *the Ramsey-adjusted ECPR prices can be expected to be even higher.* Specifically, so long as *any* rents are left to a competitor of the bottleneck owner, the rival's demand for the essential bottleneck service will be perfectly inelastic. Thus, the Ramsey rule requires the price of the bottleneck service to be raised until all such rents accrue to the bottleneck owner, while ECPR leaves competitors' efficiency rents to those rivals.

bottleneck service to be used in supplying I must also be reduced, with the reduction in the one matching that in the other, dollar for dollar. If the final-product market is effectively competitive, the bottleneck owner would also be free to *raise* final-product prices above their declared level. But the bottleneck-input price would in that case be precluded from rising above the ECPR figure corresponding to the initial declared price. In other words, ECPR is suspended for final-product prices *above* the declared price, so that no monopoly element can be added to the price of the bottleneck service.[12]

This augmented ECPR, then, ensures a level playing field *in each and every one of the products for which the bottleneck provides an indispensable input.* And while it does not eliminate monopoly in the ownership of the bottleneck facilities, it prevents the price of its services from incorporating a supercompetitive component. This arrangement, it seems to us, should go far in assuaging the primary concerns of a number of the discussants of ECPR.

II. Comments on Some of the Critics

It is appropriate to offer some remarks on the discussions of several of the critics of or commentators on ECPR, though we will make no attempt to be exhaustive either in discussing all of the pertinent papers[13] or in exploring any one of them completely.

A. *Armstrong, Doyle, and Vickers*

In an earlier paper, Armstrong and Vickers[14] had shown that the proper opportunity cost figure to use in calculating ECPR can be modified by a number of circumstances. Armstrong, Doyle, and Vickers[15] return to this subject and propose a modified ECPR to deal with it. Specifically, the complications that call for this modification include cases where: a) a gain of N final-product sales by a rival leads to a loss of fewer than N final-product sales by the bottleneck owner; b) imperfect substitutes for the services of the bottleneck are available; and, c) there is imperfect substitutability among the

12. Changing circumstances clearly may sometimes make it appropriate to modify the declared prices. Part of the task can be carried out automatically by an arrangement analogous to a price cap. In addition, the bottleneck-owning firm may be permitted periodically to change its declared final-product prices, provided that the new set of declared prices also satisfies the stand-alone-cost test.

13. *See, e.g.*, Ministry of Commerce & The Treasury of New Zealand, Regulation of Access to Vertically-Integrated Natural Monopolies (Aug. 1995) (unpublished manuscript on file with Professor Baumol); Henry Ergas & Erik Ralph, Pricing Network Interconnection: Is the Baumol-Willig Rule the Answer? (Feb. 1994) (unpublished manuscript on file with Professor Baumol); Alexander Larson, *The Efficiency of the Efficient Component-Pricing Rule: A Comment*, 41 ANTITRUST BULL. (forthcoming NO. 3, 1996) (manuscript on file with Professor Baumol).

14. Mark Armstrong & John Vickers, The Predatory Access Pricing Problem (Feb. 1995) (unpublished manuscript on file with Professor Baumol).

15. Mark Armstrong et al., *The Access Pricing Problem: A Synthesis*, 44 J. INDUS. REG. 131 (1996).

final products of the bottleneck owner and its rivals. In these cases, the opportunity cost incurred by the bottleneck owner when it loses a final-product sale must be adjusted (it must be multiplied by an "adjustment factor") before it is used in the calculation of the ECPR figure. For example, if an additional sale of twelve units of final product by rivals leads to a loss of only three units of final-product sales by the bottleneck owner, then the true opportunity cost resulting from a sale of bottleneck service to a rival is clearly only one quarter as large as the profit contribution of an added final-product sale by the bottleneck owner. We have frequently made similar observations, though we never have systematized the analysis as Armstrong, Doyle, and Vickers have done. Thus, we conclude that there is no conflict between our approach and that taken by those authors, and that they have clearly brought the analysis one step further.

B. *Economides and White*

Economides and White[16] provide a compendium of the various criticisms of ECPR that is useful in itself. The main observation made by these authors is that the opportunity-cost component of ECPR can contain a monopoly markup, and that there is no justification in terms of economic welfare for preservation of such a monopoly markup through the employment of ECPR. As has already been explained, there is no disagreement between us that when end-user price is substantially distorted, ECPR does not have the desirable properties that can be claimed for it when end-user price is at a competitive level. Economides and White show, once again, that when the incumbent bottleneck proprietor sets the end-product price at the monopoly level, substantial welfare gains may be obtainable by reducing the end-user price to marginal cost.[17] These gains can conceivably be so large as to offset the welfare lost if a less-efficient entrant takes business away from the incumbent as a result of the simultaneous abandonment of ECPR. But, of course, there is no reason to violate ECPR just because the retail price has been adjusted to a more desirable level. On the contrary, that is precisely the state of affairs in which the virtues of ECPR are unambiguous.

Despite the lack of disagreement between us and Economides and White up to this point, we do have some reservations about their position. In particular, it should be noted that ECPR is a device designed to preserve competition in what we may consider the upstream markets—the markets for inputs *other than the bottleneck*—given the state of monopoly in the market for the bottleneck service. While it is normally desirable to introduce competition into the bottleneck-service market as well, ECPR is not an

16 Economides & White, *supra* note 9.

17. Of course, if scale economies are present, then it is the Ramsey price rather than a price equal to marginal cost that is appropriate.

instrument designed for *that* purpose. If it is the intention of Economides and White to criticize ECPR for its lack of promise as a cure for bottleneck monopoly, they can fault it with equal justice as a poor remedy for inflation or warts.

C. *Laffont and Tirole*

The paper by Laffont and Tirole[18] provides the most profound reexamination to which ECPR has been subjected. The authors set out to derive the efficient price for the services of a bottleneck facility starting from first principles, that is, from a full-fledged welfare-maximization model. Laffont and Tirole have also contributed to the discussion by arguing that there is no need for *direct* regulation of access. They have demonstrated that one can provide a set of substitute incentives through the imposition of what they call "global price caps," which incentives can automatically lead the bottleneck owner and its competitors to meet the requirements of efficiency in the allocation of the bottleneck input and in supply of the final product. We agree that such incentives are possible, at least in theory; and in certain circumstances, a regime of that sort clearly can offer substantial benefits by minimizing regulatory burdens. However, such incentives are not always assured. In particular, when the incumbent firm has reasons to handicap rivals, global price caps must be supplemented by some form of ECPR to weaken such incentives. More important for the current discussion, we note that if such incentives do succeed in ensuring supply efficiency in the presence of potential retail entry, the prices of the bottleneck inputs *must* satisfy ECPR, since it is indeed a necessary condition for such economic efficiency.

Laffont and Tirole's alternative approach to the issue uses what they refer to as a "universal price cap," under which the firm is constrained not only in the prices of final products, but in the prices of bottleneck services as well. The regime requires that a weighted average of all these prices not exceed an appropriately selected figure. Laffont and Tirole describe their proposal as follows:

> 1. The intermediate good (access) is treated as a final good and is included in the computation of the price cap (this is the definition of a global price cap).
>
> 2. Weights used in the computation of the price caps are exogenously determined and are proportional to the forecasted quantities of the associated goods.

18. Jean-Jacques Laffont & Jean Tirole, Creating Competition Through Interconnection: Theory and Practice (Dec. 1994) (unpublished manuscript on file with Professor Baumol).

> As is well known, a price cap induces a firm to select the proper Ramsey structure [of prices] as long as all goods (including, here, access goods) are included in the definition of the caps and the weights are *exogenously* fixed at the level of output that will be realized; this result holds for any demand structure and, in particular, allows for the possibility of strong substitutability between access goods and other goods.[19]

Because the requirement that an access price be consistent with the maximization of constrained social welfare is much more demanding than the requirement that it not lead to the leveraging of market power and the exclusion of rivals who are equally or more efficient, their result can be interpreted as a powerful extension of the familiar contention that arm's length vertical arrangements among firms are generally efficiency enhancing. Laffont and Tirole note that their arrangement will automatically lead to prices that satisfy ECPR if the end products in question are perfect substitutes and the supply curve of firms able to provide the remaining non-bottleneck inputs for the final products is elastic. On the other hand, where the rivals provide only differentiated final products, the theorem that ECPR is a necessary requirement for efficiency no longer holds definitively. However, then the complexities of determining the requirements of a welfare maximum become daunting, even in theory and certainly in practice. The proper prices then depend on deep properties of the cost and demand functions.

Laffont and Tirole are careful to admit that the global price cap regime entails some difficulties in practice. First, they note that "a global price cap in principle allows a proper usage based pricing structure apparently without a need for the regulator to know the demand functions. As we shall see, however, the exogeneity of weights is a qualifier to this encouraging result[,] as weights based on realizations of output create some difficulties."[20] In addition, unless it is supplemented by an ECPR requirement,

> it is particularly easy for an incumbent to prey under a simple global price cap: it suffices to raise [the bottleneck price] while lowering [the bottleneck-proprietor's final-product price] so as to satisfy the price cap. Both actions hurt competitors, who may be driven by financial constraints out of the market. [And] it is clear that there are cases in which predation is profitable.[21]

In sum, the power of the Laffont-Tirole global price caps theorem is quite formidable. Yet it has its limitations. If regulation gives the firm incentives to

19. *Id.* at 18.
20. *Id.*
21. *Id.* at 21.

behave inefficiently, then the ideal results of the theorem no longer follow, as we will see presently. More to the point, as these authors recognize in the preceding quote, the global price cap, by itself, does nothing to prevent the welfare loss resulting from the exclusion of more efficient suppliers of the competitive products in question. Thus, their program seems likely to be difficult to carry out in practice, and likely to fail to achieve the immediate goal of ECPR: the prevention of the exclusion of efficient competitors.

The Laffont-Tirole analysis also calls attention to the significance of auxiliary goals to supplement the pursuit of economic efficiency, and they note that it is too much to expect a single instrument, the price of a bottleneck service, to serve simultaneously as an effective instrument for the pursuit of all appropriate objectives.[22] There may well be good grounds for the promotion of these supplementary objectives. But this is no reason to support the use of distorted pricing of bottleneck inputs for these purposes. It is true that their model suggests the desirability of such a procedure. However, this is only because the conclusion is, in effect, built into their analysis. Once the model is instructed to pursue all of the objectives they describe, if it is given that no other instrument can serve this purpose, it follows automatically that the model will recommend some adjustment in bottleneck-input price to achieve a trade-off between efficiency losses and other targets. But this follows because the model has, so to speak, been preinstructed to provide that answer. As Laffont and Tirole describe the matter, if bottleneck-service price is the only instrument available for the pursuit of a multiplicity of goals, "[i]t becomes a 'jack of all trades and master of neither'."[23]

As we have already indicated, without the supplement of ECPR, the Laffont-Tirole global price caps, despite the elegance and analytic power of the concept, do not perform as one might hope they would where the bottleneck owner has the opportunity and desire to distort the rules of the game in its own favor. If it can use strategic gaming to distort the regulator's behavior when regulated bottleneck-service prices are periodically adjusted, if abuse in the supply of bottleneck services can raise competitors' costs, or if the terms on which these services are supplied can be used to distort competition between its rivals and the bottleneck owner in some markets other than the one immediately at issue, then it can be shown that a global price cap no longer necessarily leads firms to behave efficiently. By providing indirect sources of payoffs to the bottleneck owner, these avenues for gain add a supplementary term to the firm's objective function. As we show elsewhere, if the objective function of a bottleneck proprietor includes such a supplementary term, then that firm will have an incentive to move the bottleneck-service price away from the Ramsey optimum, perhaps diverting

22. *Id.* at 21-22.
23. *Id.* at 22.

end-product demand to itself.[24] Thus, the Ramsey-optimality incentives of global price caps can evaporate when the bottleneck owner has the opportunity to profit from self-dealing—that is, from distortion of the rules of the game.

It is not our purpose here to argue the fairly obvious point that the Laffont-Tirole results break down when the assumptions of their model are violated. Rather, the critical point is that at least some of the efficiency properties of global price caps, properties which evaporate where self-dealing is possible, can be rescued by adoption of ECPR as a supplement. This is so because ECPR rules out distortions in the relationship between the price of the bottleneck input and that of the final product, distortions that can be the prime instrument of self-dealing by the bottleneck owner. If the owner is prevented from charging rivals more for bottleneck services than it effectively pays for them itself, a powerful tool for self-dealing is removed, and global price caps can then resume their salutary role.

D. *Tye and Lapuerta*

We regard the Tye-Lapuerta article that appeared in the previous issue of this Journal[25] as the only outright attack on ECPR in the published literature. Their discussion is so lengthy and deals with so many issues, many of them relevant largely to the situation in New Zealand (where that paper first appeared as a piece of testimony), that an exhaustive listing and discussion would become tedious. We therefore confine our discussion to a sample of some of their most significant arguments and seek to deal with them as briefly as possible.

1. *The Parity Principle and Monopoly Profit*

Tye and Lapuerta begin their attack on the parity principle by arguing that it will not purge the access price of monopoly rents.[26] That claim is entirely correct. As we have already emphasized, the principle was not designed for that purpose and, consequently, does not achieve that commendable goal. However, it does achieve its intended goal of leveling the playing field between the firm that supplies access and the firm that purchases access in order to use it in competition with the access supplier. To condemn a procedure that performs other useful tasks—the tasks it was designed to carry out—for failing to deal with the monopoly problem as well is patently a *non sequitur.*

24. William J. Baumol et al., Notes on the Efficient Component-Pricing Rule (Oct. 1995) (unpublished manuscript on file with Professor Baumol).

25 Tye & Lapuerta, *supra* note 1.

26. *Id.* at Part II.A.

2. *The Alleged Bias of the Parity Principle*

Tye and Lapuerta also refer to "an even greater danger": this, they tell us, is the bias of the parity principle in favor of the incumbent.[27] This is one of their central contentions, and it takes several forms. First, it is argued that the principle "assigns the incumbent ownership of the profits and the revenues needed to recover its sunk costs."[28] That is, according to this allegation, the principle decrees that all profit from an access-using service will go to the owner of the access facilities and that none will go to its access-using competitor. Second, Tye and Lapuerta repeatedly associate the parity principle with "a perfect price squeeze," a patently loaded term intended to imply that the parity price squeezes the access-using competitor dry, leaving it with nothing to cover its sunk costs: "in network industries such as telecommunications[,] . . . the rule *requires* that the incumbent implement a price squeeze . . . . [And] only the first firm to sink investments will ordinarily be allowed to recover those costs."[29]

Here we find their critical misapprehension. To explain the problems, one must go back to the fundamentals of the issue and of the role of the parity principle in relation to the proprietor of the access facilities and its competitor. For this purpose, it is useful to think once more of a product, such as electric power, as being composed of two parts. Let us refer to them as "generation" and "transmission." The circumstance with which we are dealing is one in which the transmission needed by all of the enterprises in the industry is supplied by only one firm, but many firms compete in the supply of generation. The firms, then, all provide a competitive service, generation, while one of them also provides monopoly transmission.

Now it is well known that in a competitive market, the very forces of competition will lead to a price for the competitive product (generation) that returns to each firm both the cost incurred in supplying that competitive product and, in addition, a competitive return to investors on that outlay. A firm in such a competitive market *can* earn more than this, but only to the extent that its superior efficiency permits its costs to fall short of those of its rivals. In other words, for each firm in a competitive market, the market price will cover the incremental cost of its product, a competitive return on the cost outlay, and a bonus exactly equal to any relative cost savings that the efficiency of the firm permits it to contribute.

But those three amounts are precisely what the parity principle permits the competitor of the access supplier to earn on the competitive activity (generation). This follows directly from the analysis above, which shows that if the competitor does have such an efficiency advantage, then it can afford to

27. *See id.* at Part II.C.
28. *Id.* at 450.
29. *Id.* at 450-51.

reduce its price below that of its rival by precisely the amount of its cost advantage. However, in order to outcompete its rival, it has no need to cut its price so far. Rather, it can cut its price modestly below its rival's and keep the remainder of the savings attributable to its cost advantage as profit or, alternatively, as contribution toward recovery of its fixed and common costs. Thus, the parity price enables the competitor of the access supplier to earn all three components that are available to any firm in an effectively competitive market.

Tye and Lapuerta, however, are not satisfied with that. They want the competitor to receive, in addition, at least some of the contribution that the access supplier receives from its provision of *transmission*. We can compare this to a hypothetical case where there are two manufacturers of computer monitors which, together with consoles, constitute a computer. It is as though one of the monitor manufacturers, who produces no consoles, were to bemoan the unfairness of the unwillingness of the monitor and console-producing firm to share its console profits with him.

3. *The Claim That Parity Pricing Is Neither Necessary nor Sufficient for Economic Efficiency*

Rather than slogging through the illustrations underlying the many pages of argument that Tye and Lapuerta muster to support their contention that the parity principle is neither necessary nor sufficient for efficient pricing, we merely refer to the proof we presented earlier that under parity pricing, and under parity pricing alone, can the more efficient firm afford to cut its final-product price below its rival's by *exactly* the amount that its costs are below those of its rival. This is, clearly, the level playing field *par excellence*. We agree, of course, that parity pricing by itself is insufficient to guarantee efficiency, since there can be other price distortions, or distortions of other sorts, that cause resource misallocation despite the adoption of ECPR.

We also agree that any efficient pricing rule can be violated without causing inefficiencies in resource allocation in the exceptional case where the elasticities of *all* responses happen to be exactly equal to zero. But, surely, a pricing regime such as that favored by Tye and Lapuerta, which permits an inefficient competitor to undercut the more-efficient incumbent and yet earn a profit, *can* impede economic efficiency.

There are many other matters on which we disagree with Tye and Lapuerta, but we have sought to confine our discussion to the central issues, bringing out enough to show why we are convinced that their attack leaves ECPR undamaged.

Conclusion

The characterizing feature of ECPR is its determination of the price of bottleneck services exclusively on the basis of the final-product price minus the non-bottleneck-related costs incurred in providing bottleneck services to the bottleneck-proprietor's rivals in the final-product markets. Those who have proposed alternative ways of calculating this price have, in effect, advocated either an increase or a decrease in that price from its ECPR level, usually defending their proposals on the ground that their proposed changes promoted goals and policy objectives other than economic efficiency in the allocation of production between the bottleneck owner and its rivals. This is the central distinction between the ECPR-based approach and the alternatives that have been advocated by others.

We believe that there are serious reasons to resist the use of access pricing as an instrument for the promotion of a variety of social goals, however worthy they may be. For example, it seems quite appropriate to make it easy for the impoverished to have access to communications facilities and electric power. However, there is logic behind the long record of economists' opposition to arrangements that finance such programs by means that entail the distortion of a few selected prices from their efficient levels. A direct subsidy, preferably provided by the public treasury, has the virtue of visibility and some hope of accountability as well as minimization of any resulting distortion of prices and resource allocation. In particular, the fee for bottleneck services is not a tool generally well adapted to achievement of policy objectives other than economic efficiency in the supply of the products. It is also dangerous to use the bottleneck-service price as a means to stimulate downstream competition, because the result must amount to a cross-subsidy to entrants that leads to an excessive allocation of resources into that market. It seems clear that a better way to pursue the promotion of competition in downstream activities is the use of price-caps on the bottleneck owner's end-user services, which, in turn, can provide efficient benchmarks that unregulated entrants can use in determining their own prices. When bottleneck prices are forced to artificially low levels to enable rivals to obtain a foothold, all of the problems entailed in infant-firm subsidies arise. For example, these subsidies undercut the incentives for entrants to reduce their costs. Surely, it is generally more appropriate to make certain that bottleneck service price and quality do not discriminate against entrants and that all impediments to competition are removed as quickly as possible.

ECPR achieves two limited but important objectives. It facilitates entry by efficient firms into the upstream activities that provide inputs competitively, and it does not impede the financial viability of the bottleneck owner. If conjoined with suitable price caps, it also prevents monopoly profits and reduces any incentive for the incumbent to engage in anticompetitive

conduct towards its rivals in downstream activities. No other way of accomplishing these goals is available where competition cannot carry out the task. We, therefore, continue to recommend the use of ECPR as the guide for the pricing of bottleneck inputs.