incremental cost.[9] That outcome easily fails to occur with TELRIC pricing as soon as the firm produces more than two services and any group of services has shared costs. This result is illustrated by the following example with three services:

Incremental cost of service *A*	=	$1
Incremental cost of service *B*	=	$1
Incremental cost of service *C*	=	$1
Shared cost of service *A* and *B*	=	$5
Total cost of all services	=	$8

The example shows that the incremental cost of services *A* and *B* taken together is $1 + $1 + $5 = $7. TELRIC pricing would set the price of each service at $1. Services *A* and *B* taken together would have revenues of $2, which would fail to cover their $7 incremental cost. Thus, TELRIC pricing creates cross-subsidies.

15. In a general sense, TELRIC pricing creates cross-subsidies when multiple services are available that have shared costs or common costs. Those costs do not magically disappear. Failure to cover those costs makes those services available collectively at less than their total costs.

16. What are the consequences of cross-subsidization? Entrants will make efficient decisions about the mix of resale and facilities-based competition only if their access to existing networks is provided at prices that accurately reflect economic costs. Subsidizing services by pricing them at TELRIC sends the wrong price signals and leads to incorrect decisions. When prices are too low, excessive use of underpriced facilities will result and distort the decisions of resellers. The entry and expansion of resellers is thus not only encouraged, but also financed by underpriced facilities.

17. Moreover, when network services are priced too low, the building of competing facilities

9. *See, e.g.*, WILLIAM J. BAUMOL & J. GREGORY SIDAK, TOWARD COMPETITION IN LOCAL TELEPHONY 69–72 (MIT Press & AEI Press 1994).

is likely to be discouraged. Thus, rather than stimulating facilities-based competition, TELRIC pricing discourages it. Why should an entrant seek a competitively priced alternative when it can free-ride on the incumbent LEC's facilities at prices that are below cost? TELRIC pricing turns out to be a misnomer: It should more appropriately be termed "individual-service LRIC," for it ignores the incremental costs of *combinations* of services.

18. Indeed, the problem is compounded by unbundling "at any technically feasible point," as envisioned by the Telecommunications Act.[10] Finer and finer partitioning of services wrings out the shared costs from TELRIC prices and thus increases the subsidies inherent in such pricing. In the limit, the finer partitioning of services creates TELRIC prices that will not cover the incremental costs of *any* pair or group of services that have shared costs.

3. TELRIC Pricing Creates Incentives for Excessive Unbundling

19. TELRIC pricing creates incentives for excessive unbundling because it ignores that unbundling shifts costs from attributable costs to shared costs and common costs. A firm cannot apply any pricing methodology independently of the characteristics of the products and services for which prices are being chosen. On the demand side, the characteristics of the products and services will affect the willingness of consumers to pay for those products and services. On the supply side, if the firm sets prices subject to regulatory controls based on its costs of service, then the definitions of the products and services will significantly affect the costs that are attributable to those products and services.

20. The pricing methodology that regulators adopt for interstate access, as well as for resale and unbundled network elements, should be flexible enough to adapt to the regulations governing the extent of unbundling. Efficient and compensatory pricing must allow the firm to recover its economic costs, including both its attributable costs and its unattributable costs—namely, its shared costs and common costs.

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10. 47 U.S.C. § 251(c)(3).

21. The measurement of costs depends on the definition of the firm's services. For a multiproduct firm, changes in the definition of classes of services and individual services will affect measures of incremental cost. Generally speaking, the more services that are defined by subdividing sets of services, the lower the attributable costs of individual services, and the higher the shared costs and common costs of those services. Without any increase or decrease in total costs, it is simply more difficult to identify the attributable costs of a particular service as one moves toward higher levels of disaggregation in the classification of services.

22. Suppose, for example, that a company produces services that are grouped into two categories, *A* and *B*, and each category of services is sold as a bundle. The average incremental cost of category *A* is $10. The same is true of the average incremental cost of category *B*. Moreover, the firm has common costs of $20. Suppose that there are two services within category *A*, each of which has an incremental cost of $4, and that the two services have shared costs of $2, for a total of $10. By unbundling services in category *A*, the shared costs and common costs of the firm rise by $2 to $22. In state arbitration proceedings under section 252 of the Communication Act, for example, entrants have requested incumbent LECs to engage in "subloop unbundling," so that pieces of the loop (such as the network interface device, or NID, on the side of one's home) can be obtained independently of a "NID-less" loop and other subelements. One would expect subloop unbundling to raise the incumbent LEC's proportion of unattributable costs.

23. Unbundling therefore has the effect of decreasing the proportion of costs that are attributable, and of correspondingly increasing the proportion of total costs that are classified as shared or common. To the extent that the degree of unbundling follows regulatory dictates, the resulting service definitions may bear little relation to technological and managerial measurements of costs. Consequently, it becomes increasingly difficult to identify the firm's underlying cost components. Reliance on regulatory accounting measures, based on regulatory service classifications and unbundling requirements, is likely

to cause inefficient decisions concerning the pricing of network components. That inefficient outcome is particularly likely to occur if, as one would expect, the packages of retail services that the LEC offered before the imposition of mandatory unbundling were intended to facilitate optimal management decisions about pricing and service offerings.

24. This effect of unbundling on cost calculations counsels regulators to take careful account of the interplay between unbundling requirements and the pricing of services, including interstate access. Competing carriers have an incentive to request pricing at incremental cost to the incumbent LEC as a means of obtaining network services in a manner that avoids paying for the LEC's shared costs and common costs. Further, by requesting a finer and finer partition of the incumbent LEC's services into unbundled components, competitors shift costs away from measures of incremental cost and toward measures of shared costs and common costs. In the limit, groups of services may individually have negligible incremental costs, even though as a group, their shared costs and common costs are significant.

25. TELRIC pricing thus creates a perverse incentive. Unbundling requests from competitors using LEC services may be strategic actions, rather than legitimate requests for access to network services. Competitors not only avoid paying a portion of shared costs and common costs, but also have an incentive to request ever finer partitions of services, and interconnection at every technologically feasible point, so as to shift costs farther away from incremental costs and into shared and common costs. This strategic opportunity allows competitors to free-ride on the incumbent LEC.

26. Market-based pricing avoids those perverse incentives because competitors must pay for the costs of the services that they purchase—both the incremental costs and a portion of the shared costs and common costs. By allocating shared costs and common costs in a competitively neutral manner, market-based pricing eliminates the incentive for competitors to make strategic requests for excessive unbundling. Instead, a competitor will purchase resale, unbundled network elements, interconnection, and interstate access on the basis of its market prospects rather than as an attempt to manipulate the regulatory

system.

4. TELRIC Pricing Fails to Include Increases in Shared Costs and Common Cost That Result From Unbundling

27. Unbundling has costs. The provision of resale services and unbundled network components entails two types of costs: transactions costs and production costs. Unbundling should not be an end in itself, for the bundling of products and services reduces customer transaction costs and enhances convenience. Access to a few types of local network elements is sufficient to achieve the objectives of deregulation. Competitive markets are capable of resolving the tradeoff between the need to customize offerings and the advantages of bundling. The costs of mandated unbundling must be reflected in estimates of the incumbent LEC's incremental costs, shared costs, and common costs and thus included in the prices for resale and unbundled network elements.

28. Peter Huber has emphasized that "unbundling imposed on a LEC service that faces competition will, at best, only raise prices and inconvenience customers."[11] With the many forms of competition in the local exchange, many unbundling regulations are rendered unnecessary. As Huber has noted, bundling in a competitive market is self-regulating: "If private branch exchanges (PBXs) compete directly against LEC-supplied Centrex service, then it makes no sense to order the unbundling of either. Suppliers of both PBXs and Centrex will bundle or unbundle as customers demand, or will quickly lose ground to more responsive competitors."[12] He has argued that regulators "should not unbundle 'interfaces,' 'functions,' or 'capabilities,' still less the billing and ordering systems used to sell them."[13] Regulatory commissions can achieve their open access goals with limited unbundling; they need only selectively target several points of entry to the local exchange network that are shown not to be competitive and then price that network access at compensatory levels.

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11. PETER W. HUBER, COMPETITION AND OPEN ACCESS IN THE TELECOMMUNICATIONS MARKETS OF CALIFORNIA (Feb. 8, 1994).

12. *Id.* at 7.

13. *Id.* at 112.

29. Unbundling entails transactions costs in comparison with goods and services that are sold together, because the firm must break down ordering, purchasing, billing, and pricing information for individual components. Most products and services offered by competitive companies are bundles of attributes or features. Customers also benefit from the convenience of purchasing a range of products and services from the same supplier that offers lower transactions costs through "one-stop-shopping" and bundling of products and services. Companies compete by offering packages of goods and services that enhance customer convenience.

30. For those reasons, many goods and services are sold as packages. Imagine buying an automobile or even a computer part by part. The final product not only is a physical package of components, but also is sold as a single product requiring only one set of transactions. Even when automobiles are customized with options, customers receive discounts when they choose standardized options packages. The greater the extent of standardization of bundles of features offered to either the customers or the competitors of the incumbent LEC, the lower will be the transactions costs associated with offering those features. Conversely, the more that regulatory commissions require that each retail service or network component be sold separately, or in individually customized service packages, the greater will be the associated transactions costs.

31. Excessive unbundling is not only inefficient and unnecessary. It entails product costs as well. To unbundle retail services and network components, the incumbent LEC often needs to install complex switching equipment and to provide additional interconnection facilities for competitors. As with transaction costs, the more such resale and access facilities can be standardized, the lower will be the associated costs. If unbundling and regulated pricing requirements shift the costs to the incumbent LEC, then competitors will have an additional strategic incentive to demand unique, customized wholesale and access services from the LEC.

32. The transaction costs and production costs due to unbundling represent *wholesaling* costs

for the incumbent LEC. The incremental wholesaling costs that are attributable to individual services or elements must be included in their prices. In addition, any increase in shared costs or common costs that result from unbundling also should be reflected in the prices for resale and UNEs. A competitive firm would not provide a service if it did not generate sufficient revenues to cover its costs. Regulators should account for wholesaling costs in their pricing rules. If competitors do not bear the full economic costs of the services that they purchase, they will not make efficient purchasing and investment decisions.

33. TELRIC pricing will capture wholesaling costs if and only if all of those costs are attributable. But it will not capture those transaction costs and production costs due to wholesaling that increase shared costs or common costs. Thus, TELRIC pricing will fail to reflect the full economic costs of unbundling.

34. The inefficiencies associated with the transaction costs and production costs of specialized services under mandatory unbundling are a problem when costs are shifted to the incumbent LEC's other customers or when the LEC is expected to shoulder those costs as a means of easing the transition to competition. Unbundling becomes an incumbent burden that potentially hinders the incumbent LEC's ability to compete and subsidizes new entrants, thereby distorting their decisions about how much to invest in competing facilities. Just as overpriced network services can induce inefficient bypass decisions, so also can subsidized wholesale services induce underinvestment in facilities and overuse of network components relative to less costly alternatives.

5. TELRIC Pricing Creates Incentives for the Incumbent LEC to Reduce Its Common Costs or Shared Costs

35. Because TELRIC pricing fails to compensate the incumbent LEC for its shared costs and common costs, adoption of such pricing would create an incentive for the LEC to reconfigure its network and change the structure of the company so as to increase the proportion of costs that would be attributable to those services priced at TELRIC, and to lower costs that would be classified as shared costs or common costs. This shift in the incumbent LEC's cost structure would not represent efficiency

gains: By lowering shared costs or common costs, the company would potentially increase *total* costs because it would lose some of the benefits of economies of scope. Moreover, the reductions in uncompensated shared costs or common costs that are necessary to enable the firm to break even could result in a lowering of the quality of service or the elimination of some services that are uncompensated. Thus, TELRIC pricing creates a situation that is ripe for the law of unintended consequences.

B. The Fallacy of Forward-looking Costs

36. In their affidavit in the initial round of comments in this proceeding, Professors Baumol, Ordover, and Willig state:

> In a competitive market, an asset's value is based on the future revenues it is expected to generate. The TELRIC principles adopted by the Commission replicate this stream of payments on an element-by-element basis. They reflect the economic costs, including a market-based return on capital, that an efficient entrant would encounter. In other words, TELRIC principles are fully compensatory of economic costs.[14]

The identification of the FCC's forward-looking costs with the incumbent LEC's economic costs or the expected future revenues of the LEC is incorrect. As Professor Alfred Kahn correctly observes in a letter to Chairman Hundt dated January 14, 1997:

> Advocates of the "blank slate" version of TELRIC typically assume that that is the level to which competition would drive prices, if it were effective. They are mistaken. In a world of continuous technological progress, it would be irrational for firms constantly to update their facilities in order *completely* to incorporate today's lowest-cost technology, as though starting from scratch: investments made today, totally embodying *today's* most modern technology, would instantaneously be outdated tomorrow and, in consequence, never earn a return sufficient to justify the investments in the first place.[15]

Professor Kahn further observes that

> the Commission's prescription reflects a presumption all too typical of regulators—declaring, in effect, "*we* will determine not what your costs *are* but what they *ought* to be." This approach has two major defects: first, that is not how the competitive process works; and second, its prices would actually discourage competitors coming in and building their own facilities when that would be more efficient that using the incumbent's facilities—which it was the clear intention of the new Act to encourage.[16]

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14. Baumol-Ordover-Willig Affidavit at 8 ¶ 16.
15. Letter from Alfred E. Kahn to Reed E. Hundt, Jan. 14, 1997, at 1-2 (emphasis in original).
16. *Id.* at 2 (emphasis in original).

37. This *Notice* and other recent orders and notices issued by the Commission contain a number of fallacies about economic cost. In this section, we identify and debunk those fallacies. Our main point is this: One should not base economic decisions on costs and benefits that are irrelevant to those decisions. Correspondingly, one should take into account all of the costs and benefits that each decision entails. Thus, when comparing two alternatives, one should compare the benefits and costs associated with each decision, not the benefits or costs incurred in the past, present, or future that are not directly caused by the decisions.

38. First, consider costs that already have been incurred and are not recoverable. The familiar "fallacy of sunk costs" refers to decision making that takes into account irreversible expenditures.[17] This is a fallacy because these expenditure do not affect the benefits and costs associated with later decisions; thus, such expenditure should not enter into one's decision-making process. After costs are sunk, economic decisions should be based on *quasi-rent*—that is, revenues net of avoidable cost. As we will emphasize below, sunk costs are related to obligations to preserve investment-backed expectations in private contracts and in the regulatory contract.

39. But cost fallacies need not center only on past costs. What we term the "fallacy of forward-looking costs" bases pricing and other economic decisions on future costs that are not related to those decisions, and it ignores costs that *are* related to that decision. The Commission's focus on "forward-looking cost" is intended to emphasize that the fallacy of sunk costs should be avoided—that is, only the avoidable or future cost of decisions should be taken into account. The Commission, however, gets so carried away with projected costs, that it recommends making decisions based on future costs that also are not affected by current decisions. Moreover, the fallacy of forward-looking costs ignores other costs that *are* affected by current decisions. The fallacy of forward-looking costs thus has two aspects:

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17. *E.g.*, JOSEPH E. STIGLITZ, ECONOMICS 44–45 (W.W. Norton & Co. 1993).

(1) The decision maker takes into account costs that are irrelevant to the decision.

(2) The decision maker ignores costs that are relevant to the decision, especially opportunity costs.

40. What are forward-looking costs? In its *First Report and Order* on interconnection, the Commission defines forward-looking costs as "the costs that a carrier would incur in the future."[18] That definition is fine as far as it goes. The Commission then proposes three alternative measures for the cost of interconnection and unbundled network elements for local exchange carriers: (1) "the most efficient network architecture, sizing, technology, and operating decisions that are operationally feasible and currently available to the industry,"[19] (2) "existing network design and technology that are currently in operation,"[20] and (3) "the most efficient technology deployed in the incumbent LEC's current wire centers."[21] The Commission selected a measure that is a hybrid of Options 1 and Option 3 consisting of "costs that assume that wire centers will be placed at the incumbent LEC's current wire center locations, but that the reconstructed local network will employ the most efficient technology for reasonably foreseeable capacity requirements."[22] We will now consider how that measure of cost, which the Commission proposes to extend to this proceeding, manifests a number of economic fallacies.

1. Putting the Cart Before the Horse

41. A decision entails costs. The Commission, however, puts the cart before the horse *by embedding a decision within its definition of costs*. The decision is whether or not to expand capacity, contingent on two preconditions: that the LEC's current wire center locations are given, and that the LEC has fully flexible capacity. Not coincidentally, those two assumptions correspond to a model employed by AT&T and other IXCs known as the Hatfield model, which assumes a "scorched-node" network, as

18. *First Report and Order* ¶ 683.
19. *Id.*
20. *Id.* ¶ 684.
21. *Id.* ¶ 685.
22. *Id.*

if there were no existing loops or switches in place. Such assumptions are only meaningful if this is indeed the relevant decision, such as might be the case in rebuilding a local exchange network that had been seriously damaged by war or natural disaster. Otherwise, the Commission's cost definition will be off the mark. One could perhaps defend the need to make some choices as a means of operationalizing the cost measurement. The question, however, is whether the Commission's particular set of assumptions corresponds to the decisions to which the cost measure would be applied.

42. Such a hybrid cost measure is necessarily off the mark. First, it cannot represent the costs of an entrant, which can choose where to locate its wire centers, as in Option 1. Thus, the cost measure is not relevant to the entry and operating decisions of a competitive entrant. Second, the cost measure cannot represent the costs of the incumbent, because the incumbent already has loops and switches in place, as in Option 2. Thus, the cost measure is not relevant to the expansion and operating decisions of an incumbent LEC.

2. Allocating Common Costs Arbitrarily

43. The Commission states at paragraph 221 of the *Notice* in this proceeding:

> An incumbent LEC's TSLRIC for a given service or facility, such as exchange access service, should include all incremental costs directly attributable, or dedicated, to the delivery of the service or facility in question. Carriers also should be allowed to recover a reasonable allocation of their forward-looking common costs, defined as those costs that are incurred in connection with the production of multiple products or services that remain unchanged as the relative proportion of those products or services varies. We note that when calculating the forward-looking economic cost of exchange access services, because these services share common network facilities with other incumbent LEC-provided services, such as local exchange service and intraLATA toll, fewer costs will be directly attributable or dedicated totally to exchange access services. Consequently, the incumbent LEC may need to recover significant common costs in addition to the TSLRIC of exchange access. These common costs should be recovered in a manner that is economically efficient and consistent with the pro-competitive goals of the 1996 Act. By contrast, the TELRIC of a specific facility, such the loop or the switch, would directly attribute to that facility all costs caused by that facility, regardless of the services provided by that facility. Consequently, the forward-looking common costs that the incumbent LEC must recover in addition to the TELRIC of that facility in order to recover forward-looking economic costs are lower than the forward-looking common

costs that need to be recovered for a service.[23]

The Commission's discussion asserts that the amount of common costs that should be recovered depends in a systematic way on the measure of incremental cost. This cost-based approach to pricing bears little relation to market-determined pricing. As we noted in paragraphs 51 through 55 of our initial affidavit, the Commission's two preferred approaches to determining economic cost—fully distributed cost pricing and reverse Ramsey pricing—create cost measures that are unrelated to economic cost. They create arbitrary allocations of common cost that have little to do with the market value of the products and services provided. As such, the arbitrary allocation of common cost is another illustration of the fallacy of forward-looking costs.

3. Jumping the Gun

44. The forward-looking cost rhetoric is aimed at estimating the replacement cost of network assets, a laudable objective. In its pricing recommendations and cost estimation methods, however, the Commission paints an incorrect portrait of how competitive pricing works. Technology and competitive entry occur with lags in competitive markets. Setting prices on the basis of competitors' costs is a good competitive strategy, but only when market alternatives are available. To use a "most efficient technology" standard, as the Commission recommends, is to jump the gun, because that standard is at variance with competitive markets.

45. To take a simple example, consider the evolution of semiconductors. The speed and computing power of each generation of computer chip has increased as chip manufacturers have developed new products such as Intel's 286, 386, 486, and Pentium chips. The price of a computer chip is highest when it is first introduced. The chip's price then begins a decline that depends in part on the rate of development of the next generation of chip: after the new chip is introduced, the price of the previous generation depends in part on the availability of the new chip. Thus, the pricing of chips is

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23. *Notice* ¶ 221.

affected by the lags in developing new technology and the lags in introducing products that embody the new technology. Existing products are not immediately devalued by new and improved substitutes. Rather, the adjustment process often is gradual.

46. If prices did not adjust gradually, there would be no incentive to engage in research and development or to invest in costly manufacturing to introduce any generation of products bearing new technology. Industry would be waiting for the next development before making a commitment. Thus no progress would occur. Instead, because of lags, companies earn a return on the current technology in the interim period before the new technology becomes available; after the new technology is introduced, the development cycle continues. To imagine that prices fall immediately as a new technology is spotted over the horizon would be to eliminate any incentives for R&D and investment in production.

47. Consider pricing when technological change occurs that lowers the cost of production. The firm expects its operating cost to be c_0. Technological change occurs and the operating cost of entrants is lower than the incumbent, say c_1. Suppose that incumbents and entrants have the same entry costs k (although the same argument applies if entry costs change as well). The incumbent expects to charge a price p. Should it change its price after the technological change occurs and the entrant's alternative makes its appearance? If the entrant does not have any capacity constraints, then c_1 will be the new market price. If the entrant does face capacity constraints, then c_1 will not be the new market price, which instead will fall with a lag. The lag is due to the adjustment costs of entry, which should be counted as part of the cost of the competitive alternative. Therefore, the price should not fall. That result will reflect the entrant's economic costs and provide incentives for entrants to incur the adjustment cost of entry. The incumbent's expectations would have taken this market lag into account. Thus, the best technology available is not a proper yardstick for the incumbent until the market alternative is no longer capacity-constrained. Put differently, the current market price reflects the projected cost of the alternative plus the adjustment cost associated with installing and adapting to the new production method.

48. The Commission is jumping the gun by recommending that access to the local exchange network reflect the most efficient technology before the market makes that technology available. Jumping the gun would eliminate incentives for incumbents to expand and upgrade their networks and for entrants to establish facilities. The prices of existing network facilities should adjust at *market-determined* rates that reflect the availability of facilities that embody the most efficient technology available. Jumping the gun could slow down the introduction of the most efficient technology that the Commission uses as its benchmark.

49. Moreover, how will the Commission know what is really the most efficient technology? Experience in telecommunications shows that there is rapid technological change in computers, optical transmission, wireless transmission, and network design. It is not realistic to presume that a government agency is better equipped than market participants to sort out these technological changes to determine which technology is the best available or most efficient. The process of price adjustment to technological change cannot be predetermined by government fiat; it can only be revealed through market competition. Not only are there incentive problems that could forestall the very innovation that the Commission is attempting to predict, but the information required to make the prediction is beyond the capabilities of administrative decision making.

4. Ignoring Investment-backed Expectations

50. Consider a basic example. Suppose that to carry out production a firm must invest k dollars. Suppose that the investment is irreversible, so that k represents sunk costs. The firm has operating costs c and expects to earn revenues R. The firm's economic rent is defined as revenues net of operating cost and investment cost, $R - c - k$. Economic rent provides the incentive for entry. The firm's economic quasi-rent is defined as net revenue, $R - c$. The quasi-rent provides incentives to stay in the industry after entry costs have been sunk. Having sunk k, the firm decides whether or not to produce on the basis of its comparison of R and c only. It would manifest the fallacy of sunk costs for

the firm to base the production decision on the magnitude of k. Thus, after k is sunk, only quasi-rents (not economic rents) affect the firm's decision whether or not to produce the good.

51. That condition does not mean that pricing should not take into account costs k. The fallacy of forward-looking costs ignores the expectations of the investor when the decision to invest k is made. Thus, the fallacy of forward-looking cost would be to base the investment decision on quasi-rents alone, ignoring the magnitude of k. *Before* the firm has sunk k, it is economic rents that count, not quasi-rents.

52. Buyers and sellers enter into contracts on the basis of economic rents. The purpose of contract law is to allow efficient contracts to form. Otherwise, without the protection of contract law, buyers and sellers would be tempted to behave opportunistically, taking advantage of the reliance on irreversible investment of the other party. To illustrate this point, suppose that R is determined by a buyer and seller negotiating a contract before k is sunk. After the parties enter into the contract, one of the parties sinks cost k. The other party then has an incentive to behave opportunistically by offering a payment that is only slightly above c, thus capturing the investor's quasi-rent. That situation cannot be justified by giving c the new label "forward-looking economic costs." Contract law protects the expectation, $R - c$, which equals the investor's quasi-rent. If the seller anticipated that the buyer could reduce the payment to c after the contract was formed, then the seller would have no incentive to make a transaction-specific investment in the first place.

53. To complicate matters, suppose that a new technology appears such that the replacement cost of capacity is lower than k, say k_l. Suppose that operating costs continue to equal c. The forward-looking costs of production are then equal to $c + k_l$. Again, that condition would not mean that the contract price should be reduced to forward-looking costs. The purpose of the contract is to protect the expectation interests of the buyer and seller. Thus, the price should remain at R. Forward-looking economic costs are not simply the firm's avoidable costs after it has made investments. If that were the case, there would be no transaction-specific investments

54. It is now possible to see the efficiency of the expectation damage measure in contract law and its relation to the pricing of the regulated services of incumbent LECs, including interstate access. Suppose that the buyer contracts to pay R to the seller and that another seller later appears with a better offer R_l. In other words, R_l is less than R. Contract law ensures efficient breach by conditioning the buyer's ability to breach upon his payment of the original seller's expectation of $R - c$.[24] That payment leads to efficient breach decisions because the buyer will breach the contract only if the offer from the new seller is lower than the operating cost of the original seller.[25] The offer of the entrant must be lower than the avoidable cost of the incumbent for breach to be efficient. Contract law does not require paying the incumbent the offer of the entrant. To do so would simply be a transfer of income from the seller to the buyer, and would not lead to efficient breach decisions. If the seller anticipated that the buyer could breach or pay the going rate whenever a lower price appeared, then the seller would have no incentive to make a transaction-specific investment.

55. In the regulated context, the expected revenue of the incumbent LEC happens to be based on embedded costs because, under cost-of-service regulation, the LEC's capital costs are necessarily used in the calculation of revenue requirements. That calculation does not mean that embedded costs are part of the firm's economic cost. Nevertheless, because the regulated firm's expected revenues reflect those costs, the expected revenues should be used to compensate the firm. The fact that the regulated firm's capital has a lower (or higher) replacement value in comparison with embedded cost is not relevant to the compensation decision. The embedded cost is a part of cost recovery because it underlies the incumbent firm's investment-backed expectation.

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24. *See* Oliver Wendell Holmes, *The Path of the Law*, 10 HARV. L. REV. 457, 462 (1897) ("The duty to keep a contract at common law means a prediction that you must pay damages if you do not keep it—and nothing else."). Horwitz-Matthews, Inc. v. City of Chicago, 78 F.3d 1248, 1251 (7th Cir. 1996) (Posner, J.).

25. This result obtains because the buyer will choose to breach it only if $R > R - c + R_l$. That condition is equivalent to $c > R_l$.

5. Ignoring Opportunity Costs

56. As we have emphasized, the fallacy of forward-looking costs also can arise from the omission of relevant costs. Such is the case when opportunity costs are ignored. In its *First Report and Order*, the Commission lists opportunity costs among "factors that shall not be considered in a calculation of the forward-looking economic cost of an element."[26] Not only does the Commission exclude opportunity cost, but it also offers the following limited definition of the term: "Opportunity costs include the revenues that the incumbent LEC would have received for the sale of telecommunications services, in the absence of competition from telecommunications carrier [*sic*] that purchase elements."[27] That definition is limited because it does not also identify opportunity costs that can arise given markets for the elements or local exchange services.

57. The exclusion of opportunity cost from a definition of forward-looking cost is incorrect because economic costs and opportunity costs are one and the same. "In economics," wrote Armen Alchian in his classic definition of cost, "the cost of an event is the highest-valued opportunity necessarily forsaken."[28] Chief Judge Richard Posner has similarly written in his treatise on law and economics:

> The distinction between opportunity costs and transfer payments, or in other words between economic and accounting costs, shows that cost to an economist is a forward-looking concept. Sunk (incurred) costs do not affect decisions on price and quantity.[29]

He further notes that "[t]he forces of competition tend to make opportunity cost the maximum as well as the minimum price."[30] Similarly, Joseph Stiglitz, the former Chairman of the Council of Economic Advisers, has written in his textbook that "when rational firms and individuals make decisions—whether to undertake one investment project rather than another, whether to buy one product rather than

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26. 47 C.F.R. § 51.505(d) (stayed), in *First Report and Order*, at App. B, at B-29.
27. *Id.* § 51.505(d)(3) (stayed), in *First Report and Order*, App. B, at B-29.
28. Armen A. Alchian, *Cost*, *in* 3 INTERNATIONAL ENCYCLOPEDIA OF THE SOCIAL SCIENCES 404, 404 (David L. Sills ed., MacMillan Co. & Free Press 1968).
29. RICHARD A. POSNER, ECONOMIC ANALYSIS OF LAW 6-7 (Little, Brown & Co. 3rd ed. 1986).
30. *Id.*

another—they take into account *all* of the costs, the full opportunity costs, not just the direct expenditures."[31] Finally, it is a matter of textbook economics that "opportunity cost is the same from the private and social points of view in the absence of external economics and diseconomies."[32]

58. For inputs that are purchased, the market price of the input provides the best indicator of the opportunity cost of using that input in production; for inputs that are made by the firm that uses them, it is necessary to impute the value by determining the best opportunity forgone due to the firm's use of that input in production. The opportunity cost of selling inputs to competitors depends on the opportunities forgone when the competitor makes use of the input rather than the firm itself. The price of inputs to be sold to competitors is necessarily constrained by the market price of such inputs. A firm providing a product or service, whether voluntarily or under regulatory compulsion, cannot expect to make any sales unless that input is priced at or below the market price for comparable goods.[33]

59. The opportunity costs of selling inputs, such as interstate access, should be defined according to the choices of individual firms based on relative prices in both input and output markets. Efficient network access pricing requires voluntary transactions rather than compulsory pricing. The opportunity cost of network access is the best alternative use for that scarce transmission capacity. Competition will drive the price for network access toward its opportunity cost.

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31. STIGLITZ, *supra* note 17, at 44 (W.W. Norton & Co. 1993) (emphasis in original). That definition coincides with the standard definition in textbooks on regulation:

> The economic concept of costs includes the value of all inputs required for production, including the implicit value of those inputs owned by the producer . . . . Thus, economic costs include both implicit and explicit costs . . . . Implicit costs are defined as the opportunity cost of owned resources, where the term *opportunity cost*, in turn, is defined as the value of a resource in its best alternative use. Explicit costs are the out-of-pocket expenditures on inputs purchased by the firm (which, in the short run, include both fixed and variable inputs).

DAVID L. KASERMAN & JOHN W. MAYO, GOVERNMENT AND BUSINESS: THE ECONOMICS OF ANTITRUST AND REGULATION 32 (Dryden Press 1995) (emphasis in original).

32. JAMES M. HENDERSON & RICHARD E. QUANDT, MICROECONOMIC THEORY: A MATHEMATICAL APPROACH 302 (McGraw-Hill, Inc. 3d ed. 1980).

33. *See* J. Gregory Sidak & Daniel F. Spulber, *The Tragedy of the Telecommons: Government Pricing of Unbundled Network Elements Under the Telecommunications Act of 1996*, 97 COLUM. L. REV. (forthcoming 1997).

C. Cost Causality

60. Economic analysis explains why prices should reflect costs. Prices that cover costs provide incentives to suppliers to provide a good or service. Also, prices that cover costs provide signals to buyers so that the buyer's willingness to pay for the good or service covers its cost. Buyers consequently make correct decisions about purchasing the good or service. Thus, when a supplier and buyer transact at some price, the buyer's willingness to pay is greater than or equal to the seller's costs, and they realize gains from trade.

61. Professors Baumol, Ordover, and Willig subscribe to the important principles of cost causation.[34] However, they reach incorrect conclusions when applying those principles. They observe that

> the customer loop is used to access all types of telecommunications services, including local exchange and inter- and intraLATA toll services, as well as to terminate local and long distance calls. Hence, it is impossible on any rational basis to allocate the costs of the loop among these various telecommunications services that the customer receives. In a competitive market, therefore, a loop's price would be based on the cost of its provision to the customer, irrespective of the customer's allocation of minutes of use among different services. Consequently, the cost of the loop—or any portion thereof—must be removed from the cost of exchange access.[35]

We agree that accounting-based cost allocations do not correspond to economic pricing of capacity, and that such allocations are essentially arbitrary. This is why we have recommended that market pricing of services determine the recovery of common costs rather than regulatory allocation rules.

62. Yet, it is a non sequitur to conclude, as do Professors Baumol, Ordover, and Willig, that "the cost of the loop—or any portion thereof—must be removed from the cost of exchange access." That reasoning would be similar to the observation that a restaurant serves all kinds of meals, and because the cost of the premises (kitchen, tables and chairs, and dining room) cannot be allocated among these meals, the costs of the premises should be removed entirely. By this same reasoning, all parts of the local

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34. Baumol-Ordover-Willig Affidavit at 6 ¶ 12.
35. *Id.*

exchange network would be excluded from access costs except those facilities that are entirely dedicated to an interexchange carrier, such as dedicated lines that link the interexchange carrier's point of presence (POP) to the LEC's end office serving the POP (known as a serving wire center). Part 69 of the Commission's rules requires LECs to charge a flat rate to IXCs to recover the cost of these entrance facilities.[36] However, the process of connecting the serving wire center to the LEC's end office switch, known as interoffice transport, can involve not only dedicated facilities, but also common or shared facilities that connect the LEC end office switch to another office where the LEC's tandem switch is located.[37] If we are to subscribe to the analysis of Professors Baumol, Ordover, and Willig, then common or shared facilities used in the incumbent LEC's switched transport network would also not be included in access costs.

63. Much of the local exchange network is involved in providing originating and terminating access. Moreover, the local exchange network is employed in delivering a variety of services. As Professor Baumol, Ordover, and Willig observe: "Transport and switching of a long distance call originating from a distant exchange is, from the standpoint of the network, the same as transport and switching of a call from within an exchange."[38] By their reasoning, all network costs should therefore be excluded from access pricing because their costs cannot be allocated.

64. Competitive markets do not price services in that manner. A multiproduct firm earns revenues that cover the total costs (both attributable and nonattributable costs) of providing its various services. If a service cannot earn revenues that cover its attributable costs, the firm will exit from the provision of that service. If total revenues cannot cover both attributable and common costs, the firm must close down entirely.

65. What would be the consequences of accepting the recommendation of Professors Baumol,

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36. *Notice* ¶ 25.
37. *Id.*
38. Baumol-Ordover-Willig Affidavit at 6 ¶ 10.

Ordover, and Willig to exclude common or shared costs from access pricing? One possibility is that the costs would be shifted to other users of the local exchange network. In that case, the IXCs would be free-riders on the common or shared facilities, surely an inefficient outcome. The consequences of such an approach would be that the pricing of interexchange services would not reflect the full cost of providing such service. Moreover, provision of access to IXCs below cost would discourage the provision of access facilities: IXCs would have little demand for such facilities because they could obtain subsidized facilities from the LECs.

66. Another possibility is that the LECs would have an incentive to supply access to IXCs only using dedicated facilities, so that regulation would not preclude cost recovery. Such an outcome also would be inefficient because all users of the local exchange network would miss the full benefits of economies of scope—that is, the avoidance of duplication that comes from sharing facilities, such as those between the end office and the tandem switch office.

67. Neither of these possibilities is particularly appealing. It should therefore be apparent that the cost of access to the local exchange for interexchange carriers must also include some payment for those facilities that are not explicitly dedicated to transport but are used in common with other traffic on the local network.

68. Perhaps Professors Baumol, Ordover, and Willig mean to exclude only the local loop from the cost of access, but to retain the cost of other common or shared facilities. Even in that case, however, they do not spell out how the loop will be paid for. As they well know, there is no such thing as a free local loop. Presumably, by the cost causation principle, because the local loop is a "dedicated facility," its full cost is paid by the final customer, much as one might rent customer premises equipment. The costs of the loop, however, are not fully paid for in flat rates for local service. Just as the configuration of the local exchange network was established to provide final services (such as access) rather than unbundled network elements, so also the pricing legacy is based on the pricing of final

services. Although it is true that some customers can purchase dedicated private lines, the option of basic local service continues to be available. Basic local service does not pay the costs of the local loop; rather, it is the services provided using that local loop, including access, that pay those costs.

69. Thus, the problem with the proposal to exclude local loop costs is that it occurs in apparent isolation from other regulatory proceedings, whether pricing of local service, universal service, or unbundling. The exclusion of local loop costs is part of an elaborate shell game in which the costs of the loop are passed along to the next regulatory hearing to be recovered in some as-yet unspecified fashion. This is not at all pricing based on cost causality. It is simply cost avoidance by the IXCs.

D. TELRIC Pricing Is Not Market Pricing

70. Professors Baumol, Ordover, and Willig observe: "By any measure, local exchange and exchange access markets are not competitive *today*, and thus, absent regulation, competitive access rates cannot be expected to result from any profit-maximizing, independent actions of the incumbent firms."[39] They do not, however, supply supporting evidence or reasoning for their assertion, despite their claim (perhaps merely a rhetorical flourish) that "any measure" will suffice to substantiate the proposition. They do provide a citation to the joint work of Professors Willig and B. Douglas Bernheim.[40] But the manuscript for the forthcoming Bernheim-Willig book does not support that proposition. Moreover, the cited manuscript is inconsistent with the assertions about technology that are made in the present affidavit. When discussing the technology of AT&T and other long-distance carriers, Professors Bernheim and Willig seem to recognize that common costs (which include nonattributable fixed costs) are present and substantial:

> Finally, lest one lose sight of the overarching issue, it is worth reiterating that, for an industry with substantial fixed costs, a proper test of competitiveness involves the calculation of *average* costs, including the costs associated with the amortization of fixed

39. *Id.* at 3-4 ¶ 6 (emphasis in original).

40. *Id.* at 3 ¶ 6 n.1 (citing B. DOUGLAS BERNHEIM & ROBERT D. WILLIG, THE SCOPE OF COMPETITION IN TELECOMMUNICATIONS (American Enterprise Institute working paper Oct. 25, 1996))

capital, rather than *marginal* costs.[41]

As a result, Professors Bernheim and Willig conclude that "it should be obvious that one cannot meaningfully test long distance against the relevant competitive benchmark through direct comparisons between prices and costs."[42]

71. What could be the impediment to such a comparison? Why is it that access charges have not generated any corresponding reduction in long-distance rates? The explanation according to Professors Bernheim and Willig is that, in their view, prices depend on *fixed costs*:

> However, if (as seems likely) fixed costs are rising through time, prices could well fall by less than the decline in access charges. We therefore disagree with those who see this comparison as a meaningful test of competition.[43]

Professor Willig's assertions appear to be inconsistent when comparing local and interexchange telecommunications. With respect to technology, we are asked to believe, without any supporting evidence or reasoning, that long-distance telecommunications has fixed costs but local exchange telecommunications does not. With respect to competition and pricing, we are asked to believe, again without support, that competitive prices in long-distance telecommunications reflect fixed costs while those in local do not (or perhaps should not).

72. Professors Baumol, Ordover, and Willig reiterate their contention that in local exchange telecommunications "the pool of joint and common costs that would be unrecovered from prices that are literally equal to TELRICs is most likely quite small."[44] We cannot agree. Our own analysis has demonstrated, for example, that GTE's joint and common costs are indeed a significant portion of the total costs of establishing and operating a local network.[45] Competitive prices reflect the costs that

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41. BERNHEIM & WILLIG, *supra* note 40, ch. 2, at 83 (emphasis in original)
42. *Id.*, ch. 2, at 84.
43. *Id.*
44. Baumol-Ordover-Willig Affidavit at 9 ¶ 18.
45. Michael J. Doane, J. Gregory Sidak & Daniel F. Spulber, An Empirical Analysis of the Efficient Component-Pricing Rule and Sections 251 and 252 of the Telecommunications Act of 1996, *appended to* Comments of GTE Service Corporation *in* Implementation of the Local Competition Provisions in the Telecommunications Act of 1996, Federal Communications Commission, CC Dkt. No. 96-98 (filed May 16, 1996).

companies operating in the industry actually incur. Thus, prices will reflect market-allowed coverage of attributable costs and joint and common costs. Because firms will not operate unless they can cover their costs, the assertion that TELRIC prices are competitive prices is erroneous.

II. THE MARKET-BASED APPROACH TO DEREGULATION VERSUS THE PRESCRIPTIVE APPROACH

A. The Failure to Recognize Actual and Potential Competition

73. Professors Baumol, Ordover, and Willig paint a bleak picture of competition in local exchange telecommunications: "Unfortunately, [facilities-based competition] seems unlikely to emerge as a significant feature of local competition for at least several years."[46] Moreover, they doubt the existence of UNE-based competition under the 1996 Act: "there is no reason to believe that UNE-based competition will emerge any time soon or that it will be sufficiently effective to constrain the ILECs' market power."[47] Even if they can enter, entrants are after all "new." How can they be expected to compete against the "old" LECs? "[I]n the states in which UNEs are in principle available at TELRIC-based rates, UNE-based competitors are in their nascency and there is no assurance that their offerings will be sufficiently acceptable to telecommunications customers to constrain incumbents competitively."[48]

74. That view of competition is wide of the mark. First, facilities-based competition is already in full swing across the nation. Second, UNE-based competition is underway as interconnection agreements that are being negotiated and completed lay the groundwork for the entry and expansion of competitors. Third, entrants such as AT&T, MCI, Sprint, and WorldCom are not "infants." To the contrary, they are large, well-established, experienced competitors. We review the evidence for each of these points briefly.

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46. Baumol-Ordover-Willig Affidavit at 7 ¶ 14.
47. *Id.* at 5 ¶ 9.
48. *Id.*

1. Facilities-based Competition

75. Facilities-based competition is not some distant prospect. Rather, many facilities-based competitors are already in operation, and many others have applied for and received certification for facilities-based entry. Also, the economic incentives for facilities-based entry are present and can be demonstrated empirically.[49] Moreover, many facilities-based entrants have publicly announced their capital investment plans, so that competition has moved beyond "potential" entry to "projected" entry. With *potential* entry, it is a matter of determining whether the economic incentives for entry are present and whether regulatory and technological barriers to entry are surmountable or not; the answers to these questions are then used to determine whether some as-yet unspecified firms will enter the marketplace. With *projected* entry, the identity and plans of competitive entrants are observable, so that the extent of entry is far from speculative.

76. For example, according to Professor Richard Schmalensee and Dr. William Taylor, by the first quarter of 1995, high capacity service losses were 39 percent in Philadelphia, 35 percent in Pittsburgh, 32 percent in Washington, D.C., 27 percent in Baltimore, 39 percent in Los Angeles, 37 percent in San Francisco, 50 percent in New York City, and 37 percent in Baltimore.[50] These numbers indicate the significant inroads into LEC markets by facilities-based entrants and serve to refute claims

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49. Facilities-based entry is a substitute for the purchase of wholesale services or UNEs. Therefore, if the state PUCs set uncompensatory prices for the mandatory sale of those forms of unbundled network access, they will raise the relative price of facilities-based entry and thus suppress demand for it. (The same would be true if the pricing recommendations of the *First Report and Order* were imposed on incumbent LECs as the *quid pro quo* for being allowed to price interstate access under the Commission's proposed market approach.) In the opposite direction one might argue that the facilities-based entry that had been observed to date in local markets is an artifact of high regulated rates in certain market segments. A significant distinction can be drawn, however, between the two cases of regulatory distortion of the decision to undertake facilities-based entry, even if one ignores differences in the reliability and bandwidth by which entrants have distinguished their services from those of incumbent LECs. In the case of facilities-based entry that has already occurred (principally in the form of competitive access providers), long-lived fiber networks have been installed that will remain intact even if a given CAP subsequently exits the market. Its darkened fiber could be relit, and thus the "overhang" of that capacity permanently constrains the pricing of the incumbent LEC. The point is analogous to the argument, noted by the Commission, that an RBOC cannot engage in predation in interLATA markets because, even if it could drive AT&T, MCI, Sprint, or WorldCom from the market, that carrier's fiber capacity would remain intact. *See* Implementation of the Non-Accounting Safeguards of Sections 271 and 272 of the Communications Act of 1934, as amended; and Regulatory Treatment of LEC Provision of Interexchange Services Originating in the LEC's Local Exchange Area, Notice of Proposed Rulemaking, CC Dkt. No. 96-149, ¶ 137 (released July 18, 1996) (citing Daniel F. Spulber, *Deregulating Telecommunications*, 12 YALE J. ON REG. 25, 60 (1995)).

50. Richard Schmalensee & William E. Taylor, Economic Aspects of Access Reform 37 (Jan. 29, 1997), *attached to* Comments of United States Telephone Association.