RAILROAD DEREGULATION

Using Competition as a Guide

Robert D. Willig and William J. Baumol

THE PERFORMANCE of the railroad industry since 1980 provides a vivid illustration of the benefits of regulatory reform. Productivity has leaped upward, rail rates have fallen somewhat in real terms, and the 50-year decline in the railroads' share of traffic has finally come to an end. Returns to capital have risen and investment has responded, arresting the deterioration in railroad capital and service quality. This has been made possible by eliminating many of the destructive regulations that controlled the railroad industry during this century and by reforming the regulations that remain.

The goal of the new regulatory system is to promote competition where it is present and to simulate competition where it is absent. Rail rates, for example, are no longer regulated unless there is evidence of market power on the part of a carrier. In such cases, rates are regulated under a system known as "constrained market pricing," which attempts to duplicate the outcomes of competitive markets. While the curtailment and reform of rail regulation are by no means complete, the accomplishments to date are truly remarkable.

The history of rail regulation contains important lessons for the regulation of other industries. The old regulatory system failed to handle the central regulatory problem arising in railroads and certain other major industries: the mixture of competition and monopoly elements in supply. The new regulatory system is a creative solution to this problem and provides a valuable model for regulatory reform in such industries as telecommunications, electric power, postal services, and gas pipelines.

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The Regulatory Problem

To appreciate the failings of the old regulatory system and the merits of the new one, it is worthwhile reviewing some of the structural features of the railroad industry and the associated dimensions of the regulatory problem. Certain characteristics of the industry make it a natural target for government intervention, yet also render it particularly difficult to regulate in the public interest.

First of all, there are substantial economies of scale in the provision of some rail services, whether particular routes or types of freight, which result from the heavy fixed costs associated with rail operations. To transport even small amounts of freight, a railroad must generally incur the costs of track, right-of-way, locomotive power, and certain facilities—costs that do not rise proportionately with traffic volume. In such cases, fixed costs per ton of freight fall as traffic volume increases, and rail services are

most economically supplied by a single carrier. Some rail services, in other words, are natural monopolies, and supply by two or more rail carriers involves an unnecessary increase in the resources employed in the transport process.

While scale economies go hand-in-hand with natural monopoly, a railroad may or may not have price-setting discretion such as characterizes the textbook monopolist. It all depends on whether the natural monopoly activities are shielded from competition by barriers to entry. In the railroad industry, extensive capital sums must be sunk in way and structures and in a variety of ancillary facilities in order to create new rail lines. These sunk costs generally suffice to deter the entry of new rail lines. While rival products and rival sources of supply (including trucks, barges, and alternative rail routes) impose effective competitive constraints upon many, if not most, rail activities, there remain cases where competition is weak. The resulting monopoly power is the basic justification for regulation of rail rates and earnings, and defines the basic task with which regulation must grapple.

Another pertinent feature of the railroad industry is that there are substantial economies of scope which result from the common costs of rail operations. Outlays on rails, ties, rights-of-way, yard facilities, locomotion, and train crews are among the many common costs of rail operations incurred in carrying a variety of types of freight between a variety of origins and destinations. These costs confer economies of scope on carriers offering a multiplicity of transportation services: a carrier that provides an array of services can do so at a lower total cost than a set of carriers producing each service separately.

The presence of substantial economies of scale and scope in the railroad industry creates a number of problems for government regulation. Perhaps the most troubling is the fact that it is impossible to allocate, in any nonarbitrary way, a share of fixed and common costs to any one of a railroad's many activities. There is simply no way to subdivide those costs in a mechanical fashion that is unique and has any foundation in economic logic. (The significance of this problem is shown by the fact that more than one-third of total railroad costs are fixed and common, according to ICC estimates.) In addition, if the regulator attempts to force rates to equal marginal cost, overall revenues will fall short of overall costs. For rail systems that are characterized by scale economies, rates must generally lie above the costs economically attributable to individual services if revenues are to cover total costs.

The prevalence of common costs and the financial infeasibility of marginal-cost pricing rule out any sensible mechanical or formula-based procedure for regulatory determination of rail rates. In particular, compensatory rates cannot be determined by the regulator on the basis of cost data alone since the financial viability of any price depends also on the quantity of rail services customers are willing to buy at that price. Rational determination of prices must be based on both cost and demand conditions. But that, in turn, precludes the use of a price-setting formula since no formula can possibly capture the subtleties of demand behavior. Demand varies from one prospective customer to another and among services; demands for various services respond differently to changes in market and general economic conditions.

Another pertinent feature of the railroad industry is that the supply of some services involves elements of monopoly power while the supply of other services is subject to strong competitive pressures. This creates real problems for government regulation since, in the presence of economies of scope, it can be highly inefficient to separate the competitive and monopolistic services and have them provided by different suppliers. Yet it is important to avoid regulating the services over which a supplier has monopoly power in such a way as to interfere with the efficient supply of competitive services. It is also important to avoid inducing anticompetitive behavior in the supply of the competitive services, such as cross-subsidies which permit underpricing of the competitive services at the expense of the customers of the other services.

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Finally, the efficient supply of most rail services requires cooperative behavior on the part of many firms. Rail transportation generally involves interline service, with individual shipments traversing the tracks of more than one railroad. Similarly, more than one railroad is of-

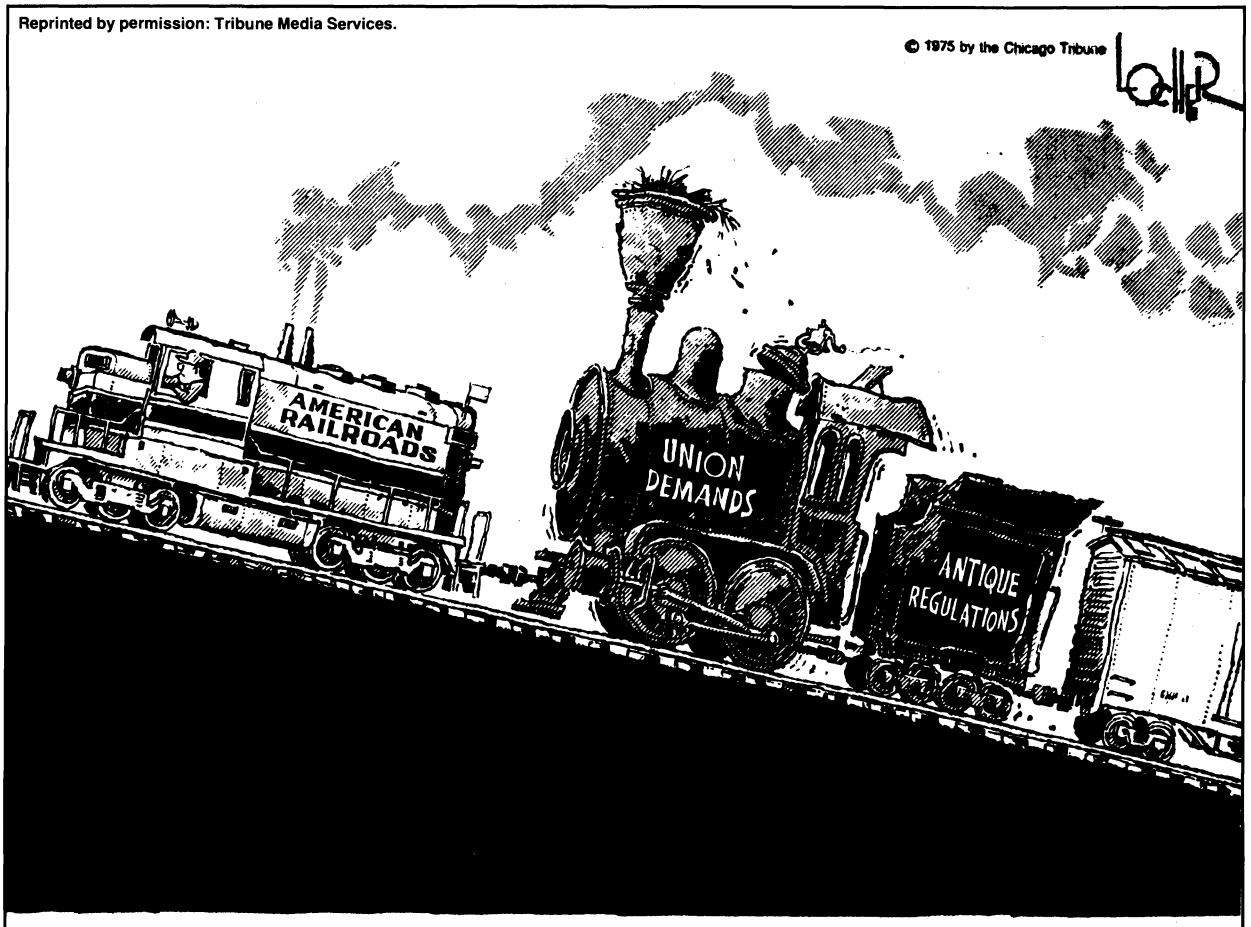
ten involved in reloading and employing empty cars returning from deliveries. Other efficient cooperative arrangements involve the use of terminal, switching, and yard facilities. The challenge is to determine when it is appropriate to regulate cooperative relationships. Should railroads be free to negotiate agreements over responsibilities and the division of revenues? What if a railroad owns facilities that are indispensable for moving certain shipments?

Regulation Before Reform

Confronted with these difficulties, the Congress and the ICC established a regulatory regime that was poorly suited to promote the public interest. Rail regulation undermined competition through protectionist rules, froze rail business into inefficient and out-dated patterns, interfered with and delayed private decisions, and, ironically, virtually precluded the financial viability of railroads.

The ICC once described its own role as that of "a giant handicapper," making certain that no one transport mode or enterprise—whether a railroad, a truck, or a barge—undertook activities or set terms for those activities which threatened the existence of any other enterprise or mode. Such protections were extended even to inefficient suppliers that could continue to operate in a market only with government protection and only at significant social cost.

The commission protected rival transport modes from price competition by setting inflated floors below which individual rates were not permitted to fall. These floors were determined by an arbitrary procedure, referred to as "fully allocated costs." Each type of traffic was assigned the costs it was calculated to incur directly, plus a portion (determined by an accounting rule of thumb) of the common costs incurred by the carrier in moving that and other traffic. Since the rate for each movement had to cover its fully allocated cost and were not permitted to fall flexibly to the level of the marginal resource cost of



Deadheading!

supply, rail carriers were often precluded from competing for traffic by undercutting less efficient transport modes even when they had a real cost advantage.

Railroads were not only prevented from full and free competition with trucks and barges, they were also severely limited by regulation in their ability to compete with one another. Rate bureaus and "rate equalization" rules required that every railroad charge the same fee for the movement of a particular commodity between a given origin and destination. Rebates and discounts to particular customers were prohibited, as were all contracts between railroads and individual shippers involving negotiated rates, quantities to be transported, service quality, and the like. When two or more railroads engaged in complementary or cooperative activities, the terms on which these activities could be carried out were regulated in detail; for all practical purposes, those terms, once set, were completely inflexible. If traffic traversed the tracks of two different railroads, ICC rules determined the division of revenue between those railroads. If a railroad used cars belonging to another railroad, ICC rules specified both the operating conditions (e.g., the period of time by which cars were to be returned to their owners) and the rates that could be charged. (For more on the "car-hire" rules, see Christopher Barnekov, "The Track Record," in this issue.)

The old regulatory regime also undermined profitability and efficiency. The railroads were generally unable to abandon services—even services with such limited demand that there was no prospect of profitable operation. The long and costly process for changing rates and service diminished the returns to innovation and increased its risks. And the ceilings on allowable rates generally precluded the railroads from covering costs, including the cost of capital. When fully allocated costs were finally abandoned as rate floors, they were reincarnated as price ceilings, with even more damaging effects: while market forces were constraining some traffic to earn less than its fully allocated cost, regulation was preventing any traffic from earning more than its fully allocated cost. This system of maximum rate regulation also attenuated rewards for successful productivity enhancement and marketing programs. An improvement in productivity, for example, which decreased costs, led to a commensurate reduction in fully allocated cost ceilings; a rise in traffic volume, which allowed fixed costs to be spread over more shipments, depressed allowable rates.

In addition, the maximum allowable rates failed to reflect the railroads' true cost of capital, and thus failed to provide the railroads with the opportunity to earn a normal rate of return on investments. Physical and financial assets were not evaluated at replacement cost or current market prices—their opportunity costs—but at the prices at which they were originally acquired, even decades earlier.

The Social Costs

The social costs of the old regulatory regime were enormous. Too many resources were devoted to transportation and those resources were misallocated among transport modes.

A number of studies have established the unnecessarily high cost of freight movements. Various studies estimated, for example, that between 1950 and 1980 more than a billion dollars a year was wasted in transporting freight by truck rather than by rail. Another billion dollars a year was wasted in transporting freight on rail routes that were too long or were utilized with too little traffic density. There were miles of unprofitable lines and the railroads were generally precluded from using price and marketing incentives to induce an efficient pattern of interline movements. Another $1.5 billion a year or more (in 1977 dollars) was wasted on unnecessary mileage traversed by empty cars, unnecessary demurrage-time between car unloadings and loadings, and circuitous loaded routings. Finally, there were the inefficiencies stemming from the weakening of the railroads' incentive and ability to innovate in marketing and in deploying new technology. "Big John" hopper cars and "unit" coal trains were just two of the cost-saving innovations that were delayed by the legal and regulatory maneuvering initiated by transport rivals.

The other major social cost of the old regulatory regime was the deterioration of the nation's rail network. During the 1970s, the Penn Central and many other railroads fell into bankruptcy. By the end of the decade, only 30 percent of the nation's freight moved on railroads that were financially viable, or nearly so. This was the predictable result of government regulations that prevented railroads from earning adequate revenues: most observers agree that the U.S. railroads failed to earn the opportunity cost of their

capital since World War II. With returns held below the opportunity cost of capital, investors were discouraged—if not deterred completely—from providing additional resources to the railroads. And rail management had every reason to withdraw capital from the industry as rapidly as practicable. Replacement and maintenance outlays were held to a minimum and expansion was all but ruled out. It has been estimated that by the late 1970s the industry had deferred or postponed approximately $15 billion of expenditures on maintenance of track.

Inadequacy of rail returns was ensured by regulation in a variety of ways. By delaying and deterring abandonment of unprofitable services, ICC rules afflicted the railroads with a permanent drain on their resources. At the same time, they did nothing to ensure that the railroads would be allowed to profit from potentially compensatory services. The ICC judged requests for rate increases by means which took into account neither the financial condition of the railroad nor the demand for its services. Instead, it relied on measures of "variable costs" and fully allocated costs based on historical averages of various components of accounting costs. The use of original cost valuation of assets for this and other purposes prevented the railroads from earning the current opportunity cost of capital, and thus discouraged them from accumulating depreciation reserves with which to finance replacement of assets. Even when rate increases were allowed in response to inflation, these increases had to be equiproportionate for all services regardless of differences in costs or the sensitivity of demands to prices.

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There were also the rules governing the division of revenues among carriers, which were arbitrary and rigid and condemned some carriers to below market returns. The regulations that protected truck and rail carriers from losing traffic to one another also prevented them from expanding their traffic and profiting from their relative efficiencies. The costs of inefficient car movements were borne, without adequate compensation, by carriers that terminated more interline freight traffic than they originated.

The price ceilings and floors caused some rail services to be priced too high—above what would prevail in a competitive market—and some to be priced too low. While the railroads could sell all the services they offered at prices that were too low, they predictably faced a shortfall of demand for the high-priced services. The inevitable result was a shortfall in revenues. The losses being sustained throughout the industry were exacerbated and the deterioration of rail plant and service was virtually guaranteed.

The rash of railroad bankruptcies in the 1970s was the death knell of the old regulatory system. It dramatized the possibility that rail service would disappear if it continued to be encumbered by ill-conceived government policies.

The New Regulatory System

Under the Railroad Revitalization and Regulatory Reform ("4-R") Act of 1976, the Staggers Rail Act of 1980, and the various ICC decisions subsequent to them, many significant components of the railroad industry have been deregulated. The remaining regulation is generally far better designed to promote the public interest.

Under the ICC's interpretation of the newly reigning statutes, two basic principles guide the reform of railroad regulation. The first is that the competitive market should serve as the model for regulation. Regulatory restraints are to be imposed or continued only where market forces are insufficient to enforce competitive behavior. In such cases, regulation should be used as a substitute for the forces of the market—to induce suppliers to behave as if competition had guided their actions. The second guiding principle is that regulatory impediments to adequate revenues should be eliminated. This does not mean that profitability will or should be guaranteed, only that carriers should be offered the opportunity to obtain competitive earnings.

In accord with these principles, a series of regulatory constraints have been eased, including the abandonment standards and division-of-revenue rules. Others, such as the prohibition on contracts and the regulation of rates for services facing effective competition, have been eliminated. Under the rules now in effect, rail rates are regulated only if there is evidence of market power on the part of a carrier. Rates set through contracts are unregulated.

Constrained Market Pricing

Where activities are deemed insufficiently competitive to justify full deregulation—in the ICC's parlance, where "market dominance" occurs—rates continue to be regulated, but in a manner entirely different from that of the past. Under ICC regulations adopted in 1985, rate ceilings are designed to ensure that consumers (shippers) pay no more for a service than if the service were supplied competitively. Rate floors are designed to prevent cross-subsidies by reflecting the same economic incremental costs that would set the floors on competitive rates. In between these floors and ceilings, railroads are generally free to select their own rates based on their assessment of market demand.

This rate setting arrangement, which the ICC calls "constrained market pricing," is the centerpiece of the new regulatory regime. It was adopted in a remarkable decision in which the commission showed a clear understanding of the fact that railroad pricing is complicated by economies of scope and scale. In its rulemaking decision, the ICC stated:

> Any means of allocating . . . costs among shippers other than actual market demand is arbitrary and may not permit a carrier to cover all of its costs. This is because non-demand-based cost apportionment methods do not necessarily reflect the carrier's ability (or inability) to impose the assigned allocations and cover its costs.

The commission went on to note that "Ramsey pricing" (which takes into account both marginal cost and elasticity of demand for each shipment) is desirable as a general guide, but impractical in day-to-day regulation given its heavy data requirements. The commission instead established the system of constrained market pricing.

The critical issue from the standpoint of efficiency is the criterion used to set the ceiling on rates where there is market dominance. The criterion established by the commission is *stand-alone cost*. As stated by the ICC:

> A rate level calculated by the stand-alone cost methodology represents the theoretical maximum rate that a railroad could levy on shippers without substantial diversion of traffic to a hypothetical competing service. It is, in other words, a simulated competitive price.

Under the stand-alone cost test, a shipper has a legitimate complaint of being overcharged for services if and only if he can find a group of shippers of any products carried by the railroad such that the amount they pay, plus the amount he pays, exceeds what they would have to pay to an efficient entrant specializing in providing those services with no barriers to entry. Stated another way, a subset of the prices charged by a railroad violates the stand-alone cost ceiling if any group of shippers who pay those prices could be served at lower cost by a hypothetical entrant specializing in providing the services purchased by the group.

The theory behind the stand-alone cost test, as the ICC acknowledges, is that of "contestable markets." The notion is that even a monopoly or oligopoly will behave efficiently if there is a strong enough threat of losing some or all of its market to new entrants. *Potential* competition precludes monopoly pricing in contestable markets. The stand-alone cost test, properly applied, guarantees consumers all the protection they would receive in markets subject to perfect freedom of entry and exit and the competitive pressures that entails. In such markets, the price of a product lies somewhere between its incremental and its stand-alone cost; just where it falls in that range depends on the state of demand. Thus, for regulatory purposes, stand-alone cost constitutes the proper cost-based ceiling for prices. Both cross-subsidies and the exercise of monopoly power are prevented.

To see why this is so, consider a firm that supplies two services, S and T. Suppose each service costs $100 a year to supply (including the required return to capital) and there are no common costs. Effective competition, whether actual or potential, would ensure revenues from each service amounted to $100 a year. Higher revenues would attract new suppliers, thus leading to lower prices, while lower revenues would drive the supplier out of business.

Now suppose instead that some of the total cost of producing the two services is fixed and common, say $40, while the balance is variable, with $80 attributable to S and $80 to T. If, because of demand conditions, only $80 or very close to it can be garnered from consumers on the sale of S, then a firm operating and surviving in a market with perfect freedom of entry can earn no more than $120 on the sale of T. These prices lie between the incremental costs ($80) and stand-alone costs ($120 = $80 + $40) of each service, ensuring that the firm covers its costs while attracting no entrants; they are mutually advantageous to consumers of both services. Should the firm attempt to raise revenues on T above the stand-alone cost of $120, it would lose business to competitors willing to charge less.

As revealed here, the forces of idealized potential competition in markets with perfect freedom of entry enforce cost constraints on prices, and yet prices remain sensitive to demand. Actual and potential competition are effective if they constrain rates in this way, and in such circumstances regulatory intervention is completely unwarranted.

Where competition is not effective, there is likely to be a proper role for regulation. Under the guidelines provided by competitive and contestable markets, prices should be constrained to lie between incremental and stand-alone costs. This is the key element of the constrained market pricing approach adopted by the ICC.

The latitude permitted by the constrained market pricing rules should make a major contribution to rail performance. Railroads now have the incentive to increase productivity, cut costs, attract new traffic and develop innovative marketing approaches. Each such action contributes to a railroad's earnings (so long as total earnings do not exceed a competitive level) and generally contributes to the public welfare.

Beyond establishing constrained market pricing as the rate setting arrangement and stand-alone cost as the ceiling on rates, the ICC has taken a number of other commendable steps to flesh out the new system. It has established short-run incremental cost as the price floor, rejecting all other price floor criteria. It has exempted from rate regulation several categories of freight, including fruit and vegetables and all boxcar traffic, because they are clearly subject to effective competition from trucks. It has also ruled that the adequacy of revenues will be judged in terms of a current-cost-of-capital standard based on return to investment financed by both debt and equity. (The details of this standard relating to the choice between replacement cost and historic cost are still under debate, but the interim decisions have brought significant progress toward the competitive standard.)

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Improved Railroad Performance

Since the regulatory revolution of the 1980s, the financial condition and the overall performance of U.S. railroads have improved considerably, as documented in the accompanying article by Barnekov. During the four years immediately following the passage of the Staggers Act, the average return on railroad net depreciated invest-

ment was just over 4 percent. Although this is far short of the cost of capital during the period (which was in the neighborhood of 16 percent), it is more than twice the rate that prevailed in the four years immediately preceding the act. No doubt fueled by this improvement in returns, between 1981 and 1985, railroads spent a total of $27 billion on railroad structures, roadway, and maintenance of way, and another $30 billion on rail cars, locomotives, and other equipment.

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A driving force behind the improved financial condition of railroads is increased productivity. Between 1980 and 1985, annual railroad operating expenses dropped some $9 billion (26 percent) in real terms, while traffic volume remained virtually unchanged. Rail rate increases have slowed considerably and are no longer outstripping the overall rate of inflation. The average rail rate, measured in constant dollars, has actually declined somewhat.

There have also been some significant and socially beneficial adjustments in relative prices. Nominal coal rates, for example, rose a cumulative 27 percent between 1980 and 1985, while rates for movements of grain and other farm products fell 26 percent, with the result that the railroads carried an increased share of these latter commodities. In contrast, in the period before 1980, all prices moved in virtual lock step.

Regulatory reform has also allowed the railroads to respond to variations in total demand. Whereas during the five years before the Staggers Act, the volume of railroad traffic was closely correlated with the volume of industrial production, there was no statistically significant correlation during the next five years. Marketing measures are now being undertaken to stabilize volume and capacity utilization, and thereby improve the dynamic efficiency of rail operations.

The new regulatory regime has produced a renaissance of the railroads in terms of their physical condition, their market orientation, and their ability to serve the freight transportation needs and demands of the public. More than 50,000 contracts have been arranged between shippers and railroads to tailor service and rate schedules to individual needs, while encouraging investment in facilities. Innovative intermodal services have been introduced, and research and development in equipment and network configuration has blossomed. Since the rail carriage of containers and truck trailers was deregulated (in 1981), this line of business has grown by more than 50 percent, and now represents the largest source of carloading apart from coal. Traffic flows have been reconfigured, and all forms of railroad capital are being better utilized. Increasingly, a railroad's commercial success is determined by its skill in marketing and operations rather than its skill in manipulating regulation.

We believe that further deregulation of the railroad industry would result in even greater public benefits. Constructive proposals—some of which are receiving consideration by the ICC—include deregulating relations between carriers except in cases where there is evidence of anticompetitive or predatory behavior, and deregulating railroads' negotiations over the division of revenues from freight that traverses the tracks of two or more carriers. The rationale for these measures is that it is the price charged to shippers for an entire journey—not the way revenues are apportioned among carriers—that affects consumer welfare. In addition, competitive market forces should be permitted to operate in determining the deployment of railroad cars. By eliminating unwarranted restrictions on rail operations, these changes would make an important contribution to rail performance.

Extending the Lessons of Rail Regulation

The rail regulation experience contains some important lessons for other industries. The telecommunications, electricity, gas pipeline, and postal-service industries all contain a mixture of monopoly and competition, and share many of the other attributes of the railroad industry that make regulation in the public interest difficult. In these industries, just as in the railroad industry over the years, regulation has stifled competition in the provision of services, restricted the benefits of economies of scope, retarded innovation, fostered inefficient service, and thereby harmed the general public. It seems time to apply the lessons of the railroad industry by extending the benefits of deregulation and constrained market pricing to other regulated industries. □

The article lauds current regulatory scheme, but the evidence it cites suggests that deregulation is the reason for the benefits not the "stand-alone cost" scheme.