Analyzing the Competitive Effects of Mergers: Is There Anything Special about Railroads

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ANALYZING THE COMPETITIVE EFFECTS OF MERGERS: IS THERE ANYTHING SPECIAL ABOUT RAILROADS?

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I. INTRODUCTION

Empirical evidence demonstrates that mergers, on average, create value for shareholders of the merging firms.[1] The relevant question from an antitrust perspective, however, is the source of these gains. Increased efficiency is one possibility. It is also possible that in some cases merger gains derive not from enhanced efficiency, but rather from an enhanced ability to realize "monopoly profits."

To determine whether a proposed merger is likely to be pro- or anti-competitive, economists often follow the approach outlined in the United States Justice Department's *Merger Guidelines* and ask whether the merger seems likely to facilitate (express or tacit) collusion.[2] Thus, economists are concerned primarily with horizontal mergers—mergers between firms in the same industry—and only when the relevant market is highly concentrated and entry of new firms is difficult.

> When only a few firms in a market into which entry is difficult account for most of the sales of a product, they may either explicitly or implicitly coordinate their actions to eliminate rivalry on price and non-price variables. . . . Therefore, a merger that would eliminate a significant competitor in an already highly concentrated market into which entry is difficult may

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enhance the ability of the remaining firms to exercise market power.[3]

In reviewing the competitive effects of the proposed sale of Conrail to Norfolk Southern, the Justice Department took the position that the standards it uses to analyze mergers under the Clayton Act[4] are "substantially the same" as the standards used by the Interstate Commerce Commission (ICC) in analyzing railroad mergers coming before that body.[5] This paper is not a critical review of the Justice Department's economic analysis of the recently abandoned transaction between Conrail and Norfolk Southern, nor is it a legal analysis of the Justice Department's position that its standards are those of the ICC. The subjects of this paper are more general. First, we explain in more detail the conventional economic analysis of the competitive effects of mergers and how that analysis should be applied in the railroad industry. Defining the relevant market receives special emphasis. Second, we consider whether there is anything extraordinary about the railroad industry that renders the conventional analysis incomplete or inappropriate.

II.   Defining the Relevant Market in Railroad Mergers

To determine whether a merger is likely to reduce competition significantly, economists and the courts usually begin by defining a relevant market or markets. This frequently is the most significant issue in the entire analysis, since a given horizontal (or, in the railroad context, parallel) merger can appear troubling or innocuous depending whether the relevant market is defined narrowly or broadly.

As discussed in the *Merger Guidelines*, an economically meaningful market is one that could be subject to the exercise of market power—the ability to raise price and thereby restrict output below the competitive level. To determine whether a proposed definition of the market is economically meaningful, the *Guidelines* suggest the following conceptual experiment: Suppose all firms in the proposed market were able to collude perfectly and attempted to raise price. Would their hypothetical collusion be successful, or would consumers switch to other products, or would firms now supplying other products quickly convert their facilities and begin production of the product in question, or would firms from other areas begin selling in the geographic area in question? If any of

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[3] Letter from J. Paul McGrath to Elizabeth H. Dole 2 (Jan. 29, 1985) (concerning the proposed sale of Conrail to Norfolk Southern) [hereinafter cited as *McGrath Letter*].

[4] 15 U.S.C. §§ 12 et seq. (1976).

[5] *McGrath Letter*, *supra* note 3, at 2 n.2.

these responses would occur significantly, the proposed market is defined too narrowly.[6]

A. *Intermodal Competition and the Relevant Product Market*

The central question in defining the relevant product market for railroading is the proper treatment of intermodal competition—competition from transportation alternatives such as trucks, pipelines and barges. Without question, there is substantial railroad traffic that would shift to other modes if the relevant price of rail transportation rose. Equally certain, however, there is other traffic, such as coal en route to electric utilities, that is effectively "locked in" to rail transportation.[7]

In a market in which all customers paid the same price for service, the proper antitrust treatment of intermodal competition would depend on the relative sizes of the two types of traffic and each type's elasticity of demand for rail services. That is, we know from economic theory that when all customers pay the same price, the elasticity of aggregate demand for any product or service is a weighted average of the demand elasticities of individual consumer groups, where the weights are determined by each group's share of total consumption. Therefore, if most rail traffic is easily divertible to other modes, and if all traffic paid the same rates, then the aggregate demand for rail services would be highly elastic and economics would dictate including intermodal competition in the relevant market.[8]

In reality, however, different shippers pay different rates for reasons unrelated (or at least not completely related) to differences in cost. Put differently, the ratio of revenue to variable cost varies considerably across types of traffic. Economists call this phenomenon price discrimination.

Price discrimination in the railroad industry may constitute a relatively efficient method of covering fixed costs in an industry with large economies of scale; scale economies in railroading will be discussed in more detail in Part III below. The important point here, however, is that whenever price discrimination is feasible, there is basis for defining relevant markets more narrowly than when all customers pay the same price.[9] It may not matter to customer A if two formerly competing

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[6] *Merger Guidelines, supra* note 2, at 3-5.

[7] *See, e.g.,* Friedlander & Spady, *A Derived Demand Function for Freight Transportation,* 62 REV. ECON. STAT. 432 (1980); Devin, *Allocation in Surface Freight Transportation: Does Rate Regulation Matter?,* 9 BELL J. ECON. 18 (1979); Winston, *A Disaggregate Model of the Demand for Intercity Freight Transportation,* 49 ECONOMETRICA 981 (1981).

[8] On the relationship between elasticity of demand, market power and definition of the relevant market, see Landes & Posner, *Market Power in Antitrust Cases,* 94 HARV. L. REV. 937 (1981).

[9] *See, e.g., Merger Guidelines, supra* note 2, at 9.

railroads become one because A may be protected by truck competition. But customer B may lack this intermodal option and therefore B's transportation costs may rise sharply as a result of such a merger.

In sum, even though there is significant intermodal competition in the railroad industry, because price discrimination is demonstrably feasible, there is basis for treating railroads alone as a relevant product market.

B.   *The Relevant Geographic Market*

At one time, analysts of railroad mergers viewed relevant geographic markets in terms of city-pairs or "corridors." It was felt that in the railroad industry:

> [t]he product bought by consumers, and hence the market as well, must be defined as the transportation between two specific geographical points. Assuming a concern only with the nature of competition between carriers of the same type, the sellers for a particular rail transportation market are the railroads connecting any given pair of cities.[10]

This city-pair or corridor focus never made much economic sense and analysts accustomed to analyzing mergers in other industries have now abandoned this approach. For example, in identifying potentially troublesome markets in connection with the sale of Conrail to Norfolk Southern, the Justice Department defined geographic markets in terms of individual points.[11] That is, the Justice Department examined rail shipments into and out of individual counties rather than focusing on shipments between pairs of points.

The fallacy in the city-pair or corridor approach is easily explained. Consider Figure 1 in which railroads 1 and 2 are the only rail connections between points A and B. Even if these two railroads merge, thereby creating a rail "monopoly" in the corridor between A and B, shippers and consumers in A and B may be relatively unaffected. As shown in the figure, they may still have opportunities to transport goods to or from points such as C, D, E, and F using other railroads. The relevant economic question with respect to shippers and consumers at points A and B is the number of effective rail outlets still available after the merger. Focusing exclusively on the rail options between city-pairs can easily lead to incorrect conclusions.

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[10] J. Meyer, M. Peck, J. Stenason & C. Swick, THE ECONOMICS OF COMPETITION IN THE TRANSPORTATION INDUSTRIES 205 (1960).

[11] In most cases, counties were selected as the defined geographic market. *McGrath Letter, supra* note 3, at 3-6.
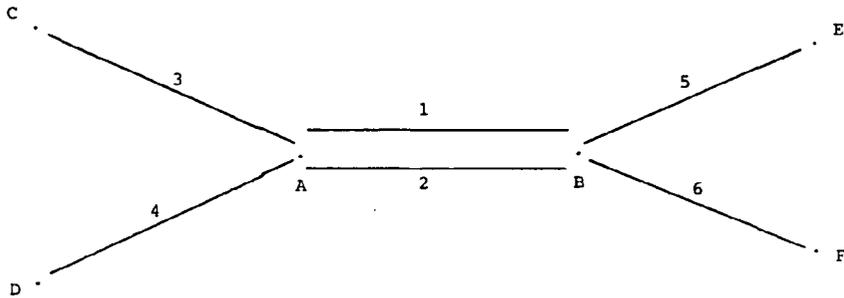
Figure 1
Rail Outlets At Points A and B

The discussion above of the relevant product and geographic markets in railroading is meant to be suggestive of the proper approach. It is not designed as a complete prescription, and it is important to emphasize that the analysis of a railroad merger (or, for that matter, any merger) should not be overly mechanical. For example, suppose product X can be shipped economically only by rail; railroads 1 and 2 are the only railroads delivering X to point A; and the two railroads merge. On the surface, such a merger appears troubling from an antitrust perspective.

Suppose, however, that customers in A have the ability to buy X produced locally. Or suppose customers in A can substitute another product Y which is shipped by truck. Or suppose customers in A can escape the apparent rail bottleneck by using an intermodal alternative to short-haul X from the lines of another railroad. An overly mechanical approach to analyzing railroad mergers may miss these more subtle substitution possibilities, each of which reduces the likelihood that the merger will have significant anticompetitive effects.

III. ARE RAILROADS DIFFERENT?

Railroad executives and lawyers generally resist the proposition that railroading is just another industry that can be analyzed using the same methods appropriate, for example, to a manufacturing industry or retailing. In making the case for special treatment, two features of the industry tend to be emphasized. First, it is said that railroads are unlike other industries because railroading is subject to large economies of scale (or, more accurately, density). This, it is suggested, can make rail consolidations desirable even though, in the short run, there may be some loss of competition. The argument is that, but for the consolidations, railroads may be reluctant to invest in track and equipment for fear that "destructive competition" will prevent them from earning a normal return on investment. Section A evaluates this argument.

The second argument for special treatment of railroad mergers empha-
sizes the fact that the railroad system in the United States is a network
of independent firms in which much traffic is handled by more than one
railroad. This, it is suggested, means that in railroading there is the
possibility of anticompetitive effects arising from vertical (end-to-end) as
well as horizontal (parallel) mergers. The argument is that railroads
have an incentive to maximize the length of haul which is unrelated to
efficiency. Therefore, the argument goes, following an end-to-end merger,
the enlarged railroad may refuse to interchange traffic with independent
connecting railroads even if the traffic could be moved at lower cost over
the independent railroad. Section B considers this argument about
inefficient "diversions."

A.   *"Destructive Competition"*[12]

Recent economic studies of cost conditions in the railroad industry
indicate that railroading is characterized by economies of (or increasing
returns to) density.[13] That is, holding constant track miles and the
quality of track, an increase in traffic results in a less than proportionate
increase in total costs. Put differently, marginal cost in the railroad
industry is less than average total cost, where average total cost includes
a normal return on investment in fixed capital.

In any industry where firms operate in a region of increasing returns
to scale, there is an economic conundrum. To encourage efficient use of
existing facilities, it is desirable that price equal marginal cost. Consum-
ers determine their level of purchases by determining at what point the
marginal value of additional purchases just equals the price they have to
pay. Thus, when price equals marginal cost, the value of the last unit to
consumers just equals the additional cost required to produce it and
output (or utilization) is at the economically efficient level. A price
greater than marginal cost results in too little output; a price below
marginal cost results in too much output.

The conundrum is that when firms operate in a region of increasing
returns to scale, marginal cost is less than average total cost. Conse-
quently, if the price of all units equals marginal cost, the firms will not
cover average total costs. In the short run this "revenue inadequacy" is
insignificant from the perspective of the overall economy. The problem,
however, arises in the long run: If firms anticipate being unable to cover

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[12] This section has benefited especially from conversations with Professor Dennis
Carlton, of the University of Chicago and Lexecon, who has analyzed the proposed merger
between the Santa Fe and the Southern Pacific. *See* Verified Rebuttal Statement of Dennis
W. Carlton, *Santa Fe Southern Pacific Corp.—Control—Southern Pacific Transp. Co.—
Merger—Atchison Topeka & Santa Fe Transp. Co.*, DRGW-33 (May 29, 1985).

[13] *See, e.g,* Braeutigam, Daughtey & Turnquist, *A Firm Specific Analysis of Economics
of Density in the U.S. Railroad Industry*, 33 J. IND. ECON. 3 (1984).

average total costs, they will be reluctant to make new investments—investments that may have a value to consumers greater than the investment required. Thus, when marginal cost is less than average total cost, tensions may arise between short run and long run efficiency.

In the absence of competition, there are well known ways out of this conundrum. The best solution is some form of two-part pricing. For example, customers may pay a lump-sum or access fee designed to cover fixed costs and then pay a price equal to marginal cost of each unit of production or service purchased. Two-part pricing preserves investment incentives yet also creates the proper incentives to utilize existing facilities. A second-best solution is some form of "Ramsey" or "value of service" pricing, in which all customers pay a price somewhat in excess of marginal cost, with the most price-inelastic customers facing the highest mark-up.[14]

Generally, when there are economies of scale over all or most of the range of output in a market, economists expect to find only one firm operating. Cost conditions seem to indicate a natural monopoly. To explain, suppose one railroad already has lines between points A and B and the volume of traffic is such that there are still economies of greater density. It seems unlikely under such conditions that another railroad would lay parallel lines. Entry would require an investment in track that would be largely sunk once made—there is not the same ability to redeploy railroad track as there is, say, to redeploy jet aircraft within the network of a commercial airline company. Under these cost conditions, entry is very risky. If, upon entering, competition caused the price of service between points A and B to drop to marginal cost, the entrant could suffer large losses. Price would be less than average total cost yet, because the fixed costs of the track would be largely sunk, the cost-minimizing strategy for the entrant at that point would be merely to carry on. Such a dismal prospect obviously is a deterrent to potential entrants.

The interesting and difficult public policy questions arise when, for whatever reasons, parallel lines exist and competition drives prices toward marginal cost. Pleading "destructive competition" and "revenue inadequacy," the railroads propose to merge. The railroads concede (at least implicitly) that the merger will eliminate competition and result in higher prices in the short run, but argue that without some kind of restriction on competition, neither railroad will have sufficient incentive to invest in track maintenance or in upgrading track quality. Therefore, it is claimed, the long run benefits to shippers and consumers of the merger more than offset any short run losses from higher rates.

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[14] *See* Baumol & Bradford, *Optimal Departures from Marginal Cost Pricing*, 60 AMER. ECON. REV. 265, 278-79 (June 1970).

This argument is logically consistent. The problem, however, is distinguishing cases where the argument may have merit from cases where the argument is advanced, but the short-run/long-run trade-off in fact tips in favor of preserving intramodal competition in the short run. In this regard, we have the following observations:

1. The usual backdrop for the argument that merger is needed to preserve investment incentives is a backdrop of revenue inadequacy—the railroads' systemwide revenues are less than total costs, where total costs include a return on investment. It is important to note, however, that the relevant question with respect to a proposed merger is not systemwide revenues and costs, but rather revenues and costs from the operations in the area affected by the merger. Suppose, as in Figure 2, that railroad 1 had lines from A to B and from B to C, while railroad 2 has lines only from B to C. A merger of the two railroads addresses and potentially cures the revenue inadequacy problem only on operations between B and C. Therefore, to determine relevant revenue inadequacy, railroad 1's revenues and costs on operations between A and B should be backed out of the analysis to the extent possible.
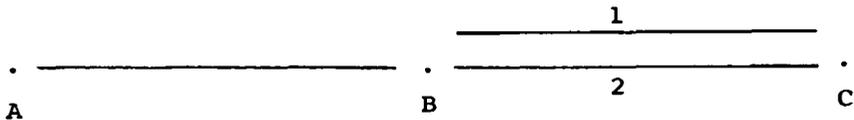

Figure 2
A Railroad Merger With Parallel and End-to-End Dimensions

2. Suppose this accounting adjustment is made and revenues in the relevant area still appear less than total costs. The argument for restricting competition is that this is the only way to preserve investment incentives. Note, however, that the argument assumes that reinvestment is desirable, which may or may not be the case. The operations may be in an area where demand for railroad services has declined to a point where the socially optimal course is to discontinue further investment.

3. Now suppose that revenues in the relevant area are less than total costs and that reinvestment is socially desirable. The next question, usually unexamined by the argument for merger, is whether restricting competition in fact is necessary to preserve investment incentives. Merger proponents advance the following scenario: Each railroad assumes that, if it invests, its rival will also invest and competition inevitably will drive price near marginal cost. Therefore, fearing this "destructive competition," both are reluctant to invest in the first place.

But this is just one scenario, and there are other scenarios with equal basis in economic theory. For example, another model is: Each railroad knows that if it is the first to make a new investment (such as upgrading

track quality), its competitor at that point, fearing the same post-investment competition discussed above, may be reluctant to follow suit. Therefore, rather than investment paralysis, one instead might observe the parallel railroads for strategic reasons actually racing to invest.[15]

4. Finally, suppose that revenues are less than total costs in the relevant area; that reinvestment is socially desirable; and that a fear of post-investment competition dampens investment incentives. There is still a question whether the long-run loss from underinvestment is greater or less than the possible short-run losses to the economy from reduced inter-railroad competition. Perhaps the economy as a whole is better off if the competition between the railroads is allowed to play itself out.

In sum, the "destructive competition" argument for mergers between parallel railroads is logically consistent from the perspective of economic theory. However, before accepting the argument as justification for an otherwise anticompetitive merger, a number of difficult questions require addressing.

One postscript to this discussion: It is sometimes argued (incorrectly) that because there are economies of density in railroading, a merger between parallel railroads permits cost-savings even in the short run—traffic can be directed over the lines of one railroad, yielding lower average total costs. This argument is a classic example of the sunk cost fallacy. Assume marginal (not average) costs are constant or rise with added volume and that the two railroads operate equally efficiently (i.e., have the same variable cost for a given volume of traffic). Then reallocating traffic in the manner described saves absolutely no costs. Total variable costs are the same (and possibly higher, if marginal costs are rising). Total fixed costs, being fixed, are unaffected. Therefore, total costs in the short run are the same (if not higher). Put differently, the decrease in one railroad's average total cost is offset (and possibly more than offset) by a necessary increase in the other railroad's average total cost.

B. Inefficient Diversions

The "destructive competition" or "revenue inadequacy" argument is an argument sometimes used to defend railroad mergers that, using conventional analysis, may appear anticompetitive. The argument about inefficient diversions is at the opposite end of the rhetorical spectrum—an argument sometimes used to oppose end-to-end railroad mergers that, using conventional analysis, may appear procompetitive. In general, end-to-end railroad mergers offer the promise of more reliable and more

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[15] For a model of strategic behavior similar to this, see Spence, *Entry, Capacity, Investment and Oligopolistic Pricing*, 8 BELL J. ECON. 534 (1977).

timely service without any of the concern about reduced competition generated by parallel mergers.[16]

As mentioned above, the inefficient diversion argument starts from the premise that railroads have an incentive to maximize their length of haul for reasons unrelated to efficiency. Therefore, the argument goes, when railroads 1 and 2 in Figure 3 merge, they have an incentive to refuse to interchange traffic with railroad 3, even if railroad 3 is a more efficient carrier between points B and C for some types of traffic.
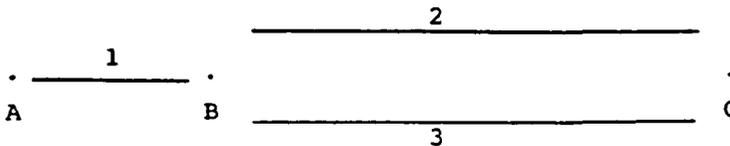

Figure 3
An End-to-End Merger Between Railroads 1 and 2

In a world in which railroads can freely negotiate how they divide revenues from traffic moving over more than one line—a world we understand has existed since the Staggers Rail Act of 1980[17]—this argument is difficult to accept. The problem is the underlying premise: that railroads have an incentive to maximize their length of haul for reasons unrelated to efficiency. Not only is the premise unexamined by proponents of the argument; it also is inconsistent with rational economic behavior.[18]

A numerical example may help highlight the fallacy. Suppose in Figure 3 that the variable costs of moving a shipment between B and C over railroad 2 are $10, while the costs are only $5 if the shipment moves over independent railroad 3. Suppose also that the variable costs of the short haul from A to B over railroad 1 are $2 and, for simplicity, assume that the rate charged from A to C is $15, whether or not the shipment is interchanged at B.

If the newly merged railroads 1 and 2 move the shipment from A to C, profits are $3 (= $15 - $2 - $10). If instead railroad 1 interchanges with railroad 3, total costs are lower and total profits increase to $8 (= $15 - $2 - $5). Even though it means accepting a short haul, the merged railroad has a powerful profit motive to interchange with railroad 3.

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[16] *See, e.g.*, Harris & Winston, *Potential Benefits of Railroad Mergers*, 65 REV. ECON. STAT. 32 (1983).

[17] Pub. L. No. 96-448, 94 Stat. 1895 (1980).

[18] For a similar argument to that presented below, see McFarland, *Railroad Competitive Access: An Economic Analysis*, U.S. Dept. of Justice, Econ. Policy Office Discussion Paper (Nov. 20, 1985).

Railroad 1 is better off accepting the short haul provided merely that it receives more than $5 of the $15 in total revenues. For example, suppose the division is $6 to railroad 1 and $9 to railroad 3. Railroad 3 covers its cost and makes $4 (= $9 - $5) in profit. More importantly for the analysis, the profits of railroad 1 rise to $4 (= $6 - $2) from the no-interchange level of $3.

The general point, which is really an implication of the famous Coase Theorem in economics,[19] is that inefficient routing creates an opportunity for gains from trade. As just shown, correcting the inefficicency creates added value and, provided transactions costs are low enough to make negotiations feasible, revenue divisions can be arrived at that provide all parties concerned with sufficient incentive to make the necessary routing adjustments.

What then to make of complaints about inefficient diversions? One likely possibility is that these are the complaints of a connecting railroad that has enjoyed a favorable division, which it fears it will have to renegotiate to retain traffic. For example, suppose that before the merger between railroads 1 and 2, railroad 3 received $11 on traffic moving over its lines on the way from A to C. After the merger, to induce the merged railroad to interchange and route efficiently, railroad 3 will have to cut its division of revenues to $10 or less. Naturally, it does not welcome the adjustment.

Finally, note that this discussion, while critical of the argument that railroads have an incentive to route inefficiently, does not imply that end-to-end mergers necessarily, in all cases, enhance efficiency. Indeed, the analysis just presented suggests a possible bargaining motive for end-to-end mergers completely unrelated to efficiency. In terms of the example above, suppose that the merger between railroads 1 and 2 generated only modest improvements in quality of service that were more than offset by diseconomies from creating an overly large firm.[20] Nevertheless, the merger might appear privately profitable if the result was, as in the example above, an ability to force connecting railroads to accept lower divisions. But this source of private profit is just a pecuniary economy—a transfer from one railroad to another. From the perspective of the overall economy, the merger would be inefficient.

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[19] Coase, *The Problem of Social Cost*, 3 J. Law Econ. 1 (1960).

[20] Note that there is no inconsistency between economies of density—where, holding track-miles constant, more traffic leads to lower average total costs—and diseconomies of size—where expanding the number of track-miles leads to a more than proportionate increase in costs. Economies of density neither imply nor are implied by economies of size. *See* Braeutigam, Daughtey & Turnquist, *supra* note 13, at 4.

IV. CONCLUSIONS

This paper has explained the basic economies of defining relevant product and geographic markets in the railroad industry. The principal conclusion with respect to the product market is that, because price discrimination appears feasible, railroads alone can comprise a relevant product market, intermodal competition notwithstanding. The principal conclusion with respect to the relevant geographic market is that a focus on city-pairs or corridors is misguided.

The paper has also examined two arguments suggesting that the conventional methods used to analyze the competitive effects of mergers are inappropriate or incomplete in the context of the railroad industry. With respect to the "destructive competition" or "revenue inadequacy" argument, we conclude that the argument is logically consistent, but that there are many difficult questions which must be answered before one can decide what weight to give the argument in any particular case. In contrast, we conclude that the usual form of the inefficient diversions argument is implausible since it requires irrational economic behavior.