

A PERSPECTIVE ON THE RAILROAD ABANDONMENT PROBLEM

by

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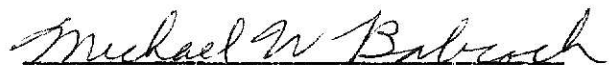
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## I. INTRODUCTION

In 1977, the railway industry as a whole experienced a rate of return to net worth of 1.8%. (1) This low rate of return is reflected by the fact that since 1967, ten class I railroads have filed for bankruptcy. Concurrently, the capital devoted to this industry does not appear to be effectively utilized in many instances. The railroads faced with severe capital shortages in recent years must concentrate traffic on certain corridors as much as possible to conserve funds and resources.

It has been noted that 20% of the railroad route miles produce 67% of the traffic. (2) Maintenance expenses which can be reduced without affecting revenues in the short run are often reduced on light density lines. As a result of this practice, 47,000 miles of track were being operated under slow orders in 1977. (1) A slow order indicates that it is not safe to operate a train at normal speeds. The railroads are in many instances anxious to divest themselves of many of these light density lines. The resources devoted to them they claim could significantly relieve existing capital shortages on the profitable portions of the railroads. In the last few years, there has been an increase in public awareness of the problem. It has become apparent that past regulation has hampered the efficient allocation of resources in transportation. In particular, it is evident that the railway system is overextended and needs to be reduced in size. The reduction in route mileage has been an ongoing process since the 1920's. The speed and extensiveness of this process it is alleged has been much reduced by regulatory process.

The purpose of this paper is to present an overview of this problem. The main questions addressed are: (1) Why are the railroads apparently overextended? (2) Has government activity contributed to the problem? (3) What

are the economic implications of termination of service on light density railway lines? (4) What effects are indicated by empirical evidence? (5) Can current government programs designed to deal with the problem be justified on efficiency grounds? (6) Is a reduction in railroad route mileage necessary and will it improve resource allocation?

## II. HISTORICAL PERSPECTIVE

The development of the transport sector in the U.S. closely parallels that of the rest of the economy. The interaction between the transport sector and the development process has often been noted. The relationship is a key element in controversy that has developed surrounding attempts to rationalize the railway system where it is unprofitable. The present problem, however, does not seem to be one of development but of overdevelopment and problems associated with downward adjustments in transport infrastructure. Of particular concern is the effect on development of potential reductions in the supply of transport services.

In the colonial era development was limited to coastal areas since the only effective means of bulk transport were waterways. Early investment in transport was in canal building which was later complemented by the application of the steam engine in water transport. Dramatic reductions in freight costs from interior points to eastern markets stimulated agricultural development in the midwest. Overland transport was prohibitively expensive so this development was limited to areas with virtually direct access to the river and canal network. In the early 1800's, passenger service was almost exclusively overland by stage coach due to the slowness of water transport. In the early 1800's, the steam engine was applied to overland transport in the form of railroads. The first tracks were built in Maryland in the 1830's. Prior to the Civil War, there were nearly 30,000 miles in place, most of it directly on top of old stage coach lines. The railroads were clearly the most efficient means of overland transport. The logistical advantages created by the rail network in the north have been credited with strategically helping the Union win the Civil War. Encouraged by the federal government and by intense competition

by communities railroad expansion continued apace after the war. The federal government provided land grants to the roads based on miles of track built. Local communities in some cases offered lucrative subsidies to entice railroads to serve their towns. Railroad construction was sometimes profitable independent of any potential freight traffic. The rail network was expanded to over 163,000 miles by 1890 (3). The network mileage reached its peak in the 1920's with over 250,000 miles of track. Since then system mileage has been shrinking.

After the Civil War, the railroads enjoyed the position of dominant freight hauler in the U.S. Railroads were the first large scale industrial organizations and they tended to pattern their management operations on military organization. This characteristic has no doubt contributed to rigidities in policy that have lately become apparent. In the 1920's, other modes of transport began to effectively compete for freight business.

The development of the gasoline engine and the Good Roads Movement caused a boom in motor transport just as technological development and government policy had earlier for rails. The roads movements provided the impetus for federal involvement in provision of the road network. Mileage of paved roads nearly doubled in the 1920's; between 1917 and 1925 federal road expenditure rose from 5 to over 75 million dollars. Truck registrations nearly tripled in the 1920's (4).

While the road network was receiving massive injections of federal funds in the 1920's, interest in inland waterways was being revived. Due in no small part to the importance of pork-barrelling in the legislature, large injections of federal funds were directed to waterway development. It was in the 1920's that waterways and trucking began to divert traffic from the railroads.



We have seen how technological developments complemented by government policies have led to the development of the three main modes of freight transportation. The government policies with respect to the railroads are, however, fundamentally different from those with respect to the other modes. Government policy was originally to substantially subsidize provision of rights of way for all three modes. The rights of way are in fact owned by the government in the case of waterways and roadways. Railroads, on the other hand, must own and maintain their own roadbeds. This is one factor which leads to very high fixed costs for this mode. Trucks, however, (to the extent that they do so) pay for rights of way through fuel taxes. In this way a large fixed cost is transformed into a variable cost. Inland waterway users pay no direct charges. The result is that government policy has substantially altered relative cost structures as between modes of transportation to the disadvantage of the railroads.

The traditional structure of rates is another factor which has contributed to erosion of the railroads' freight base. Two aspects of this can be identified as particularly important. The first is the practice of rate blanketing. Under a blanketed rate structure, freight moves into a market from a large region at uniform rates regardless of distance. The intent of this device is to stimulate traffic by reducing rate differentials. In this way commodities produced at some distance from a market are allowed to compete with those which are produced closer to the market. The effect is that the shorter haul traffic subsidizes the longer hauls. In the event that the subsidization of the comparatively longer haul traffic forces rates above truck costs, the traffic becomes subject to diversion to truck. "Value of service" pricing refers to the practice of setting rates on commodities as high as the

traffic will bear. For high value commodities, shipping and distribution costs tend to be a relatively small proportion of total delivered costs. The elasticity of demand for transportation of these types of commodities tends to be relatively low, that is shipping volume is insensitive to rates. Again when rail rates are set above truck costs for a particular movement, trucks become potential competitors. The traditional structure of rates being based on "value of service" pricing has apparently enabled trucks to divert more traffic from rail than they would if rates were closer to cost of service.

Broad trends in both the location and composition of manufacturing activity have been cited as contributing to the diversion of traffic from rail to other modes. Primary activities which generate the type of low grade bulk traffic which is most suitable for rail are growing much less rapidly than the rest of G.N.P. This is true because over time output is becoming more and more highly processed.

The dispersal of manufacturing locations and the increased number of stages in manufacturing reduces long haul requirements. Increased processing of output makes output more valuable and gives trucks, because of their speed, an advantage over rail. Speed and frequency of freight service can be important elements in reducing inventory costs. If service offered by trucks is relatively more frequent and dependable minimum size shipping lots can be decreased. The smaller and more frequent the shipments the lower inventory levels required. Lower inventory levels can in some cases be a significant source of cost savings.

In 1916 intercity ton mileage of freight was carried predominantly by rail which accounted for 77% of the traffic. By 1976, this share had fallen to 32% (1). The trends in shares of intercity freight revenues are even more

dramatic (5). Trends in shares of intercity freight tonnage are shown in the table below.

Table 1  
Relative Volume of Inland Intercity Freight Traffic\*

	1916	1939	1944	1950	1955	1960	1965	1972
Railways	77.2	62.6	69	56	49	44.1	43.3	38.9
Motor Carriers	---	10	4.57	16.3	17.5	21.8	21.9	22.1
Inland Waterways & Great Lakes	---	17.9	13.9	15.4	17	16.7	16	16.1
Pipelines	4.4	9.5	12.2	12.1	15.9	17.4	18.7	22.7
Airlines	---	0	.01	.03	.04	.07	.12	0.2

\*Source, Melvin R. Fair, Ernest W. Williams, Economics of Transportation and Logistics, Business Publications Inc., Dallas, 1975.

### III. GOVERNMENT INVOLVEMENT IN TRANSPORT MANAGEMENT

Initially government policy towards railroads was one of encouragement and subsidy. However, in the last part of the nineteenth century, the behavior of the railroads began to draw public attention. The roads formed rate pools to hold rates up. These arrangements caused rates to fluctuate wildly as the cartels were formed and subsequently fell apart, as members tried to divert traffic through rate reductions. Secret rebates to large customers was established practice. Lack of effective competition caused high rates to be charged at country points. Customers located at points served by more than one road, on the other hand, enjoyed competitive rates. This situation led in many cases to long and short haul discrimination. Long and short haul discrimination refers to the practice of charging a higher tariff for a shorter haul than a longer haul over the same line.

The situation led Congress to pass the Interstate Commerce Act in 1887. The law forbade long and short haul discrimination and rate pools. In 1906, the Hepburn Act gave the ICC power over rates. Subsequently, the Transportation Act of 1920 gave the ICC the power to regulate minimum and maximum rates and abandonments (5).

Since 1920, the ICC has approved the abandonment of over 63,000 miles of railroad line.

"The common carrier has been granted and has accepted a charter from the sovereign authority, and the abandonment or discontinuance of such a charter can be accomplished only by permission or authority granted by the sovereign authority." (6)

Accordingly, since 1920, railroads seeking to abandon a line have had to seek from the ICC a certificate that public convenience and necessity permitted it.

Sloss, Humphery, and Krutter have identified trends in abandonment activity for the period between 1920 and 1970 (5).

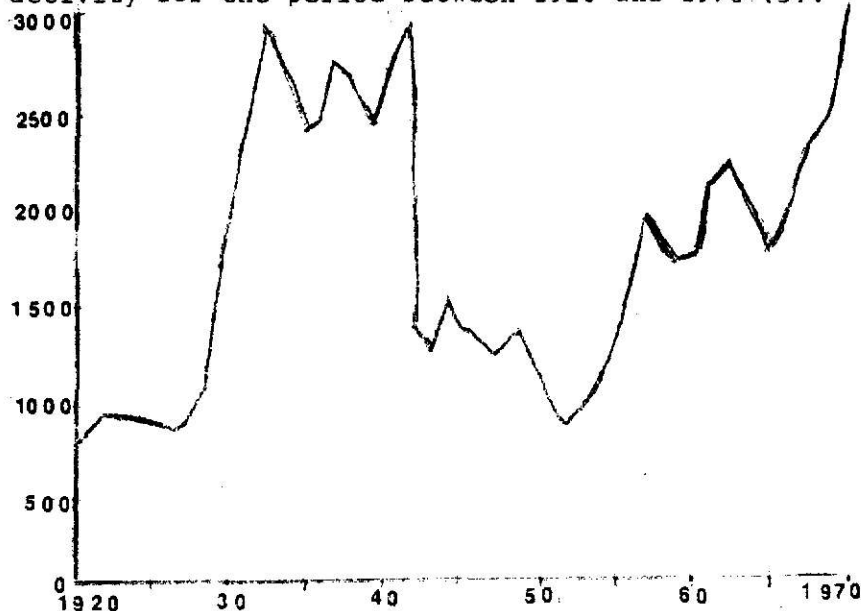


Fig. I

Railroad route miles represented in abandonment applications.(5)

Following Sloss, et al, the four trends identified are (1) 1920-1927, little abandonment activity, due in part at least to the general prosperity of the period; (2) 1928-1941, increased abandonment activity, due to auto and truck competition and the Great Depression; (3) 1942-1943, little abandonment activity due in part to employee protection provision being validated by the Supreme Court and a state of general prosperity; (4) 1954-1969, period of construction of interstate highways, introduction of jet aircraft in passenger service, steadily increasing abandonment activity. A fifth period since 1970 may be added to Sloss's. In this period there has been continued increasing abandonment activity due to recessions and changes in government policy via ~~a~~ abandonments.

#### IV. RECENT LEGISLATION

Since 1970, Congress has directed the ICC through a series of actions to cease requiring rail carriers to cross-subsidize unprofitable operations. Cross subsidies occur when railroads operate a service with a deficit that must be made up from revenues from profitable operations. In the past, the ICC has required railroads to cross subsidize light density lines when public convenience and necessity warranted it.

The recent legislation rejects the premise that general railroad operations should subsidize unprofitable services. In particular, the legislation recognizes that funds to make deficits on money losing operations should come from those who benefit from such operations. Those who benefit might be the general taxpayers, state and local taxpayers or shippers groups.

The National Rail Passenger Act of 1970 first adopted this principle for rail passenger service. The 3R Act of 1973 and the 4R Act of 1976 subsequently extended this principle to freight operations of the Northeastern bankrupts and then to freight operations nationwide respectively.

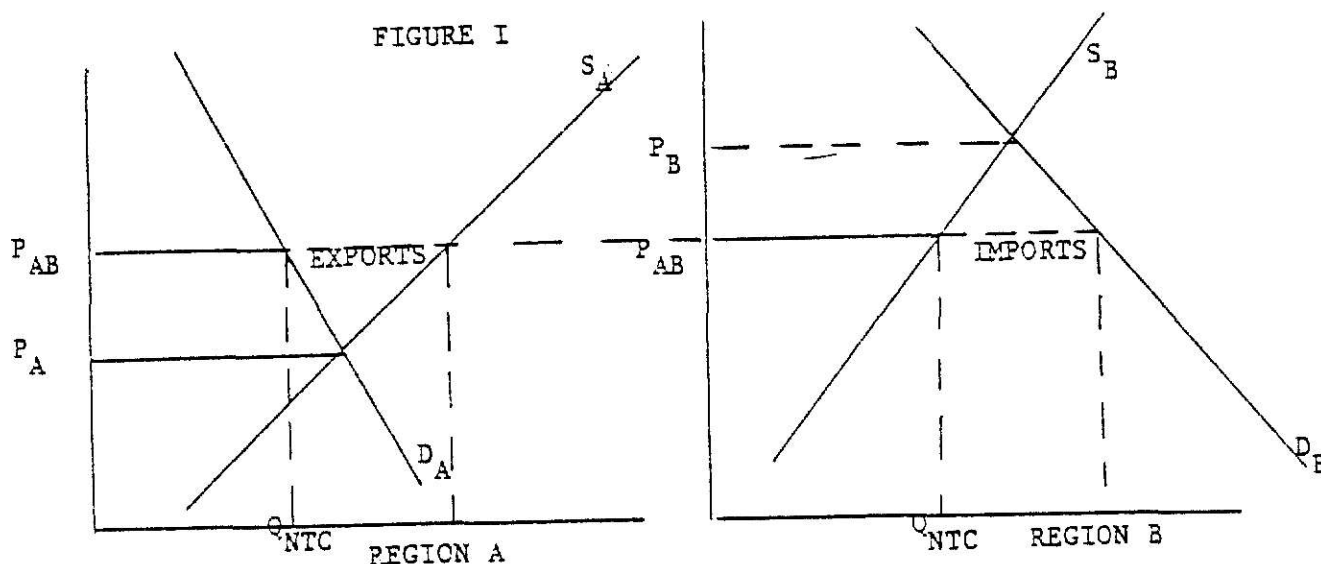
The 3R and 4R acts make available subsidies for continued operations for those lines operating at a loss but for which the costs incurred by abandonment would be greater than the operating deficit. Congress has stressed the transitional nature of these programs. The 3R Act contains provisions for a two year subsidy program. The 4R Act of 1976, contains provisions for a five year subsidy program and extends the deadline for use of funds under the 3R Act to 1981. After federal funding expires, the intent is that any continuing subsidy be made at the state or local government level and/or by private groups.

The subsidy provisions in the 3R Act called for a 70%/30% federal/state share of deficits on the eligible lines for the first two years (6). The 4R Act elevates and extends the federal share; in addition it provides that subsidies and grants under the program may go to nonrail alternative transportation projects. The federal/state share of any subsidy provided in the Act are in the first through fifth years, respectively; 100%, 90%/10%, 80%/20%, 70%/30%, 70%/30%. The 4R Act provides 540 million for this purpose for lines outside the northeast. This amount is not nearly enough to cover the deficits on all light density lines in the area.

The Carter Administration has proposed increasing the federal share of subsidies to 80% and making them permanent (1). In addition, they propose making at least \$100,000 available to each state to establish rail planning. Under the present program to become eligible for federal funds, the states must provide a state rail plan containing investment priorities and an evaluation of the state's rail service. In this way it is hoped that the limited funds available will be channeled to the most essential light density traffic lines.

## V. THEORY

A useful starting point in analyzing implications of rail line abandonment is to look at the factors which set up a flow of commodities between areas (12). Interregional trade theory suggests that a prerequisite to commodity flows between regions is the existence of price differentials net of transportation costs. Suppose the demand and supply functions for a commodity in the absence of trade between two regions A and B is represented below.

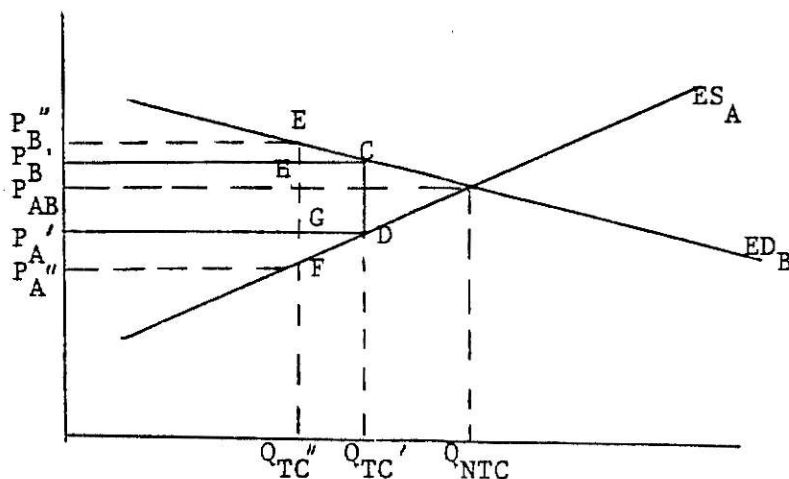


Suppose the two graphs are on the same scale, then the equilibrium price in the A market is below that in the B market. There is a potential for trade between the two regions. To evaluate this potential, excess supply and demand curves may be constructed. At prices above  $P_A$  there is a surplus supply available for movement to the B market. Similarly, at prices below  $P_B$ , there is an excess demand available to stimulate this movement. If we measure these excesses, we can construct the ES and ED curves. At prices below  $P_B$ , the curve  $ED_B$  represents the excess demand at market B. Similarly,  $ES_A$  represents surpluses available in market A, as the price is raised above  $P_A$ . In the



absence of transport costs between the two markets, a quantity of  $Q_{NTC}$  would be shipped between A and B, and the prices in both markets will converge on  $P_{AB}$  (figures I and II).

FIGURE II



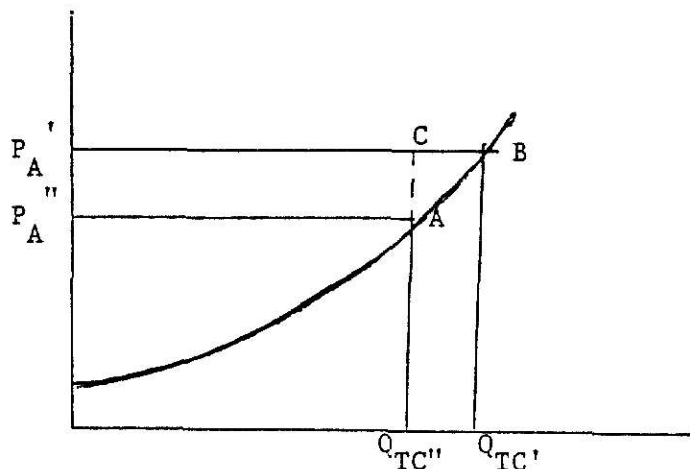
Suppose we introduce transport costs between the two markets equal to  $CD$  per unit (figure II). In order to stimulate shipments from the A market to the B,  $P_B$  must exceed  $P_A$  by at least  $CD$ . With transport cost per unit of  $CD$ , the quantity  $Q_{TC}$  will be shipped from A to B. Supply is decreased at A and increased at B, price at A rises to  $P_A$  and falls at B to  $P_B$ . The incentive to ship between the two markets is eliminated when the difference between the two market prices is equal to transport costs. We have seen how a price differential in excess of transport costs stimulates production in the A market and reduces it in the B market.

We are now in a position to examine how a hypothetical line closure affects the product market. Suppose for the commodity movement from the A to B the market is accomplished by an all-rail movement, and this is the cheapest method

of transportation. Now the rail line from B to A closes down and the new least-cost movement is by truck. The new per-unit shipping cost from A to B rises to EF in figure II. The flow of commodities between the areas falls to  $Q_{TC''}$ .

In the new situation the impacts for the individual competitive producer can be analyzed. The increased transportation costs to the producer may be represented by  $P_A, P_{A''}, AC$  in figure III. Output for the producer at A falls from  $Q_{TC'}$  to  $Q_{TC''}$  in figure III. The resources  $Q_{TC''}Q_{TC'}AB$  are released by the output reduction. To the extent that they are not reemployed in other uses, unemployment will be increased.

Figure III



The above analysis treats relative freight rates as if they corresponded to costs. The relative freight rates are however the signals shippers react to when they decide on output and shipping. Changes in rates to the shippers then are the appropriate parameters in gauging their reactions to line closures. The changes in material income associated with changes in transport costs should be calculated on the basis of real resource cost differentials between the modes of transportation compared.

There is the problem of operationally defining and measuring these effects. The increase in transportation costs may include monetary and nonmonetary impacts which in turn may be public or private. Private monetary costs are increased shipping costs on remaining output, relocation costs if the firm is forced to move all or part of its operation, and any investment required to modify shipping facilities. Modification of shipping facilities may include specialized loading or trans-loading equipment, fork lifts, docks, etc.

Social or public costs which may be incurred by the transportation system include upgrading or increased maintenance costs resulting from increased levels of truck traffic, (net of any increase in tax receipts), lost taxable property when the line is abandoned etc. Nonmonetary costs associated with division of traffic from rail to road may include environmental impacts such as changes in emission levels, noise levels, highway safety, etc.

Impacts associated with output reductions include private costs to the shippers. These are such items as profit lost from volume reductions and increased shipping costs. Public costs associated with output reductions may include those associated with increased unemployment. A measure of these costs may be increased unemployment payments, or the value of the lost jobs. Increased prices may result from output reductions and be considered public costs. In some cases, increased unemployment may cause spending levels to fall in the affected area. If these spending reductions are significant, they may affect employment in tertiary; i.e., service activities.

Complications arise when the impacts are associated with distributional shifts in these parameters. For instance, if employment is reduced in Smallville on an abandoned line, but the jobs are replaced in Littleton, 10 miles away on

the mainline, should this be counted as a cost of abandonment? Appropriate weights for these changes and nonmonetary impacts is the responsibility of policy makers.

The problem with light density line analysis is identifying the costs and benefits available to keeping a line open. Quantification of the pecuniary costs and benefits and the assignment of weights to the non-pecuniary impacts is the essence of cost benefit analysis. When a number of investment options are considered it may be useful to construct ratios of benefits to costs for each of the competing projects. If the analyses are consistent between projects, those which yield the highest benefit to cost ratios represent the most productive investments.

Long term impacts may be difficult to estimate much less compare between areas. For example, the effect on industrial development of railway line losses may be important. The future ability of affected communities to attract new industry is a frequently expressed concern in communities faced with loss of rail service.

## VI. PAST AND PROSPECTIVE ABANDONMENTS: EVIDENCE GATHERED

Several studies have been completed, which have investigated the effects of branch line closures in the past. Three publications were helpful in identifying these studies and have been drawn on in preparing this report. They include Allen and Due (9), the U.S. Senate Committee on Agriculture and Forestry (4), and Anderson, Johnson and Sorenson (2).

In this section, the results are reviewed of studies indicated with particular emphasis where they throw light on the economic adjustment processes which occur as a result of rail abandonment. The studies have elicited results pertinent to direct impacts on sales volume, changes in employment, effects on industrial development, changes in the commodity mixes produced and reorientations in logistics patterns.

In the 4R Act, Congress directed the DOT to submit a national evaluation of the benefits and costs associated with the rail subsidy program provided in the Act. The report by Consad was issued in 1977 (7). In the report, an attempt was made to measure the costs which would be incurred nationally if all uneconomic lines were to be abandoned in the absence of a subsidy program. Due to the scope of the study, no attempt was made to measure the indirect effects of potential line closures; for example, network effects and mitigating adjustments were ignored.

The first step in the analysis was development of estimates of lines subject to closure. The results of detailed financial analysis of the reorganized roads in the northeast made by U.S.R.A. were utilized. Consad found that a simple statistical criteria could be developed which would predict accurately (ex post) the viability of lines in the northeast. The criterion selected was whether or not the line originated or terminated at least 70 cars per

mile/year. The criterion ignores important considerations in determining an individual lines viability. However, the 70-car rule seems to be a good proxy for detailed viability analysis for an aggregate study.

The criteria indicates that some 20.4% of all nonconrail rail mileage as potentially excessive. This represents 36,460 miles of track outside the northeast. The traffic which originates on these lines represents about 2.8% of all nonconrail originations (by tons) or 32.4 million tons out of a total of 1.282 billion tons. The termination tonnage potentially affected is considerably less, about .9% of total terminations.

Surveys of rail users on these lines were conducted to determine in the event the relevant line was closed, the extent to which users would:

1. Continue to ship by rail from the nearest surviving rail station.
2. Convert to an alternate mode.
3. Relocate to nearby stations.
4. Terminate portions of business dependent on rail.
5. From these estimates were developed of private and public sector investment requirements and increased annualized expenditures on transportation.

The survey analysis produced probable reactions to line closures by the private and public sector. About 70-75% of shipments were expected to move between the present origin and destination. The majority of this traffic will move by truck or truck/rail. Another 3 to 9% of traffic will continue to move through affected facilities, but from, or to closer markets. About 20% of the traffic will no longer move through affected facilities; one-half of this will still move through facilities within commuting range--the other half would be lost from the general area.

Freight rates to affected users were estimated to increase 9 to 18% or about \$3 a ton. This represents a total increase in transport expenditures of \$148.2 million outside the ConRail system.

Nationally, annual costs to the private sector of potential and recent closures were estimated to be \$160 million; annualized public sector costs were expected to be approximately \$17 million. The increase in public sector costs indicates only transport related costs incurred (such as increased highway maintenance and construction costs, net of increased user charges).

Fuel consumption was expected to increase slightly. On petitioned lines and lines abandoned on ConRail, overall fuel consumption was expected to decline. The reason for this is that local service on very light density lines is relatively fuel inefficient, even when compared to other modes.

Present movements to and from the potentially affected lines consume about 200 million gallons of diesel fuel annually. Potential closures could increase fuel consumption on these movements by 1.94 million gallons a year or about 3.5%.

The estimates in the study are not meant to be precise, but rather a rough indication of abandonment costs. The estimates are limited to transport related effects. Ignored are the private and social costs associated with output reductions. For example, indications were given of the volume of shipments lost from the area. No account was taken of the impact of these volume reductions on employment levels or on user profits.

The study does account for such costs resulting from line closures which are incurred by traffic diversions from the closed lines. Accounted for are private investment required by such items as trucks, forklifts, relocation or modification of facilities, and so on. Public sector maintenance cost

increases resulting from heavier freight movements, and increased construction costs net of user charges on highway traffic are accounted for.

The study makes apparent that the costs resulting from abandonment probably is considerably less than the costs of continued operation on the lines considered. Closure of the 25,500 miles of apparently uneconomic lines in the northeast would save the roads about \$140 million a year in operating expenses (6). Track facilities worth \$640 million would be released for other uses. This does not account for the men and equipment devoted to this service. By contrast, the private and public costs (including investment) on these 25,500 miles plus 6,600 miles in the northeast are estimated at \$146 million (7) per year.

In the aggregate, it appears that increased costs of transportation, if all uneconomic rail line is abandoned, will not be significant. Considering resources devoted to transportation of goods originating and/or terminating on these line segments, real savings may be realized by allowing them to close. It would appear that in order for the benefits of keeping a line open to exceed the costs, normally some significant external benefits must be associated with continued operations.

External benefits of keeping a line open are the external costs which are incurred if a line is closed down. The term "external" is used to refer to a cost or benefit which accrues to a person or group of persons not a party to the transaction which produces them.

When a line is shut down, its users (as noted above) may find that their operations are no longer as profitable due to increased transportation costs.

Since resources are usually in some degree mobile, they may be moved out of the area to uses in which the rate of return is higher. This may involve



output reductions or relocation. (The adjustments are made to offset or eliminate losses which could potentially be realized.) Resource movements out of areas may have some effect on the continued vitality and/or development potential of an area. For example, reduced employment levels in an area may cause serious local spending reductions. If the spending reductions constitute a considerable portion of local spending, the profitability of firms in the local service sector may be affected. If workers who become unemployed are not reemployed in the area, population decreases might be expected. The following section summarizes some of the empirical evidence of the actual effects of past abandonments.

One of the foremost concerns of communities faced with loss of a rail line is the potential effect on economic development. Allen and Due (19) citing the Iowa Rail Planning Commission have noted that of the 153 new firms attracted to Iowa towns of less than 3,000 population between 1967-70 only nine were not served by railroad. Empirical studies indicate that availability of a particular mode of transportation does not generally of itself preclude a particular site. A checklist of location attributes may include orientation to markets, availability of a type of labor, amenities, taxes, etc. The importance of location attributes, of course, varies with the type of firm.

One group of studies deals with attempts to measure the impact of loss of rail service on the vitality of the affected communities. Usually they attempt to isolate (by statistical means), the effects of loss of rail service from other factors causing decline in an area's economic vitality. The study approach used generally compares performance indicators for test areas that have lost service and control areas that have not.

H. R. Fast has studied trends in city size distributions in rural Saskatchewan, in reference to this problem (10). The province has undergone reductions in rail mileage in recent years. He notes an overall decline in population in the province. The trend seems to be most pronounced in communities in the lower end of the city size distribution. These declines he attributes to improvements in productivity and transportation. The former factor reduces the need for population and, the latter the need for people to live close to their farms. Fast documents the loss of services in towns of various sizes. Comparison of communities which have lost rail service with those who have not, and those who have never had rail service indicates that many cities which continue to have rail service are losing activities. Also, indicated by the study is that many towns that never have had service continue to grow and prosper. Fast concludes that trends in other factors affecting community vitality tend to dominate the absence or presence of rail service.

Sloss, Humphery and Krutter tested trends in economic indicators for nine counties which had lost substantial portions of their rail lines (15). The abandonments took place in the late 50's and early 60's. The parameters tested were changes in bank deposits, change in the value of farm value added, changes in the value of manufacturing value added, employment in manufacture, new capital expenditures, retail sales and merchant wholesale sales. The county was the test unit and adjacent counties which had not lost service were used as a control group.

Three statistics were constructed from the data. One was used to compare pre-abandonment trends in the indicators between counties, another to compare post-abandonment trends. The third statistic compared between counties the

difference in the growth rates in the pre- and post-abandonment periods.

The hypothesis that test counties fared equally as well as the control counties in terms of these indicators could not be rejected. The conclusion was reached that loss of rail service had little economic impact on the counties studied. Care is cautioned in extrapolating these results. The counties studied were of very light population density with no large towns. Future abandonments are likely to produce more pronounced effects on these parameters as more heavily used rail lines become uneconomic and are closed. This is true since it appears that traffic densities required to maintain profitability on line segment are rising over time.

Ben J. Allen addressed the same question as part of a doctoral dissertation at the University of Illinois (19). He also examined several areas which had lost rail service. He concluded that shipments continue to be made from the same general area after abandonment. For this reason it seems that employment and income did not decline noticeably.

Several factors contribute to mitigating the effect of loss of rail service on rail users. Physical conditions such as the presence of dense line networks or nearness to navigable waterways are important. Institutional factors such as rate structures and inventory policies can affect the severity of increased shipping costs. Reductions in distribution costs may be experienced if a switch to trucks enables the firm to reduce inventory levels as service frequency and minimum size lots are decreased.

The absence of rate blanketing tends to reduce truck/rail rate differentials as discussed above. This lessens the increased costs associated with switching from rail service.

The scope of the study involved generally has an important effect on the degree to which the impact of an abandonment is measured. The larger the degree of aggregation in the data the greater is the possibility that adjustment processes are internalized in the data. The smaller the study area the more severe will be the measured impacts as fewer of the adjustment processes associated with the closure will be incorporated in the data; e.g., displaced workers who later find jobs, etc.

For example, Zasada has documented the effects of line closures on elevator capacity in Saskatchewan (11). He found that all elevators on abandoned lines closed immediately upon loss of service. He found that nearly all the lost capacity was replaced by expansion on adjacent lines.

Fishbein and Thompson have developed a framework for dealing with labor market adjustments to abandonment situations (12). They utilize the results of studies of the Michigan U. I. program. The study of movements into and out of the unemployment system have yielded a statistic known as the J.F.R. (job flow rate). The JFR was derived for each occupation on the basis of factors which affect the likelihood of reemployment. They include considerations of age, sex, education and skill level. These attributes are in turn associated with typical workers in each occupational strata.

The results of a survey which rail users on abandoned lines provided estimates of employment reductions. Using these basic unemployment estimates the occupational impacts were determined utilizing the state occupational matrix. Using the JFR statistic the estimates thus generated were adjusted to account for workers who are reemployed in the short run. The statistic indicated that basic unemployment estimates could be reduced by between 25 and 35%. The analysis suggests that where available such statistics are

useful for adjusting basic unemployment impacts. It also suggests that in areas where labor is immobile, unemployment costs may be high and such analysis may be available and worthwhile.

Changes in logistical configurations also can be expected as the result of line closures. Adjustments of this type and changes in the commodity mixes produced in a region can also be identified as potential reactions to line closures. Adjustments of this type have been noted in post-abandonment studies.

In a study of the consequences of the abandonment of the Grass Valley line of the U.P. in central Oregon which was 52 miles in 1965, Due notes such changes (9). The closing of the line prompted one of the two local co-ops to build barge facilities on the nearby Columbia River. The new truck/barge arrangement moves export grain to Portland at or below the old rail cost. In this respect, the line closure prompted development and relieved the region of unprofitable capital.

The other elevator continues to ship to Portland but uses truck/rail. Since rail rates on the line were graduated and not blanketed, the truck/rail movement is only slightly more costly than the previous all rail Portland rate.

Arvin Bunker's study described in references (2), (4), and (9) documents a similar shift in logistic patterns and also changes in production patterns. Two lines were studied. One crossing the Mississippi River between Illinois and Iowa was 94 miles long. Since grain was already being diverted to truck/barge up to 90 miles from the river, the effect on elevators was slight. Fertilizer dealers were hit with increased delivered prices and suffered a loss in volume. Some shift into livestock production was noted but this was not attributed to the line closing.

The other line studied also in Iowa, but without water access, produced different results. The elevators located on the line found that they were limited to local markets and their volume was declining. There was a marked increase in cattle feeding operations which was attributed to the loss of the line. Fertilizer dealers, forced to rail/truck, were severely affected. About half of those located on the line closed (3 of 6). Those remaining experienced increased volume and continued to be profitable. The increased volume was attributed to business captured when the other firms closed down. The other firms experienced market incursion from firms on adjacent lines which received an advantage.

## VII. CONCLUSIONS

Changing conditions in the freight transportation industry have made it apparent that the railway system is overextended. Diversions of traffic from rails to other modes have been taking place apace for 50 years. Especially important in this respect is the trucks' advantage over rail for short-haul and high valued traffic. Economies of line density have induced railway management to concentrate traffic on as few lines as possible. The result of those influences is to leave significant portions of the railway network carrying very light traffic densities. This is especially true in areas of very high network density. In these areas, line configuration is designed to perform a "feeder" role in collecting traffic for interregional trunk lines. Trucks, of course, being much more flexible in utilization and having very low fixed costs, are very competitive for this feeder traffic.

The regulatory system, it has been alleged, has severely reduced the ability of railway management to adapt to changing requirements. This is claimed despite evidence (5) that the ICC approves a very high percentage of abandonment applications and these in a reasonable period of time. The counter-argument to this evidence is that railroads are sophisticated in predicting the outcomes of applications. They are then unlikely to enter the expensive proceedings unless there is a high probability of approval.

Recent legislation has recognized the problems of the railroads in adjusting their line networks. The legislation tries to expedite abandonment procedures by laying the burden of proof that public convenience and necessity requires continued operation on contestants. The legislation, recognizing that this might cause a surge in abandonments, has provided for continuation subsidies and state rail planning.

Studies of past and prospective abandonments have been completed. They indicate that abandonments generally represent real resource savings to transportation. However, since operations of uneconomic rail lines are subsidized by the railroads, cost increases to shippers are to be expected. These cost increases can be expected to set off adjustment processes by the lines' former users. Disasterous consequences of abandonments are frequently predicted. Those opposing abandonments fear that their communities' vitality and/or development potential will be seriously affected. Firms usually adjust to line closures after initial unfavorable impacts and regain their old profitability by changing their modes of operation. In the case of some marginal firms business closures have been experienced. Evidence to date indicates that of itself line abandonments generally have little adverse economic impact on the communities served. Effects of traffic diversions to the rest of the transport system tend to be slight, due to the high capacity of most road networks relative to the volume they carry.

The transitional subsidies for continued operations of uneconomic lines provided for in the 3R Act and the 4R Act represent increasing government intervention in transport. Experience with government involvement in this area has been dismal. Most commentators agree that government involvement in transport in the past has aggravated the problems it was meant to remedy. When the Transportation Act of 1920 gave the ICC power over abandonments, there were signs the railway system was already beginning to adjust (4).

There is growing feeling that the characteristics essential for adequate competition, if they have not been present in the past, are present in most of the transportation industry today. Air traffic is already substantially



deregulated. The 4R Act provided for rate flexibility in rail rates. The ICC has, however, frustrated the intent of this claim by consistently disallowing it by finding "market dominance."

The transitional program of subsidies provided for in the 3R and 4R Acts has potential to smooth problems associated with reductions in railroad route mileage. Where severe economic effects are felt, states, local communities or shippers' groups may find it advantageous to make up operating deficits on the line(s) the railroads would abandon. One could agree that the transitional subsidies are necessary on economic grounds due to the size and uncertainties of these investments.

The Carter Administration has proposed making the subsidy program permanent. In the apparent absence of widespread significant externalities to railroad abandonments, this proposal does not seem justified.

The stated intent of Congress to return railroads to the realm of viable private enterprise would not be served by a permanent federal subsidy program. A permanent program of this type may further distort the allocation of resources in the transportation industry. Placing control over service discontinuance on light density rail line more in the hands of railway management seems to be the action which will best allow the rail system to adjust.

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A PERSPECTIVE ON THE RAILROAD ABANDONMENT PROBLEM

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AN ABSTRACT OF A MASTER'S REPORT

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The purpose of this paper is to present an overview of the railroad abandonment problem. The main questions addressed are: (1) Why are the railroads apparently overextended? (2) Has government activity contributed to the problem? (3) What are the economic implications of termination of service on light density railroad lines? (4) What effects are indicated by the empirical evidence? (5) Can current government programs designed to deal with the problem be justified on efficiency grounds? (6) Is a reduction in route mileage necessary and will it improve resource allocation?

The paper examines the factors which have led to an overextension of the railway system in historical perspective. A theoretical framework for examining economic impacts of abandonment is discussed. Studies of past and prospective abandonments are reviewed.

The evidence indicates that real resource savings to transportation could be realized if uneconomic rail line is abandoned. Significant adverse economic effects on the affected communities are not very widespread. The overall costs of maintaining all light density rail line in service is far in excess of the benefits to continuing service.