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THE COSTS OF RAILROAD REGULATION: A FURTHER ANALYSIS

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Interstate Commerce Commission and Federal Trade Commission, respectively. The views and conclusions expressed here do not necessarily represent the opinions of the ICC, the FTC, or any of their members. The authors wish to thank James Langenfeld, Alan Mathios, Mike Metzger, Paul Pautler, Bob Stoner, John Woodbury, and an anonymof.C, an vieeor

ABSTRACT

The Staggers Act of 1980 largely ended almost a century of government regulation of railroads. This paper presents evidence that deregulation has had a positive impact on the economy. Specifically, deregulation has

I. INTRODUCTION

The Staggers Rail Act of 1980 largely ended almost a century of government regulation of railroads. Railroads were given substantially more rate flexibility and managerial control over their operations, and both intermodal and intramodal competitiveness were increased (motor carriers were largely deregulated simultaneously). In this

(towards marginal costs) because of deregulation. However, our analysis shows that rates and costs have actually fallen significantly.
Second, and more importantly, his approach ignores much larger impacts
of deregulation on cost levels and service quality (that is, Boyer looked at relatively small "triangles" instead of "rectangles" of welfare gains due to allowing more efficient methods of service and production). Thus, the rate declines largely represent net 242.87 9

to

19802 we obtain very low Durbin-Watson statistics. This suggests an omitted variable bias in Boyer's specifications.
There are at least two significant problems with this specification beyond the lack of demand side variables. First, Boyer's construction of the dummy variable implies that the full effects of rail deregulation occurred overnight on January 1, 1980.3 But deregulation did not occur overnight, and not at the beginning of 1980. Although the deregulatory process actually began many years earlier, it proceeded at a

variable largely reflects the influences of deregulation and changes in traffic composition. 5
While the influence of traffic composition on train weight is

be considered as partial rate deregulation, although these rate cases remained slow, costly, and hotly contested.
This gradual thawing of regulatory rigidities generated the incentives
for railroads and shippers which led to increases in shipment sizes which, in turn, are probably a principal cause of the rise in WEIGHT before 1980.6 After Staggers, rates became quite flexible and this process speeded up considerably. In this context, it can be seen that WEIGHT is largely a function of the rate deregulation process in the years before and after Staggers.
In addition to the change related to regulatory conditions, variations in WEIGHT also partly reflect more purely "technological" changes such as the gradual replacement of older, smaller freightcars by newer, larger cars. In Section III we attempt to separate the parts of WEIGHT due to deregulation and to changes in traffic composition.

III. AN ALTERNATIVE RAIL RATE MODEL

A. Specification
Because it is not plausible to expect that the impact of the Staggers
Act occurred overnight, we have

11.110wt

formally legalized rail service contracts,7 provided virtually total confidentiality of contract rates and terms, and exempted contract rates from direct regulatory review. A very few contracts were made in 1979 and before passage of the Staggers Act in 1980, and

to which at least one key aspect of Staggers was implemented and applied by users. As our measure of the extent of implementation of the Staggers Act, therefore, we use "STAGGERS", the number of rail contracts each yearlO divided by the number in 1986. This normalization will aid in the interpretation of our regression coefficients.
In addition to the limited deregulation of the 1970s and the accelerated deregulation of Tm (In)9g8 Tio0.9 164.28 574This

We do not include YEAR as a variable in our specification. In regressions run with data prior to 1981 (that is, prior to the Staggers Act) the coefficient on year is insignificant and positive, as it is in Boyer's model. After 1980 YEAR is highly collinear with STAGGERS. YEAR is normally used to represent general technological progress; but this seems to have been absent in the railroad industry in the decade before Staggers. To the extent to which technological innovation was applied after 1980, it was probably made possible by changes in the regulatory environment brought about by the Staggers Act.
Before testing our full model we test our hypothesis that WEIGHT is primarily a function of i 8 i

Thus, our full model is

(3-1) In(WEIGHT) = bo + blST AGGERS + b2BULK + el
(3-2) In(A vg Rates) = Co + clST AGGERS + c2BULK + c3In(WEIGHT) + C4FUEL
+ cslnHAUL + c6GNPCH + C7In(TRUCK) + e2

Inserting (3-1) into (3-2) yields the model we estimate

(3-3) In(A vg Rates) = Co + c3bo + (c i + C3bl)ST AGGERS + (C2 + c3b2) BULK
+ c4FUEL + csln(HAUL) + c6GNPCH + c7In(TRUCK)+ c3e l + e3

and we expect Cl' C2' c3' Cs < 0 and bl, b2, c4, C6' and C7 > O. (The variable WRES in our specification equals the residual

ST AGGERS remains significant (and larger in absolute value) in any specification with fewer variables.
The coefficients on our other variables are within reasonable limits. BULK seems a bit more negative and length of haul less negative than we would have expected. The coefficient on GNP change is significantly positive, reflecting aggregate demand's impact on determining rail rates. Truck rates are positive, indicating competition, but small, indicating that the modes may not be strong substitutes. The coefficients on fuel price are significant and have the expected signs (positive) in the GNP price deflator equations. However, in the PPI equations, none of the coefficients on fuel price are significant.
These results suggest that deregulation saved shippers billions of dollars. Annual rail freight revenues were $35.0 billion in 1980, measured in 1986 dollars. Based on our estimates, by 1986 shippers were saving about $3.5 to $5 billion16 because of rate reductions, after correcting for changes in such factors as commodity composition, length of haul, and fuel prices.

IV. DEREGULATION AND SERVICE QUALITY
The reduction in rates is not the only benefit to shippers, however. Boyer states that he used train WEIGHT to reflect a decline in quality of service, on the view that larger shipments mean less frequent shipments and less handling by railroads. However, there is currently no reliable evidence on whether service frequency has declined or increased. Further, the handling to which Boyer refers was a major source of uncertainty, damage

16 $35 billion times 0.11 equals $3.85 billion, $35 billion times 0.14 equals $4.90 billion.
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and delay. Its reduction has contributed in large part to the greater speed and reliability now provided to shippers and represents an increase in quality for the shipper.
To the shipper, the quality of transportation services is reflected in the level

service. Consistent with the regulatory changes, Delaney has shown (1986, 1987)19 that inventory levels have been substantially reduced since 1981. He estimated that total logistics cost fell from 14.5 percent of GNP in 1981 to 11.1 percent in 1986. That is, if logistics accounted for the same fraction of GNP in 1986 as in 1981, total logistics costs would have been over $130 billion greater. About $50 billion of this reduction can be ascribed to lower interest rates; but the remaining $80 billion or so results about equally from lowered freight costs and from lower inventory levels.20 Although it is possible to ascribe some portion of the reduction in inventory levels to other sources (for example, improvements in data processing), most of these could have had little impact apart from the improved reliability and speed made possible by deregulation.
It is quite difficult to apportion the roughly $40 billion in non transport logistics savings between rail and truck service, since most of the data used to estimate logistics costs are not available on such a basis. But if rail-related savings are roughly proportional to rail revenues, tons, or ton-miles, they would be about $8, $10, or $12 billion respectively. Of course, rail commodities tend to be of lower unit value than truck commodities. Thus speed of shipment is presumably of less significance. But the costs associated with storage of the vast quantities of these commodities

19 Delaney's analysis was criticized in a pamphlet by Michael K. Evans (1987). The controversy has been reviewed in Beier and Stone (1988). Beier and Stone generally support Delaney's analysis, with slight modifications. Their estimate for the 1980-86 reduction in inventory costs is about $84 billion, after accounting for lower interest rates.
20 The freight share of GNP has fallen just over one percent since 1981, or a bou t $40 billion. Source: Transportation Policy Associa tes, Transportation in America, Fifth Edition, July Supplement, (Washington, D.C., 1987), p. 4.

13

are nonetheless very substantial, and even with bulk commodities substantial savings are likely to have resulted from lower inventory levels. Therefore, even if the logistics savings resulting from rail deregulation are less than proportional to rail traffic shares, they are unlikely to be much less so. Thus, rail-related logistics savings can be conservatively estimated to be in excess of $5 billion and may be closer to $10 billion annually.

V. OTHER IMPACTS OF DEREGULATION

Railroad deregulation also has had broad impacts in enabling railroads
to reduce their operating costs by about twenty-five percent,21 resulting in an increase in profits despite the sharp reductions in rates. It is very

substantial compensation from the railroads. Average earnings of remaining rail workers have also risen significantly compared to other U.S. laborers since 1980.23 Thus, it appears that deregulation did not reduce the amount of rents gained by rail workers, contrary to the experience in the trucking industry. (See Rose (1987).)
Finally, taxpayers appear to have benefitted noticeably from rail deregulation. Federal subsidies to freight railroads have declined by about $600 million (in 1986 dollars) since 1980, now amounting to only about $60 million annually.24

VI. CONCLUSION

A comprehensive estimate of the savings from transport deregulation should take into account the change in price to shippers, the change in product quality, the reduction in firms' cost structures, the impact on taxpayers and losses to labor. A rough calculation of total welfare gains from the rail deregulation resulting from the Staggers Act then would include something on the order of $3.5 to $5 billion in lower rates to shippers, about $500 million in higher profits to railroads, and $5 to $10 billion in lower inventory-related logistics costs. Taxpayers could also be considered to have gained from the reduction of over half a billion (1986) dollars in federal subsidies to freight railroads. The effect of deregulation

23 Comparison of 1980-86 rail average earnings from Railroad Facts with average nonagricultural earnings from Economic Report of the President, 1987, Table B-42. Real rail earnings rose about nine percent while average nonfarm real earnings declined about one percent.
24 Source: Railroad R-l

on rail labor is difficult to determine, and may have been positive or negative.
Thus, our estimate of the total annual gains from rail deregulation are from $9 to $15 billion. Because there is little evidence that any major group has lost from deregulation, this total represents net gains, and not merely transfers from one part of

TABLE 1

Regression Results for

TABLE 2

Regression Results
Dependent Variable: Natural Log of Real Rail Revenues per Ton-Mile (t-statistic in Parentheses)
Years: 1970-86

Equation (1) (2) (3) (4) (5) (6)

Deflator GNPD GNPD GNPD PPI PPI PPI

Intercept 1.294 l.507 0.978 l.500 l.762 0.785 (26.430) (5.347) (2.551) (21.325) (4.819) (1.428)

STAGGERS -0.143 -0.133 -0.139 -0.118 -0.105 -0.119

(-3.363) (-2.926) (-3.193) (-2.229) (-1.842) (-2.315)

BULK

BULK

DEREG

GNPCH

FUEL

HAUL

STAGGERS

TRUCK

WEIGHT

WRES

YEAR

Table 3

Description of Variables

Description

Percentage of rail shipments that are bulk goods

Source

Railroad Facts

A dummy variable for deregulation (0 prior to 1981, I for 1981-6)

Percent change in GNP
year to year

Fuel prices for railroads

A verage length of rail haul

Number of rail contracts in
year divided by number of rail con tracts in 1986.

Real truck rates in
1986 dollars

A verage weight of train loads

Economic Report
of the President

Railroad Facts

Railroad Facts

ICC Office of
Transportation
Analysis

Transportation
in America

Railroad Facts

The residual from regressing STAGGERS and HAUL on the log of WEIGHT

Calendar year (minus 1969)

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REFERENCES

BARNEKOV, Christopher C., "Railroad Deregulation: the Track Record", Regulation, 1987, No.1.

--:-___ -...,._...-.-' "The Potential Effects of Deregulation on Railroad Operating Costs", Ohio University, processed, 1980.

BEIER, Frederick J. and Stone, Garry Brooks, "Review of the Delaney-Evans Debate", Cambridge, Massachusetts: U.S. Department of Transportation, Transportation Systems Center, January 1988.

BOYER, K. D., "Minimum Rate Regulation, Modal Split Sensitivities, and the Railroad Problem", Journal of Political Economy, 1977, pp. 493-512.

- - - -:=--_..,...--:---::---::-" "Equalizing Discrimination and Cartel Pricing in Transport Rate Regulation", Journal of Political Economy, 1981, pp. 270-86.

Transportation pp. U

RAST ATTER, E. H. and Snow, John W., "Car Hire Charges and Railroad Car Shortages" in Papers, Eleventh Annual Meeting, Transportation Research Forum, Oxford, Indiana: Richard B. Cross, 1970, pp. 115-124.

ROSE, Nancy L., "Labor Rent-Sharing and Regulation: Evidence from the Trucking Industry," Journal of Political Economy, December, 1987, pp. 1146-1178.

SUMNER, Jason