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THE IMPACT OF REGULATION ON
TRANSPORTATION EFFICIENCY

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The market institution in the United States has historically managed the efficient use of resources. When this institution is deemed inefficient for the task at hand, an administrative helper may be called upon to assist in the management task. Regulation of transport modes commenced in 1887 with railroads. By 1940, segments of all transportation modes (including rail, air, motor, water and pipeline) were under the regulatory control of the federal government. Have the regulatory policies of the Interstate Commerce Commission (ICC) and the Civil Aeronautics Board (CAB), for example, been consistent with an efficient system? ^{1/} This question does not infer that, given no interference, the market would have achieved an efficient system. This question does, however, challenge the accomplishments of the regulatory agencies and does infer that a question exists as to whether the policies implemented by the above agencies are consistent with an efficient system.

In 1965, the transportation sector in total (including private automobiles, highway and airport construction) contributed 20 percent of GNP [21, p. 7], with approximately one fifth of that amount generated by regulated producers. In 1970, the total net investment in railroads, motor transportation (including private automobiles and highways), domestic water transportation, pipelines, natural gas pipelines and air transportation was \$310 billion [23, p. 45], 33 percent

of our national wealth [22, p. 9]. Of the \$310 billion, \$230 billion was accounted for by the motor transport mode, indicating the significance of the motor vehicle in the transport system. The focus of this note is on the regulated producers with particular emphasis given to railroads, trucking, and airlines. However, the transportation sector is a system, and what effects the regulated producers will (to varying degrees) affect the unregulated producers, and vice versa. A sector that commands resources of the magnitude indicated above can, if mismanaged, generate a significant distortion in the allocation of scarce national resources.

In the next section, studies of transport modes are presented that demonstrate the existence of rents ^{2/} which have resulted from regulation. Then, the Buchanan-Tullock collective choice model is employed to develop decision rules that are used to determine the collective choice between market regulation and unencumbered market management. Third, a combination of Thompson's [31] organizational design - environment model and previous research is presented suggesting why the predictions of the Buchanan-Tullock model are negated. Lastly, conclusions and implications are set forth.

Many objectives have been suggested for a transportation system. They include improving the social, political and economic intercourse of a nation, stimulating economic growth, providing adequate transportation for reasons of national defense, and decreasing time and distance

costs. It is suggested that these objectives are best achieved through public investment programs, such as the highway program and the construction of airports. Other objectives include freeing the transportation system of destructive competition and eliminating the threat of high costs associated with re-establishing a mode or modes that have lost their comparative advantage and declined in importance. However, it is not evident that the last two are unattainable through an efficient system; therefore, the objective of efficiency is assumed.

Regulation--Present Thinking and Social Costs

The Weeks Report published in 1955 [34] called for less regulation and more reliance on competitive forces to establish prices in the transportation industry. There was strong opposition to this report from motor and water carriers because the proposed policy appeared to favor railroads. What has happened since 1955? Sloss [27, p. 328] charges that:

"Reaffirmation of the basic tenets enunciated in the Weeks Report by Presidents Kennedy, Johnson and Nixon has produced few results other than volumes of Congressional hearings on modification of federal transportation regulation. Views favoring less restrictive controls over entry and pricing in transportation have been expressed by the Council of Economic Advisors and by past and present members of the

Department of Transportation. The American Trucking Association and members of the Interstate Commerce Commission have firmly opposed any relaxation of motor carrier regulation."

Several studies indicate a price-cost deviation of regulated firms from unregulated firms. Keeler [19] using 30 major domestic air travel markets and estimating a long run airline cost model, determined that in 1968 regulated routes had fares that were 20 to 95 percent greater than the estimated unregulated fares [19, p. 399]. For 1972, mark-ups of 48 to 84 percent were calculated [19, p. 420]. ^{3/} Keeler's findings are supported by Jordan [18] and Purvis [19, p. 421], but disputed by Caves [8]. Keeler tested his model for accuracy by predicting air fares for the relatively unregulated intrastate California airlines. The route numbers are few, but the model accuracy is very high.

In the trucking industry, Sloss [27, p. 355] found that regulation cost Americans between \$348 million and \$361 million per year during the period 1958 through 1963. For Canada, the overcharges range from \$10 million to \$15 million per year during the same period. Farmer [12, p. 402], using Department of Agriculture and ICC data, compared average revenues and costs per intercity ton mile for 25 exempt (unregulated) carriers operating in Delaware, Maryland and Virginia in the early 1960's with regulated carriers operating in the Middle Atlantic states (including the above 3 states). Farmer concluded that exempt agricultural carriers had average revenues 41

percent lower than the common carriers handling special freight, and 58 percent lower than common carriers handling general freight. Also, exempt carriers had average costs considerably lower than the nonexempt carriers. Finally, a study by the U.S. Department of Agriculture [17, p. 166] indicated that following deregulation in 1956 of frozen food motor carriers, rates dropped between 11 and 29 percent with an average of 19 percent. During the same period, rail rates increased 6 to 14 percent.

In the railroad industry which is totally regulated, Kolko [17, p. 170] determined that 39 percent of the railroad stock was paying dividends in 1888 (one year after the start of regulations) and in 1910, 67 percent were paying dividends. Kolko also found that during that same period, the average rate of dividends on all stock rose from 2.1 (1888) to 5 percent in 1910. These findings are consistent with the rates of return on book investment from 1890 to 1968 [17, p. 170].

The Logical Basis for Public (Consumer) Intervention

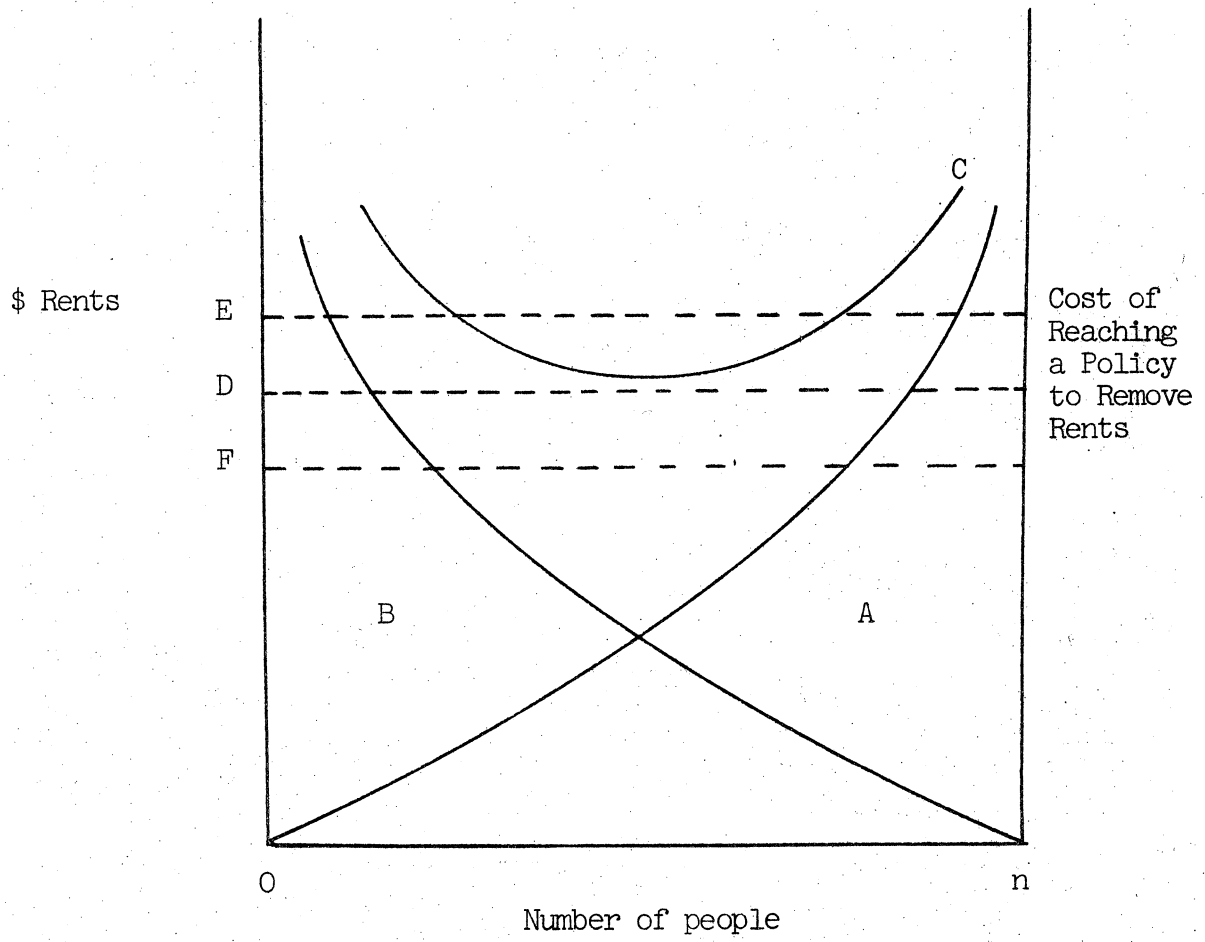
The Buchanan-Tullock model [6] establishes a theory of collective choice. One must establish when the populous desires collective action and when private action is the preferred organization. In order to facilitate this determination, Buchanan and Tullock employ a cost approach whereby minimization of costs necessarily maximizes individual welfare. Costs are categorized into external costs ^{4/} and decision making costs. ^{5/} Assuming that decision making costs only

occur in collective decision making (this does not imply that transaction costs are zero in the private market), it is necessarily true that if the external costs associated with the private organization of an activity are less than the costs of collective organization of the same activity (minimum point of schedule C in Figure 1), the rational individual will choose private organization.

The question to be addressed using the Buchanan-Tullock model is: should the market institution be allowed to operate unencumbered by regulatory constraint or is regulation needed? ^{6/} For discussion purposes, the external costs are considered to be rents. It is recognized that external costs other than rents exist. ^{7/} However, perceived rents were one of the early reasons for regulation and today with regulation, rents still exist (as recorded earlier in this note), even though all potential rents are not captured by the regulated producers as a result of non-price competition [10 and 35].

In Figure 1, schedule A is expected rents that remain after imposition of regulatory constraint on the market institution, given a decision rule whereby agreement from m of n people is required in order to effect group action. As m increases with respect to a given n , expected external costs decrease. The larger the group (m) required to effect collective action, the greater the likelihood for an individual to block action unfavorable to himself plus the more externalities other group members will eliminate. Schedule B is the expected cost, in time and effort, required to secure agreement concerning the group

FIGURE 1



action to be taken. It is hypothesized that as group size (m) required for approval increases, decision costs increase. Schedule C is the vertical summation of schedules A and B. A rational person will minimize schedule C, thus arriving at a decision rule of X percent of n people agreeing on a course of group action.

Given that regulation is to be affected, the remaining rents and the decision cost incurred (in order to decrease rents) are minimized and indicated in Figure 1, level D. ^{8/} In order to determine whether unencumbered market organization is preferred by consumers as opposed to regulatory constraint, expected rents from market organization ^{9/} is super-imposed on Figure 1. Points E and F represent two levels of rents that could occur under market organization and point D indicates the remaining rents plus decision making costs from a regulated market, assuming the potential of minimizing schedule C was fully realized. The decision rules are as follows:

At $E > D$: Regulatory Constraint

At $F < D$: No Regulatory Constraint

In 1887 when railroad regulation was enacted, there were perceived rents accruing to the railroad industry. If consumers perceived that at that time $E > D$, (according to the Buchanan-Tullock model) regulatory constraint was the rational choice. In 1887, rail was the dominant mode and other modes were either non-existent, or of minimal competitive threat to railroads. Today, numerous modes exist which suggests that even if modes are oligopolistic intra mode, competitive conditions

would be approximated for the transportation sector in total. For example, railroad services alone might be oligopolistic, but if railroads faced unregulated competition from trucks and automobiles, the extent of rents in railroads would be limited by the motor transport shipping alternative.

Based on this, expected costs (rents) from unregulated transport markets have probably declined to a position such as $F < D$ in Figure 1 with development of competing transport modes over time. As a result, one would expect decreasing emphasis on regulation. However, we have had increasing regulation! Why?

Why Has Regulation Policy Not Been Altered?

The Buchanan-Tullock model is a consumer oriented model. Many reasons could be cited for its negation; however, it is argued in this note that the main reason is the producer orientation possessed by the regulatory agencies. Thus, in order to provide a framework for conceptualizing a probable reason regulation has continued, the organizational design-environment model of organization theory, a producer oriented model, is now presented. Thompson [31] indicates that technology and the task environment are major sources of uncertainty with which a firm must cope. The firm will attempt to decrease this uncertainty and provide as much determinancy as possible to the external factors that must be taken into consideration when making decisions, assuming that the marginal benefit exceeds the marginal cost. Key elements in the organizational design-environment model are dependency (causing uncertainty)

and power (attempts to decrease uncertainty).

In this note, concern is with the task environment and its effect on the firm and the firm's actions. The task environment is defined as those parts of the environment which are relevant or potentially relevant to goal setting and goal attainment [31, p. 27]. ^{10/} The firm seeks control (power) over its task environment (the source of uncertainty). For our purposes, the relevant entity in the firm's task environment is the regulatory agency. The degree of certainty a firm can anticipate from a regulatory agency and the degree of producer influence on regulatory actions is increased as producer power is increased over the regulatory body. This producers have seemingly accomplished with success. ^{11/}

Stigler charges that the state possesses the power of coercion-a power that no household or firm possesses. This allows the state to "ordain the physical movements of resources and the economic decisions of households and firms without their consent" [30, p. 4]. Therefore, by utilizing the state and its powers, industry can increase its profitability. Stigler states that the four main policies generally sought by firms include subsidies, control over entry, control of substitutes and complements, and price fixing. In particular, Stigler [30, p. 5] found that the Civil Aeronautics Board, since its inception in 1938, has not allowed a single new trunkline. He also found that even though the quantity of freight hauled by common carrier truckers has increased

and the requests for new certificates has reached 5,000 annually in recent years, the numbers of such carriers has decreased.

Occupational licensing is another device employed by interest groups to improve their economic standing. Since most licensing is performed at the state level, the political process can be used to initiate the requirement for licensing. In order to test this hypothesis, Stigler [30, p. 14] specified a function having the first year of licensing as the dependent variable and 2 independent variables: (1) the ratio of occupational size to the total labor force of a state in the census year nearest to the median year of regulation, (2) the fraction of the occupation found in cities over 100,000 (over 50,000 in 1890 and 1900) in that same year. In general, the larger the occupation and the larger the city, the earlier licensing regulation was enacted.

Jordan [17] tested three hypotheses regarding the purpose of regulatory commissions. They were consumer protection, no-effect, and producer protection. His hypotheses were tested on interstate airlines, railroads, and freight motor carriers. Given the producer protection hypothesis, one would hypothesize that after regulation of competitive or oligopolistic firms, industries would experience increased price levels, greater price discrimination, greater rates of return and restricted entry. Jordan found all to be true except rate of return which he found to be inconclusive. He states that, "Overall, there is clear evidence that regulatory policies and procedures do have substantial effects on these industries, and that these effects tend to

benefit producers rather than consumers" [17, p. 174].

Hilton [16] charges that regulatory commissions try for minimal squawk behavior, plan in the short-run only, and cross subsidize uneconomic service for noneconomic reasons. He maintains that his charges are a result of vague directives from Congress, ambiguous rate setting directives, and administrators whose tenure in office is short, thus adding incentive for them to attempt to increase their chances for employment in the regulated industries after their regulatory employment has expired.

Conclusions and Implications

In conclusion, it has been argued that rents exist as a result of regulation and would be reduced or eliminated without regulation. The decision rules resulting from the Buchanan-Tullock model indicate that rational individuals will choose market management over a regulated market whenever private external costs are less than collective external costs plus decision costs. It is argued that with the development of competing modes over time, there has been a decrease in private external costs. Referring to the Buchanan-Tullock model, it is hypothesized that consumers would choose market management as opposed to the current regulated market; however, this has not been observed. A de-emphasis of regulation has not been realized because legislators and regulatory commissions are dominated by transportation interests. Therefore, the basic conclusion of this note is threefold. First, producers have the

capacity to exploit the regulatory process to their own advantage. Second, regulation results in higher transportation costs to consumers. Third, regulatory operations are predicated on producer interest in the main and only secondly on consumer interest. Implications to be drawn from these conclusions are twofold. First, regulatory policy has not been consistent with an efficient transportation system. Second, a de-emphasis of regulation would be a major, and possibly sufficient, step to realizing competitive conditions among transportation modes.

FOOTNOTES

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1. To achieve an efficient transportation system, the following economic problems must be solved: "The efficient allocation of resources to the provision of transportation services and facilities as compared to other uses to which these resources might be put, with efficient allocation among the various agencies which supply transportation today and with the efficient utilization of the resources already allocated" [23, p. 4].
 2. Rents are defined as that part of the firm's income which is above the minimum amount necessary to keep that firm in its given occupation. For this analysis, however, rents are defined to include those profits mentioned above plus those costs associated with non-price competition (which results from the industry being price constrained-regulated) [10 and 35].
 3. While these mark-ups imply large potential rents (profits), they do not accrue to the airlines because of non-price competition, variation in quality being an important non-price variable [10 and 35].

4. External costs are defined as "costs that the individual expects to incur as a result of the actions of others over which he has no direct control" [6, p. 45].
5. Decision making costs are defined as "costs which the individual expects to incur as a result of his own participation in an organized activity" [6, p. 45].
6. For this analysis, it is assumed that regulation is the most efficient public alternative to an unconstrained market institution.
7. For example, the necessity to arrest destructive competition both intra and inter mode, the high costs of re-establishing a mode or modes that had lost their comparative advantage and had declined in importance, and maintenance of unprofitable routes.
8. In our government, most collective decisions are made by majority vote. The cost of collective organization will be greater than level D (minimum of schedule C) in Figure 1 if the minimum of schedule C is not associated with a majority vote.
9. The rents associated with private market organization are not necessarily identical with those encountered under regulatory constraint. Rents could accrue to a firm under regulatory constraint as a result of regulation and in excess of those that could be earned under private market organization. However, as the percentage of people required to make a collective decision increases, the chance for abuse decreases which decreases expected rents.

10. The entities of the task environment include: (1) customers, both distributors and users; (2) suppliers of materials, labor, capital, equipment and work space; (3) competitors in markets for outputs and inputs; (4) regulatory groups, including governmental agencies, unions and interfirm associations.
11. It is recognized that certain producers and certain modes wield more power and influence over regulatory agencies than others. Power and influence are not equal among participants; however, in general, producers have considerable influence with regulatory agencies. Before regulation, producers did not clamor for interference because of the uncertainties that would accompany enactment. Now, most producers (not all) discount the idea of deregulation for several reasons, one of the most significant being the uncertainties deregulation would bring.

REFERENCES

- (1) Altman, Edward I. "Predicting Railroad Bankruptcies in America," The Bell Journal of Economics and Management Science, Spring 1973, Vol. 4, No. 1, pp. 184-211.
- (2) Blaine, J. C. D. "The Dynamics of Transportation," Transportation Journal, Vol. 6, No. 4, Summer 1967, pp. 19-27.
- (3) Blauwens, G. "The Optimal Output of Transport In An Imperfect Economic Environment," Journal of Transport, Economics, and Policy, September 1972, Vol. 6, No. 3, pp. 285-293.
- (4) Blood, Dwight M. "The Impact of Transportation Rate Structure on the Movement of Agricultural Commodities," Journal of Farm Economics, Vol. 46, No. 5, December 1964, pp. 1297-1305.
- (5) Buchanan, James M. The Demand and Supply of Public Goods, Rand McNally and Company: Chicago, 1968.
- (6) _____ and Tullock, Gordon. The Calculus of Consent, University of Michigan Press: Ann Arbor, Michigan, 1971.
- (7) Burkhead, Jesse and Miner, Jerry. Public Expenditure, Aldine Publishing Company: Chicago, 1971.
- (8) Caves, R. E. Air Transport and Its Regulators, Harvard University Press: Cambridge, Mass., 1962.
- (9) Douglas, George W. "Price Regulation and Optimal Service Standards," Journal of Transport, Economics, and Policy, May 1972, Vol. 6, No. 2, pp. 116-127.

- (10) _____ and James C. Miller III. "Quality Competition, Industry Equilibrium, and Efficiency in the Price-Constrained Airline Market," American Economic Review, September 1974, Vol. 64, No. 4, pp. 657-669.
- (11) Emery, P. W. "An Empirical Approach to the Motor Carrier Scale Economics Controversy," Land Economics, August 1965, pp. 285-289.
- (12) Farmer, Richard N. "The Case for Unregulated Truck Transportation," Journal of Farm Economics, Vol. 46, No. 2, May 1964, pp. 398-409.
- (13) Frye, Joseph L. "An Analysis of Rail-Water Coordinate Service," Transportation Journal, Spring 1967, Vol. 6, No. 3, pp. 5-15.
- (14) Garrison, W. L. "Fragments on Future Transportation Policy and Programs," Economic Geography, Vol. 49, No. 2, April 1973, pp. 95-102.
- (15) Griliches, Zvi. "Cost Allocation in Railroad Regulation," The Bell Journal of Economics and Management Science, Spring 1972, Vol. 3, No. 1, pp. 26-41.
- (16) Hilton, George W. "The Basic Behavior of Regulatory Commissions," The American Economic Review, Vol. 62, No. 2, May 1972, pp. 47-54.
- (17) Jordan, William A. "Producer Protection, Prior Market Structure and the Effects of Government Regulation," Journal of Law and Economics, 15 (1), April 1972, pp. 151-176.
- (18) _____. Airline Regulation in America, Johns Hopkins University Press: Baltimore, Md., 1970.

- (19) Keeler, Theodore E. "Airline Regulation and Market Performance," The Bell Journal of Economics and Management Science, Autumn 1972, Vol. 3, No. 2, pp. 399-424.
- (20) Koshal, Rajindar K. "Economies of Scale," Journal of Transport, Economics and Policy, Vol. VI, No. 2, May 1972, pp. 147-153.
- (21) Niskanen, William A., Jr. Bureaucracy and Representative Government, Aldine-Atherton: Chicago and New York, 1971.
- (22) Pegrum, Dudley F. "Conflicts in Transport Policy," Transportation Journal, Vol. 6, No. 1, Fall 1966, pp. 5-16.
- (23) _____. Transportation: Economics and Public Policy, 3rd Edition, Richard D. Irwin, Inc.: Homewood, Illinois, 1973.
- (24) Roberts, Merrill J. "Some Aspects of Motor Carrier Costs: Firm Size, Efficiency and Financial Health," Land Economics, August 1956, pp. 228-238.
- (25) Sampson, Roy J. "Inherent Advantages Under Regulation," The American Economic Review, Vol. 62, No. 2, May 1972, pp. 55-61.
- (26) Scherer, F. M. Industrial Market Structure and Economic Performance, Rand McNally and Company: Chicago, 1971.
- (27) Sloss, James. "Regulation of Motor Freight Transportation: A Quantitative Evaluation of Policy," The Bell Journal of Economics and Management Science, Autumn 1970, Vol. 1, No. 2, pp. 327-366.
- (28) Spann, Robert M. and Erickson, Edward W. "The Economics of Railroading: The Beginning of Cartelization and Regulation," The Bell Journal of Economics and Management Science, Autumn 1970, Vol. 3, No. 2, pp. 227-244.

- (29) Spyschalski, John C. "Shippers Views Toward Railway Rate Deregulation: The Case of Agricultural Traffic," Transportation Journal, Spring 1967, Vol. 6, No. 3, pp. 16-25.
- (30) Stigler, George J. "The Theory of Economic Regulation," The Bell Journal of Economics and Management Science, Spring 1971, Vol. 2, No. 1, pp. 3-21
- (31) Thompson, James D. Organizations in Action, McGraw Hill Book Company: New York, 1967.
- (32) Ulrey, Ivon W. "Problems and Issues in Transportation Policy and Implications for Agriculture," Journal of Farm Economics, Vol. 46, No. 5, Dec. 1964, pp. 1281-1289.
- (33) Warner, Stanley J. "Cost Models, Measurement Errors, and Economies of Scale in Trucking," in M. L. Burstein et al., The Cost of Trucking: Econometric Analysis, William C. Brown Publishers: Dubuque, Iowa, 1965, pp. 1-46.
- (34) Weeks, Sinclair. Revision of Federal Transportation Policy--A Report to the President, U.S. Government Printing Office: Washington, D. C., 1955.
- (35) White, Lawrence J. "Quality Variation When Prices Are Regulated," The Bell Journal of Economics and Management Science, Autumn 1972, Vol. 3, No. 2, pp. 425-436.
- (36) Williams, Ernest W., Jr., ed. The Future of American Transportation, Prentice-Hall, Inc.: Englewood Cliffs, N. J., 1971.

- (37) Wilson, George. "The Effect of Rate Regulation on Resource Allocation in Transportation," The American Economic Review, Vol. 54, No. 3, May 1964, pp. 160-171.