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ORGANIZATIONAL FORM AND PERFORMANCE IN URBAN MASS TRANSIT

ABSTRACT

Ownership and management for urban mass transit organizations have taken many forms over the years, with publicly-owned and managed systems now dominant. In recent years, however, strong economic and political forces have increased pressures for privatizing urban mass transit services. This review analyzes twenty studies from three countries on the relationship between organizational form and transit performance. It concludes that previous research has not made a persuasive case for the whole-scale privatization of either ownership or management of urban mass transit organization.

ORGANIZATIONAL FORM AND PERFORMANCE IN URBAN MASS TRANSIT

§ 1. INTRODUCTION

The evolution of ownership within the U.S. transit industry during this century is well documented (Barnum, 1977; Fielding, 1983a). Privately-owned firms carried most transit riders at the turn of the century. The mortality rate for these organizations was quite high as transit riders shifted to the use of automobiles. However, most surviving transit organizations remained privately owned until 1964, when federal capital subsidies became available to local government. Since 1964, most transit organizations have come under public ownership.

Recent concerns about transit performance and about the continuation of federal operating subsidies have led to calls for reassessment of transit ownership and management practices in the United States (Fielding, 1983b). Both scholars and public officials have shown interest in privatizing public transit services (Poole, 1980; Savas, 1982). This option also has received favorable consideration in several other countries.

This review analyzes the results of twenty international studies about the performance of transit agencies operating under different ownership and management conditions. The relative advantages of public or private ownership and management conditions. The relative advantages of public or private ownership and management are assessed against three broad performance dimensions: operating efficiency, revenue generation and service effectiveness. The paper concludes with research and policy implications drawn from the review.

§ 2. CONCEPTUAL OVERVIEW

Organizational forms may be described and analyzed by arraying them along two conceptual dimensions: ownership and management. Berle (1959) observed

that ownership is essentially a relationship between an individual and a tangible or intangible thing. An owner secures possession of this thing by legal title, and out of his possession flows control over its use and enjoyment of its benefits. Management is a process in which people equipment, materials, and other organizational resources are combined to produce goods and services. Managers are defined by their activities, which are intended to facilitate the operation of an organization and to keep it achieving, or approaching, its goals. Although specific definitions vary, management activities include planning, staffing, directing and monitoring results, and coordinating people.

Variations in ownership and management are commonly associated with organizational performance (Meyer, 1982). For example, the current interest in the ownership of public services arises from the belief that varieties of ownership forms are systematically associated with differences in organizational performance. The public sector is often stereotypically linked with inefficiency and ineffectiveness. This may be in part due to lack of participation in the marketplace. But it may also be a product of the difficulty of determining how efficient, effective, or productive an organization is when it produces non-excludable goods and/or when its outputs are not priced and sold. Furthermore, inefficiency and ineffectiveness in public services may be a result of responsiveness to the public interest. Elections are expected to secure responsiveness. But there is little reason to suppose they insure, or even encourage, the efficient or effective production of services. Indeed, they may do the opposite, as politicians promise that services will be provided for very different constituencies simultaneously. The public sector is also expected to promote equity and justice. These are terms open to many varied interpretations. It is thus

difficult to define and promote goals of public sector enterprises.

The academic literature on privatization focuses on the prospects of increasing the efficiency of public sector organizations by altering arrangements for the production and delivery of public services. Privatization usually means increasing the role of private firms in production and distribution, although it may also involve private sector planning and financing. Several strategies accomplish privatization. One is what Savas called load shedding, turning over a formerly public service to the private sector. The public sector might thereby simply withdraw from the supply of the service, or might retain a presence through standards for service quality. Another privatizing strategy is to franchise or license a few producers to operate in a jurisdiction. This is sometimes done now with taxicabs.

But the most common form of privatization is performance contracts for the purchase of services (Fisk, Kiesling and Muller, 1978). Performance contracts allow governments to establish service standards and performance incentives, but give private contractors the choice of how to produce the service. The expected advantages of contracting include the flexibility to negotiate for service expansions or reductions. Without public employee unions or civil service protections, the contracting government can alter the level of services applied. Contracting is also expected to provide greater efficiency in service production by reducing costs. It is expected to result in clearer definition of service characteristics, so that governments can specify what they are contracting to obtain. This is an advantage, because it may discourage pouring money into ill-defined services which do not seem to generate the desired results. Contracting is also expected to provide greater efficiency in service production by reducing costs. It is expected to result in clearer definition of service characteristics, so that governments can specify what they are contracting to obtain. This is an advantage, because it

may discourage pouring money into ill-defined services which do not seem to generate the desired results. Contracting may also make it possible to take advantage of expertise provided by private firms serving several jurisdictions and may encourage innovation in service production techniques (Straussman, 1981; Fisk, Kiesling and Muller, 1978; Poole, 1983).

The success of contracting and other privatization strategies is contingent upon several factors. Private sector efficiency may be partially the result of the profit motive. But it is also a function of the market conditions under which a service is provided. If the market is competitive, the threat to change contractors may be a motivation for efficiency. But if there are no alternative suppliers, then a contractor can extract monopoly profits even if he is inefficient. Although competition may be a necessary condition for efficiency, it is quite possible that it is not sufficient. The information that competitors exist must be known by public officials and/or citizens, and these individuals must be willing and able to act on it. Lack of knowledge about competitors reduces effective competition by restricting the pool of alternative suppliers. It is unclear whether privatization will increase the efficiency of public service production and distribution. Straussman (1981) says there is little empirical information about the real--as opposed to the expected--benefits of privatized contracting. On the other hand, Pool contends the overwhelming weight of the evidence (as well as economic theory) points to the conclusion that competitive provision of public services will end up costing less than monopoly provision (1983). The empirical literature on organizational form and transit performance is reviewed next as a means for assessing these conflicting assertions.

3. RESEARCH REVIEW

A summary of 20 studies which investigate ownership-management structure and performance in urban mass transit is presented in table 1. Although a relatively large literature deals with the performance aspects of transit, there is a paucity of research on the relationship between ownership-management forms and performance. For the purposes of this review, we have further limited the available research by eliminating case studies and examining only those studies which investigate both form and performance.

Most of the reviewed research used large organizational samples from which statistical inferences were drawn. All of the studies used an ex post facto research design and most employed regression techniques as the primary statistical analysis technique. Because the review focuses on the relationship between form and performance, research was drawn primarily from the fields of political economy, microeconomics, and transport economics. A few studies originated from the fields of public administration and organizational behavior.

The studies reviewed are listed alphabetically in Table 1. The independent variables listed in the Table are limited to those which focused upon the form-performance relationships. The "major findings" column summarizes those conclusions which relate directly to form-performance relationships.

TABLE 1 ABOUT HERE

The most frequent structural distinction made within the studies was a simple public-private dichotomy; some authors identified a variety of distinctions. Although they examined similar performance phenomena, e.g., efficiency and effectiveness, the definitions of criteria were often dissimilar. The findings are discussed here according to three performance criteria categories: operating efficiency, revenue generation and service effectiveness.

3.1 Operating Efficiency

Efficiency in public transport generally refers to the use of inputs (Labor, capital and fuel) to units of produced service outputs. Operating efficiency focuses specifically on labor, vehicle, fuel and maintenance factors (expense, employee, roadcall) or general operating expense.

Research on relative efficiencies of transit organizational forms has produced highly diffuse results. Results from six studies (Foster, 1973; Pashigian, 1976; Holthoff and Knighton, 1977; Wallis, 1980; Pucher, 1982a, Anderson, 1983) indicate private ownership is more efficient than public; four (nelson, 1972; Pozenda, 1977; Barbour and Zerrillo, 1982; Anderson, 1983) support the opposite conclusion. Three studies of ownership found no differences (King and Erlbaum, 1977; Barnum and Gleason, 1979; Pucher, 1982b). There are fewer studies on contract management, but these results are also ambiguous (Barnum, 1977; Pucher and Markstedt, 1983; Pucher, Markstedt and Hirschman, 1983). Analysis of these studies suggests some reason for these ambiguities: performance differences among types of public owners, differences in the type of areas served by public and private firms, and changes in the population of public and private organizations over time.

Nelson (1972) and Anderson (1983) found that public firms owned by municipalities were more efficient than private firms. Giuliano (1980)

replicated this result in a comparison between municipalities and special districts. These unexpected differences in operating efficiency were attributed to two factors: (1) the ability of municipal firms to transfer overhead costs from the transit department to the costs of other departments; and (2) the acquisition of tax-free capital funds by public firms which were inaccessible to private firms.

Foster (1973) categorized transit firms by population density and firm size. In cities with low population densities, public firms had lower unit costs in both 1960 and 1970. High population density cities showed private firms with lower unit costs for 1960 and 1970. Overall, small public firms obtained lower costs per vehicle mile than small private firms. Large private firms had lower costs per vehicle mile than large public firms in general over the ten year time period.

King and Erlbaum (1977) controlled for city population and density. In large cities with a high density population, private firms covered operating costs by subsidizing basic trunk line service with revenue from non-line haul services. King and Erlbaum concluded that "private operators...do not perform any better than public operators in the provision of basic trunk line services" (p. 13). Barbour and Zerrillo (1982) found that small private firms generally have higher operating costs per vehicle mile and per vehicle hour than small public firms.

Anderson (1983) attempted to capture the economic effects of private-to-public ownership transitions with 1967-1974 data. By 1974, 77 percent of bus transit operations were publicly owned. Anderson's study found that the overall private-to-public ownership change resulted in a 26-73% increase in cost/revenue ratios. In addition, cost per passenger and cost per bus hour increased. Even though most public transit firms exhibited high costs, public municipal transit firms obtained the lowest cost per revenue passenger

during the same seven year period, corroborating Foster's (1973) findings for the 1960-1970 period.

One trend seems to emerge from these studies: the more recent the analysis, the more likely that private ownership will be more efficient than public. There are several probable explanations for this trend. First, because the total number of privately-owned operators has grown quite small, estimates of relative efficiencies have become increasingly unreliable, raising questions about the validity of recent cross-sectional studies. Second, statutory and other environmental changes may have affected public and private firms differently. For example, Pucher, Markstedt and Hirschman (1983) attributed higher operating costs of public firms to federal policies between 1960 and 1975. Finally Hothoff and Knighton (1977) suggest that the trend is a function of which firms have opted for public ownership in recent years. The least productive private firms tend to become public. They write (p. 19): "It is not because operations are public that they are unproductive, but the reverse: Unproductive operations tend to become public."

The declining number of privately-owned firms has led some investigators to abandon ownership comparisons and instead to compare privately-managed contractors with public firms. Barnum (1977) concluded that publicly-owned and managed firms were more efficient than contract-managed firms. Pucher, Markstedt and Hirschman (1983) and Pucher and Markstedt (1983) found that contract management obtained lower per hour costs and was, therefore, more productive. Thus, the research results on the relative efficiency of contract management are inconclusive.

Labour Efficiency. A significant component of operating costs is payments to labour. Based upon 1960-1970 data, Foster (1973) found operator wages to be a significant factor in rising costs per vehicle mile after 1967.

He attributed this wage inflation to increased public ownership of transit firms. Supporting Foster's conclusion, Hammermesh (1975) found that the private-to-public ownership transition correlated with a major wage increase for the first two years after the transition. After the initial two-year period, public transit firms maintained the higher wage rate. Finally, Anderson's (1983) study using 1967-1974 data supports the thesis that the private-to-public ownership transition brought higher wages. She found that the ownership transition correlated with an increased real wage rate in all cases except conversion to special transit authority without taxing power.

For a more recent period (1978-1980), Barbour and Zerrillo (1982) found that labor efficiency in terms of vehicle miles and hours per employee was higher for small private firms than small public firms. The same measures for large firms showed vehicle hours per employee equal for public and private firms, but vehicle miles per employee showed private employer higher than public. One must note, however, that Barbour and Zerrillo based their conclusions on New York data which contained many private express operators, which may have significantly affected results.

Barnum and Gleason (1979) analyzed the wage differences between private and public sectors on a variety of intraorganizational levels. They found that a municipal firm's operator base wage rate increases as subsidies increase; whereas, management contract firms exhibit a higher degree of overtime payments to operators. Municipal firms also exhibited a negative correlation between non-operator pay and subsidies.

3.2 Revenue Generation

Revenue generation compares the amount of revenue generated by the system to unit of service output. Passenger revenue includes farebox revenue, pass sales and auxiliary income, but operating revenue may include these revenue sources as well as revenue from charter, freight and other sources.

Pashigian (1976) found that private firms regulated by state agencies obtained higher revenues per vehicle mile than public firms under similar regulatory restraints. State regulated private firms had higher profits than local regulated private firms. In contrast, private firms under local regulated private firms performed equivalent to public firms on a revenue per vehicle measure. In sum, Pashigian concluded that the political proximity of regulators is related to performance levels. This conclusion has received support from several later studies (Anderson, 1983), but has also been refuted in a later study of British transit (Higginson and White, 1982).

After the dramatic increase of federal operating and capital subsidies in the seventies, previously parallel revenue/cost ratios of public and private transit firms went askew. Anderson (1983) examined the private-to-public ownership transition from 1967-1974 and found a 12% farebox real price decrease in the public sector. As farebox revenues decreased, public firms relied heavily upon operating subsidies (Nelson, 1972). With the rising federal subsidy level, public fares consistently decline (Barnum and Gleason, 1979; Anderson, 1983).

During this same period, privately-owned firms retained or increased farebox prices at a faster rate than public firms (Anderson, 1983). Contract managed firms have consistently shown the highest fare price (Anderson, 1983). In addition, private express services continued changing fares sufficient to cover operating costs (King and Erlbaum, 1977; Barbour and Zerrillo, 1982).

In summary, the past twenty years have shown farebox revenues gradually declining in comparison to costs. The effects of subsidies played a major role in this change (Pucher, 1982b & Pucher, Markstedt & Hirschman, 1983). In addition, the changing political economy of transit has influenced the willingness of public operators to increase fares to cover rising costs

(Marris, 1972). In contrast, private firms have consistently increased fare levels to cover rising operating costs.

3.3 Service Effectiveness

Service effectiveness involves utilization of the service by the public and the impact of transit in an area. Typical measures of service effectiveness focus on consumption of produced service units in terms of passenger trips or passenger miles. Other assessments relate produced output to the amount of public assistance necessary for system operations.

Although less research has been conducted on service effectiveness than the preceding performance dimensions, there is general agreement that public ownership has tended to increase service levels. Foster (1973) concluded that service, measured by the number of vehicle stops, increased after 1966 for public firms, while the average vehicle speed for public and private firms remained equivalent. Barbour and Zerrillo (1982) found that public bus systems usually achieved greater levels of passenger carrying effectiveness than private operators. Anderson's (1983) assessment of service factors which changed during the ownership transition from private to public in the U.S. differs significantly from the others. First, route miles increased while service frequency decreased. Second, total area served also increased. Anderson speculated that public systems focused on the "visible" aspects of transit operations in order to obtain increased political support for public ownership. As exhibited in Anderson's data, public firms indeed focused on the "visible" aspects such as number of route miles and geographical service area in lieu of less "visible" services such as frequency. While focusing on these "visible" aspects of services, the public firms also incurred a 26-73% increase in cost/revenue ratios (Anderson, 1983).

An aspect of the service effectiveness concept not addressed in any research is the social equity of the services delivered by particular

organizational forms. Because major goals of transit are to increase mobility within urban areas and to provide transportation for the transit dependent, the distribution of services should be an important performance criterion. Research on the distribution of services in the contexts of urban services generally (Lineberry, 1977) and transit specifically (Prosperi, 1980) need to be extended to organizational form-performance relationships.

3.4 Summary

Conclusions drawn from the twenty studies reviewed above are summarized in Table 2. These conclusions might best be described as "tendencies" uncovered in the research because of the limited volume of research and the disagreements among the studies. Many of the results, particularly those involving costs, do not appear to be stable over time, judging by contradictory findings of studies conducted during the 1960's and 1970's. There are both methodological and substantive explanations for this instability.

TABLE 2 ABOUT HERE

From a methodological standpoint, it can be argued that enhancements in organizational form-performance research have occurred over time and, therefore, the findings of recent research should be considered more valid than earlier research. Most of the research, however, failed to reflect the continuity implied by this explanation. There was considerable variation of form-performance definitions over time and few attempts to systematically relate them from study-to-study.

A more likely methodological explanation for the instability of findings

is the heterogeneity of samples used in the various studies. Research samples varied widely by number of cases (ranging from a metropolitan area sample to national sample), services rendered and stage in organizational life cycle. This variability makes valid comparisons tenuous.

The sample variability explanation is very closely allied to changes within the population of organizations, which is one possible substantive explanation for the instability of research findings. The U.S. transit industry has experienced significant changes during the last 20 years (Barnum, 1977; Fielding, 1983 a & b). Federal financing and regulatory policies, inflationary energy prices and public preferences have profoundly altered the context and practices of the transit industry. These shifts could have modified the relative merits of different organizational design.

Many of the studies we reviewed found that organization size, urbanization or other contextual variables affected the design-performance associations. These moderators might have contributed to the instability problem we discussed earlier.

We noted in our review of the general conceptual literature that private ownership and management are stereotypically linked with efficient and effective services; public services are the antithesis. These stereotypes disintegrate, however, upon empirical examination, as this review demonstrates.

2 4. CONCLUSIONS

As noted earlier, some of the reasons for the absence of consistent and cumulative research results are methodological. The variety of organizational samples, time periods and analytical methods have made comparison of research results difficult and, in some cases, treacherous. Future research would benefit from a common data base which would reduce sample variability from

study-to-study. In the U.S., the Urban Mass Transportation Administration's Section 15 reports should provide this standardized, reliable and longitudinal data base. Furthermore, organizational context needs to be systematically integrated into future methodologies. The "peer group" concept developed by Fielding et al (1984) could be a useful analytic device for conducting organizational comparisons. Specifically, future research methodologies could incorporate one or more of the following recommendations:

1. For the purposes of developing policy implications, time series or pooled time series analysis is needed. This is because organizational form has developed over time, and a complete set of organizational types does not exist at any point in time (e.g., in the 1960's, the transit authority type was not popular, and today private ownership is rare among large and medium-sized transit systems).
2. Research has shown that there are important variations in efficiency and effectiveness among different forms of public ownership and management. These differences are obscured by studies using a simple public-private ownership dummy variable.
3. Environmental variables, including legal and political process variables, are essential to an accurate econometric model of transit industry. Incorporating political economy variables in such a model has not yet been done, but such a model of economic and political markets for transit, using pooled time series data, should return useful policy results.

The shortcomings of previous research, however, are not purely methodological, but also theoretical. Theory has often been implicit. The explicit use of theory has usually been limited to arguments about the superiority of private ownership because of the profit motive. What alternative perspectives might be useful for replacing the overly simplified

theoretical relationships about organizational form and performance? Two directions seem to have merit. First, performance of managers in the public and private sectors may be a function of three factors, which are independent of organizational ownership and management, but are often confounded with them. These factors are: incentive systems, economies of scale, and arena structure (Poole, 1983). Incentive systems encompass the rewards and punishments for certain behaviors. Arena structure refers essentially to the market conditions (e.g., competitive versus monopolistic) under which a service is provided. Economies of scale refer to the relationship between unit cost structure and size.

That these variables are important is supported by Anderson's (1983) research which concluded that performance differences did not appear to be a function of ownership, per se, but rather of bureaucratization and sponsorship. These results coincide with the views of public choice theorists, who argue that competition and economic incentives ought to be used to maximize desired results.

This approach might also account for the research findings that have identified performance differences between special districts and municipal governments. For example, municipal governments are essentially multidivisional service organizations, and the probable competition, accountability and coordination inherent in this organizational structure may produce more efficient results.

Second, organizational form and performance could each be studied as variables in more inclusive population ecology and political economy theories. The former framework involves an application of population ecology theory to the study of organizations (Hannan and Freeman, 1978). Theories of political economy stress power phenomena as a means for understanding economic

relationships and structural formation and change within organizations (Freeman, 1982). These theories together would be useful for understanding processes underlying organizational creation, the variety of organizational forms (e.g., why are the types of organizational forms today so different from those 20 years ago?), and the goal formation process (e.g., how do the organization's formal goals differ from those pursued by the dominant management coalition?). This direction might also consider what equilibria are optimal for the pursuit of different primary goals, for example, efficiency versus social welfare.

Implicit in our criticisms and suggestions for future research is the view that the use of past research about the relationships between organizational form and performance for the development of public policy would be both difficult and risky. Past research is not conclusive about how the design of transit agencies can be altered to improve efficiency. Any effort to apply past research to current service effectiveness problems would be very hazardous. For the time being, policy decisions will have to be made without the advantage of conclusive research support.

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Table 1. SUMMARY OF EMPIRICAL STUDIES ON
TRANSIT STRUCTURE AND PERFORMANCE

Study	Ownership/Management Categories Used In Study	Sample Size	Year(s) Data Were Collected	Dependent Variable(s)	Independent Variable(s)	Major Findings
Anderson, S.C.(1983) The effect of government ownership and subsidy on performance: Evidence from the bus transit industry.	Private Private utility- owned Transit authority with/without taxing power City or country transit Contract management	76	1967-1974	Demand (annual revenue passengers) Service frequency Price (average revenue per passenger) Wage rate Cost per bus hour Bus hours per urban area	Subsidy source and type Service type Area demographics	Publicly-owned firms managed by contract offered less service frequency and efficiency (cost per bus hour and per cost per bus hour and per revenue passenger) and charged a higher real fare than publicly- owned firms managed by municipal governments. All public ownership types with public management were associated with lower real average fares than regulated private fares ranging from -9% to -19%.
Barbour, L.C. and Zerillo, R.J.(1982) Transit performance in New York State.	Public Private	110	1978-1980	Four measures of efficiency, three measures of economy, and seven measures of effectiveness	Fleet size Type of service provided	Generally, private systems exhibit higher efficiency; however, public systems are higher in passenger- carrying effectiveness, number of passengers and passenger miles. High degree of private system express services may partially explain larger private revenues.
Barnum, D.T. (1977) <u>From private to public: Labour relations in urban mass transit</u>	Transit authority City or country transit Contract management	8-49	1965-1971	Wage level Vehicle hours per employee	Subsidy Local labour market System size Geographic region Union presence City demographics Political influence	No difference in the wage levels of public and private systems. Public productivity (vehicle hours per employee) was also higher than private contract management.
Barnum, D.T. & Gleason, J.M. (1979) <u>Measuring the influence of subsidies on transit efficiency and effectiveness.</u>	City transit Transit authority Special district Contract management	26-29	1974-1976	Cost per vehicle hour Wage rates Annual riders per capita	Operating and capital subsidies from local, state, and federal government. Geographical area Fleet Size	Ownership and management forms had an insignificant effect on base operator and non-operator wage rates. City transit had higher operator wage rates but lower non-operator wage rates than transit authorities or special districts. Contract management related to higher overtime payments to operators.

Table. 1. SUMMARY OF EMPIRICAL STUDIES ON
TRANSIT STRUCTURE AND PERFORMANCE (con'd)

Study	Ownership/Management Categories Used in Study	Sample Size	Year(s) Data Were Collected	Dependent Variable(s)	Independent Variable(s)	Major Findings
Foster, J.R. (1973) <u>The determinants of and the cost functions of urban 1960-1970.</u>	Public Private	51	1960-1970	Cost per vehicle mile (total expenses/ total bus miles)	Bus miles Wages Bus speed City population, density, land area. Route miles Buses per route mile Ownership	Vehicle costs per mile from 1961 1967 were lower for public firms as a group than for private firms; more rapidly rising wages in public firms eliminated difference by 1969-70. But, small public firms in low population densities had lower cost per vehicle mile in similar densities. The reverse occured with larger firms and higher densities.
Giuliano, G. (1980) <u>Transit performance: The effect of environmental factors.</u>	Municipal firm Transit district	30	1976-1977	Revenue vehicle hours per employee Operating expense per revenue hour revenue vehicle hours per maximum vehicle hours	Peak/base ratio Firm age Fleet size Wage rate Population density Union/non-union status	Municipal operators had lower and higher cost effectiveness than transit district operators, but they were also usually smaller operators with smaller service areas. Geographic extent of (size) of transit system has a significant positive relation with cost-vehicle mile.
Hammermesh, D.S. (1975). <u>The effect of government ownership on union wages.</u>	Public Private	48	1963-1971	Unionized operator wages relative to manufacturing worker's hourly earnings Public craftsmen wage relative to private craftsmen	population size and density Unionized/ non-unionized manufacturing workers Population educational attainment Minority population	Wages increased during first two years after private-to-public ownership conversion; subsequent years show no further changes in private/public wage disparity.
Higginson, M.P. & White, P.R. (1980) <u>The efficiency of British urban bus operators</u>	District council Regional council Passenger executive transport London transport	55	1970-1980	Fifty operating efficiency indicators	Degree of local political control Fleet size Type of vehicle Peak/off-peak ration Staff size Area demographics performance	District council firms, i.e. municipal, with a fleet of 100-200 buses and town size of 150-200,000 performed best on a variety of efficiency indicators. Degree of local political control has insignificant influence on performance.

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Study	Ownership/Management Categories Used In Study	Sample Size	Year(s) Data Were Collected	Dependent Variables	Independent Variable(s)	Major findings
Holthoff, W.C. & Knighton, R.G. (1977). Cost increases, cost differences and productivity of transit operations in New York State	Public Private	12	1973	Total operating costs -labor -maintenance Vehicle miles per employee Revenue passengers per year	Average operating speed	Private firms obtained higher vehicle miles per employee than public firms.
King, R.L. & Erlbaum, N.S. (1977) <u>Factors influencing transit productivity.</u>	Public Private	66	1974-1977	Passengers per vehicle mile Revenue per vehicle mile. Cost per vehicle mile	Type of service (intra or inter-city service) Population	Depending upon area population and service type, private and public operators perform differently. Private provision of basic trunk line service does not perform any better than public provision.
Nelson, G.R. (1972) An econometric model of urban bus transit operations.	Private Utility-owned firm Private firm under local regulation Private firm under state regulation Public transit authority Public municipal firm	44-51	1960-1968	Market demand Market supply (bus-miles) market cost-revenue ratio Fare price Total costs	Firm cost-revenue ratios Wages Fleet Size Various demographic variables	In 1968, bus firms owned by power companies and municipalities had the highest cost-revenue ratio; government regulated private firms and transit authorities had a lower cost-revenue ratio. (The cost-revenue ratio was measured by the ratio of total costs to total passenger revenue.) Total costs (including a calculated capital cost) were 10% lower for public systems than for private.
Pashigian, B.P. (1976). Consequences and causes of public ownership of urban	Locally regulated private and public State regulated private and public Transit authority or District regulation of public firms	40-58	1960-1970	Operating revenue per vehicle mile Operating cost per vehicle mile operating profit margin	Operating expense per vehicle mile Vehicle miles Various economic and demographic variables Ownership/ Management/regulation structure	Private bus firms under state regulation had higher profits than those under local regulation. No evidence that the changeover to subsidized public firms reduced trip costs by improving service frequency.

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Study	Ownership/Management Categories Used in Study	Sample Size	Year(s) Data Were Collected	Dependent Variable(s)	Independent Variable(s)	Major Findings
Pozdena, R.J. (1977) Comparing regulated private production and public enterprise: The urban bus transit industry.	Public Private	28-42	1965-1970	Bus hours Route miles	Administration costs Maintenance costs Operating costs Fleet size Fuel consumption	Public firms in 1970 had lower costs per bus hour than regulated private firms.
Pucher, J. (1982a) A decade of change for mass transit.	Public Private	35	1970-1979	Cost per bus hour	Operating subsidies	Operating costs for privately- owned systems were \$.68 less per hour than for publicly-owned systems.
Pucher, J. (1982b) Effects of subsidies on transit costs.	Public ownership/ public management Public ownership/ private management	86	1979	Cost per bus hour	Operating subsidies Fleet size Fleet age Monthly earnings of local public employees	Subsidies cause significantly higher operating costs per bus hour. Other factors that were expected to increase costs, such as private management and degree of peaking, had no significant effect.
Pucher, J. & Markstedt, A. (1983) Consequences of public ownership	Public Private	4	1970- 1975 1980	Cost per bus hour Cost per bus mile Cost per passenger	Operating subsidies Bus hours per employee Comprehensive wage rate increases Trends in labor costs Trends in ridership Trends in business hours & rules Trends in fares	Increased subsidies and public ownership have kept down fares, permitted expansion, but encouraged wasteful cost escalation.
Pucher J., Markstedt, A., & Hirschman, I. (1983). Impacts on costs of urban public transportation	Public ownership/ public management Public ownership/ private management	77-135	1979-1980	Operating cost per bus hour	Fleet size and age Wage Operating subsidies Peak/base ratio Bus hours per employee Percentage of work- trips made on mass transit.	Operating costs for privately managed/publicly-owned firms were \$1.72 lower per bus hour than publicly owned/publicly- managed firms.

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Study	Ownership/Management Categories Used In	Sample	Year(s) Data Were	Dependent Variable(s)	Independent Variable(s)	Major Findings
Robey, D., Bakr, M.M. & Miller, T.S. (1977). Organizational size and management autonomy: Some structural discontinuities.	Municipal ownership/ private management Transit authority ownership/private management	26	Not Provided	Degree of centralization Operations autonomy Number of levels in hierarchy	Size (Fleet size)	Neither size nor organization type were correlated with centralization of number of administrative levels. Larger transit systems exhibit more autonomy than smaller systems. Centralization not correlated with size or organization structure.
Sinha, D.C., Jukins, D.P. & Bevilacqua, O.M. (1980). Stratification approach to evaluation of urban transit performance.	Public Private	51	1975	Vehicle miles per vehicle Vehicle miles per driver Revenue passengers per driver Twenty-five other performance variables	Speed Wage rate Population Length of public ownership	Older public systems are more efficient in vehicle and passenger use than younger public systems. Young public systems have lower operating systems per vehicle, higher revenue per passenger, and higher deficit per capita. Duration of transit system public ownership accounts for ten percent of performance variance.
Wallis, I.P. (1980) Private bus operations in urban areas--their economics and role.	Public Private	11	1970-1978	Operating cost	Wage rate Maintenance cost Administrative cost Capital improvement cost Staff cost	Private operating costs in in Australia are 50-70 percent lower than public operating costs. Difference was attributed to greater labour flexibility; lower maintenance costs; smaller support staffs; lower basic wage rates and benefits.

TABLE 2. CONCLUSIONS ABOUT ORGANIZATIONAL FORM AND PERFORMANCE

Operating Efficiency:

Neither ownership nor management variations appear to have predictable associations with operating efficiency. Labour costs appear to be positively associated with public ownership.

Revenue Generation:

Publicly-owned systems have restrained fare growth as subsidies have increased; private and contract-managed firms have continued to increase fares to keep pace with rising costs.

Service Effectiveness:

Publicly-owned systems provide higher levels of service, but the criteria for allocation of these services may be politically rather than demand-based. No studies have looked at the relationship between distribution of services and organizational form.