

Motivations and Impediments to Public Transit Contracting, Consolidations and Alliances: The U.S. Experience

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I. INTRODUCTION

When public transit operators seek ways to improve their cost effectiveness, the question of transit organization often arises. Can the cost effectiveness of single service transit operators within a region be improved if the service is provided through some form of collaborative arrangement? Although transit collaborative arrangements exist, there is very little empirical evidence of the motivations for and impediments to such arrangements. For example, how are costs and benefits shared?; what agreement must be made to assure smaller participating firms or municipalities that their voices will be heard and their concerns and interests considered in major decisions? ; what mechanisms must be designed to resolve inter-firm or municipality conflicts and initial resistance which may result from organizational cultural differences and fear of 'the unknown'?

The purpose of this study is to investigate determinants (motivations, impediments and other factors) of whether public transit systems collaborate, thereby providing important information for understanding the success and failure of collaborative efforts. Three types of collaboration are distinguished: contracting, merger/consolidation and alliance. Contracting involves a firm hiring another firm to provide services along a route or to perform such tasks as equipment and facility maintenance. Merger/consolidation is an arrangement whereby firms combine under one management and the merging firms lose their individual identities. Alliance, on the other hand, is an agreement that combines services while the individual firms maintain their identities.

LITERATURE REVIEW

Schneider (1989) suggests from purely economic perspective that bureaucratic budget maximization and rent seeking are the reasons for bureaucrats supporting public cooperation/consolidation. This view holds that bureaucrats favor consolidation because it increases their monopoly power and enables them to raise taxes and fees thereby increasing their budgets.

Indeed if this is true, then one should expect higher levels of inefficiency and, therefore, a core argument against public cooperation/consolidation. Durning (1995), for example, contends that fragmentation holds down prices, and reduces the market for public goods thus causing inefficiencies. Further, Boynes (1992) and DiLorenzo (1983) argue that fragmentation, not consolidation, is associated with lower government costs in metropolitan areas.

Empirical results from public transportation and public administration studies suggest economies in consolidating transportation services (Viton, 1990), and mild optimism that consolidation improves services (Durning, 1995). However, Durning (1995), also found that consolidation of county services lowered efficiency, effectiveness and responsiveness and that contrary to popular views, the type of management did not affect cooperation nor did location in a SMSA increase cooperation. This finding is contrary to Campbell and Glynn (1990) result that the propensity to cooperate among cities depends upon city size.

In the public sector, counties and cities cooperate in the exchange of information and in the purchase and supply for public service (Campbell and Glynn, 1990). Similar cooperative arrangements are also found in the public transit sector, though here, the subject has not been well researched and documented. The few accounts of cooperation in public transit can be traced to Shaw (1981), Topp (1989, 1990) and Hartgen and McCoy (1990).

Topp's (1989, 1990) accounts of cooperation in public transit in Germany distinguished between cooperatives and federations. In Germany, cooperatives are found in small cities and emphasize service between towns and country. They do not involve establishing a new company, rather companies negotiate and work together. A federation, on the other hand, consists of firms that cooperate by establishing a new authority. Members of the federation divide revenues among themselves according to a predetermined formula.

In the United States, cooperation may be mandated by legislation as is the case in Los Angeles county where a commission was established and made responsible for short-range planning, policy and program development, project selection, new system development, resource generation and allocation. The legislation requires that "key decision makers sit together as a single policy board to discuss, decide and act in concert" (Shaw and Simon, 1981). Voluntary forms of cooperation exist in the United States, particularly, in delivering elderly and handicapped transportation services. Here, there is ample evidence of cooperative agreements at the local level and between agencies and transit firms (Lantz and Demetsky, 1981). At the regional level, cooperation exists between Metropolitan Planning Organizations (MPOs) in the form of county compacts, state and local government compacts, councils of MPOs, transportation management associations, and the establishment of state authorities (Hartgen and McCoy, 1990). Outside the transportation field, cooperation exists between counties in the exchange of information and services.

In the public sector the motivations for cooperation include service improvements and generating more revenue (Topp, 1994), better integration of highway transportation and public transit, to improve decision making, to make effective use of resources, and to involve municipalities and agencies in the transportation decision making process (Shaw et.al, 1981). Additional reasons to cooperation include getting social service agencies out of the transportation business, and ensuring greater vehicle utilization (Lantz and Demetsky, 1981). When cooperation has been used by counties, its purposes have been to increase efficiency, to provide better quality services at costs equal to or lower than each country would incur separately in providing the service (Durning, 1995; Town and Lambert, 1987; Dehoog, 1992). We may add that an additional reason for intercounty

cooperation is to pool together the individual expertise of the counties to develop and deliver high quality services.

When firms providing the same service are merged, the motivation may be cost savings that arise from consolidation of scale or the provision of a greater level of service. The (merged) regional system may be able to exploit economies in purchasing or inventory, or perhaps may use efficiently joint maintenance facilities and other types of capital. Similarly, when firms with different services are merged, the motivation is cost saving that arises from consolidation of scope. Here, although the modes may be distinct, there are potential cost savings from centralized functions (e.g., scheduling and payroll). The less distinct are the modes, the greater the potential for economies from consolidation of scope.

Cost savings from consolidation of scale and scope of transit systems have been investigated by Viton (1992). This study was restricted to operating costs and ignored the question of capital cost savings. Viton (1992) found that consolidations involving modes other than motorbus service could lead to significant cost savings but that the addition of motorbus service to other services could actually increase regional transit costs. Whether and to what extent cost savings arise from consolidation of scope depend upon the resulting system-wide wages compared to those paid by the individual transit agencies, as well as by the levels of services provided. If consolidation raises wages, the cost-saving effect of the multi-modal merger will depend upon the wage levels before and after the consolidation. Mergers of firms providing different services are more likely to be cost effective for smaller than larger agencies. A properly chosen consolidation can reduce costs whereas ill-conceived proposals may have the opposite impact.

Another motivation for establishing regional and multi-modal transit systems is government pressure (and the accompanying government funding). In Tidewater, Virginia, the Tidewater Transportation District Commission (TTDC), under pressure from the U.S. DOT has become the coordinator and provider of special transportation services in addition to fixed-route services. The TTDC has taken over the provision of special transportation services from human service organizations and the roles of the human services organizations have been limited to hiring and controlling drivers, determining an individual's eligibility for service, and securing \$1 million worth of liability insurance for the service.

Still another motivation for establishing regional and multi-modal transit systems is to reduce risk, i.e., spreading the risk over the greater assets of a system versus the assets of a single agency (Contractor and Lorange, 1988). Also, a larger public system may be able to take advantage of greater government support (e.g., subsidies) provided to larger by not to smaller systems.

While these motivations are important, there are impedances to collaboration. These impedances are the costs of collaboration and include capital outlays for the provision of service by the system (as opposed to capital outlays required by independent agencies or firms), and transaction costs (Gegax and Tschirhart 1984; Hill 1990; Hennart 1991). System transaction costs are the costs of extensive decision making for negotiating, operation and enforcement of the system. The negotiation costs in establishing regional transit systems in particular may be high. For example, negotiations for determining the rules (or methods) for allocating system costs and revenues that are acceptable to the merging agencies may be time intensive. Allocating shared (or system) costs are discussed in Talley (1988) and Telser (1985). The transaction costs for operating a system (due to its size) are expected to be greater than the sum of those costs formerly incurred by

the merging agencies. If so, the difference between the system transaction operation costs and those formerly incurred by the merging agencies are the transaction operation costs attributable to the system. Transaction enforcement costs are the costs of ensuring compliance (e.g., monitoring costs and costs of safeguards to keep opportunism in check) by the merging or cooperating agencies with system agreements or arrangements.

In addition to the above cost impediments others include:

1. How to respond to other agencies in the region that have transportation planning responsibilities (Hartgen and McCoy, 1990);
2. The joint determination of system goals and objectives by participating agencies and governments;
3. The joint determination of system cost and revenue allocation rules (or methods) by participating agencies and governments;
4. The integration of different services into a multi-modal system (Cottrell and Demetsky, 1981);
5. Government funding restrictions (e.g., no funding) and regulations; and
6. The lack of technical, evaluative and planning skills of agencies.

Methodology

To accomplish these objectives, a review of relevant literature in the fields of management, economics, and public administration that addressed interfirm and intergovernmental cooperation was done and provided the foundation for the methodology utilized in this study.

Based upon the review, a survey questionnaire targeted at top level transit managers was developed, and used to evaluate the performance and the dynamics of cooperative arrangements among public transit firms. Top managers were asked to answer questions about their collaboration arrangements, and to indicate their levels of agreement to statements that related to the processes and outcomes of collaboration. Specifically, the instrument elicited information on top managers' perception of and experiences with coordinated services in the areas of motivation, cost, impediments, and benefits. Additionally, it elicited background information about the organization. If a transit system has been involved in all three areas of collaboration, the manager was asked to answer the questions for each type of collaboration, otherwise the manager was asked to complete the questionnaire for the type of collaboration applicable to his transit system.

The questionnaire was pretested, modified, and then mailed with prepaid return postage to 400 top executives (General Managers) of United States public transit systems who are members of the American Public Transit Association (ATA). The 1996 directory of the ATA was the source of the addresses of the top executives. Of the 135 completed questionnaires returned 115 were usable. The data from the questionnaire were coded and analyzed using the probit method and other statistical techniques including factor analysis. Specific models for contracting, mergers, and alliances were developed and estimated to identify the factors relevant in explaining these forms of collaboration. Additionally, a recursive system of equation was developed and estimated to explain the outcomes of collaboration.

RESULTS

Table 1 shows the proportion of responding firms involved in collaboration. Clearly, contracting is the most dominant form of collaboration in transit systems. Of the firms responding to the survey 37.2% are involved in some form of contracting, compared to 27.5%, and 18.6% respectively that are involved in alliances and consolidation. The major areas of collaboration are in equipment and facility maintenance. Approximately 57.6% of the firms collaborate in these two areas. Next in the order of importance are equipment purchases (8.4%) and passenger service (8.4%). Because firms collaborate in more than one area these percentages do not sum to one-hundred.

Collaboration is most often initiated by transit systems. In about 69.7% of the firms this is the case, but in 22.7% of the firms it was initiated by the governments of the participating cities. Most likely this is because they are municipal systems. State and federal governments play very minor roles in initiating collaboration. Only in 4.5% and 3.0% of the firms do we find that collaboration was initiated by a federal mandate or by state legislature.

The parties to the collaboration are generally transit systems and private firms. Approximately, 36.1% of the collaboration involve transit and private firms which is not surprising because it reflects the wave since the 1980's to contract out portions of transit operations to private firms. Other parties are transit systems collaborating with social service agencies (15.7%), counties and transit systems (13.3%), adjoining transit systems (13.3%), overlapping transit systems (8.4%) and counties and cities (4.8%). In addition, 1.2% of the collaboration involve counties, whereas 7.2% involved social service agencies or counties and social service agencies.

When collaboration occurs, the study shows that demand responsive modes are generally those that are involved. Approximately, half the collaboration in this study involved demand responsive transit systems. Bus modes account for 33.7% of the collaboration while 10.9% and 1.9% respectively involve van pool and rail. Other transit modes such as ferries are involved in 4.3% of the collaboration.

TABLE 1 - TYPES OF COLLABORATION

	Percent Firms
A. Consolidation/Merger	
- Merged/Consolidated	18.6
- Under Consideration	7.8
B. Alliance	
- Formed an Alliance	27.5
- Under Consideration	3.9
C. Contracting	
- Contracted out Service	37.2
- Under Consideration	4.9

Throughout the public transit literature, it has been suggested that cost advantages are behind most contracting efforts. Since the public transit literature is devoid of studies on collaboration in general, the motivations behind it is unknown. Table 2. sheds some light on the motivations. Clearly, cost savings are behind most collaboration efforts. Specifically, 39.5% of the respondents indicate that cost savings are behind their collaboration. Increased effectiveness in providing service, and improved service quality, however, are also important reasons for collaboration. The table also shows that almost the same percentage (32.6%) of the respondents indicated increased service effectiveness in collaborating whereas 23.3% indicated improved service quality as their reason for collaborating. Increased resources and government pressure were indicated by 14.7% and 12.4% of the respondents as their reasons for collaborating.

TABLE 2 - MOTIVATIONS FOR COLLABORATING

	%
Cost Savings	39.5
Government Pressure	12.4
Increased Effectiveness in Providing Service	32.6
Improve Service Quality	23.3
Increase Resources	14.7

* Because firms checked more than one, the percentages do not sum to one.

The motivation to collaborate often is hampered or slowed by factors unforeseen or outside the control of the collaborating parties. Table 3 shows a list of the factors that impede most collaboration in transit systems. Three factors, cost of daily service, resistance from other agencies and difficulty agreeing on combined system goals are the most important impediments to collaboration. Of these factors, resistance from other agencies, perhaps because of competition, is the most important. Firms also are fearful that cost increases may result when they collaborate or that their operational goals may conflict with each other. Furthermore, collaboration may be thwarted because employees fear job losses which are more likely to occur in the cases of consolidation and contracting than in the case of alliances.

TABLE 3 - IMPEDIMENTS TO COLLABORATION

	Frequency
• Cost	14
- Cost of Daily Service	14
- Cost of Overseeing Collaboration	1
- Cost of Vehicles, Equipment and Facilities	5
• Resistance from Other Agencies	17
• Difficulty Agreeing on Combined System Goals	14
• Difficulty Agreeing one combined System Cost Allocation Methods	8
• Difficulty Agreeing on Combined System Revenue Allocation Methods	6
Allocation Methods	5
• Difficulty Making Personnel Decisions	7
• Government Funding Restrictions	6
• Lack of Citizen's Support	2
• Disagreement Between Elected Officials	6
• Disagreement Between Potential Members	4

Among the remaining factors listed in Table 3, there is no dominant impediment to collaboration. It is important to note that only one respondent indicated the cost of overseeing the collaboration as impediment. Similarly, too, respondents indicated lack of citizens' support as an impediment to collaboration. However, it is notable from the table that government funding restrictions may thwart collaboration efforts. This particularly is true when local funding does not permit extension of service to outlying areas where collaboration with adjoining or overlapping agencies is possible. Similarly, it is notable that difficulties in agreeing to cost allocation methods may thwart collaboration involving alliances, since it is not conceivable that this will apply to contracting and consolidation.

Though government funding restrictions were indicated by very few firms as inhibiting collaboration, their role in successful collaboration cannot be over emphasized. This is because the major sources of funding for most collaboration are government funds. In this study, more than half of the respondents indicated that the government is the major source of funding for collaboration. The next most important funding source is sales tax followed by contributions from member firms. Gasoline taxes and other funding sources such as passenger revenue dedicated property and utility taxes are used by very few firms to fund collaboration. Additionally, the study data reveal that when the parties must contribute towards collaboration few, 8.5%, do so based upon a predetermined formula. Such is the case, for example, when counties and cities collaborate to provide transit services.

Collaboration in transit firms tends to be both short and long term. For the purposes of this study, collaboration spanning over five years is considered long term while all others are considered

short term. In this respect, the study data shows that 50% of the collaboration have been in place for more than five years and that the same percentage has been in place for five years or less. Of the short term collaboration, most (31.7% of the respondents) have been in place for two years. Similarly, in response to the question about how long the collaboration is designed to last, 50.8% indicated it is long term or more than five years. However, in this case we observe that very few collaborations are designed to last for two years or less. A three to five year collaboration was indicated by 35% of the respondents. Thus, collaboration tends to be medium term and long term. This is not surprising since these lengths of time allow members to recoup any capital invested. Short term collaboration does not allow participating members enough time to adjust to their new environment. Also, initial start up cost may be so high that firms are unable to recoup their capital when the collaboration is for a short period and this is the reason for firms entering into medium and long term collaboration.

Determinants of Collaboration

Having discussed collaboration statistics of our survey, let us now identify the significant factors that affect each method of collaboration (i.e., contracting, alliances and consolidation). To do so a models were developed to specifically explain contracting, alliances and consolidation.

Contracting: We postulate that the desire to contract depends upon the areas covered by the contract, the benefits and costs, who initiated it, the parties involved and firm size. Contracting in transit systems generally covers passenger service, facility maintenance, and equipment maintenance among others. In the early days of transit contracting most efforts were concentrated on passenger service. Today, transit contracting is diversified and includes other functions previously performed internally.

We hypothesize that contracting is positively related to the areas covered by the contract. However, a negative relationship is possible because the more areas contracted out the higher the level of resistance within the organization and that can reduce the contracting effort. Contracting is also positively related to the benefits from it. Conversely, higher cost or impediments will reduce the level of contracting. Thus, we expect the relationship between contracting and impediments to be negative. We also expect that contracting will be positively related to the roles of the government in initiating it since this is an indication of pressure on transit systems to contract out service. Since we have observed that most collaboration are funded by the government, the desire to reduce government funding is enough pressure in firms to contract out portions of their operations to save cost. However, government involvement can have negative impact on contracting if management feels it is being forced to do so. While government involvement can increase contracting, the success of contracting is expected to be higher when it is initiated by transit systems. Hence, we expect the relationship between transit system involvement in the contracting process and contracting to be positive. Similarly, we expect a positive relationship between contracting and system size. That is, large firms are more likely to contract out service than small firms possibly to shed services they can no longer provide efficiently.

We investigate the above hypothesized relationships regarding whether a transit system will choose or not choose to contract out service by utilizing the statistical technique, probit analysis.

Specifically, probit analysis is used to estimate the following equation:

$$Y = F(Z_i) \quad (1)$$

where Y equals one if the transit system chooses to contract out service and zero if it does not choose to contract out service. Z_i is the above set of ($i = 1, 2, \dots, j$) variables or factors hypothesized to affect the contracting-out decision.

Probit estimation results of the contracting-out equation appear in Table 4. The asterisks besides the coefficients in the table indicate those coefficients that are statistically significant in explaining the decision to contract. These coefficients suggest that firms are more likely to contract out passenger service compared to other areas such as facility maintenance.

Also, the results clearly suggest that contracting out services is motivated by the availability of increased resources and government pressure. Both variables have positive and significant coefficients but their significance levels show that government pressure exerts more influence on contracting than cost savings. Surprisingly, and contrary to expectations, improved service quality is negatively related to contracting suggesting that firms do not consider improved service quality as the motivation to contract out service. In fact they are more likely to contract out poor services than better and profitable services. Additionally, cost savings have the correct positive sign but insignificant coefficient.

Among the impediments appearing in Table 4, only two have a statistically significant coefficient but all have the correct sign. Resistance from other agencies and government funding restrictions reduce the probability of contracting out services. These results also suggest that government pressure increases the probability of contracting out services and when transit systems are made parties to the collaboration this probability increases.

TABLE 4. - FACTORS AFFECTING CONTRACTING

Description	Probit Coefficient	Std. Error
Same Service Contracting	0.2334***	0.1616
Different Services	0.4593*	0.1603
MOTIVATIONS		
Cost Savings	0.1910	0.1830
Government Pressure	0.2822***	0.1893
Increased Service Effectiveness	-0.1068	0.1693
Increased Resources	0.2741***	0.1817
IMPEDIMENT		
Resistance from their Agencies	-0.5061*	0.2303
Difficulty in Making Personnel Decisions	-0.0249	0.3389
Government Funding Restrictions	-0.4743***	0.3344
OTHERS		
Passenger Service Contracting	0.2634***	0.1751
City and County as Parties to Collaboration	-0.1182	0.4316
Transit System as Party to Collaboration	0.2517**	0.1325
Operating Cost	0.0208	0.0415
Intercept	2.1567*	0.1793

Pearson Goodness of -fit Chi-Square = 152.153, Sample Size = 114, P = 0.019; Convergence Criterion = 0.0009;

* Significant at 0.01 level

** Significant at 0.05 level

*** Significant at 0.10 level

Standard errors are in parentheses.

Merger/Consolidation

The desire for transit systems to merge also depends upon similar factors as the desire to contract out service. Merger or consolidation, however may be a result of economies of scope and even economies of scale. Economies of scope allow merged firms to realize cost savings from producing a variety of services particularly if the same resources are used to produce different products. When firms merge, they are able to produce a large output (if they produce the same or similar services) and this may lead to lower average costs. If so we hypothesize a positive relationship between the desire to merge or consolidate service and the cost savings to be realized. Other motivations for merging are increased effectiveness in providing the service, improved service quality and government pressure. Here too, we hypothesize positive relationships between mergers/consolidation and these variables. We also hypothesize that lack of adequate resources will

negatively affect the desire to merge.

Let M represent the choice a transit system faces in regard to a merger, i.e., M equals one if the transit system chooses to merge and zero if it does not choose to merge. Further, M may be expressed as a function of the above set of Z_i ($i = 1, 2, 3, \dots, j$) variables hypothesized to affect the merger decision.

$$M = G(Z_i) \quad (2)$$

Equation (2) is also estimated using the statistical package, probit analysis.

The probit estimation results for equation (3.2) are in Table 4. Again, as in Table 3.10, the significant coefficients are indicated by the asterisks. The results suggest that cost savings, government pressure, and the involvement of transit systems in the collaboration arrangements increase the probability of firms merging their operations. Increased service effectiveness is not a significant reason to merge, possibly suggesting that firms merge with the hope of realizing economies of scope and economies of scale. This result is supported by the fact that the probability of a merger increases when the types of transit services involved are different. Improved service quality is not a significant motivation to merge. Examining the table the coefficient of the impediment, lack of adequate resources, has the correct signs but is statistically significant. Thus, it can be argued that this is not a strong factor to consider in the decision to merge. The probability of a merger also reduces with network size though insignificantly. As evident from the table the coefficient of route mile is negative but insignificant.

Table 5. - Factors Affecting Merger/Consolidation: Probit Estimation

Description	Coefficient	Standard Error
Combination of Different Service	0.3077**	0.1949
MOTIVATION		
Cost Savings	0.4600**	0.2663
Increased Service Effectiveness	-0.1477	0.2875
Government Initiative	0.3055**	0.1813
Improved Service Quality	0.1127	0.2825
IMPEDIMENTS		
Lack of Adequate Resources (e.g Labor)	-0.2508	0.3840
OTHERS		
Route Mile	-0.0962	0.0921
Intercept	2.4626*	0.5092

Pearson Goodness-of-fit Chi Square = 175.678; Df = 116; P = 0.001.

* Significant at 0.05 level

** Significant at 0.010 level

Table 6. - Factors Affecting Alliances

Description	Coeff.	Std Error
Combination of Same Service	0.2170	0.2019
Motivation : Cost Savings	0.3221	0.2544
Motivation : Increased Service Effectiveness	0.7688	0.2771
Motivation : Increased Service Quality	-0.2496	0.2416
Motivation : Increased Resources	0.1494	0.2114
Impediment : Cost of Vehicles, Equipment and Facilities	-0.8840	0.4396
Impediment : Disagreement Between Elected Officials and Potential Members	-0.1015	0.3860
Impediment : Difficulty Agreeing to Goals, Cost and Revenue Allocation Methods	-0.1073	0.1144
Government Initiation of Merger	0.1208	0.1788
Transit System a Party to the Collaboration	0.0431	0.1574
Areas Covered : Equipment Maintenance	0.3323	0.1937
Duration : Long Term	0.3887	0.1852
Alliance Initiated by Transit System	-0.1453	0.2433
Operating Cost	0.0101	0.0507
Intercept	1.8120	0.2813

Pearson Goodness-of-fit Chi square = 137.094, DF = 114, P = 0.069, ** Significant at 0.025 level, * Significant at 0.01 level

**TABLE 7 - CONTRACTING, MERGERS AND ALLIANCES: STATISTICALLY
SIGNIFICANT
DECISION DETERMINANT**

Variables	Contracting	Mergers	Alliances
MOTIVATIONS			
Cost Savings		+	
Government Pressure	+	+	
Increased Service Effectiveness			+
Increased Resources	+		
IMPEDIMENTS			
Cost of Vehicles, Equipment and Facilities			-
Resistance from Other Agencies	-		
Government Funding Restrictions	-		
OTHERS			
Areas Covered: Equipment Maintenance			+
Duration: Long Term			+
Transit System as Party to Collaboration	+		
Passenger Service	+		
Same Service	+	+	
Different Service	+		

+ - positive relationship
- - negative relationship

Factors Affecting Alliances

Alliances constitute the second most important method of collaboration in public transit firms. As we have defined earlier, in alliances, firms maintain their individual identities but may cooperate in certain areas of their operation. Transit firms, for example, may collaborate to facilitate passenger transfer by issuing through tickets or they may form alliances to purchase equipment or lobby Congress for legislation beneficial to them. We hypothesize that the factors that motivate firms to form alliances (and, therefore, are positively related to their desire to form alliance) are cost savings, increased service effectiveness, improved service quality, and increased resources. On the other hand increased cost of vehicles, equipment, and facilities, difficulty agreeing to goals, cost, and revenue allocation methods, and disagreement between elected officials and potential members are impediments to the formation of alliances and, therefore have a negative effect on their desire to form alliances. Successful alliances may also depend on who initiated them and the types of firms involved. For example, if transit firms initiate alliances they will be committed to their success. When governments initiate alliances they do so for different purposes or to achieve goals that

conflict with those of management. Under those circumstances managerial interest in the alliance will be low, suggesting a negative relationship between the government initiating the alliance and its success. If the government and management agree on goals, e.g., when management lobbies the government to pressure possible parties into the alliance, the relationship is expected to be positive. From these possible outcomes, the sign of the relationship between government initiation of the alliance and the desire to form it cannot be determined beforehand.

The desire to form an alliance will also be affected by the functional areas affected. Firms may form alliances for specific purposes. If a functional area is that mostly affected by alliances a positive relationship is expected between the two. If not, the relationship could be negative.

Let A represent the choice a transit system faces in regard to an alliance, i.e., A equals one if the transit system chooses to form an alliance and zero if not. In addition, A may be expressed as a function of the above set of Z_n ($n = 1, 2, 3, \dots$) variables hypothesized to affect the alliance decision. Thus,

$$A = A(Z_n) \quad (3)$$

This equation is also estimated via the probit estimation technique.

The probit results are in Table 6. Clearly many of the variables hypothesized as affecting the desire to form alliances have no statistically significant relationship to alliance. The statistical results suggest that alliances are motivated by the desire to increase service effectiveness, but not by service quality, cost savings, or increased resources. A major impediment to alliance is cost of vehicles, equipment, and facilities. Although the coefficients in the remaining hypothesized impediments to forming an alliance have the expected negative signs, they are not statistically significant.

The estimation results also suggest that alliances tend to be long term (more than five years) allowing firms to recoup their capital expenses. Mostly, alliances are formed for equipment maintenance. By pooling equipment maintenance firms are able to realize economies in purchasing materials and parts particularly for vehicle maintenance. Also, the alliance can bargain with potential contractors to perform this function cheaply.

Table 7. summarizes those variables (or factors) found to have statistically significant coefficients in the Probit estimations investigating the decisions of transit systems to contract, merge, or form alliances. Two factors are common to mergers and contracting and have the same coefficient signs. Government pressure increases the probabilities of a merger and contracting out services. Also mergers and contracting generally cover the same service.

Besides these common factors, it is obvious that the factors that negatively or positively affect alliances are not necessarily the same factors that affect mergers or alliances. While this may be seen as a result of the way we have modeled alliances, mergers and contracting, it is still true that different motivations are behind the ways collaboration is done in public transit systems.

CONCLUSION

This study examined survey data to identify determinants of public transit collaboration (i.e., either contracting, a merger/consolidation or an alliance). The contracting estimation results suggest that transit systems are more likely to contract: passenger service, if the transit system is a party to the collaboration and if motivated by the availability of increased resources and government pressure. Impediments to contracting include resistance from other agencies and government funding restrictions.

The merger/consolidation estimation results suggest that transit mergers are motivated by cost savings and government initiative (or pressure). Also, the likelihood of a merger increases if different services are consolidated, which combined with cost savings also suggest that economies of scope is a merger motivation. The alliance results suggest that alliances are motivated by increased service effectiveness, but not by service quality, cost savings, or increased resources. An impediment to forming an alliance is the cost of vehicles, equipment, and facilities. Alliances tend to be long term (more than five years) and formed for equipment maintenance. The general conclusion to be drawn from these results is that while public transit collaborations may have common motivations, the motivations and especially the impediments to collaboration tend to differ by type of collaboration.

Together these results clearly confirm most of the traditional arguments for contracting out services by transit systems. In addition, they suggest that we cannot use improved service quality as an argument for contracting, and government initiation of contracting increases the probability that the service will be contracted out to private firms. What should be encouraged is including transit in the initial program to contract out service.

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