

Is Contracting Out Government Services the Great Panacea? Evidence from Public School Transportation in Louisiana

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Many advocates of markets point to the inefficiencies of government bureaucracy and offer privatization plans as their solution (Cato Institute, 2003, 327-335). But in many cases their privatization plans are not pure privatization in which government sells its assets and exits an area completely. Instead, many of the so-called privatization plans simply replace government contracts with its own employees with government contracts with third parties. The services are still funded by taxes (as opposed to user purchases), and the people providing the service are still selected and hired by government, so the situation is far from a free-market. While many imply that competitive outsourcing must lead to lower costs, this is not necessarily the case.

Although the goal of outsourcing of government services is to harness the benefits of competition by making many groups compete for a contract, the situation is far from a free-market. When government hires its own employees, it selects from a competitive pool of people, but this does not guarantee anything close to a good outcome. Benson (1994, 46) writes,

Private firms in free markets must persuade consumers to buy their products. Individual consumers are the source of

demand, and they are free to choose where to spend their money. If government provides services, whether through direct bureaucratic production or through contracting out, individual 'buyers' (taxpayers and/or voters) have virtually no influence on what they buy.

Studying the contracting out of certain transportation services allows us to do a nice case study. While many propose "privatization" of bus services as a way of decreasing costs, whether one type of government arrangement is better than another government arrangement is far from clear. In this article we investigate examples of "privatized" bus routes for public schools in Louisiana. We report statistical cost comparisons from the production of public school transportation in Louisiana during the 2002-03 academic year. Louisiana school parishes (districts in other states) provide student transportation via four systems or methods: contract-owned, mostly contract-owned, board (school)-owned, and mostly board (school)-owned buses. After adjusting for the number of students, the miles transported, and other factors, our statistical comparison shows that board-owned and mostly board-owned systems operate at a statistically significant lower cost than do contract and mostly-contract systems. This finding contradicts our previous research for Tennessee public school districts during the academic 1992-93 year (Hutchinson and Pratt). According to that research, 15 of 19 contract systems in Tennessee operated at a savings that equaled 27 percent of the average contract cost. The remaining four districts operated at a cost that was 21 percent above the average. The Louisiana versus Tennessee contradiction may result from institutional, location, regulatory, or structural factors, as previously noted by Ott and Hartley (1991) and Vickers and Yarrow (1991). Both indicate that the best (or cheapest) method of production remains inconsistent between private and public and, hence, is an empirical issue. Thus the different outcome between the two states is not surprising – although we had hoped to be able to generalize the

results to other states, as has been suggested by more recent studies in other areas (Mueller 2003, and Megginson and Netter 2001).

Background

Public school bus transportation in Louisiana provides a cross-sectional setting for a comparison of public versus private production of student transportation. Each school system in Louisiana has the option of producing its own bus transportation, of contracting with private producers for that transportation, or choosing a combination of the two.

Our research focuses on identifying which system has the lowest transportation cost. The answer, from an education and taxation perspective, is relevant to the fiscal needs of public school systems. Dollars spent busing students are unavailable to pay for other educational inputs such as teachers, books, or classroom and laboratory equipment.

Transportation cost comparisons among school systems are likely to be impacted by geographical size, number of students, and topography. Other factors that might influence cost include how contracts are negotiated and priced, the frequency of changing or negotiating contracts, the number of contracts, and the method for allocating routes between contract-owned and board-owned buses in mostly-board and mostly-contract parishes. Hence, determining causality for any cost difference among the 62 Louisiana school systems would be difficult. This study therefore focuses narrowly on determining whether or not empirical cost differences exist among the four transportation systems in Louisiana.

Hutchinson and Pratt (1999) used a statistical methodology similar to the one employed in this paper. Several other studies have also undertaken a statistical analysis of school transportation. Among these are Bails (1979), McGuire and Van Cott (1984), and more recently Cassell (2000) and Damask (2002).

McGuire and Van Cott (1984) focused on 275 Indiana school districts during the 1979-80 academic year. They divided school

districts according to five output categories and into ownership categories—similar to those in Louisiana—public only, private only, public part of joint system, and private part of joint system. They report mean cost statistics per trip, per mile, per student, and per student-mile, plus average trip length and students per trip according to ownership and output categories. Their study found (p. 40) that contract bus ownership lowers cost-per-mile by 12 percent when compared to board-owned buses.

Cassell (2000) and Damask (2002) both studied busing in Ohio school districts in the 1997-98 academic year. Cassell reported that contract-provided transportation was 33 percent more expensive relative to board-provided transportation. Damask contends that Cassell's results are incorrect due to the omission of some direct and all indirect costs in board-operated systems. According to Damask, if these costs are included, the contract provided transportation is 11 percent less expensive (p. 6). Although Damask's critique was appropriate, his correction method is deficient. His adjustments were based on the omitted cost from the eight largest board-operated school districts, which equaled 45 percent of their total expenditures. He arbitrarily allocated five percent of this total, or approximately \$150 per pupil, to transportation cost in those systems. Thus, he increased the total cost in each board-operated district by \$150 per pupil times the number of pupils. We believe this method relies upon too many assumptions to provide a reliable adjustment or estimate.

Our method of adjusting for the omitted costs noted by Damask is to reduce each system's contract payment for the contractors' amortized capital cost. This cost is calculated by multiplying the amortized cost of the large (small) bus times the system's number of contractor-operated large (small) buses. We do not account for other support service costs; however, these should be relatively small.

Other research on public school transportation includes that by Chambers (1978) and Denzau (1975). Related studies include Viton (1981) DeBorger (1984), and Williams and Dalal (1981), which

estimated variable-cost translog functions for commercial-bus transportation. The Viton and DeBorger studies produced similar results, finding price-inelastic demands for factor substitution. Williams and Dalal, using data from publicly owned urban-bus systems in Illinois, determined that the translog-cost function was a valuable method for estimating the production of bus service.

Model Specification

We model a school system's production of student bus services (Q_i) using current technology, capital (type I [K_1] and type II [K_2] buses), labor (L) and fuel (F) inputs. We assume that localization factors are captured by the variable population-density-per-mile (G), and distinguish among the four alternative production systems through three dummy variables (D_i). These dummy variables represent board-owned (D_{BD}), mostly board-owned (D_{MB}), and mostly contract-owned buses (D_{MC}). The dual cost function (C) for producing bus service is:

$$C = c(Q_i, P_F, P_L, P_{K1}, P_{K2}, G, D_i). \quad (1)$$

The P 's are the respective input prices.

The explanatory variables of this cost function are exogenous although the price of capital may be an exception. Each school system's output of bus transportation (Q_i) depends upon the number and geographical distribution of students that must be transported within that particular system. Likewise, the input prices for drivers and fuel are exogenous. Bus drivers are hired in price-taking competition with local trucking, taxi, and commuter bus firms; similarly, each board or contractor is one of many purchasers of fuel in the local market. The population density variable (G) for each system is also exogenous.

Some school systems and a few large contractors may purchase buses in quantity; if so, they may obtain price concessions unavailable to other purchasers and thus capital prices, P_{K1} and P_{K2}

are endogenous. Other factors such as variations in seating configuration and number of seats per bus also work against bus prices being exogenous. We therefore re-specify a short-run cost function, C_{SR} , fixing each school system's capital stock at K_1 and K_2 :

$$C_{SR} = c_{SR}(Q_i, P_F, P_L, K_1, K_2, G, D_i). \quad (2)$$

This specification allows that a district may not optimize its short-run bus usage and for lumpy purchases of buses.

Contract producers are, of course, profit seekers who amortize their annual cost of buses into each contract. Board-owned buses are funded separately from student transportation. Hence, we reduce each contract, mostly-contract, and mostly-board systems' cost by the amortized cost of its contract buses to maintain comparability to board operating cost. Finally, in Louisiana the choice among the four alternative busing systems, dummy variables D_i , belongs to each system's board.

We approximate short-run cost Equation (2) through the translog-cost function:

$$\begin{aligned} \ln C_{SR} = & \alpha_0 + \sum_i \alpha_i \ln Q_i + \sum_r \alpha_r \ln P_r + (\sum_i \sum_j \alpha_{ij} \ln Q_i \ln Q_j) / 2 \quad (3) \\ & + (\sum_r \sum_s \alpha_{rs} \ln P_r \ln P_s) / 2 + \sum_i \sum_r \alpha_{ir} \ln Q_i \ln P_r + \sum_k \alpha_k \ln K_k + \\ & (\sum_k \sum_n \alpha_{kn} \ln K_k \ln K_n) / 2 + \sum_r \alpha_{kr} \ln K_k \ln P_r + \sum_i \alpha_{ki} \ln K_k \ln Q_i + \\ & \ln G + \ln D_B + \ln D_{MB} + \ln D_{MC} + \mu_c. \end{aligned}$$

The α parameters for i (and j) are associated with output measures: average number of students transported daily (A) and one-way miles driven (M); the α parameters for r (and s) are associated with the input prices: average annual driver salary (P_L) and cost per gallon of

fuel (P_F); and, the α parameters for k (and n) are associated with buses: type I (K_1) and II (K_2). The error term is μ_c .

Given the focus on cost comparison, goodness of fit is more relevant than the quality of any individual parameter estimates. The following parameter restrictions are imposed to assure that the estimation yields a well-behaved cost function that is homogeneous of degree one in prices:

$$\sum_r \alpha_r = 1 \tag{4}$$

$$\sum_r \alpha_{ir} = \sum_r \alpha_{jr} = \sum_r \alpha_{rs} = \sum_s \alpha_{rs} = \sum_s \alpha_{ks} = \sum_r \alpha_{kr} = 0$$

$$\alpha_{ij} = \alpha_{ji}, \alpha_{rs} = \alpha_{sr}, \text{ and } \alpha_{kn} = \alpha_{nk}.$$

Finally, the estimation is enhanced by including the information from the translog-share equations, S_i :

$$\sum_r = \alpha_r + \sum_s \alpha_{rs} \ln P_s + \sum_i \alpha_{ir} \ln Q_i + \alpha_{kr} \ln K_k + \mu_r. \tag{5}$$

The error terms μ_r on the respective share equations must sum to one. Thus, including all the share equations yields a singular matrix. Our estimation therefore omits one share equation. Application of an iterative-Zellner-efficient (IZEF) estimation procedure provides single values for those coefficients shared by the cost function and share equations, and yields full-information maximum-likelihood estimates that are invariant to the omitted share equation.

Data and Estimation

Louisiana's regulation and safety inspection system along with school board and parental concern over student safety combine to minimize any variation in the quality of bus service among the school systems. Bus service is multi-dimensional and measured by the number of students transported and one-way miles driven. These measures vary substantially (see Table 2) among the school systems in

each of the four delivery systems. The data do not include the number of bus trips or routes, both of which would be useful output measures. Of course, more buses must be operated as more simultaneous trips become necessary due to dispersion of students or schools or the terrain. Thus, our numbers of type I and II buses, in addition to measuring the fixed capital, also serve as a proxy for the dispersion of students.

All the data, except for gasoline price and population density, were obtained from the Louisiana Department of Education. Louisiana has 66 school systems. Four systems were dropped due to missing data. Twenty of the sixty-two remaining school systems operate a contract-owned or private bus system. In these systems all bus service is provided via the private market. Another 19 systems operate what Louisiana terms board-owned or public bus service. These systems provide all school bus service themselves. They own the buses and hire the drivers. The remaining 23 systems provide school bus transportation under a hybrid of the board-owned or contract-owned models. Eleven systems have a mostly contract-owned system with some board-owned busing. The remaining 12 systems operate a mostly board-owned system with some contract-owned busing. Table 1 provides a list of the systems/parishes in each of these categories.

The cost of a gallon of fuel was not included in the Department of Education data. Instead, fuel price was obtained from the Chamber of Commerce in each parish for a particular two day period. If transportation is board provided, the fuel cost per gallon is adjusted downward by the amount of the state and federal fuel taxes, \$0.38 per gallon, because public school systems are exempt from these taxes. In the hybrid systems, mostly board-owned and mostly contract-owned, we adjusted the cost per gallon of fuel for these taxes according to the proportion of miles driven by each type of service in a particular system.

Population density per mile was obtained by combining a county's 2000 land area and population according to the *County and City Data Book* and *Population and Housing*.

Table 1:
List of Parish Systems by Type

Contract	Board	Mostly Board	Mostly Cont.
Acadia	Bossier	Ascension	Catahoula
Allen	Caddo	Avoyelles	East Carroll
Assumption	Calcasieu	Beauregard	East Feliciana
Concordia	Caldwell	Bienville	Evangeline
DeSoto	Cameron	Grant	Franklin
Iberia	Claiborne	Jackson	Lafayette
Iberville	East Baton Rouge	Jefferson Davis	Rapides
Jefferson	Madison	Lincoln	Sabine
LaSalle	Morehouse	Richland	St. Landry
Livingston	Orleans	St. Charles	Tensas
Natchitoches	Ouachita	Union	Vernon
Points Coupee	Plaquemines	Vermillion	
St. Mary	Red River		
St. Tammany	St. Bernard		
Tangipahoa	St. James		
Terrebonne	St. John		
Washington	St. Martin		
West Baton Rouge	Webster		
West Feliciana	West Carroll		
Winn			

The mean and standard deviation for the regression variables are categorized according to bus-system type and reported in Table 2. Because we eventually compare the Louisiana results to those obtained from a similar study of Tennessee public-school busing, the comparable data from Tennessee are also reported.

The data in Table 2 indicate that board-only student-transportation service has the highest total variable cost. In fact, the cost is 34% higher than for contract-owned districts. However, the board-owned bus districts on average transport students considerably more miles than do other districts.

Table 3 reports the coefficient estimates from the stacked set of translog Equations (3) and (5) with coefficient restrictions (4).¹

Excluding the geographic and dummy variables, 13 of the 21 independent coefficient estimates for Louisiana are significant at the 95-percent confidence level (used throughout this paper). Upon comparing the Louisiana results to those from Tennessee, one observes that 5 of these 13 significant coefficient estimates were also statistically significant for Tennessee. Three (α_1 , α_2 and α_{LL}) of the five coefficient estimates are statistically the same. Seven of the coefficients change sign between Louisiana and Tennessee; however, none of these seven is statistically significant for both states.

For both Louisiana and Tennessee the geographic variable, α_G , statistically and significantly impacts cost. Yet, its sign is different for the two states. The sign reversal likely is caused by a larger number of high population-density school systems in Tennessee as compared to Louisiana. It is noteworthy that the dummy variables designating board-owned and mostly board-owned systems are negatively and statistically significant whereas the dummy for a mostly contract-owned system is positive though not statistically

¹ Because there were only 19 contract systems in Tennessee, the equation system with its 22 independent coefficient estimates was estimated for the board systems. This estimated translog cost function was then used to estimate the variable cost for each contract system.

Table 2
Descriptive Statistics, Means and Standard Deviations

Louisiana (School Year 2002-03)				
Type and Number of School Systems	All (62)	Contract (20)	Mostly Contract (11)	Board (19)
Total Var. Cost	\$4,039,088	\$4,002,172	\$5,365,656	\$5,365,656
Standard Deviation	\$588,702	\$880,487	\$1,532,361	\$1,532,361
No. Stud. Trans.	7544	8540	6933	8454
Standard Deviation	8036	8597	7109	10006
One-Way Miles	11211	23955	2883	8578
Standard Deviation	38632	61930	3290	26708
Fuel Cost/Gallon*	\$1.62	\$1.80	\$1.75	\$1.44
Standard Deviation	\$0.18	\$0.10	\$0.08	\$0.07
Driver Salary	\$13,865	\$14,255	\$13,623	\$13,709
Standard Deviation	\$1,959	\$1,970	\$2,141	\$1,992
Population Density	162.06/mi	145.48/mi	103/mi	272.18/mi
Standard Deviation	398.21/mi	319.73/mi	202.23/mi	618.45/mi
Tennessee (1992-1993)				
Type and Number of School Systems	Mostly Board (12)	Contract (19)	Board (91)	
Total Var. Cost	\$2,519,421	NA	\$617,490	
Standard Deviation	\$383,186		\$1,052,400	
No. Stud. Trans.	5002	6648	3538	
Standard Deviation	3167	7736	4708	
One-Way Miles	1745	2900	1646	
Standard Deviation	827	3155	2260	
Fuel Cost/Gallon*	\$1.49	\$1.13	\$0.73	
Standard Deviation	\$0.05	\$0.09	\$0.09	
Driver Salary	\$13,683	\$7,934	\$7,103	
Standard Deviation	\$1,873	\$2,821	\$2,661	
Population Density	69.48/mi	351.07/mi	292/mi	
Standard Deviation	73.7/mi	595.9/mi	456.58/mi	

NA: Information not available

* Fuel cost data for Louisiana was gathered on July 22 and 23, 2005; for Tennessee this data was collected during the 4th quarter 1992. Board and mostly-Board operated systems do not pay state and federal fuel taxes.

Table 3
Independent Parameter Estimates

Parameter	Louisiana		Tennessee			
	With Density Var.		With Density Var.		Without Dens. Var.	
	Estimate	t-score	Estimate	t-score	Estimate	t-score
a ₀	14.878	120.456	13.086	327.379	13.169	513.254
a _A	0.234	2.263	0.138	1.666	0.064	0.813
a _M	-0.035	-1.072	0.125	2.036	0.111	1.770
a _L	0.379	25.731	0.733	72.132	0.732	72.987
a ₁	0.623	7.437	0.678	7.073	0.757	8.139
a ₂	0.093	3.735	0.079	2.580	0.085	2.712
a _{AA}	0.534	4.459	0.060	0.226	0.026	0.094
a _{MM}	0.003	0.174	-0.117	-0.623	-0.270	-1.465
a _{AM}	-0.157	-3.097	-0.001	-0.003	-0.192	-1.318
a _{LL}	0.086	2.072	0.089	3.451	0.088	3.358
a _{LM}	0.002	0.343	-0.053	-2.168	1.056	2.289
a _{AL}	-0.011	-0.927	0.030	1.009	0.030	1.031
a ₁₁	0.062	4.133	0.003	0.006	-0.757	-1.647
a ₂₂	0.020	2.810	0.088	1.339	0.070	1.023
a ₁₂	-0.037	-4.062	-0.049	-0.348	-0.191	-1.413
a _{1A}	-0.313	-5.200	0.017	0.063	0.294	1.140
a _{2A}	0.001	0.111	-0.001	-0.012	0.069	0.699
a _{1M}	0.151	3.378	0.065	0.222	0.429	1.610
a _{2M}	0.007	0.929	0.000	0.002	0.048	0.501
a _{1L}	0.004	0.618	0.037	0.951	0.040	1.022
a _{2L}	-0.003	-1.038	-0.000	-0.022	0.002	0.117
G	0.073	3.066	0.051	-2.660		
D _{BD}	-0.100	-2.211				
D _{MB}	-0.157	-3.528				
D _{MC}	0.025	-0.550				
R ²	0.95		0.97		0.90	

different from zero (from the contract-owned system). The negative coefficients on the dummy variables for board-owned and mostly board-owned systems indicate that, in Louisiana, these systems generally transport students at a significantly lower cost than the contract-owned systems after accounting for system differences in

one-way miles driven, number of students, number and type of buses, labor and fuel prices, and population density.

Table 4 reports the school transportation cost for the representative (average) parish. This calculation is obtained by substituting information for the representative school system into the estimated translog-cost equation. As seen in Table 4 and evident given the statistically significant and negative coefficient on the dummy variable for board operation, a change from a contract transportation system has the potential to reduce cost by approximately 10 percent. In addition, mostly-board operated bus systems also operate at a significant saving over contract systems. This suggests that school systems in this group are able to “cherry-pick,” allocating relatively lower cost routes to board-owned buses and more expensive routes to contractors. A similar conclusion – again evident from the statistically significant and negative coefficient on the mostly-contract dummy variable – applies to mostly-contract systems. A comparison between contract and mostly-contract parish-school systems indicates that this hybrid system has an average cost that is 2.5 percent higher though lacking statistical significance.

Table 4
Comparative Cost for Representative Parish

Method/System	Cost of the Representative Parish	Comparison to Contract %
Board	\$ 2,479,977	90.52%
Mostly Board	\$ 2,341,167	85.45%
Mostly Contract	\$ 2,808,216	102.50%
Contract	\$ 2,739,703	100.00%

Conclusion

As was true in Tennessee, statistical results comparing the cost (for a particular school year) of student transportation across school systems in Louisiana support the conclusion that it does matter whether transportation is provided via a board-owned or contract-owned system. However, in Louisiana board-owned (and mostly board-owned) systems are cheaper to operate than contract-owned (and mostly contract-owned) systems, whereas the Tennessee study showed the opposite. This finding is consistent with the concept articulated by Ott and Hartley (1991) and Vickers and Yarrow (1991) that whether private production or government production is cheaper remains an empirical question.

Hence, our Tennessee result cannot safely be generalized to other states, nor can the results, as supported by the results from individual school systems within Louisiana and Tennessee, necessarily be applied to an individual system. The best or cheapest method for transporting school students still remains an empirical issue. This article provides support in favor of Benson's (1994) "Third Thoughts on Contracting Out."

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