

Contract choice and cost efficiency: the French urban public transport case

Joanna Piechucka*

*Paris School of Economics / Microeconomix

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Objective

The main objective of the paper is to study the impact of different regulatory contracts on the cost efficiency of public transit systems

- A positive analysis approach is taken to study the determinants of regulatory contract choices that in turn impact the operating costs of urban public transport operators in France
- The endogeneity of regulatory contract choices is a central feature of the analysis

The industry

- Organizational background
 - ▶ The local public authority is responsible for organizing urban public transport
 - ▶ It can provide the service itself or delegate this task to a private or public-private transport operator (90%)
 - ▶ In the case of delegation a public-private partnership is established and regulated through an agreement
- Regulatory contracts
 - ▶ The agreement specifies the characteristics of the service to be provided, the resources put at the disposal of the operator and the conditions of subsidizing the service
 - ▶ The two main contract types observed in the industry are fixed-price and cost-plus contracts

Principal-Agent framework

- The Principal asks the Agent to produce a given level of output in exchange for a reimbursement and this relationship is regulated by a contract
- Asymmetric information may give rise to two phenomena:
 - ▶ Operators have better experience and information on the costs of providing the service than local authorities (adverse selection)
 - ▶ The non-observability of effort undertaken by the operator on the delegated operation of the transport service (moral hazard)
- Regulatory contracts could affect the cost-reducing effort undertaken by the operator

Econometric approach

Endogenous treatment-effects model

- Translog cost function

$$\ln C_{it} = \ln C(Y_{it}, w_{it}, Z_{it}, DT_{it}; \beta) + (\alpha_i + \xi FP_{it}) + \varepsilon_{it}$$

- FP_{it} is a binary endogenous variable that stems from an unobservable latent variable

$$FP_{it}^* = \gamma_0 + \gamma_{priv} Priv + \gamma_K Keolis_{it} + \gamma_T Transdev_{it} + \gamma_v Veolia_{it} + \gamma_N \ln N_{it} + \gamma_t t_{it} + \eta_{it}$$

- The value of FP_{it} is taken accordingly to the rule:

$$FP_{it} = \begin{cases} 1 & \text{if } FP_{it}^* > 0 \\ 0, & \text{otherwise} \end{cases}$$

Data and variables

Original database of a 16-year panel of 103 bus networks in France for the years 1995-2010 created from an annual survey conducted by CERTU, GART and UTP

- Cost function [details](#)
 - ▶ Operating costs (C)
 - ▶ Quantity of output (Y)
 - ▶ Input prices (w_L, w_m)
 - ▶ Commercial speed (CS)
 - ▶ Network size (N)
- Contract choice [details](#)
 - ▶ Contract type (FP)
 - ▶ Affiliation to the three major groups (*Keolis, Veolia, Transdev*)
 - ▶ Legal entity of the operator (*Priv*)
 - ▶ Network size (N)

Main results

Parameter estimates of the cost function

Variables	Exogenous contract type			Endogenous contract type		
	Estimates		St. Error	Estimates		St. Error
First order terms						
$\ln(Y)$	0.269	***	0.025	0.230	***	0.020
$\ln(N)$	0.106	***	0.013	0.095	***	0.012
$\ln(CS)$	-0.112	**	0.060	-0.187	***	0.052
$\ln(w_L)$	0.903	***	0.017	0.872	***	0.016
FP	-0.044	***	0.014	-0.236	***	0.013
Second order terms	yes			yes		
Time dummies	yes			yes		
Network dummies	yes			yes		
Sample size		1349			1349	

Note: ***: Significant at 1%, **: Significant at 5%, *: Significant at 10%.

Operating costs and labor price were normalized to material costs to account for homogeneity of degree one.

As all variables were normalized to their sample mean, the first-order terms can be interpreted as cost elasticities.

Main results

Marginal effects of the contract choice function

Variables	Endogenous contract type		
	Marginal effects		St. Error
<i>Priv</i>	0.113	***	0.034
<i>Keolis</i>	0.102	***	0.024
<i>Veolia</i>	0.035		0.026
<i>Transdev</i>	0.272	***	0.014
<i>N</i>	-0.054	***	0.015
<i>t</i>	0.023	***	0.002

Note: ***: Significant at 1%, **: Significant at 5%, *: Significant at 10%.

Summary

- The results show a significant and important impact of regulatory choices on the operating costs of transport operators
 - ▶ Given similar network characteristics, networks operated under fixed-price contracts appear to exert approximately 20% lower costs
- Ignoring the endogeneity of contract choice could lead to undervaluing the importance of regulatory incentives for the urban transport network