Cost Efficiency in Swedish Bus Contracts

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Introduction

In Sweden, the 21 county-wise organized Public Transport Authorities (PTA) are in charge the local public transport provision. Since the 1990’s, the PTAs have used, almost exclusively, competitive tendering to arrange the traffic. When implemented, the competitive tendering process decreased costs, while the opposite effect was observed when the number of tendering rounds increased (Alexandersson and Pyddoke, 2010). National statistics now suggests that supply has increased with 30 percent during the last decade, while the total costs have increased with over 50 percent. Further, the process of designing contracts for traffic areas varies across PTAs, meaning that there are little consensus in how and when to use different contracting factors. For example, while some PTAs use incentives payment based on patronage, others use fixed price contracts. Another example of the heterogeneous management is that some PTAs choose to provide some, or in one case all, of their traffic using their own operators (that is, no competitive tendering round is issued). Due to the issues discussed above, there is a need for better understanding in what drives cost inefficiencies. Accordingly, the purpose of this paper is to estimate the cost inefficiency in bus contracts tendered by the PTAs, and determine how contract design factors affect the same.
Model

A stochastic frontier analysis approach is used to estimate a frontier cost function and the associated cost inefficiencies. Variance that cannot be attributed to the frontier cost function or the “standard OLS error term” is defined as cost inefficiency and is captured by the inefficiency component of the model. This method has been frequently used when analyzing inefficiencies in public transport for various European countries, for example Farsi et al. (2006) using Swiss data, Piacenza (2006) for Italy, and Walter (2011) for Germany. The issue of cost efficiency in public transport is relatively unexplored for Sweden, with the exception of Holmgren (2013) who use aggregated data at county level to show that cost efficiency in Swedish counties has decreased substantially between 1986 and 2009. However, due to the aggregated data, the analysis in Holmgren (2013) cannot offer any statistical explanation to what factors affect efficiency. As time series data allowing such inferences is not available for Sweden, a cross-section data set is used with observations at contract level (traffic area) to determine how various contract specific variables affect cost inefficiencies.

The cross-sectional data set used in the analysis contain cost (actual payment), supply and contract design variables for year 2013 and about 300 bus contracts tendered by the Swedish PTAs. The contracting data has never been used to analyze cost efficiencies, and give the possibility to do more disaggregate analyses than previous studies on Swedish public transport (for example Holmgren (2013)). In addition, the Swedish Road Traffic Registry and annual reports of the operators are used to form variables included in the frontier cost function. The frontier cost function is constructed using vehicle kilometers as output variable and the input factor prices of capital, labor, and other factors. Also, control variables capturing contract type (fixed price or incentives contracts with different shares of incentives payment), county fixed effects, and population density are included. To explain the inefficiencies, we include contract design variables such as contracting length in years, population density, operator type (large operator and publicly owned Swedish operator) and contract type.
Results and policy discussion

The preliminary results suggest that labor costs account for the largest share, 70 percent, of the input factor costs in a contract. Capital account for about 25 percent, and other input factors about 5 percent of the total costs. Furthermore, the output elasticity is close to one. Turning to the explanatory factors of cost inefficiency, which are the estimates in focus of this paper, contracts with longer contracting periods are associated with lower inefficiencies. A quadratic term of the contracting length was added to capture potential non-linearity, but the same relationship was found. Population density was found to affect cost efficiency positively, with an insignificant quadratic term for the same. Contracts operated by a publicly owned Swedish operator are on average less efficient than its privately owned counterparts. Finally, contracts with a high share of incentives payment (over 25 percent of the total payment) are less efficient than the reference group of fixed price contracts.

The policy implications from these preliminary results are that PTAs should aim for longer contracting periods. While this would allow the operators to use their vehicle fleet for longer periods and have a more secure financial situation, longer contracting periods could, for example, slow down adoption of technical innovations, which should be considered when designing the contract. Further, the use of publicly owned operators in some counties should be abolished in favor of competitive tendering, which in the past has proven to decrease costs. The design of high share incentives should be revised as it seem as if the contracts operated today cause higher inefficiencies. Case studies of such contracts could be conducted in order to evaluate the driving forces for the operators. However, contracts with a lower share of incentives payment show no significant difference in cost inefficiency compared to fixed price contract. As incentives payment should encourage the operator to care more about its costs as well as improve the public transport system, the payment form should be further explored and evaluated.
References


