Empirical Essays on Railway Infrastructure Costs in Sweden

MATS ANDERSSON

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Abstract

The subject of this thesis concerns pricing the use of transport infrastructure. We are empirically investigating the relationship between railway traffic volumes and infrastructure management costs. More specifically, we are interested in estimating the change in infrastructure management costs from marginal variations in traffic volumes, i.e. to estimate the marginal cost of railway infrastructure wear and tear. Both Europe and Sweden have moved towards a marginal cost based transport pricing policy, thus driving the need for more empirical work on rail infrastructure costs to underpin the level of a wear and tear charge. The thesis consists of five papers. In paper I, the data situation for planning railway maintenance and renewal is surveyed internationally. The survey indicates that most infrastructure managers are still in the data gathering phase, rather than ready to use modern computerised planning tools to make sound decisions in the field of maintenance and renewal. In paper II, we investigate the data situation for infrastructure cost analysis in Sweden. A panel data set that consists of cost, traffic and infrastructure information is created. The data covers 1999-2002 and contains almost 190 annual observations. Three main cost categories are identified; infrastructure operation, maintenance and renewal. This data is used for estimations of cost functions in paper II, III and V. Econometric techniques are applied for this purpose, with several different model specifications. In paper II, the method of pooled ordinary least squares (POLS) is applied. In paper III, we turn to unobserved effects models to exploit data heterogeneity. Finally in paper V, a dynamic generalised method of moments estimator is used to explore a potential dynamic cost dependency. The main findings are that the POLS approach, which has been used in similar studies in Europe recently, is rejected in favour of fixed effects estimation for this data. Furthermore, we also reject the idea of regression analysis to capture marginal rail renewal costs. In paper IV, we suggest an analytical expression combined with survival analysis of rail ages to estimate marginal renewal costs. We derive elasticities with respect to output as well as marginal costs for the different cost categories, and find that the current charge for wear and tear in Sweden is well below these new estimates. This opens up for increased, marginal cost based rail infrastructure wear and tear charges, which would reduce the financial burden on Swedish tax-payers.

Keywords
Railways, Infrastructure, Marginal Costs, Maintenance, Renewal, Econometrics, Panel Data, Survival Analysis