Examining the cost structure of urban bus transit industry: does urban geography help? ©

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Abstract

The purpose of this paper is to expand empirical research on bus transit operation costs and test the hypothesis that physical and geographical characteristics are plausible explanatory cost factors. A translog cost function has been estimated, using a panel dataset of 1053 observations over 1996–2002 for a cross-section of 264 transit bus agencies in the US, combined with geographical and physical data processed with GIS technology. The results confirm the importance of geographical factors as determinants of bus transit costs. The trade-offs between geographical factors in shaping the frontier between economies and diseconomies of density are assessed. The implications of the results for public policy regarding competition are discussed.

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1. Introduction

In his extensive review of the transportation literature, Winston (1985) notes that there has been much statistical cost analysis of all modes of transportation since Walters (1963) survey of production and cost functions. The economics of bus transit operations among the modes of mass transportation have drawn particular attention for two reasons: (1) bus transit is the most efficient form of urban transportation in terms of cost per passenger trips (Keeler et al., 1975), and (2) it is the only mode with the ability to generate enough revenues to cover both capital and variable costs (Viton, 1981). However, bus transit cost studies have been limited in their spatial scope and site-specific variables approximating the differences among the physical settings where the busses are operating have been largely neglected.

Miller (1970) states that the costs of urban bus transit operations “vary across the cities in ways that cannot be entirely accounted for by factor price or output differences” (p. 22), thus “the city setting ought to be considered in estimating the costs of urban bus transportation” (p. 31). Lee and Steedman (1970) claim that “variations between geographical areas in terrain and traffic conditions are plausible explanatory factors in transport cost differences between undertakings” (p. 20). The aim of this paper is to test the hypothesis proposed by Miller (1970) and Lee and Steedman (1970), using current data and expanding earlier empirical research on bus transit operation costs, while accounting for the site-specific characteristics of the service area. A total cost function is estimated using a panel dataset covering bus agencies operating in the US. The cost impacts of changes in output, input prices, and site-specific factors are analyzed, and the implications of the results for public policy are assessed.

The remainder of the paper is organized as follows. Section 2 consists in a review of the literature, and Section 3 presents the modeling approach. Data sources and processing are described in Section 4, and the estimation procedure is discussed in Section 5. The implications of the