The political economy of urban transport-system choice

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Abstract

This paper analyzes the political economy of transport-system choice, with the goal of gaining an understanding of the forces involved in this important urban public policy decision. Transport systems pose a continuous trade-off between time and money cost, so that a city can choose a fast system with a high money cost per mile or a slower, cheaper system. The paper compares the socially optimal transport system to the one chosen under the voting process, focusing on both homogeneous and heterogeneous cities, while considering different landownership arrangements. The analysis identifies a bias toward underinvestment in transport quality in heterogeneous cities.
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1. Introduction

A frequently heard criticism of local public policy in the US concerns the choice of transport systems. In particular, environmentalists and other activist groups often argue that US cities have overinvested in automobile-oriented transportation infrastructure at the expense of public transit. They argue that urban residents would be better off if past transport investment had favored rail and bus systems, with less money spent on freeways.

This argument has gained force recently with the emergence of urban sprawl as a policy issue. Critics argue that freeway investment has encouraged excessive spatial growth of US cities.[1]

Unfortunately, urban public economics provides almost no insight into the issues surrounding the choice of an urban transport system. Transport costs are viewed as exogenous in the typical urban model rather than being the result of a prior policy decision regarding the nature of the transport system. As a result, the above criticism of transport investment patterns is difficult to evaluate using existing models. To remedy this deficiency, the present paper proposes and analyzes a model where the transport system is chosen endogenously, with the choice carried out in the context of a simple urban general equilibrium framework. The goal of the analysis is to compare the socially optimal transport system to the one selected under the public-choice process.

While transport costs impose a direct burden on consumers, these costs also affect land rents in a general equilibrium model by determining the value of access to the city center. This land-rent impact creates several paths by which the transport system affects consumption. When land rent flows to absentee landowners living outside the city, a transport-induced change in rent affects just the cost of living for consumers. But when consumers are resident landowners, earning as income a share of the city's total land rent, transport-induced rent changes affect both living costs and incomes. Recognizing these differences, one goal of the analysis is to explore how landownership arrangements affect the choice of the transport system.

Transport costs in the model have two components: money cost and time cost. The money cost per mile of travel, denoted t, captures the costs of road construction and automobile operation under a freeway system while representing the analogous construction and operating costs under a public transit system. Time cost, on the other hand, captures the value of the time spent in travel. It depends on the inverse of the transport system's speed, denoted ϕ, being equal to ϕ multiplied by the wage rate. The analysis rests on the fundamental assumption that ϕ is a decreasing function of t, so that the city faces a trade-off between time and money cost in choosing the transport system. To facilitate the analysis, this trade-off is viewed as continuous, with a continuum of transport systems corresponding to different combinations of t and ϕ available to the city. While this assumption is obviously unrealistic, it allows the choice between an expensive, fast freeway system and a cheap, slow bus system to be couched within a continuous optimization problem.

The discussion begins by analyzing transport-system choice in the benchmark case where city residents are homogeneous in their skill levels, thus earning uniform incomes. The analysis shows that the socially optimal system minimizes total transport cost (including time cost). The discussion then demonstrates that the political equilibrium coincides with the social optimum regardless of landownership arrangements. Under the political process, only the urban residents themselves have the right to vote, with absentee landowners (if they exist) having no voice in the city's transport decision.

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[1] For an excellent overview of the debate on sprawl, where such ideas can be found, see the urban sprawl symposium in the Fall 1998 issue of the *Brookings Review*.