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Regional Science and Urban Economics 34 (2004) 455–488
regional SCIENCE & urban ECONOMICS
www.elsevier.com/locate/econbase

Spatial competition of governments in the investment on public facilities

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Received 23 March 2003; accepted 26 May 2003
Available online 28 March 2004

Abstract

I study competition of the governments that make a decision on the investment in their public facilities, which yield an excludable good with nonrivalry. Special attention is paid to their strategic interaction, their spatial relationship, an opportunity to exploit third party regions, and a discrete nature of some of their choices. Their decision making process is analyzed as a two-stage game in a model of a linear economy. I characterize equilibria and discuss welfare implications.

JEL classification: H4 (Publicly provided goods); R1 (General spatial economics); R5 (Regional government analysis)
Keywords: Coordination failure; Excludable good with nonrivalry; Linear economy; Multiple equilibria; Public goods; Regulation; Spatial competition; Strategic interaction; Transportation cost

1. Introduction

We often observe that competition of the governments that make a decision on the investment in their public facilities results in an inefficient outcome. For instance, a municipal government sometimes decides to construct a gigantic convention center discouraging its nearby governments from doing so. However, if its rivals decide similarly, as is likely to occur, the same metropolitan area ends up with a surge of the construction of such facilities. To take another example, it is not rare that local governments make every effort at constructing a highway network in their own jurisdictions in order to dissuade

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doi:10.1016/S0166-0462(03)00070-X

those in their neighborhoods from doing so, which tends to result in excessive provision of highways. Many questions arise about those problems. What factors demarcate the governments that do invest in their public facilities from those that do not? Is the amount of the investment made by a government that cares welfare of only the residents in its own jurisdiction socially optimal, larger than optimal or smaller than optimal? If it is not optimal, do we have any mechanism that induces a government to make an optimal amount of investment?

In order to answer those questions, it is important to notice two properties of goods (or services) provided through a broad range of public facilities. First, they are, though provided by a government, not pure public goods due to their excludability: a government can and often does charge a fee (user fee) for the use of its facilities to exclude those who do not pay it. Second, they are not pure private goods, either, because they are nonrival, that is, collective consumption is possible at least up to a certain limit with or without some congestion. Examples of the public facilities that yield such goods are abundant: cultural facilities such as a convention center, concert hall, public library, museum and sports pavilion; facilities for our basic needs of life such as a fire station and public health center; and finally, infrastructure such as a drainage system and transportation systems including an airport, seaport, highway network and high speed train system, to name a few.

As to a government's decision problem, on the other hand, four characteristics are important. First and most importantly, the decision involves strategic interactions among governments. For one thing, payoff of each government depends crucially on the behaviors of the others. This is because demand for the good provided by a government and, therefore, its revenue raised from a user fee hinge upon the 'quality' of the similar goods provided by the nearby governments and their levels of the user fee. Furthermore, the number of the other governments that affect a payoff of a particular government is usually fairly restricted. Second, spatial aspects are important in the decision problem, for the area served through public facilities of each government is determined by the geographical locations of its facilities of the nearby governments. Third, regions with no public facilities play a major role in the decision problem. The excludability mentioned above gives governments an opportunity to collect a user fee from consumers outside their jurisdictions. In particular, they will attempt to exploit those living in regions with no public facilities. For instance, Chicago and Saint Louis would compete against each other in the provision of airports to attract more passengers from vast cornfield regions expanded between them. Thus, such regions, which I call 'Midland', play a critical role in the governments' decision. Finally, a decision variable for the investment is discrete rather than continuous. Theoretically, a government could, for instance, construct a convention center with 500 000 square feet of exhibit space, that with 501 000 square feet, that with 502 000 square feet or so on. In reality, however, political process usually allows it to have only a few options: the option to construct a convention center with 500 000 square feet of exhibit space, say, and that not to construct it at all, for example.

This paper is an attempt to answer the questions mentioned earlier, paying special attention to the two properties of the goods provided through public facilities and the four characteristics of the decision problem. For that purpose, I construct a model of a linear economy, which is an extended version of a Hotelling model with each endpoint of the segment being weighted by a mass of population constituting a 'city'. The city govern-