A GAME OF TWO CITIES: A TOLL SETTING GAME WITH EXPERIMENTAL RESULTS

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Abstract

In this paper we model the competition between two cities as a game to maximise the welfare considering the impact of demand management strategies in the form of cordon tolls. This research builds on earlier work which studied the competition in a small tolled network meant for private modes of transport which have a choice of route. The earlier work showed that while both cities have an incentive to charge alone, once they begin, they are likely to fall into the ‘Nash Trap’ of a prisoner’s dilemma where the incentive to defect is higher than that to cooperate thus eventually leading to a ‘lose-lose’ situation. The current paper extends the idea of competition between cities by setting up a system dynamic model of two cities which includes modes such as car, bus, train and walking and cycling. This paper innovates by integrating the simulation of land use transport interactions with a class room style experimental game and analyses the gaming strategies from a continuous repeated prisoner’s dilemma involving setting of tolls to maximise the welfare of residents. The aim is to test (a) whether the strategies adopted are as theory predicts and (b) whether the players recognise the benefits of lower tolls when given information about the regulated solution and collaborate or continue to play to win. The results show that players respond to the information and maintain a collaborative solution which may have significant implications for regulation and the development of cities within regional partnerships.

Key words: Road user charging; competition; land use transport interaction; game theory, repeated prisoner’s dilemma.

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