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Strategic Choice in Tourism with Differentiated Crowding Types

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Abstract

We introduce a model of tourism choice where we consider that the choice of a tourism resort by a tourist, depends not only on the characteristics of the product offered by the resort but depends also on certain characteristics - crowding types- of the other tourists that have chosen the same resort. To get insights about the effect of crowding types in the allocation of tourists across resorts we exploit a club formation approach and model the framework by means of a Nash game. We establish existence of strategic equilibrium and characterize relevant equilibria.

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1. Introduction

The planning, marketing and supply of tourism facilities depend on tourists' preferences with regard to tourism goods and services; that is, in economic terms, they depend on which kind of utility function represents tourists' tastes. Usually, the utility function depends on prices and the tastes of every tourist with regard to goods and services. Nevertheless, at the moment when one makes the decision to travel, there are also other fundamental variables to take into account, like the typology of residents and other tourists reaching a particular destination. For example, young people like to stay together with other young people, with whom they may share interests in certain activities, while family groups usually prefer resorts where they can find other families, and so on. Then, in economic terms, it seems clear that one variable that is part of the utility function for a tourist is the typology of tourists with whom that tourist shares a destination.

The distribution of the different types of tourists reaching a destination affects the development of both the demand and the supply side. We can find several examples of this changing behavior. A very famous example of a traditional family destination that begins to attract new tourists types with interests that are opposite those of the traditional clients, thus producing a modification of the profile of the destination, is the case of Benidorm (Spain). This change is described in Claver-Cortés et al. (2007) from the supply perspective in terms of the life cycle of a destination. Some recent studies from the destination life cycle perspective are, among others, Oreja Rodriguez et al (2008) for Tenerife (Canary Islands) and Liu et al (2008) for Costa Rica, the latter of which draws connections between the destination life cycle and a changing traveler profile from Plog's (2001) categorization of travelers. See also Agarwal (2001) and Hovinen (2002).

In this work, we introduce a model that provides insight into how the characteristics of tourists are relevant to the allocation of tourists across resorts. Tourists have a taste profile or utility function that measures the degree of satisfaction that they get from joining a resort. The novelty is that the utility function depends not only on the product that is offered in the resort but also on certain characteristics—crowding types—of other tourists placed at the same destination. By crowding type, we mean the set of observable characteristics of a group of tourists that affect the welfare of the other tourists (or the way in which the other tourists perceive the destination). The crowding type concept was introduced and explored by Conley and Wooders (1996, 2001) in a cooperative framework. Recently, in Faias and Wooders (2006), the crowding type variable has been used in the context of strategic club formation, which is an appropriate setup for model resorts.

In our model, the tourists choose resorts, but since the utility that they achieve depends on the crowding profile of the resort, this means that the utility depends on the choices of the other tourists. Thus, we model the framework using a Nash game. The set of available resorts is the strategy set, the payoffs are defined by utilities, and an equilibrium is an allocation of tourists through resorts such that no single tourist has an incentive to move to another resort.

To the extend that we accept the claim of game theory to be the correct framework to describe the behavior of rational agents, we will use the non-cooperative game theory as a tool for analyzing strategic interactions between economic agents in a tourism model. By taking a gametheoretic approach, our main aim is to model and discuss the implications of the crowding profile variable in the tourism markets. Finally, we claim that this model could be extended by introducing other significant variables to improve its accuracy, prices are an example.

In Section 2, we present the model. The equilibrium existence result is proved in Section 3. In Section 4, we discuss characterizations of the equilibrium by providing sufficient conditions regarding the number of tourists of each crowding type and the relative evaluations that tourists assign to the resort that guarantee the prevalence of certain equilibria.

2. The model

We consider an economy with I tourists indexed by $i \in \{1,...,I\} = \mathbf{I}$ and four tourism resorts. Each tourism resort is characterized by two features: the location, which could be a beach (B) or mountain (M), and the product offered, which could be a hotel with a disco (D) or a hotel with a golf course (G). Let $\mathbf{R} = \{BD, BG, MD, MG\}$ denote the set of tourism resorts. The tourists behave strategically by choosing the resort that gives them the best payoff. The payoff depends on the physical characteristics of the resort—namely, location and offered product—and on some observable characteristics of the other agents staying at the same resort. We consider two illustrative crowding types related with the age of the tourists: namely, c_y if the tourist is young and c_o if the tourist is old (adult). Let $\mathbf{C} = \{c_y, c_o\}$ denote the set of crowding types. Actually, the relevant variable is the number of agents of each crowding type; that is, $m_R = (m_{Rc_y}, m_{Rc_o})$ denotes the crowding profile of the tourists at the tourism resort R, m_{Rc_y} is the number of tourists with crowding type c_y and m_{Rc_o} is the number of tourists with crowding type c_o.

The tourists have the preferences described as affiliated with their respective taste profiles. We consider four taste types, $\mathbf{T} = \{t_{BDy}, t_{BGo}, t_{MDy}, t_{MGo}\}$. Each taste type is represented by a utility (payoff) that depends on the physical characteristics of the resort, R, and also on the crowding profile of the resort, m_R. The four payoff functions are the following,

$$u_{t_{BDy}}(R, m_R) = f_{BD}(R) + m_{Rc_y} - m_{Rc_o} + C, \quad f_{tBD}(R) = \begin{cases} V_{BD} & \text{if} \quad R = BD \\ 0 & \text{if} \quad R \neq BD \end{cases}$$

$$u_{t_{BGo}}(R, m_R) = f_{BG}(R) - m_{Rc_y} + m_{Rc_o} + C, \quad f_{BG}(R) = \begin{cases} V_{BG} & \text{if} \quad R = BG \\ 0 & \text{if} \quad R \neq BG \end{cases}$$

$$u_{t_{MDy}}(R, m_R) = f_{MD}(R) + m_{Rc_y} - m_{Rc_o} + C, \quad f_{MD}(R) = \begin{cases} V_{MD} & \text{if} \quad R = MD \\ 0 & \text{if} \quad R \neq MD \end{cases}$$

$$u_{t_{MGo}}(R, m_R) = f_{MG}(R) + m_{Rc_y} - m_{Rc_o} + C, \quad f_{MG}(R) = \begin{cases} V_{MG} & \text{if} \quad R = MG \\ 0 & \text{if} \quad R \neq MG \end{cases}$$

with $V_{BD}, V_{BG}, V_{MD}, V_{MG}$ positive constants.

Thus, a tourist with taste type t_{BDy} prefers a resort with a beach and disco and is indifferent to the others. Furthermore, s/he prefers the company of young people and dislikes the company of old people. The other taste types are straightforwardly interpreted.

In summary, each tourist can be characterized as belonging to one of two types, the crowding type or the taste type. Let $n(c,t)$ denote the total number of tourists in the economy with crowding type c and taste type t. The fundamentals of this tourism model, the resorts and the tourists, are described by $\mathbf{E} = \{\mathbf{R}, (n(c,t))_{c \in \mathbf{C}, t \in \mathbf{T}}\}$. We model the behavior of tourists as a strategic game. The strategy set of each tourist-player is the set of available resorts, $\mathbf{R}$. Each player i chooses a tourism resort, $R_i \in \mathbf{R}$. These choices give rise to a strategy profile, that is, a vector with the strategy of every agent, $(R_1,...,R_i,...,R_I) \in \mathbf{R}^I$. A strategy profile $(R_1,...,R_i,...,R_I)$ defines an allocation of tourists across resorts and also defines the crowding profile for each resort, that is, the number of members of each crowding type in each resort, m_R. Therefore, given a strategy profile $(R_1,...,R_i,...,R_I)$, the payoff of a tourist i is his utility evaluated at (R_i, m_{R_i}); that is, $\Pi^i(R_1,...,R_i,...,R_I) = u_{\tau(i)}(R_i, m_{R_i})$.[5]

3. Equilibrium: Definition and Existence

The goal of this paper is to find an allocation of tourists throughout the tourism resorts such that, given the choices of resort available to every tourist, no tourist has an incentive to move to another resort. Therefore, we consider the Nash equilibrium as the equilibrium concept for the game, $\mathbf{G} \equiv \{(\mathbf{R}, \Pi^i); i \in \mathbf{I}\}$ which is the game that describes our tourism model $\mathbf{E}$.

Definition. A profile $(R_1^*,...,R_i^*,...,R_I^*) \in \mathbf{R}^I$ is a pure strategy Nash Equilibrium for the game $\mathbf{G} = \{(\mathbf{R}, \Pi^i); i \in \mathbf{I}\}$ if

$$\Pi^i(R_i^*, R_{-i}^*) = \max_{R_i \in \mathbf{R}} \Pi^i(R_i, R_{-i}^*)$$

for all $i = 1,...,I$.

Theorem. There exists an equilibrium of mixed strategies for the Nash game $\mathbf{G} = \{(\mathbf{R}, \Pi^i); i \in \mathbf{I}\}$ associated with the tourism model $\mathbf{E}$.

Proof: For every player i the strategy set, $\mathbf{R}$, is finite; therefore, there exists an equilibrium in mixed strategies (See Fundenberg and Tirole, 1995).

Existence of equilibrium in non-cooperative games is a currently issue and we refer a seminal

[5]Let $\tau : \mathbf{I} \to \mathbf{T}$ be a function that assigns a taste type to each tourist $i \in \mathbf{I}$, that is, $\tau(i) = t$ for some $t \in \mathbf{T}$.

paper in this area by Schmeidler (1973) with the first general proof of existence of equilibrium points. From the other hand, Carmona and Podczeck (2009) is a recent paper generalizing most of the known results in existence of equilibrium.

Next, we explore special cases of our model; specifically, we exhibit three propositions that show the role of the crowding type in the allocation of tourists across the tourism resorts.

Equilibrium characterization

We assume that there are no tourists of some types; that is,

$$n(c_y, t_{BGo}) = 0, \quad n(c_y, t_{MGo}) = 0, \quad n(c_0, t_{BDy}) = 0, \quad n(c_0, t_{MDy}) = 0.$$

Proposition 1. For an economy under assumptions,

$$V_{BD} > n(c_y, t_{BDy}) + n(c_y, t_{MDy}) \quad (1.a)$$
$$V_{MD} > n(c_y, t_{BDy}) + n(c_y, t_{MDy}) \quad (1.b)$$
$$V_{BG} > n(c_o, t_{BGo}) + n(c_o, t_{MGo}) \quad (1.c)$$
$$V_{MG} > n(c_o, t_{BGo}) + n(c_o, t_{MGo}) \quad (1.d)$$

the following distribution of tourists is a Nash equilibrium,

	Resorts			
	BD	BG	MD	MG
Tourists	$n(c_y, t_{BDy})$	$n(c_o, t_{BGo})$	$n(c_y, t_{MDy})$	$n(c_o, t_{MGo})$

In this equilibrium, at resort BD we have all the young tourists with taste type t_{BDy}, at resort BG we have all the old tourists with taste type t_{BGo}, at resort MD we have all the young tourists with taste type t_{MDy} and, finally, at resort MG we have all the old tourists with taste type t_{MGo}. Actually, under these assumptions, each tourist values the product represented by the resort more than the crowding profile and then chooses the resort that offers his/her preferred product.

Proposition 2. For an economy under assumptions

$$V_{BD} > n(c_y, t_{BDy}) + n(c_y, t_{MDy}) \quad (2.a)$$
$$V_{MD} + n(c_y, t_{MDy}) < n(c_y, t_{BDy}) \quad (2.b)$$
$$V_{BG} > n(c_o, t_{BGo}) + n(c_o, t_{MGo}) \quad (2.c)$$
$$V_{MG} + n(c_o, t_{MGo}) < n(c_o, t_{BGo}) \quad (2.d)$$

the following distribution of tourists is a Nash equilibrium:

	Resorts			
	BD	*BG*	*MD*	*MG*
Tourists	$n(c_y, t_{BDy}); n(c_y, t_{MDy})$	$n(c_o, t_{BGo}); n(c_o, t_{MGo})$		

The assumption in Proposition 2 implies that the mountain destination does not attract any demand. Indeed, tourists who prefer the beach have a strong preference for the resort product and then choose the beach destination. Tourists who prefer the mountain are few in comparison with tourists who prefer the beach and have a weak preference for the tourism product. As a result, the crowding type component of the payoff function prevails over the resort product component. Consequently, tourists who prefer the mountain also choose the beach destination. The next proposition shows how the previous equilibria could drastically change with a variation in the parameters.

Proposition 3. For an economy under assumptions

$$V_{BD} > n(c_y, t_{BDy}) + n(c_y, t_{MDy}) \quad (3.a)$$
$$V_{MD} + n(c_y, t_{MDy}) < n(c_y, t_{BDy}) \quad (3.b)$$
$$V_{BG} + n(c_o, t_{BGo}) < n(c_o, t_{MGo}) \quad (3.c)$$
$$V_{MG} > n(c_o, t_{BGo}) + n(c_o, t_{MGo}) \quad (3.d)$$

the following distribution of tourists is a Nash equilibrium:

	Resorts			
	BD	*BG*	*MD*	*MG*
Tourists	$n(c_y, t_{BDy}); n(c_y, t_{MDy})$			$n(c_o, t_{BGo}); n(c_o, t_{MGo})$

Conclusion

The crowding type variable—that is, the characteristics of tourists that affect the welfare of other tourists—is significant in the allocation of tourists across tourism resorts. Indeed, the relative evaluations that tourists make of a resort product and the crowding profile of the other tourists at the resort influence the demand for resorts. Thus, the suppliers of the tourism resorts should take into account not only the taste type but also the crowding type of the tourists whom they would like to attract when they design the resort.

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