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Full Length Article

The economics of destination cards☆

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ABSTRACT

Destination cards have been recognized as effective tools for promoting tourism destinations. However, their role as mechanisms for coordinating tourism service providers within the destination remains underexplored. We address this gap by developing an enriched version of the Hotelling price competition model to investigate the welfare effect of destination cards. We assume that a destination with two price-setting attractions and one complementary good (transportation) introduces a card offering discounts on attractions and free access to local transportation. We find that the card is welfare-improving, although it also alters the pricing strategy of the attractions and, under certain conditions, might reduce tourist surplus.

Introduction

Tourism destinations are markets where the spatial concentration of service providers (e.g., amusement parks, hotels, restaurants, transport), organizations (e.g., Destination Management Organizations), natural attractions, landscape, heritage, and infrastructure yields the supply of an integrated tourism product (Yang & Fik, 2014; Zach & Hill, 2017). This product results from the combined effort of all the (independent) actors co-located within the destination, whose activities are complementary and mutually relevant. For example, introducing an effective transport system might encourage tourists to visit distant attractions; similarly, tourists' utility from visiting a museum may be enhanced when restaurants offering quality food open nearby.

As a result, the tourism product exhibits characteristics of what has been defined as an "anticommons" (Candela et al., 2008; Heller, 1998, 1999; Michelman, 1982), a condition in which ownership and production are fragmented among multiple providers, each offering a complementary component of the whole product. In this context, tourists visiting a destination effectively require some form of "permission to access" to be granted by each provider of complementary services. Suppose one provider fails to deliver or delivers a low-quality component; this creates a negative externality, an inefficiency that affects all other tourism components, causing the overall tourist experience to suffer and profits to decline. Unlike what happens in other economic sectors, where these "complementary externalities" are typically solved through a process of vertical integration, the specificity of tourism suggests that

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the resulting inefficiencies are mainly addressed through coordination efforts undertaken by independent providers (Novelli et al., 2006; Stienmetz & Fesenmaier, 2018). Business practice shows that there are two different ways of managing the anticommons problem: (i) inter-firm coordination agreements, often facilitated by Destination Management Organizations (Angeloni, 2016); (ii) integration of various tourism services into package tours (e.g., all-inclusive holidays) sold by tour operators and travel agencies (Figini, 2022).

In this paper, we focus on an increasingly popular form of inter-firm coordination agreement—the destination card (hereafter, Card)—and develop a microeconomic model to explore the welfare effects of its adoption in a tourism destination. The Card, also called "tourist card", "city card", "city pass", "guest card", "visitor card", or "welcome card", typically provides tourists with access to attractions, transportation services, and other amenities at discounted rates or free of charge (Le-Klähn et al., 2015; Leung, 2020; Zoltan & Masiero, 2012). Its primary objective is to encourage greater utilization of available tourism facilities (Zoltan & Masiero, 2012) and improve the quality of the tourism experience by providing cost- and time-saving functionalities (Leung, 2020; Thirumaran & Eijdenberg, 2021).

Although publicly reported Card sales are rare, available data indicate growing adoption. For example, since their introduction in 1995, the Vienna Tourist Board and VisitBerlin reported cumulative sales of over 7 and 15 million units, respectively, by 2024 (Vienna Tourist Board, 2024; VisitBerlin, 2024). This growth has also attracted scholarly interest, as reflected in a recent surge of contributions on the topic (e.g., Àlvarez-Albelo & Martínez-González, 2023; Dalle Nogare & Scuderi, 2024; Leung, 2020). To further illustrate the widespread diffusion of Cards in different contexts, Table 1 presents the five top cities ranked by Popova (2023) and the five top European Alpine regions ranked by Landesinstitut für Statistik (2023). Although these rankings are unrelated to Card adoption, it is noteworthy that all the listed destinations offer a Card, highlighting the broad penetration of this tool in business practice.[1] The table also summarizes the Cards' key features: some are free, others available for purchase, and all offer either free public transport, discounted attraction admission, or both.

Table 1
Cards in selected destinations.

Name	Price	Website	City/Region	Free public transport	Attractions
Paris Passlib'	positive	parisjetaime.com	Paris	yes after supplement[a]	free
Dubai Unlimited Pass	positive	dubaipass.visitdubai.com	Dubai	no	free
Madrid City Card	positive	citycard.esmadrid.com	Madrid	yes	discount
Tokyo Pass	positive	mytokyopass.com	Tokyo	yes after supplement[b]	free
I Amsterdam City Card	positive	iamsterdam.com	Amsterdam	yes	some free, some with a discount
TirolWest Card Basic	zero	tirolwest.at	Tyrol	yes	free
Alto Adige Guest Pass	zero	suedtirol.info	South Tyrol	yes	free
Salzburg Card	positive	salzburg.info	Salzburg	yes	free
Zugspitz Arena Bayern Tirol Card	zero	gapa-tourismus.de	Bavaria	yes	free guided hikes, discounts on attractions
Trentino Guest Card	zero	trento.info	Trentino	yes	some free, some with a discount

[a] The Paris Passlib' does not include transportation, but the Navigo Day Pass or Forfait Paris Visite can be purchased separately at a flat rate for unlimited transport.
[b] The Tokyo Pass offers the option to add unlimited subway travel within the specified time frame for a one-time additional cost.

From an economic theory perspective, Cards are a specific form of coordination, functioning as *price* agreements among providers of substitute services (i.e., different attractions) and complementary services (i.e., attractions and transportation). The relevance of coordination for tourism destinations is well-documented (for a recent review see Messori & Volo, 2024) and, in the tourism economics literature, price coordination has been analyzed first by Wachsman (2006) and then extended by Andergassen et al. (2013, 2017). These authors consider a stylized destination with two suppliers of complementary tourism services (e.g., an airline and a hotel) to show that both consumer surplus and producer surplus increase when the two firms coordinate prices to maximize their *joint* profits, an outcome referred to as "coordination theorem": this is because tourists benefit from lower prices, while firms gain from increased sales.

We contribute to this body of literature by providing a less stylized representation of tourism destinations, specifically acknowledging that (i) multiple firms managing similar tourism attractions (e.g., museums and galleries; churches and castles; theme and amusement parks) co-exist within a destination and may compete to attract time-constrained visitors; (ii) tourists may rely on local transportation services to reach local attractions, provided the destination has an effective transport system; (iii) tourists typically seek to visit multiple attractions, i.e., they exhibit a preference for variety (Andergassen et al., 2013), though they may be unable to visit all desired attractions due to constraints such as limited length of stay or high transportation costs.

To incorporate these features, we build on the approach recently introduced in the tourism economics literature by Àlvarez-Albelo and Martínez-González (2022), who apply the Hotelling price competition model. The Hotelling framework has the advantage of

[1] More precisely, the Dubai Destination Management Organization does not issue Cards directly; however, its website promotes Cards from tour operators. The table provides an example of one such Card.

representing a linear city (or region), thereby reflecting the physical nature of a destination, with two firms/attractions located at opposite endpoints and tourists enjoying accommodation services distributed along the city. However, unlike (Àlvarez-Albelo & Martínez-González, 2022), we extend the Hotelling model by introducing a three-firm configuration, in which the two attractions compete in prices, while a third firm offers a complementary service, i.e., public transportation (Dwyer et al., 2020; Wachsman, 2006), at a regulated fare. This three-firm extension represents our primary and novel theoretical contribution, as it enables the model to explicitly distinguish between substitute services (the different attractions) and complementary services (transport and any of the attractions). In turn, this captures the implications of having complementarities in the tourism product, the pivotal element driving coordination strategies. In doing so, we significantly depart from Àlvarez-Albelo and Martínez-González (2022), who only consider two attractions and, following Armstrong (2013), provide a behavioral interpretation of substitutability and complementarity of tourism services, for which services are substitutes for single purchasers and complements for joint purchasers. On the contrary, since the tourism product is a bundle of complementary goods and, at the same time, there are competing providers offering substitute services, we believe our three-firm configuration to be the correct one to describe tourism destinations without and with the Card.

Additionally, we explicitly distinguish coordination from bundling. While bundling offers consumers discounts only when services are purchased together, we conceptualize the Card as a proper coordination tool that provides discounts irrespective of purchasing decisions. We choose to model coordination rather than bundling to better reflect how Cards typically function in business practice, as illustrated in Table 1.

Another important aspect in which we depart from the existing literature, and Àlvarez-Albelo and Martínez-González (2022) in particular, is related to transportation costs. These costs typically reflect heterogeneity in consumer preferences and horizontal differentiation between products. On the contrary, we adopt Hotelling's original spatial setup, and we interpret the transport costs as the actual time *and* monetary costs that tourists incur when traveling from their hotel to the attractions. It is important to remark that, although our modeling strategy resembles some Industrial Organization papers on platforms with multihoming (starting from Caillaud & Jullien, 2003), to the best of our knowledge, this is the first extension of the Hotelling model to a three-firm configuration, where the third firm explicitly provides transport from the consumer's location to the firm.

Finally, a key assumption of the standard Hotelling model is that consumers purchase at most one unit of the good from either firm, which fails to capture their love for variety (Andergassen et al., 2013). Therefore, we also extend the standard framework to the so-called "non-unit demand Hotelling model" (or multihoming), allowing tourists to buy from both firms (for similar specifications, see Àlvarez-Albelo & Martínez-González, 2022; Anderson et al., 2010; Jeitschko et al., 2017; Kim & Serfes, 2006). An important novelty of our approach, however, is that we let the transportation costs take *any* positive value relative to the tourists' gross utility from visiting the attractions, marking a departure from all previous studies employing the non-unit Hotelling framework, as well as from most papers utilizing the standard framework (for a recent exception, see Bacchiega et al., 2023). As discussed below, this enables us to capture a broader range of economic behaviors and welfare outcomes that were previously unexplored, representing a further contribution of this work.

With such a model set-up, we solve the following price competition game: first, the two attractions simultaneously choose prices to maximize profits; second, tourists make their purchasing decisions. At equilibrium, two main scenarios arise. When transportation costs are relatively high, tourists located near either attraction opt to visit only the nearby one to minimize transportation expenses, while those situated farther away visit both. When transportation costs are lower (this is the novel scenario we emphasize) more tourists visit both attractions. We then introduce a Destination Management Organization that provides tourists with a Card, offering free public transport and a percentage discount on the price of the two attractions. We show that the Card modifies tourists' purchasing decisions and alters the outcome of the price competition game. In particular, we derive the conditions under which, due to lower transportation costs that reduce demand elasticity, all tourists choose to visit both attractions when the Card is available. Anticipating this outcome, attractions respond by increasing their prices, ultimately causing tourists to pay *more* despite the discount.

The final step of our analysis consists of studying how the presence of the Card affects the firms' equilibrium profits, the tourist surplus, and the sum of these values: the total surplus (also named social welfare in the economics literature). Our findings are as follows. Both the total surplus and the two attractions' equilibrium profits increase with the Card's presence, thanks to the demand boost. By contrast, when transportation costs are such that all tourists opt to visit both attractions only when the Card is available, the tourist surplus decreases due to the price increase of the attractions described earlier. This is a novel result that deviates partially from the coordination theorem and arises from solving the Hotelling game without parametric restrictions: this approach allows firms to adjust their pricing strategies in response to the Card and the resulting change in tourists' purchasing behavior. Note in conclusion that the increase in total surplus due to the Card is always higher than the losses incurred by the transport company, which no longer collects revenue from travel ticket sales, and, in the specific scenario, by tourists. Hence, there is room for intra-destination compensation, making a Pareto improvement (that is, increasing one actor's surplus without causing a loss to any other's) always achievable in the destination.

To the best of our knowledge, this is the first study to provide an economic theory analysis of price coordination mechanisms jointly involving providers of complementary and substitute services. This way, our paper contributes to three streams of literature: (i) the tourism economics literature on complementarities and coordination, (ii) the tourism management literature on Cards, and (iii) the industrial organization literature on pricing strategies in the presence of complementarities. In Section "Literature Review', we describe these strands in detail. In Section "The model", we present the non-unit Hotelling model applied to the tourism destination. In Sections "Equilibrium" and "Destination Card", we study the market equilibrium without the Card and with the Card, respectively. Section "Welfare Effects of the Destination Card" investigates the welfare effects of the Card. Section "Extensions" introduces some extensions of the model to check the robustness of the main results, while the two final sections summarize the main findings, discuss their practical implications from a tourism policy perspective, and describe their limitations.

Literature review

Complementarities and coordination

Although the implications of treating complementary goods have been well known since (Cournot, 1838)'s work on complementary duopoly, the anticommons problem has received scant attention in microeconomics. When a market presents this problem, the double marginalization analysis of Spengler (1950) should be applied to a more general situation where firms do not necessarily constitute a succession of production stages.[2] As Baumol (2001) and Ruffin (2008) note, when firms produce components of the final product (which may or may not represent different stages of production), the negative externality resulting from complementarity drives the sum of individual prices to exceed the profit-maximizing price of the final product (Economides & Salop, 1992). Baumol (2001), in his analysis of R&D policies, notes that R&D generates positive externalities for all firms within the same geographical area. Consequently, he argues, the management of R&D should be coordinated at the local level, with approval from antitrust authorities. Parisi and Depoorter (2003) apply the same reasoning to intellectual property rights, while Teller et al. (2016) and Vitorino (2012) extend it to the retail market.

In the tourism economics literature, Wachsman (2006) introduces a simple coordination model among local complementary stakeholders. Andergassen et al. (2013, 2017) later extend and strengthen this approach in what they call the "coordination theorem": "Given the anticommons property of the tourism product, coordination among firms in the destination, which can either be provided by the destination management or by a tour operator, increases profits from tourism"(Andergassen et al., 2013, p. 93). Accordingly, the rise in profits is attributed to a coordinated strategy aimed at reducing prices relative to the non-coordination benchmark. Tourists also benefit from this price reduction by experiencing an increase in consumer surplus, which improves overall market welfare. Coordination can occur in various forms (Figini, 2022): quantity, to prevent bottlenecks in tourism supply; quality, to meet tourists' expectations; or price between producers of complementary (and substitute) goods. Our analysis focuses on price coordination, employing Cards to model coordination dynamics. Cards are particularly suitable for this purpose, as they allow for the exogenous introduction of coordination within a destination. Moreover, their established use in business practice underscores their relevance and validity for the present study.

Destination cards

Previous research on Cards covers various topics, including their function and impact. Primarily, these studies examine the potential marketing use of tourists' behavioral patterns, exploiting data on Card use to access attractions or public transport, integrated with their socio-demographic characteristics (Scuderi & Nogare, 2018; Zoltan & McKercher, 2015). Few studies explore how the presence of a Card can foster inter-firm coordination within the destination. For instance, Schnitzer et al. (2018) explore suppliers' motives in joining a Card alliance, while d'Angella and Go (2009) emphasize the need for coordination to achieve individual success within a destination. To our knowledge, Àlvarez-Albelo and Martínez-González (2022) is the only existing microeconomic analysis of Cards. However, their definition of Cards appears to align more closely with a bundle pricing agreement involving providers of substitute services than with the conventional definition of Cards in tourism business practice. Thus, their conclusion that Cards increase firm profits while reducing consumer surplus would be better framed within the industrial organization literature on bundling rather than coordination.[3] In a recent follow-up, Àlvarez-Albelo and Martínez-González (2023) expand their previous analysis to explore coordination between a Destination Management Organization and a foreign tour operator.

From a methodological perspective, these papers rely on different approaches, primarily within management and, to a lesser extent, economics. Most studies adopt qualitative methodologies, collecting data through interviews, surveys, or focus groups (Angeloni, 2016; Leung, 2020). Others employ conceptual models to develop frameworks (Thirumaran & Eijdenberg, 2021) or apply cluster analysis and pattern recognition (Scuderi & Nogare, 2018; Zoltan & McKercher, 2015). On the quantitative side, Zoltan and Masiero (2012) perform an ordered logistic regression to identify the benefits tourists receive from the Card. While these studies address relevant gaps, their predominant reliance on qualitative and, to a lesser extent, quantitative methods highlights the need for more theoretical investigations to advance the understanding of Cards. In this sense, the limited research in economic theory focuses primarily on substitute goods (Àlvarez-Albelo & Martínez-González, 2022), while the analysis of coordination in destinations should include complements. We fill this gap by providing an in-depth analysis of the equilibrium welfare effects of Cards, using a three-firm framework to simultaneously capture the presence of complementary and substitute services within the tourism product.

Pricing strategies in the presence of complementarities

Understanding the effect of tourism firms' coordination on pricing strategies is integral to the configuration of the tourism product. Indeed, prior literature (Àlvarez-Albelo & Martínez-González, 2022; Armstrong, 2013; Jeitschko et al., 2017) examines substitute products that might be converted into complements, when jointly purchased, through a bundle discount, and finds a reduction in consumer surplus. According to Armstrong (2013), when firms offer a bundle discount, they (i) mitigate the

[2] When instead firms operate at different production stages, it is well-known that vertical integration is the efficient solution.

[3] More precisely, Àlvarez-Albelo and Martínez-González (2022) find that consumer surplus can increase when a relatively large proportion of tourists travel to a two-attraction destination but are bound to visit no attraction.

substitutability of their products, converting "products which intrinsically are substitutes into complements" (Armstrong, 2013, p. 454), and (ii) relax competitive pressures, which induce firms to raise prices, thereby increasing their profits but shrinking consumer surplus. This outcome relates to the wider industrial organization literature on bundling strategies in duopolies (Anderson & Leruth, 1993; Chen, 1997; Matutes & Regibeau, 1992), showing how such strategies enable competitors to increase product differentiation and loosen competition at the expense of social welfare. Bloch (1995), using a coalitions approach, and Goyal and Moraga-González (2001), using a bilateral link formation approach, show that excessive horizontal coordination among substitutes can lead to asymmetric and inefficient equilibria, while an intermediate level of coordination maximizes both aggregate profits and social welfare, thereby intensifying the debate on the desirability of coordination.

Differently, the tourism literature highlights that coordination is welfare-enhancing if there are at least two complementary products that are always demanded together. The coordination theorem results in an unambiguous increase in the total surplus; however, Mantovani and Ruiz-Aliseda (2016) show that when markets reach saturation, coordination among firms selling complementary products may not allow firms to capture greater value. Such contrasting results in the literature stem from a misalignment in the interpretation of coordination and bundling: see Bojamic and Calantone (1990) for a framework integrating the economic and marketing approaches to tourism price bundling. In this sense, price coordination—and the Cards—can be considered a specific form of bundling, but not all bundling strategies involve coordination between complementary goods, as bundling can also apply when there are only substitutes. While not addressed explicitly, this distinction has been indirectly acknowledged by Llanes et al. (2019), who examine a market featuring both complements and substitutes. In their model, two producers offer complements to a monopolistic product. The authors compare bundling and coordination strategies based on sharing the complementary benefits with the incumbent. They find that coordination becomes advantageous as network strength rises and the degree of complementarity decreases. Conversely, bundling with a specific complement proves more effective with weaker networks and higher complementarity.

We enter this debate by showing that the tourism sector provides an interesting example of the implications of coordination with complementary goods and by acknowledging that, consistent with standard microeconomic theory, complementarity and substitutability derive from the intrinsic nature of goods or services, rather than from behavioral responses to bundle pricing. This is why our model, which integrates several strands of literature, has a hybrid nature. We draw from tourism economics the emphasis on complements and the anticommons nature of the tourism product. We draw from microeconomics the theoretical approach—the Hotelling model—to better represent the specific features of the tourism destination. We adapt the Hotelling approach to model the effects of a Card offering discounted transport and access to attractions. Finally, we provide a thorough analysis of the Hotelling model without imposing any parametric restriction; in doing so, we also contribute to a niche topic in the Hotelling literature (Bacchiega et al., 2023; Mérel & Sexton, 2010).

The model

A tourism destination is (i) a physical space in which (ii) tourists visit attractions (iii) using infrastructures, such as roads and public transport, and (iv) enjoy accommodation services to stay a limited amount of time (at least one night) (dos Santos Estevão et al., 2015). To capture these four aspects in a parsimonious mathematical framework, we rely on an enriched version of the Hotelling model, which retains its original spatial interpretation.

This model is characterized by a unit-length linear city (or region); this incorporates feature (i). There are two tourism attractions, denoted $i = 1, 2$, and each managed by a profit-maximizing firm, located at the endpoints of the city/region, firm 1 at point 0 and firm 2 at point 1; this captures feature (ii). There is a third company providing transport services in the area: this incorporates feature (iii). A unit mass of tourists, referred to as consumers, enjoys accommodation services that are uniformly distributed along the city/region; this captures feature (iv). The location of a consumer's accommodation within the city/region is denoted by $x \in [0, 1]$ and is exogenously determined by the distribution and availability of accommodations. In Fig. 1, we visually represent such a tourism destination within the Hotelling model.

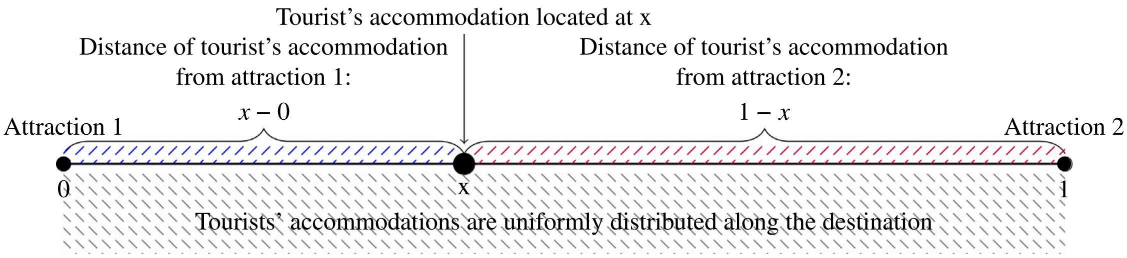

Fig. 1. The tourism destination in the Hotelling framework.

When a consumer located at accommodation x visits firm i, she bears a transportation cost $Td_i(x)$, where $d_i(x) \equiv \{x, 1 - x\}$ is the Euclidean distance between the consumer's location and that of firm i, and $T \equiv (t + m)$ is the marginal transportation cost. We conceptualize tourists' transportation costs as including both monetary m and time t components, thereby capturing the multidimensional nature of travel budgets. Indeed, beyond conventional financial constraints (e.g., public transport fares), tourists also face time constraints, such as fixed arrival and departure dates, which limit the time available to visit attractions. Consequently, if an attraction is located far from a tourist's accommodation, the associated travel time may discourage a visit due to the high opportunity cost of the time lost traveling. More precisely,

1. t is the per-unit-of-distance time disutility; one can think of t as the per-unit-of-distance travel time—affected by, e.g., traffic congestion or quality of the public transport infrastructure—and/or the per-unit-of-distance travel disutility—affected by, e.g., the consumers' length of stay; we refer to t as the *marginal time cost* of transportation;
2. m is the per-unit-of-distance *regulated* fare of the travel ticket; $md_i(x)$ is then, e.g., the metro, or bus, or train fare to get to firm i and cashed by the transport company; we refer to m as the *marginal monetary cost* of transportation.[4]

The decision to rely on two distinct parameters to model transportation costs stems from the recognition that the time and monetary components, capturing inherently different aspects, are not perfectly correlated: for instance, more congested cities do not necessarily have more expensive public transportation.

In our non-unit demand Hotelling model, consumers can visit only one firm, both firms, or no firm. When a consumer located at $x \in [0,1]$ visits only firm i at price p_i, her utility function is

$$U_i \equiv v - T d_i(x) - p_i, \tag{1}$$

where v is the gross utility from visiting firm i, $T d_i(x)$ is the transportation cost to get to firm i, and p_i is the price charged by firm i; we refer to consumers visiting only one firm as *single purchasers*. Instead, when a consumer located at $x \in [0,1]$ visits both firms, her utility is

$$U_{1+2} \equiv 2v - T - (p_1 + p_2), \tag{2}$$

where $2v(= v + v)$ is the gross utility from visiting firm 1 and firm 2, $T(= T(x + 1 - x))$ the transportation cost borne by the consumer to reach both firms, and $p_1 + p_2$ the sum of prices of the two attractions. We define these consumers as *joint purchasers*. Finally, when consumers do not visit any firm, their utility is zero.[5]

Next, we derive the demand function of firms 1 and 2. This is done by identifying the locations of indifferent consumers, which determine the boundaries of the segments of consumers making different choices. More precisely, we solve equations $U_1 = U_{1+2}$ and $U_2 = U_{1+2}$ for x to get the location of the consumer indifferent between visiting firm 1 or both firms, denoted x_1, and that of the consumer indifferent between visiting firm 2 or both firms, denoted x_2, respectively. The consumers located in the interval $[0, x_1]$ are single purchasers of firm 1; intuitively, those located close to firm 1 may prefer visiting only the nearby firm to save on transportation costs. Instead, consumers in the interval $[x_2, 1]$, thus closer to firm 2, are single purchasers of firm 2. Finally, consumers located between x_1 and x_2 are joint purchasers; since they are pretty far from both firms, they have less incentive to visit only one attraction and save on transportation costs. This derivation is formally summarized in Lemma 1.

Lemma 1.

1. *The demand from single purchasers of firm* 1 *is*

$$x_1 = D_1 \equiv \frac{T - v + p_2}{T} \tag{3}$$

2. *The demand from single purchasers of firm* 2 *is*

$$1 - x_2 = D_2 \equiv \frac{T - v + p_1}{T}. \tag{4}$$

3. *The demand from joint purchasers corresponds to*

$$x_2 - x_1 = D_{1+2} \equiv \frac{2v - T - \left(p_1 + p_2\right)}{T}. \tag{5}$$

We are interested in solving the following price competition game: first, the two firms managing the attractions simultaneously choose prices p_i to maximize profits; then, consumers make their purchasing decisions. Without loss of generality, we let the firms' and transport company's production costs be zero. Most importantly, we analyze this game by letting the marginal transportation disutility T take any positive real value for any given $v > 0$. Doing so, three alternative equilibrium configurations arise.

1. Some consumers purchase from both firms, while all the others visit only one firm. This is the *mixed-purchase scenario*, in which all consumers buy at least from one firm, hence the market is fully covered: see Fig. 2 for a graphical representation; the blue and red sloping lines indicate the utility of single purchasers of firm 1 and 2, respectively, as a function of their location x, while the green horizontal line denotes the utility of joint purchasers. Intuitively, this configuration occurs when the marginal transportation cost T is neither negligible relative to v, otherwise all consumers would visit both firms, nor it is relatively sizeable, otherwise no consumers would buy from both firms; graphically, the blue and red lines are not too flat, nor too steep.

[4] For a similar specification, see de Palma et al. (2018), who study competition between transport facilities in a Hotelling framework and assume that travelers bear two different types of transportation costs: an actual monetary cost to get to the facility and a time disutility cost.

[5] The assumption that both attractions provide consumers with the same gross utility v is made for simplicity. Alternatively, one could consider two different parameters, $v_1 \neq v_2$, but this would complicate the analysis without offering additional qualitative insights. At the same time, our simplifying hypothesis does not imply that consumers perceive the attractions as identical. On the contrary, it accommodates the idea of two similar but distinct sites (e.g., a monument and a museum) that are equally valued by consumers, for instance, due to their popularity within the destination.

2. Every consumer visits both firms. This is the full-coverage *joint-purchase scenario* that arises when T is low relative to v, hence consumers can easily move around the city/region: see Fig. 4, where the green horizontal line indicating the utility of joint purchasers extends over the entire city/region.
3. No consumer buys from both firms, and some consumers do not buy at all, i.e., the market is partially covered. This is the *single-purchase scenario* that occurs when T is relatively high: see Fig. 5, where the green horizontal line indicating the utility of joint purchasers disappears because the consumers located relatively far from the endpoints do not visit any firm.[6]

Equilibrium

We solve for the Nash equilibrium of the price competition game played by the profit-maximizing attractions. We first consider the mixed-purchase scenario and then move to the other two configurations.

Mixed-purchase scenario

Each firm sets its own price to maximize profits. In the mixed-purchase scenario, the profit function of firm i is $\Pi_i = p_i(D_i + D_{1+2})$, where D_i is the mass of single purchasers and D_{1+2} that of joint purchasers. Graphically, the demand of firm 1 is given by the blue and green lines in Fig. 2, while that of firm 2 by the red and green lines.

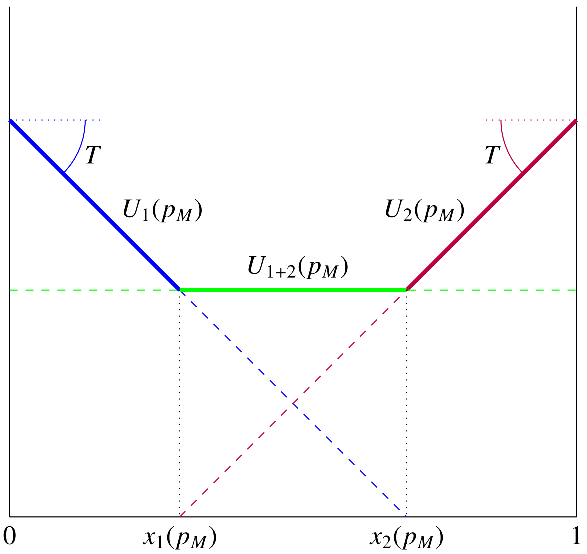

Fig. 2. Consumers' equilibrium utility functions in the mixed-purchase scenario.

Using (3), (4), and (5), firm i profit function can be rewritten as

$$\Pi_i(p_i) = p_i\left(\frac{v - p_i}{T}\right). \tag{6}$$

Remarkably, the demand function of firm $i = 1, 2$ is not affected by the price p_j charged by competitor $j = 2, 1$; in other words, there is no strategic interaction between firms, though the market is fully covered. This is because the last consumer purchasing from firm i is the one indifferent between joint-purchasing and single-purchasing from firm j: see Fig. 2. In turn, this consumer's location is affected only by price p_i. The reason can be explained as follows. When firm 1, say, reduces p_1, consumers in $[x_2(p_M), x_2'(p_M)]$ shift from patronizing only firm 2 to joint-purchasing: see Fig. 3. Accordingly, the decrease in D_2 is fully compensated by the increase in D_{1+2} and the overall demand function of firm 2, $D_2 + D_{1+2}$, is unaffected. This is a pivotal aspect of the non-unit demand Hotelling model: firms are not competing in business stealing because an aggressive pricing strategy by firm j does not decrease the demand of firm i.[7]

The Nash equilibrium prices turn out to be symmetric,

$$p_1^* = p_2^* \equiv p_M \equiv \frac{v}{2},$$

where the subscript M is a mnemonic for the mixed-purchase scenario: see Appendix A.1 for all the proofs and calculations related to this subsection. For future reference, we remark that the last consumer buying from firm i would derive zero utility if she bought

[6] The single-purchase scenario captures a possibly implausible situation where some tourists travel to the destination, buy accommodation services, but decide to visit no attractions. We include it to have a thorough analysis of the price competition game; however, in Section "Extensions", we exclude it and verify that our welfare analysis is completely unaffected.

[7] For further details, see Kim and Serfes (2006), who refer to this result as the "aggregate demand creation effect" (p. 575).

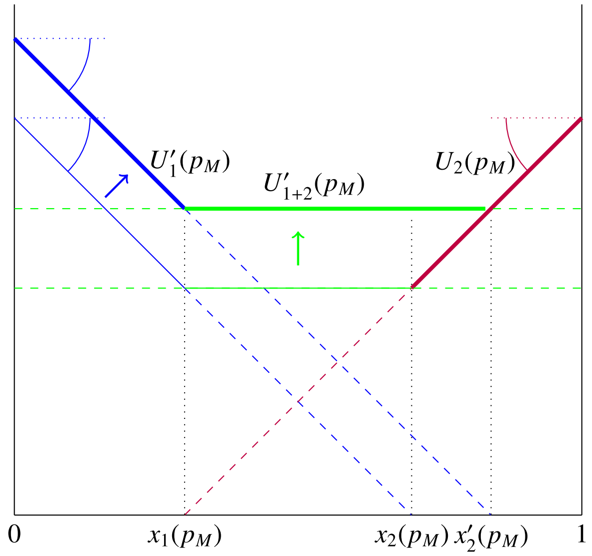

Fig. 3. Absence of business stealing in the mixed-purchase scenario.

solely from firm i - see points $x_1(p_M)$ and $x_2(p_M)$ in Fig. 2; if the price of firm i were higher, this consumer would get negative utility from visiting attraction i and, therefore, would prefer buying only from firm j.

To derive the parametric interval under which the mixed-purchase equilibrium arises, we substitute p_M into (3) and (4), and get the (symmetric) equilibrium demands of single purchasers, $D_1(p_M) = D_2(p_M) \equiv 1 - \frac{v}{2T}$, which are positive when $T > \frac{v}{2}$ and always lower than 1. Similarly, we plug p_M into (2) and verify that the joint purchasers, whose equilibrium demand is $D_{1+2}(p_M) \equiv \frac{v}{T} - 1$, get nonnegative utility when $T \leq v$. Overall, the parametric condition for the mixed-purchase equilibrium is

$$\frac{v}{2} < T \leq v. \tag{7}$$

As anticipated, transportation costs have to be neither small, otherwise all consumers would visit both firms ($D_1 = D_2 = 0$ and $D_{1+2} = 1$), nor big, otherwise no consumers would buy from both firms (i.e., $D_{1+2} = 0$).

As T rises within interval (7), joint purchasers located close to $x_1(p_M)$ and $x_2(p_M)$ shift to single-purchasing to save on increasingly expensive transportation costs. More precisely, when T tends to $\frac{v}{2}$, almost all consumers are joint purchasers (i.e., $D_{1+2}(p_M) \to 1$) because transportation costs are relatively mild. In the opposite case where $T = v$, all consumers become single purchasers, (i.e., $D_{1+2}(p_M) = 0$).

We conclude this subsection by providing a welfare analysis to evaluate the desirability of market outcomes from a societal perspective, that is, one that accounts for all economic agents, including consumers and firms. We hence compute the value of social welfare (or total surplus), an economics concept defined as the sum of producer and consumer surplus. Thus, we compute (i) the producer surplus PS, defined as the sum of the two attractions' equilibrium profits, $\Pi_1(p_M) + \Pi_2(p_M)$, (ii) the transport company's equilibrium profits Π_{TC}, stemming from the sales of travel tickets to consumers, and (iii) the consumer surplus CS, given by the aggregate consumer utility computed over all single and joint purchasers. We get

$$PS_M \equiv \frac{v^2}{2T},$$
$$\Pi_{TC,M} \equiv \frac{mv^2}{4T^2},$$
$$CS_M \equiv \frac{v^2}{4T}.$$

Total surplus, the sum of PS_M, $\Pi_{TC,M}$, and CS_M is

$$TS_M \equiv \frac{(4m + 3t)v^2}{4T^2}.$$

As a final remark, note that the welfare values are negatively affected by T. Indeed, as T grows, (i) firms are worse off because their demands shrink; (ii) the transport company is worse off because fewer consumers choose to joint-purchase and, accordingly, they travel less; (iii) consumers are worse off because they bear higher transportation costs.

Joint-purchase scenario

When the transportation costs are relatively low, $T \leq \frac{v}{2}$, and the attractions' price is p_M, the analysis in Section "Mixed-purchase Scenario" shows that *all* consumers prefer to visit *both* firms, i.e., $D_{1+2}(p_M) = 1$. As a result, the profit function of firms is not as in (6) anymore and the firms play a different price competition game. In Appendix A.2, we show that the Nash equilibrium prices turn out to be symmetric and equal to

$$p_1^* = p_2^* \equiv p_J \equiv v - T, \tag{8}$$

where J is a mnemonic for the joint-purchase scenario.

Here, transportation costs are relatively low, so both firms can cover the entire market. At equilibrium, each firm actually serves the entire market, i.e., their demand is $D_{1+2}(p_J) = 1$, at the highest possible price. Intuitively, this price is such that the consumer located at 0 (1) would get zero utility if she purchased only from firm 1 (0) (see points $x_1(p_J)$ and $x_2(p_J)$ in Fig. 4): if the price were higher, the consumers at the endpoints would obtain negative utility from visiting the attraction at the opposite end, hence firms could not serve all consumers.

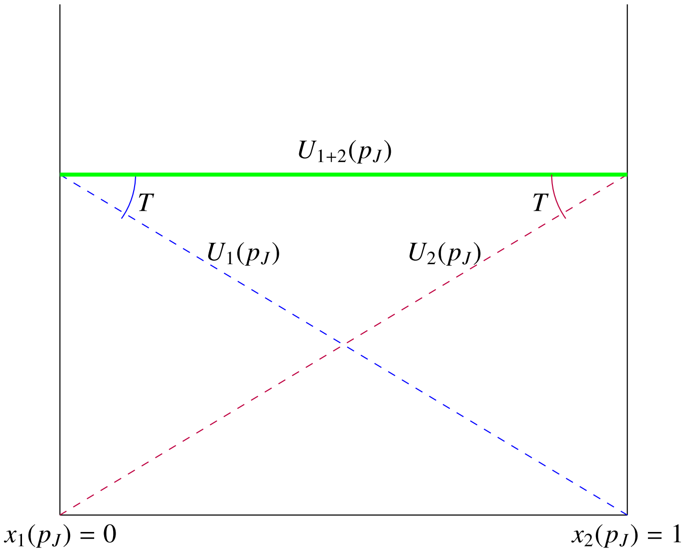

Fig. 4. Consumers' equilibrium utility functions in the joint-purchase scenario.

We can now calculate the welfare values: the producer surplus is $PS_J \equiv 2(v - T)$, the transport company's equilibrium profits are $\Pi_{TC,J} \equiv m$, and the consumer surplus is $CS_J \equiv T$. The total surplus is, accordingly, $TS_J \equiv 2v - t$. Note that PS_J decreases with T, while CS_J increases with it: this is because a higher T forces firms to reduce the equilibrium prices if they want to serve the entire market. By contrast, $\Pi_{TC,J}$ is fixed at m because every single consumer travels the entire city/region.

Single-purchase scenario

The remaining parametric interval, which completes the analysis of the price competition game, is $T > v$. Here, transportation costs are relatively high, and the analysis in Section "Mixed-purchase Scenario" shows that no consumers engage in joint-purchase behavior when the price is p_M because their utility would be negative. As a consequence, the last consumer willing to buy from firm i is not anymore the one indifferent between buying from both firms and buying from firm j, as it occurs under the mixed-purchase scenario. Rather, it is the consumer indifferent between buying from firm i and not buying at all: see points $x_1(p_S)$ and $x_2(p_S)$ in Fig. 5. Solving equations $U_1 = 0$ for x and $U_2 = 0$ for $1 - x$, we hence get the demand for attraction 1, $D_1 = \frac{v-p_1}{T}$, and for attraction 2, $D_2 = \frac{v-p_2}{T}$, and we easily derive the symmetric Nash equilibrium prices, $p_S \equiv \frac{v}{2}$, where S is a mnemonic for the single-purchase scenario.

Note that $p_S = p_M$ because firm i's demand and profit functions are as in (6). This, in turn, is due to the fact that the last consumer gets zero utility when patronizing only firm i, under both the single-purchase and the mixed-purchase scenarios. However, a crucial difference arises. Here, the last consumer $x_i(p_S)$ is actually patronizing firm i only, with the effect that consumers in interval $(x_1(p_S), x_2(p_S))$ do not visit any firm, and the market is partially covered. By contrast, the last consumer $x_j(p_M)$ patronizes firm j too under the mixed-purchase scenario, and full coverage occurs.

Given $p_S = p_M$, the welfare analysis under the joint-purchase scenario is straightforward in that all values take the same functional forms as under the mixed-purchase one, $PS_S \equiv \frac{v^2}{2T}$, $\Pi_{TC,S} \equiv \frac{mv^2}{4T^2}$, $CS_S \equiv \frac{v^2}{4T}$, and $TS_S \equiv \frac{(4m+3t)v^2}{4T^2}$: see Appendix A.3 for details. Notably, same functional forms do not mean same values because, for any given v, T is higher here and, hence, surplus is lower.

We summarize the results of mixed-, joint-, and single-purchase scenarios in the following

Proposition 1. *Three alternative equilibrium configurations of the price competition game arise, depending on the value of T relative to v.*

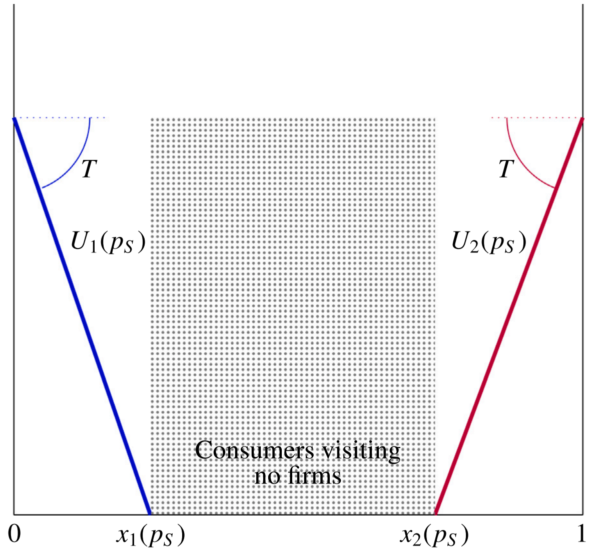

Fig. 5. Consumers' equilibrium utility functions in the single-purchase scenario.

(i) If $T \leq \frac{v}{2}$, joint-purchase equilibrium with symmetric prices $p_J \equiv v - T$, producer surplus $PS_J \equiv 2(v - T)$, transport company's equilibrium profits $\Pi_{TC,J} \equiv m$, consumer surplus $CS_J \equiv T$, and total surplus $TS_J \equiv 2v - t$.

(ii) If $\frac{v}{2} < T \leq v$, mixed-purchase equilibrium with symmetric prices $p_M \equiv \frac{v}{2}$, producer surplus $PS_M \equiv \frac{v^2}{2T}$, transport company's equilibrium profits $\Pi_{TC,M} \equiv \frac{mv^2}{4T^2}$, consumer surplus $CS_M \equiv \frac{v^2}{4T}$, and total surplus $TS_M \equiv \frac{(4m+3t)v^2}{4T^2}$.

(iii) If $T > v$, single-purchase equilibrium with symmetric prices $p_S \equiv \frac{v}{2}$, producer surplus $PS_S \equiv \frac{v^2}{2T}$, transport company's equilibrium profits $\Pi_{TC,S} \equiv \frac{mv^2}{4T^2}$, consumer surplus $CS_S \equiv \frac{v^2}{4T}$, and total surplus $TS_S \equiv \frac{(4m+3t)v^2}{4T^2}$.

Destination card

We now introduce a Destination Management Organization providing tourists with a Card in the city/region. To keep the analysis as general as possible, we do not model any specific objective function pursued by the Destination Management Organization when introducing the Card. Instead, we simply rely on the business practice illustrated in Table 1 and assume that the Card offers two benefits: (i) Free public transport (e.g., the metro, bus, or train fare is waived), so that consumers do not bear the marginal monetary transportation cost m anymore; put differently, the overall marginal transportation cost borne by consumers falls from $T \equiv m + t$ to $T \equiv t$ and the transport company's equilibrium profits drop to zero; (ii) Percentage discount on the attractions' prices: if the attraction i price is p_i, consumers pay αp_i, with $\alpha \in (0, 1]$. Crucially, in Section "Extensions" we show that the same two benefits (i.e., any discount $\alpha \in (0, 1]$ on the attractions and a 100% discount on the public transport fare) would be optimally chosen by the Destination Management Organization regardless of whether its goal is to maximize total surplus, the sum of producer surplus and transport company's profits, or the overall demand for the two attractions.

As shown in Table 1, the Card can be offered to tourists either for free or for a fee. Here, we consider a free Card, while in Section "Extensions" we will discuss the robustness of our findings when a fee is required, also investigating the case of a 100% discount on attraction prices, i.e., $\alpha = 0$. To get the utility of a joint purchaser using the Card, we substitute $m = 0$ into (2) and consider the discount α:

$$U_{1+2}^{DC} \equiv 2v - t - \alpha(p_1 + p_2), \tag{9}$$

where the superscript DC is a mnemonic for destination card. Similarly, the utility of a single purchaser using the Card and located at $x \in [0, 1]$ becomes

$$U_i^{DC} \equiv v - td_i(x) - \alpha p_i. \tag{10}$$

Finally, when consumers do not visit any firm, their utility is 0.

The new timing of the game is as follows: first, consumers decide whether to use the Card; second, firms simultaneously choose prices to maximize profits; finally, consumers make their purchasing decisions. From this three-stage game, which is solved in Appendix B, we derive the following:

Proposition 2. *When the Card is available, all consumers decide to use it, and three alternative equilibrium configurations of the price competition game arise, depending on the value of t relative to v.*

(i) If $t \leq \frac{v}{2}$, joint-purchase equilibrium with symmetric prices $p_J^{DC} \equiv \frac{v-t}{\alpha}$, producer surplus $PS_J^{DC} \equiv 2(v-t)$, transport company's equilibrium profits $\Pi_{TC,J}^{DC} \equiv 0$, consumer surplus $CS_J^{DC} \equiv t$, and total surplus $TS_J^{DC} \equiv 2v - t$.

(ii) If $\frac{v}{2} < t \leq v$, mixed-purchase equilibrium with symmetric prices $p_M^{DC} \equiv \frac{v}{2\alpha}$, producer surplus $PS_M^{DC} \equiv \frac{v^2}{2t}$, transport company's equilibrium profits $\Pi_{TC,M}^{DC} \equiv 0$, consumer surplus $CS_M^{DC} \equiv \frac{v^2}{4t}$, and total surplus $TS_M^{DC} \equiv \frac{3v^2}{4t}$.

(iii) If $t > v$, single-purchase equilibrium with symmetric prices $p_S^{DC} \equiv \frac{v}{2\alpha}$, producer surplus $PS_S^{DC} \equiv \frac{v^2}{2t}$, transport company's equilibrium profits $\Pi_{TC,S}^{DC} \equiv 0$, consumer surplus $CS_S^{DC} \equiv \frac{v^2}{4t}$, and total surplus $TS_S^{DC} \equiv \frac{3v^2}{4t}$.

We discuss Proposition 2, restricting our attention to the firms' pricing reaction to the Card. Under the mixed- and single-purchase scenarios, two results are worth remarking. First, firms increase the price with the presence of the Card, $p_M^{DC} \geq p_M$ and $p_S^{DC} \geq p_S$, because they anticipate that consumers will enjoy a discount. Second, consumers end up paying the same price as without the Card because the price rise is such that the discount is neutralized, $\alpha p_M^{DC} = p_M \equiv \frac{v}{2}$ and $\alpha p_S^{DC} = p_S \equiv \frac{v}{2}$. Under the joint-purchase scenario, firms increase prices not only as a consequence of the price discount but also because public transport is now free of charge. At this equilibrium, indeed, the price is such that consumers located at the endpoints would get zero utility from visiting only the firm at the opposite end. When their cost to travel the entire city/region decreases by the amount m thanks to the Card, firms can raise the equilibrium price by the same amount. This triggers the counterintuitive outcome that consumers end up paying more when the Card is available, $\alpha p_J^{DC} = v - t > p_J \equiv v - (t + m)$.

Building on the equilibrium configurations derived above, we proceed in the next section to systematically assess how the presence of the Card affects welfare, by comparing Proposition 1 with Proposition 2.

Welfare effects of the destination card

The welfare effects of the Card are evaluated by proceeding in two steps. First, we compare the parametric intervals involving t, m, and v that give rise to the three equilibrium configurations without the Card, on the one hand, and with the Card, on the other hand. Second, for each interval, we compare the welfare values without the Card and with the Card.

To complete the first step, we recall that $T \equiv t + m$ and express the intervals in Proposition 1 as follows: (i) $t \leq \frac{v}{2} - m$; (ii) $\frac{v}{2} - m < t \leq v - m$; (iii) $t > v - m$. Doing so, we make them directly comparable to the intervals in Proposition 2: Fig. 6 provides a graphical visualization.[8]

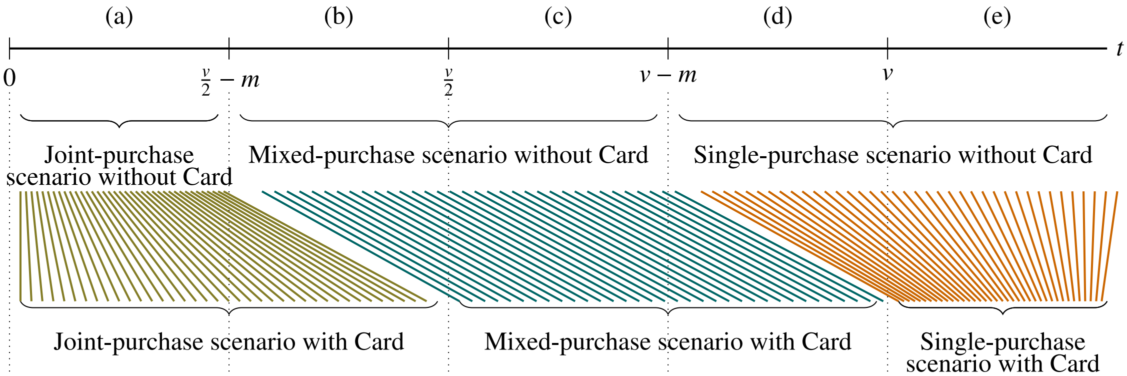

Fig. 6. Equilibrium configurations without the Card and with the Card.

The figure shows that the presence of the Card may trigger a change in the equilibrium configuration. More precisely,

(a) if $t \leq \frac{v}{2} - m$, all consumers are joint purchasers both without the Card and with the Card.
(b) If $\frac{v}{2} - m < t \leq \frac{v}{2}$, some consumers are single purchasers, and some others are joint purchasers without the Card, but all turn into joint purchasers with the Card.
(c) If $\frac{v}{2} < t \leq v - m$, some consumers are single purchasers and some others are joint purchasers both without the Card and with the Card. However, the proportion of joint purchasers grows, thanks to the Card.
(d) If $v - m < t \leq v$, no consumer is a joint purchaser without the Card, but some turn joint purchasers with the Card.
(e) If $t > v$, all consumers are single purchasers both without the Card and with the Card. However, the proportion of consumers who visit no firm shrinks, thanks to the Card.

Graphically, the comparisons of the scenarios with and without Card in Fig. 6 shows that the share of joint-purchasers (colored in green) increases, while the share of single-purchasers (colored in red) decreases when the Card is available. Note that the Card boosts the demand for attractions in all of the above intervals, except interval (a), where demand is already maximized without the

[8] The existence of interval $t \leq \frac{v}{2} - m$ implies that $m < \frac{v}{2}$ and $\frac{v}{2} < v - m$.

Card. The interesting question is whether such a demand-enhancing effect is also accompanied by higher welfare. To answer this question, we move to the second step of the welfare analysis, comparing welfare without the Card and with the Card in each of the above intervals. We derive the following

Proposition 3. *The welfare effects of the Card depend on the value of t relative to v and m. In particular:*

(1) *if $t \leq \frac{v}{2} - m$, producer surplus increases, consumer surplus decreases, transport company's profits decrease, and total surplus stays the same;*

(2-a) *if $\frac{v}{2} - m < t < \frac{\sqrt{m^2+v^2}-m}{2}$, producer surplus increases, consumer surplus decreases, transport company's profits decrease, and total surplus increases;*

(2-b) *if $\frac{\sqrt{m^2+v^2}-m}{2} < t \leq \frac{v}{2}$, producer surplus increases, consumer surplus increases, transport company's profits decrease, and total surplus increases;*

(3) *if $t > \frac{v}{2}$, producer surplus increases, consumer surplus increases, transport company's profits decrease, and total surplus increases.*

Proof. See Appendix C. □

When $t \leq \frac{v}{2} - m$, corresponding to region (a), the time cost of transportation is so low that all consumers visit both firms even without the Card. Hence, as discussed in the last paragraph of Section "Destination Card", the Card induces firms to raise the equilibrium price to the extent that consumers end up paying more despite the price discount; since the demand of both firms is already at its maximum, producer surplus grows at the expense of consumer surplus and transport company's profits. Total surplus remains unaffected because the Card does not increase overall demand; as a result, the gain enjoyed by the attractions is equivalent to the sum of the losses incurred by the transport company and tourists. If the goal of the Destination Management Organization is to maximize total surplus or demand for the two attractions, the Card proves ineffective in this interval. If, instead, the aim is to maximize tourism revenues, the Destination Management Organization might be keen on introducing the Card.

We now shift our attention to interval $t > \frac{v}{2}$, which subsumes regions (c)–(d)–(e) in Fig. 6 and involves the mixed- and the single-purchase scenarios. As discussed right after Proposition 2, consumers are charged the same price as without the Card, despite the presence of a discount. However, free public transport stemming from the Card enhances demand, either because some single purchasers decide to visit the other firm as well – regions (c) and (d) – or because some previously inactive consumers decide to visit at least one firm — regions (d) and (e). As a result, both producer and consumer surpluses increase. Total surplus also grows due to the increase in the overall demand, which allows the gains enjoyed by firms and consumers to outweigh the losses suffered by the transport company. This is also true in region (e) of Fig. 6, where the time component of travel cost is so significant that even a reduction in the monetary component does not convince any tourist to become a joint purchaser. These results are consistent with the coordination theorem, while offering a more analytic contribution. Existing studies (Cools et al., 2016 and, for the specific case of tourists, Leung, 2020, and Le-Klähn et al., 2015) have stressed the importance of transportation costs in driving consumer purchasing decisions and affecting their surplus. We show that the benefits of lower transportation costs extend beyond individual travelers, generating broader collective benefits for the destination, in terms of welfare gains.

Finally, we turn to intervals (2-a) and (2-b), visually corresponding to region (b), where our analysis provides novel and interesting results. Here, the Card turns out to be particularly effective, as the reduction in transportation costs induces all consumers to purchase from both firms. However, while in interval (2-b) both producer and consumer surpluses are enhanced, in interval (2-a) consumers are worse off even though they buy more. The explanation for this counterintuitive outcome is as follows. The Card triggers a change in the equilibrium configuration, shifting from a mixed-purchase equilibrium to a joint-purchase one. This, in turn, induces firms to adjust the equilibrium price: each one charges $p_M \equiv \frac{v}{2}$ without the Card, while the price paid by consumers is $\alpha p_J^{DC} \equiv v - t \geq p_M$ with the Card. In interval (2-a), t is relatively low, hence the price difference $(\alpha p_J^{DC} - p_M)$ is significant; at the same time, the increase in demand triggered by the Card is limited because of the little proportion of single purchasers converting to joint purchasing. Overall, the negative price effect on consumer surplus prevails over the positive one due to higher demand, resulting in a welfare loss for consumers.

In conclusion, we observe that the total surplus never decreases, and increases in (the relevant) intervals (2-a), (2-b), and (3). As a result, there is always room to compensate the transport company and, in interval (2-a), the consumers for the losses incurred by the presence of the Card, thereby achieving a Pareto improvement in the destination.

Extensions

In this section, we introduce and discuss some extensions and alternative interpretations of the model to check the robustness of our analysis and broaden its applicability to different settings.

Other means of transportation. Our analysis relies on the implicit assumption that all consumers use public transport to travel across the city/region. This is not necessarily the case, as tourists may, e.g., (i) use private transport or (ii) simply walk to the attractions. Here, we discuss why our model can easily accommodate these alternative transportation options. In case (i), it is sufficient to interpret m, the marginal monetary cost of transportation, as the expenditure for private transport. In case (ii), one can suppose that T, or any other parameter larger than t, indicates the increased marginal time cost of transportation, due to the fact that travel time is generally longer when walking. Suppose both categories of tourists shift to public transport when endowed with the Card, either because they save on the monetary component of transportation – case (i) – or on the time component — case (ii).

This is likely to be the case because (saving) money and time are generally indicated as the two most influencing factors in driving tourists' transport choice (e.g., Le-Klähn et al., 2015). As a result, our analysis turns out to be robust to this extension.

No single-purchase scenario. To provide a thorough analysis of the price competition game, no restrictions were made on the value of parameter t relative to v and m. However, we anticipated in Footnote 3 that the single-purchase equilibrium, though interesting from a theoretical perspective, may have no relevance from an applied point of view. Here, we assume away this scenario by letting t be non-higher than $v - m$; this indeed excludes regions (d) and (e) in Fig. 6, where the single-purchase equilibrium arises without (and in region (e) even with) the Card. One can easily check that Proposition 3 is robust to this sensible parametric restriction in that the three intervals describing all possible Card's welfare effects remain.

Optimally designed Card. While we previously assumed that the Destination Management Organization does not target any specific objective function when introducing the Card, we now discuss the case where it chooses α and m to maximize one of the three following objective functions: (a) total surplus; (b) the sum of producer surplus and the transport company's profits (hence excluding consumer surplus); (c) the overall demand for the two attractions. These three objective functions are included to ensure analytical completeness; however, the literature highlights that Destination Management Organizations typically seek to maximize either (a) or (b) (Andergassen et al., 2017).

To show that the resulting design of the Card is equivalent to the exogenous one considered in the previous sections (i.e., $m = 0$ and any discount $\alpha \in (0, 1]$ on the attractions) and, therefore, that our analysis is robust to this extension, we proceed in two steps. First, we remark that the three objective functions listed above are all (weakly) decreasing in m under any equilibrium configuration. As a result, a Destination Management Organization willing to maximize them would optimally set $m = 0$. Second, Proposition 2 shows that the price paid by consumers for the attractions does not depend on $\alpha \in (0, 1]$ when the Card is available. It follows that the three objective functions listed above are not affected by the price discount level and that any $\alpha \in (0, 1]$ is compatible with their maximization.

Priced destination card. We now assume that the Card is not distributed for free but is priced. This is a relevant scenario when the private sector directly achieves coordination, and the price is needed to compensate the transport company through a private agreement. To proceed, we modify the game's timing accordingly. First, the agents set a price k for the Card; second, consumers decide whether to buy the Card; third, firms simultaneously choose prices to maximize profits; finally, consumers make their purchasing decisions. In Appendix D, we show that the results of Proposition 3 are robust to this extension: total surplus remains the same in interval (1) of Proposition 3 and increases for higher values of t; producer surplus always increases, while consumer surplus is less likely to do so, which is an unsurprising result as consumers are worse off when buying the Card compared to receiving it for free. More precisely: in interval (2) of Proposition 3, condition $\frac{\sqrt{m^2+v^2}-m}{2} < t \le \frac{v}{2}$ is not anymore sufficient for consumer surplus to increase with the Card; in interval (3), consumer surplus decreases if the Card price is sufficiently high.

100% Price Discount. When $\alpha = 0$, the Card eliminates not only the monetary transportation cost m, but also the prices p_1 and p_2 to visit the attractions. Our model then collapses because the firms cannot set prices anymore. To circumvent the problem, we assume that only a share $\mu \in (0, 1)$ of consumers have access to the Card. In Appendix D, we show that, unlike the case $\alpha \in (0, 1]$, firms' equilibrium prices are not affected by the presence of the Card. This is because firms profit only from the consumers without the Card, who enjoy neither free public transport nor price discounts. Most importantly, we verify that the results of Proposition 3 are robust to this extension in that the Card increases total surplus. Different from the main analysis, producer surplus shrinks because a proportion μ of consumers no longer pays for the attractions. Consumer surplus, instead, increases for two reasons: on the one hand, consumers without the Card pay the same price as they would without it; on the other hand, consumers with the Card enjoy free access to both attractions and public transport.

Discussion

Cards are increasingly recognized in the tourism economics literature as one of the most relevant coordination tools implemented in business practice. They are agreements that typically include discounts (up to free availability in the extreme case) on a mix of substitute and complementary services. From an economic theory perspective, they are double-edged. On the one hand, they help address the *anticommons problem* (Candela et al., 2008; Heller, 1998, 1999; Michelman, 1982), that is, the inefficiency arising from the presence of complementary services provided by independent firms within the tourism product. Accordingly, coordination brings advantages for the industry and the destination alike, as stressed in the tourism literature (Andergassen et al., 2013; Figini, 2022). On the other hand, Cards might raise concerns about collusion and should be closely monitored and potentially limited by antitrust regulators, as they might redistribute welfare from consumers to producers (Àlvarez-Albelo & Martínez-González, 2022; Armstrong, 2013; Jeitschko et al., 2017). These contrasting views stem from the fact that the industrial organization literature tends to identify price coordination with bundle pricing, while, for the tourism economics literature, price coordination necessarily involves goods and services that must be consumed together (complements), such as transportation and attractions.

We contribute to this debate by showing that tourism offers a compelling example of the benefits of coordination when it comes to complementary services. We do so by modeling the market equilibrium in the destination, first without, and then with the Card. We rely on the Hotelling framework and extend it to explicitly consider the existence of complementary services. In this way, we significantly depart from Àlvarez-Albelo and Martínez-González (2022), who examine only substitute products that might be converted into complements when jointly purchased. By contrast, we highlight that coordination matters if and only if two products are always jointly demanded by the consumer: in our model, transportation and at least one of the two attractions. In this sense, the Card can be considered a form of bundling, although not all bundling agreements involve complementary goods and, hence, the need for coordination.

To allow for this crucial feature, we extend the Àlvarez-Albelo and Martínez-González (2022) model to a three-firm structure with two substitute goods (attractions) that, under certain conditions, can be jointly purchased (i.e., tourists decide to visit both), and a complementary good (transport) that is always part of the bundle. Compared to Andergassen et al. (2013), this spatial approach based on an enriched version of Hotelling has the advantage of capturing all the fundamental aspects at play in the tourism context: the model represents (i) a physical space (a linear city/region), where (ii) tourists located in the position of the accommodation services within the city/region (iii) visit attractions (spatially differentiated, as they are located at the opposite ends of the region) using (iv) infrastructures (such as roads and public transport) which enter the model through the time and monetary cost of covering the distance between accommodation and the attractions.

Within this novel framework, the welfare implications of introducing a Card offering free local transport and price discounts on attractions can be discussed. The welfare effects depend on the parameters t and m, and v, which roughly represent the relative importance of the two complementary goods in the tourists' budget: t captures the time component of transportation cost, m the monetary component—that is waived by the Card—and v the gross utility tourists derive from visiting an attraction. Before interpreting the findings of Proposition 3 and Fig. 6, summarized in Fig. 7, it is important to note that the parametric intervals defining the different scenarios are mutually exclusive. Each scenario reflects a distinct structural configuration of the destination, determined by the relative values of the three parameters; therefore, comparisons across scenarios are not meaningful. Destinations cannot move freely across scenarios without structural changes, typically achievable only through long-term strategies and policies (e.g., investments in the public transport system).

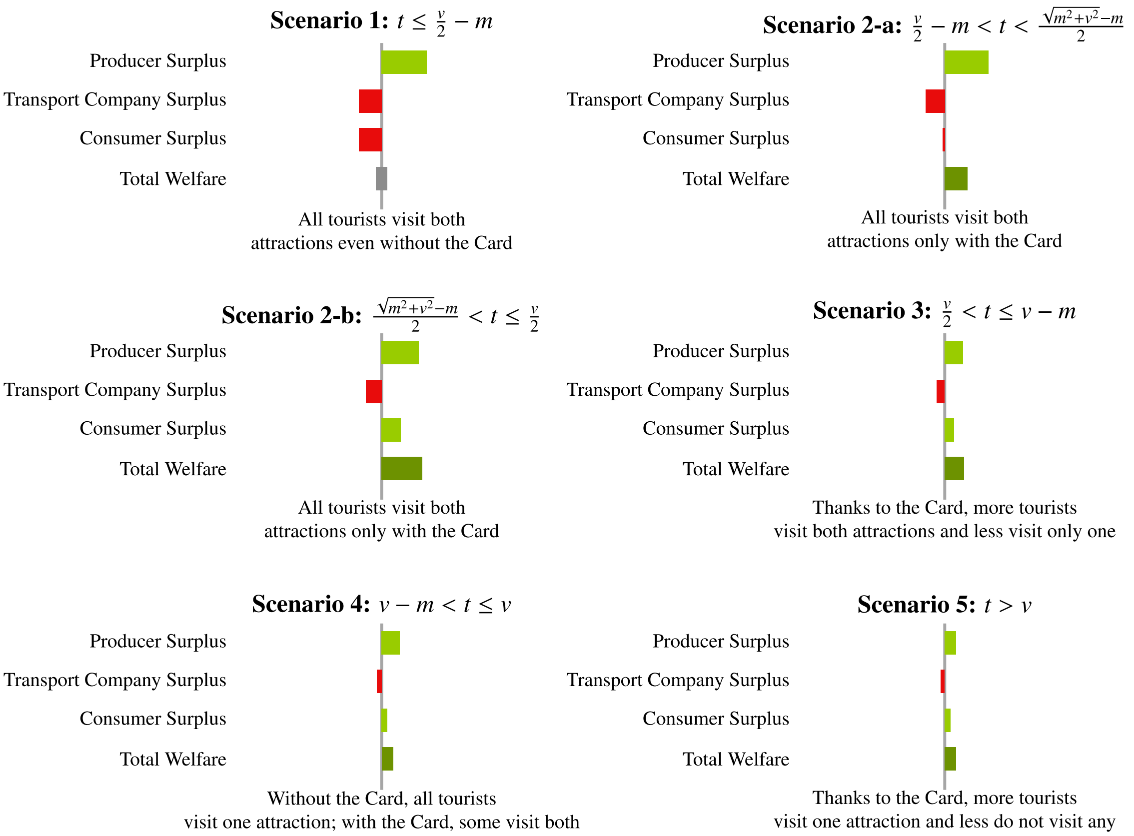

Fig. 7. Welfare changes with the Card.

The first important finding is that coordinating the prices of transportation and attractions increases total surplus (except in Scenario 1, where it does not change) and producer surplus. This is in line with the coordination theorem (Andergassen et al., 2013) and partially differs from Àlvarez-Albelo and Martínez-González (2022). The overall increase in welfare ensures that any losses incurred by the transport company can be offset through cross-subsidization, using local taxes levied on attractions and, when consumer surplus rises, on tourists as well, to compensate losses, thereby achieving a Pareto improvement in the destination. This general conclusion can be enriched with interesting policy implications once we examine the five scenarios in more detail.

In Scenario 1, for any given m, the time component of the transportation cost t is so low relative to the appeal of the attractions v, that the anticommons problem is not severe, and all tourists visit both attractions even without the Card. In this case, the Card does not enhance total surplus, as the overall demand for attractions remains unchanged, already being at its maximum. However, the Card induces firms to raise equilibrium prices to the extent that consumers end up paying more despite the price discount. As discussed in Section "Extensions", the Destination Management Organization can pursue different objectives and, if the goal is to maximize tourism profits, the Card proves effective, but an antitrust intervention might be necessary to compensate consumers, whose surplus shrinks.

In Scenarios 3, 4, and 5, t is relatively high: the Card increases demand for attractions but is unable to induce all tourists to visit both. Here, our findings align with the tourism economic literature, extending the results of the coordination theorem to a three-firm framework that includes both substitute and complementary services. The reduction in monetary transportation costs brought about by the Card yields collective benefits: firms experience higher demand, increasing producer surplus more than the reduction in profits of the transport company, and tourists benefit from reduced transportation costs, thereby increasing their surplus as well. Since these scenarios lead to a Pareto improvement in the destination, the introduction of the Card would be advisable from a policy perspective.

The last words are reserved for Scenarios 2-a and 2-b, the most interesting ones. Here, transportation costs are such that all tourists decide to visit both attractions only when they have access to the Card. The Card is, therefore, highly effective in stimulating demand for attractions. At the same time, however, it reduces demand elasticity and encourages attractions to raise prices. In Scenario 2-a, the resulting price surge is particularly pronounced, making tourists worse off despite the increase in demand. This outcome offers an economic theory rationale for the observation made by Messori and Volo (2024), who noted that while most tourism studies highlight the positive impacts of coordination, they often overlook its potential negative effects. These results, along with those in Scenario 1, might be of particular interest for destinations where travel costs are low relative to the attractions' appeal, due to, for instance, an efficient transport system or longer average stays.

Conclusions

This paper contributes to the tourism economics literature by offering a comprehensive perspective on the coordination challenges faced by tourism destinations in the presence of both complementary and substitute services. We highlight the benefits—as well as the potential drawbacks—of managing the anticommons problem that characterizes the tourism product and stems from the inefficiencies due to the presence of complementary services offered by independent providers. Moreover, our analysis contributes to the industrial organization literature by showing that such inefficiencies are relevant for the organization of important markets, such as tourism, and deserve proper investigation. It also argues that a spatial economics model such as Hotelling, due to its geographic dimension, provides a more accurate representation of the tourism market structure than other competition models, such as Cournot or Bertrand. Finally, our study highlights the importance of solving the Hotelling game without imposing parametric restrictions, as this flexibility can reveal important and counterintuitive insights, such as the possible decrease in the tourist surplus when the Card is available in a certain parametric interval. Overall, our findings show that the Card is Pareto superior: it never decreases total surplus, always increases producer surplus, and, except under a specific parametric condition, also enhances consumer surplus. Consequently, there is both room and need to levy local taxes on attractions (and, when consumer surplus rises, on tourists as well) to offset the losses incurred by the transport company and achieve a Pareto improvement in the destination.

From a practical perspective, the Card may function as a commitment tool that facilitates coordination among a heterogeneous set of stakeholders who might otherwise operate independently. Indeed, by agreeing to offer their services through the Card, participating actors engage in a structured form of coordination requiring formal agreements, revenue-sharing mechanisms, and joint governance structures. The resulting interorganizational relationships and networks may serve as the foundation for additional forms of coordination, such as, for instance, the establishment of a product club or common marketing initiatives. Accordingly, this study could serve as a valuable tool for policymakers, Destination Management Organizations, and tourism firms in assessing whether the Card can be welfare-improving, depending on the destination's characteristics and tourists' preferences. The Card has been shown to be particularly effective in boosting the demand for attractions in Scenarios 2-a and 2-b (Fig. 7), when the time component of transportation cost, t, is not high relative to the appeal of the attractions, v. This is likely to occur in destinations where traffic flows smoothly and public transport infrastructure is of high quality—so tourists' travel time is low—or in destinations with a longer average length of stay, which reduces travel disutility. Tourism organizations should therefore work to fulfill these conditions by collaborating with local authorities to ensure that private and public transportation services are effective, and by strengthening the factors that encourage longer tourist stays.

At the same time, the Card has been shown to enhance total and producer surplus but harm tourists in Scenario 2-a, where t is closer to the lower bound of the interval and, hence, time costs are relatively low. In this case, consumer surplus under the mixed-purchase scenario is relatively high because consumers suffer low time costs and the attraction's equilibrium price does not depend on them. In contrast, consumer surplus under the joint-purchase scenario is relatively low because firms adjust prices strategically, eroding consumer surplus, and the increase in demand induced by the Card is limited as most consumers decide to visit both attractions even when the Card is not available. Thus, in this scenario, an antitrust authority concerned with preserving consumer surplus might find it appropriate to intervene, aiming to redistribute the gains to achieve a Pareto improvement.

A final practically relevant aspect of our analysis is to show that an effective price coordination mechanism must involve goods and services consumed together, such as transportation and attractions. Suppose instead that the Card offers only price discounts on attractions, as in the Dubai case (see Table 1). Our model predicts that the Card would fail to influence tourists' purchasing decisions and would, accordingly, have no impact on total welfare. In fact, we show that attractions would raise their prices to the extent that tourists end up paying the same price as they would without the discount.

This work is not without limitations, which also suggest avenues for further research. First, reasons beyond price coordination might justify the existence of Cards. One important reason, particularly in natural areas such as coasts, mountains, and lakes, is to encourage tourists to shift from private to public transportation, reducing congestion and pollution.[9] Although mentioned in the model's extensions, this aspect could be explicitly addressed by incorporating the local population and the environment into the model and welfare analysis. Second, the model assumes that tourists' locations are exogenously determined by accommodation availability. When attractions are equally valued ($v_1 = v_2 = v$), it is reasonable to assume that tourists are indifferent in their location choices. However, if one attraction is more appealing, tourists will likely stay closer to it, making location choice endogenous, a condition that might be worth investigating. Finally, future research could complement this theoretical paper with empirical validation through an experimental design involving, for example, three pairs of destinations. Each pair would represent low, medium, and high t values. Within each pair, destinations should exhibit similar structural characteristics and demand composition, differing only in the availability (or absence) of the Card. Such a design would enable the assessment of the Card's impact on visit rates, profitability, and tourist surplus.

Nevertheless, given that the use of Hotelling in the analysis of tourism coordination is still in its infancy and this is the first study to develop a three-firm representation of tourism destinations, we believe that our analysis, in its current form, is sufficient to draw attention to the topic and provide insights into its primary dynamics and welfare implications. If this approach proves valuable, more comprehensive models will follow.

CRediT authorship contribution statement

Sonia Messori: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization. **Alessandro Fedele:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization. **Paolo Figini:** Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Supplementary data

Technical appendices and proofs related to this article can be found online at https://doi.org/10.1016/j.annals.2025.104036.

Data availability

No data was used for the research described in the article.

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[9] In this respect, Cards might not be successful in natural areas where tourists associate public transport with higher disutility compared to private vehicles. Consider a shuttle service at a mountain resort transporting guests from their hotel to the ski slopes. Since tourists must carry skis, ski boots, and other equipment, private cars are typically perceived as a more attractive option than public transport.

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