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The impact of Airbnb on the economic performance of independent hotels: an empirical investigation of the moderating effects

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ABSTRACT

The evidence on the effect that sharing economy accommodation platforms have on the performance of hotels is not univocal, and a general picture about the circumstances under which hotels may suffer the least from this disruption is still missing. This paper contributes to bridge this gap by examining the role that contingent factors can play in reducing the negative impact of Airbnb on the profitability growth of independent hotels. We examine whether the attractiveness of the city zone where hotels are located and their online reputation moderate the effect that the usage of Airbnb listings has on the profitability growth of independent hotels. Using a panel dataset of a sample of 725 independent hotels located in six Italian cities with high tourism attractiveness, and by triangulating ISTAT, AIDA, AirDNA, TripAdvisor and Trustyou datasets, we found that the negative effect of Airbnb on the profitability growth of hotels is reduced when the hotels are located in attractive city zones. However, the online reputation of hotels does not have any significant moderating effect on the relationship investigated. We discuss how these results contribute to understand competitive dynamics in the hotel industry through a lens based on the disruptive innovation theory.

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Airbnb; hotel; tourism; sharing economy; profitability growth

Introduction

The rise of the sharing economy, which has been made possible thanks to the Internet, has changed the way people make use of underutilized goods, and has also altered the competition dynamics between incumbents and new entrants in many sectors. One industry that has been revolutionized by the sharing economy more than others is the hospitality sector, as a result of the rise of many short-term rental platforms, such as Airbnb (Hansen Henten & Maria Windekilde, 2016). The way such platforms have entered the hospitality industry follows the dynamics of the disruptive innovation theory (Christensen, 2013). The incumbents, that is, hotels in the tourism sector, risk losing competitive ground for two reasons: first, due to the lack of an adequate strategic response and innovation capabilities to the competitive threats posed by disruptors and, second, due to the way they respond, that is, by improving service levels to serve customer segments with more complex needs.

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It has already been analysed, in the recent research, how the rise of sharing economy platforms in the hospitality service industry has affected the performance of hotels (Blal et al., 2018; Dogru et al., 2019; Zervas et al., 2017). The outcomes present a picture of mixed results on how the availability of listings on Airbnb has an impact on the profitability growth of hotels. Such mixed results limit our understanding of the circumstances under which hotels suffer the least from the disruption effects that sharing economy schemes introduce into this industry, and they thus reduce our current understanding of the actions that hotels can enact to mitigate the threat posed by short-term rental platforms. Such mixed results are the consequence of a prevalence of empirical studies, which have been conducted in contexts with structural differences in the characteristics that affect the demand and the supply in tourism and the real estate markets at the local level. Apart from showing contrasting effects on estimating the impact of short-term sharing platforms on the performance of hotels, to the best of our knowledge, these studies do not consider the effective capability of hotels to cope with the competitive threats exerted by such disruptors as short-term rental sharing platforms. Accordingly, this study adopts a lens that is based on the disruptive innovation theory (Christensen, 2013) to investigate the effect of the diffusion of the leading sharing accommodation platform – Airbnb – on the performance of hotels in the vicinity. Specifically, we focus on two essential properties of the portfolio of resources and capabilities that hotels can deploy to cope with the disruption exerted by such new entrants as Airbnb. Such factors are the touristic attractiveness of the micro-zone in which a hotel is located within a city, and the extent of its ordinary capabilities, as reflected by the reviews generated by travellers on infomediary platforms. These two factors reflect the 'what to sell and where to locate' questions (Baum & Haveman, 1997; Sainaghi, 2011). Moreover, they have been highlighted as critical regarding the performance of hotels and their capability to survive in the long-term (Litvin et al., 2008; Zhang et al., 2011). Our aim has been to test whether these factors mitigate the competitive threats on profitability posed by disruptors, and whether these factors allow hotels to survive and prosper in times of disruption.

The first moderator we investigated for a hotel, namely its location in an attractive city zone, can be considered as a Ricardian rent, which is capable of appealing to a large number of customers and of granting cost advantages to some activities, such as sales and advertising, which can more than outweigh the higher costs related to real estate (Kivell, 1993; Montgomery & Wernerfelt, 1988; Prieto-Rodriguez & Gonzalez-Díaz, 2008).

The second moderator we investigated, that is, the online reputation of a hotel, is an ordinary capability that each hotel possesses. Specifically, ordinary capabilities refer to those capabilities through which a firm makes 'its living in the short term' (Winter, 2003) and which allow it ' to do things right' (Teece, 2014), namely to cope in a thrivining manner with the industry's critical success factors. The ordinary capabilities in the hotel industry allow hotels to offer high service levels of traditional features, like managing the customer relationship, ensuring comfort and cleanliness and offering adequate amenities (Paiva & Vasconcelos, 2019). Although the awareness that arises from the disruptive innovation theory can in general have a limited effect on contrasting the competitive threat of new entrants, in a traditional sector, where room for innovation is limited, the conclusion may be different from what was expected. This is especially true for independent hotels, which are generally smaller than hotels in a hotel group, and are mostly made up of small-medium enterprises, many of which may not have the resources needed to invest in critical activities, such as research and development and workforce creativity improvements (Pikkemaat & Peters, 2006).

In short, the aim of the paper has been to answer the following research question:

> To what extent can the rent positions, due to the attractiveness of a hotel's position and its online reputation arising from its ordinary capabilities, influence the impact of the diffusion of short-term rental sharing-economy solutions on independent hotels at a city level?.

The study has in particular focused on independent hotels located in the six historical cities with the highest touristic flows in Italy. In so doing, the present study contributes to the emerging literature

debate on the economic impacts of the sharing economy on the incumbent hotel industry. From a managerial point of view, this study offers information to this specific category of hotels about the circumstances under which they become more vulnerable to the competition induced by such sharing economy platforms as Airbnb.

Theoretical background

Sharing platforms for short-term accommodation as a disruptive innovation

Sharing-economy platforms are reshaping industry structures and competitive dynamics in such sectors as mobility (e.g. Uber) and accommodation (Li & Srinivasan, 2019). This phenomenon is more evident in the accommodation sector, due to the entrance of players like HomeAway, VRBO, VayStays and Airbnb, who are focused on matching the demand and supply of short-term accommodation. Airbnb is the leading company in this market segment, with more than 6 million accommodation listings from 192 countries (Airbnb, 2019). Back in August 2017, Airbnb had more listings than the number of rooms built by the top five hotel brands combined (TOPHOTELNEWS, 2017). Airbnb makes the matching between hosts and guests possible, and charges a percentage of the daily cost. Guests pay a rate of between 6% and 12%, and this percentage decreases when several nights are booked, thereby making booking more convenient for longer periods, while hosts pay a fixed fee of 3% of the room price (Hansen Henten & Maria Windekilde, 2016). The sales revenues of Airbnb amounted to 2.6 billion dollars in 2017. Moreover, if the average intermediation fee applied were 12%, the value of the online transactions intermediated by Airbnb would surge to about 22 billion dollars.

The critical advantage of a sharing economy platform in tourism lies in its capability to orchestrate assets, such as rooms and apartments, when they are lying idle, thereby allowing the two sides of the platform to gain a mutual advantage in finding each other (Parker et al., 2016). A combination of different factors leads hosts to generally charge lower prices than hotels. They offer a lower level of service features to travellers, such as daily cleaning and breakfast, compared to the traditional service structure of a hotel, and a more flexible and scalable cost structure of the platform orchestrator and the hosts. Hotels in fact need to hire staff to work 24/7, in order to satisfy the strict regulations that are imposed, to pay higher taxes and to remunerate the shareholders' cost of equity capital (Chu & Choi, 2000; Dolnicar & Otter, 2003; Guttentag, 2015), while hosts may set a price that does not cover the long-term fixed costs, due to the capital invested or the extraordinary maintenance of their properties (Oskam et al., 2018).

Several elements make the effects exerted by platforms like Airbnb on the competitive dynamics of the hotel industry fall in line with disruptive innovation, as conceptualized by Christensen in his theory (Christensen, 2013).

First, the worldwide diffusion of Airbnb listings follows the trajectory of the first half of an S-shaped curve, as shown in the AirDNA data plotted in Figure A1 in the Appendix. Such a boost in the diffusion rate, after a flat beginning, is in line with the economic rules that characterize platform-based business models and multisided markets, such as the direct network externalities and the importance of complementary goods in the value transferred to the users on each side of the platform. By looking at the diffusion curve plotted in Appendix A1, it is possible to note that the flat section lasts until at the end of 2011, when the rate of listing growth starts to accelerate; the adoption rate accelerates until the year 2015, when it stabilizes at circa 1.3 million new listings per year. It is also possible to notice the elbow of the curve between 2014 and 2015.

Second, the way platforms like Airbnb have entered the market of short-term accommodation solutions and have generated a significant threat of substitution against hoteliers follows the dynamics theorized by Christensen and then underlined by Guttentag et al. in 2015 and 2017 (Christensen, 2013; Guttentag, 2015; Guttentag & Smith, 2017). Specifically, sharing economy platforms initially targeted a downmarket, represented by travellers in search of cheap accommodation and with a limited willingness to pay for many of the amenities and features being offered by hotels,

like daily cleaning of the rooms or wellness services (Chu & Choi, 2000; Dolnicar & Otter, 2003; Guttentag, 2015). In other words, the travellers that were initially attracted by platforms like Airbnb were not the same type of customers that were attracted to international hotel chains like the Marriott or Hilton, as it offered none of the good qualities of a hotel. In this vein, the first accommodation solution offered on the Airbnb platform was in fact just an air-inflated mattress in a living room in a students' apartment.

As Airbnb grew in popularity and in its capability to act as a listing orchestrator, it also started to provide diversified services and guidance to both travellers and renters, thus increasing the quality of its offering for both sides, as suggested in the Christensen theory (Christensen, 2013). Airbnb then began to address the needs of higher-value customers, who would otherwise have stayed at a nice hotel, and to offer them lower prices, which were made possible thanks to the flexibility of the new business model, as demonstrated by the introduction of a simultaneous review and certification system, a tool that had the aim of awarding the quality of the listings offered (Ert & Fleischer, 2019). Moreover, Airbnb has been able to provide superior performance, pertaining to the services and features needed to create memorable experiences, due to the greater rigidity that arises from the high fixed cost that is typical of the business model used by hotels (Kotas, 1982; Mody et al., 2017). In the same way, Airbnb is able increase its room capacity in a faster and cheaper way than any hotel, as a result of the flexibility of its platform-based business model (Roma et al., 2019; Zervas et al., 2017), putting into practice the 'scale without mass' principle theorized by Brynjolfsson et al. (2008), which is at the base of the competitive advantage of many digital companies (Brynjolfsson et al., 2008). The points discussed so far are summarized in Table 1.

In formulating his general disruptive innovation theory, Christensen observed that, in many cases, the incumbent's reaction to the disruption caused by a new entrant is to offer 'services that are actually too sophisticated, too expensive and too complicated for many customers on their market. […] However, by doing so, companies unwittingly open the door to 'disruptive innovations' at the bottom of the market'. An innovation that is disruptive allows a whole new population of consumers at the bottom of a market access to a product or service that was historically only accessible to consumers with a great deal of money or skills (Eckert, 2019). The disruptive innovation theory indicates two possible ways for hotels to respond to the disruptor: shifting their focus to higher market segments or replicating and perfecting the disruptor business model (Christensen & Raynor, 2013; Guttentag, 2015).

A clear picture of the responses introduced by hotels to fight the phenomenon is still missing in the recent literature, and most of the researches carried out through interviews indicate that hotels do not consider sharing economy platforms as a threat, and are behaving as the disruptive innovation theory suggests (Choi et al., 2015; Koh & King, 2017). On the other hand, some large international chains are exploring business innovations that can positively affect their cost position, their differentiation potential and their scalability. For example, the Marriott group has launched a section of the website where it is possible to book 'moments' (https://moments.marriottbonvoy.com/), something similar to the 'experiences' page of the Airbnb website, and has created a platform for certain high-end short-term rentals (https://homes-and-villas.marriott.com/).

Table 1. The disruptive innovation characteristics of Airbnb.

	The beginning of Airbnb 2008–2010	Airbnb after some years 2011–2015	Airbnb today 2016–2020
Performance level	Air-mattress in living room in a shared apartment	Enlarged range of services	Business-oriented services; Airbnb Plus
Prices	On average cheaper than hotels	Covering all price ranges	Covering all price ranges, attacking the high-end market
Diffusion	Slow diffusion rate	Quick acceleration of the diffusion rate	Stable diffusion rate

The impact of a short-term rental sharing economy platform on the performance of hotels

The previous literature has clearly demonstrated that, in part due to the growth of sharing platforms in the accommodation industry, the economic performance of the hotel sector is now decreasing (Akbar & Tracogna, 2018; Forgacs & Dimanche, 2016; Guttentag, 2015; Zervas et al., 2017). By looking at the general global trends in the travel industry, it is possible to see how hotel revenues increased between 2015 and 2017 at a lower rate (+ 8% vs +11%) than the revenues produced in the travel and tourism industry as a whole (TUI, 2018; WTTC, 2018).

Notwithstanding the threat of the sharing economy to hotels, the growth in economic importance of sharing platforms in the accommodation industry has not yet been accompanied by univocal firm-level evidence about a negative impact of the local supply of listings on sharing platforms on the profitability of hotels.

The impact of short-term rental sharing economy platforms has already been studied, mostly focusing on Airbnb, the most successful platform, on the hotel industry, but contradictory evidence has emerged (Appendix A2). Zervas et al. (2017) demonstrated that a 1% increase in Airbnb supply decreased hotel revenue by 0.04% in Texas (Zervas et al., 2017). Dogru et al. (2019) studied the phenomenon in 10 of the main U.S. cities and demonstrated that an active supply of entire homes impacted hotel RevPAR (Revenue Per Available Room) and ADR (Average Daily Rates) by 0.02%, with a significant effect on all the hotel segments (Dogru et al., 2019). Roma et al. (2019) also observed a significant impact of Airbnb supply on hotel pricing; they showed how the price is mostly constrained during weekends and for the lower star categories (Roma et al., 2019). On the other hand, even though most of the researches have highlighted a negative impact of the diffusion of the sharing economy on the performances of hotels, some results show a different picture. In the next sections, we report details of all the factors that can lead to a positive or insignificant impact on the performances of hotels, in contrast to the negative effect found in the majority of available researches.

The first factor that has a positive effect on the performance of hotels is the average price of the Airbnb listings in the same city (Blal et al., 2018). Observing the RevPAR of hotels and the average Airbnb listing prices in the city of San Francisco at 11 time instants, between December 2013 and February 2018, they found that a higher RevPAR was correlated with a higher average price of Airbnb listings. Moreover, in the same research, the hotel segment was identified as a positive moderating factor, which means that five-star hotels obtain significantly more benefit from the average price of Airbnb listings. The same result emerged after examining the output of research carried out on thirteen of the most important touristic cities in Italy, where it was found that a high penetration of Airbnb listings had a detrimental impact on the pricing level of 1, 2 and 3 star hotels during the weekends, with high-end hotels (4 and 5 stars) not being affected to any great extent (Roma et al., 2019). On the other hand, this latter factor, that is, the hotel segment, has also been found not to have a significant effect on the ROE of hotels in Austin and Barcelona. Researchers in Austin analysed the impact of the number of Airbnb listings in the same Postal code area on the hotel RevPAR (Xie & Kwok, 2017). The direct relationship between them showed a negative correlation, but the hotel segment was found not to be a significant moderator of the relationship. Researchers in Barcelona collected balance sheets from a sample of hotels from 2008 to 2013 and found that the hotel category was not significantly correlated with the ROE (Aznar et al., 2017). In the same paper, the authors also studied the correlation between ROE and the presence of Airbnb listings within a radius of 1 km from a hotel, and found a positive and significant correlation. In this case, the high number of Airbnb listings behaves like a proxy of the attractive location of the hotel. The last positive relationship was found in the kingdom of Swaziland, in Africa, where a positive correlation between the Airbnb occupancy rate and the hotel occupancy rate was found in the four main cities, which were investigated from 2012 to 2016 (Ginindza & Tichaawa, 2017). The reason for this phenomenon probably lies in the different phases of tourism development the country has been undergoing and it

is within this specific context of a developing country, with a growing tourism and accommodation sector, that the authors show us different markets for hotels and Airbnb and conclude that the two products can be viewed as non-competitors.

The first factor Xie and Kwok (2017) found to not have a significant impact on the relationship between hotels and Airbnb is the online rating of the hotels (Xie & Kwok, 2017). The authors used the variable as a moderator between the supply of Airbnb listings in the same Postal code area and the RevPAR, but they found no evidence of a moderating effect. The authors suggested that Airbnb listings remain equally noticeable substitutions for hotels across all the perceived rating scales. The second factor that has not shown any significant effect is the total Airbnb supply (Blal et al., 2018; Choi et al., 2015), when tested in the city of San Francisco and in the main Korean cities, regarding the presence of hotels. The last factor we have considered is the size of the hotel, which was shown to not have a significant impact on the city of Barcelona (Aznar et al., 2017).

The analysis of these studies highlights the lack of a clear conclusion about the impact of the offered local supply of listings on the sharing-economy platforms on the performance of hotels and seems to suggest that some hotels are suffering from this new form of competition, whereas other hotels do not seem to be particularly affected. From a theoretical standpoint, this issue is related to the fact that some companies are more able than others to cope with the disruption ignited by new entrants, and that there may be critical contingent factors that could explain the impact of Airbnb on the performance of independent hotels. These include the features of the local market where the hotels operate (hotel positioning) and the ability of a hotelier to manage changes in the tourism sector (hotel's capabilities). These two contingent factors are considered in this study, since they are the main critical success factors in the hospitality and accommodation industry (Baum & Haveman, 1997; Sainaghi, 2011). Their importance and effect on the investigated relationship are discussed in the following sections.

Hypotheses development

The critical contribution of this study lies in assessing how ordinary capabilities that are reflected on a hotel's reputation and the attractiveness of their position allow hotels to cope with the diffusion of Airbnb's short-term rental solutions at the city level (Figure 1).

The zone of the city where the hotel is positioned has been demonstrated to have an impact on the performance of hotels (Baum & Haveman, 1997; Egan & Nield, 2000; Lado-Sestayo et al., 2020; Sainaghi, 2011; Yang et al., 2014), since travellers desire proximity to the points of interest (e.g. museums, important architecture) and local transportation systems (Masiero et al., 2019). It has been shown that the entrance of landlords into the accommodation market is higher in city centres or zones that have a high tourist attraction (Zhang & Chen, 2019). This economic behaviour may be due to the higher demand for accommodation in these types of areas, which is caused by aggregation economies due to the higher concentration of touristic points of interest and the lower costs borne by customers to access them. In historical European cities, such as the ones in our setting, these points of interest are generally located in the city centres (Diaz-Parra & Jover, 2020; González-Pérez, 2020) and, following an approach based on a mono-centric model, this is why we have assumed that these areas can be regarded as 'highly attractive' and the territory outside these areas as relatively 'less attractive'. In other words, since the central location of a hotel is a valuable resource that is challenging to imitate and almost unique, due to the scarcity of free space in city centres, we consider it as a Ricardian rent, which is able to grant performance advantages with respect to hotels outside of the attractive zone (Montgomery & Wernerfelt, 1988; Prieto-Rodriguez & Gonzalez-Díaz, 2008). These hotels located in the central area, due to the nature of the Ricardian rent granted by their position, may face lower operational costs than competitors for using their assets, and have better financial results and/or more freedom to fight against the disruptor as a result of the considerably greater amount of resources available (Barney, 1986). The higher endowment of resources may essentially be due to two factors. First, a hotel's capability to follow benefit

differentiation logics for the customer, due to the presence of aggregation economies that endow the hotel with the possibility of offering memorable experiences to its customers, thanks to a more prosperous and more proximate value network (Hamel, 2002; Kandampully, 2006). Such a value network is made up of restaurants, museums, theatres, stores and local transportation systems. Second, independent hotels located in attractive city zones have usually been in existence longer and are usually run by families; this implies that, in some cases, they have already borne some of the costs related to real estate (Barney, 1986; Glancey & Pettigrew, 1997).

However, there is another perspective linked to the disruptive innovation theory that can explain why hotels at present located in city centres can suffer less from the competitive threats posed by sharing-economy schemes. In fact, the entry of the disruption into city centres and the most attractive zones is higher. In other words, the listings of hosts on sharing platforms are mainly concentrated in city centres because of the greater attractiveness of the area and the higher sunk cost borne by landlords (Quattrone et al., 2018; Zhang & Chen, 2019). The cost advantage of hosts that list their assets on platforms, such as Airbnb, implies that the price of listings in zones with high touristic attractions may be comparable with that offered by hotels that are located outside the most attractive areas in a town, and may even be lower than the price of hotels in the city centre, but offer a higher level of service (Zhang & Chen, 2019). This is in line with the disruptive innovation theory, where the disruptor starts eroding the accommodation market with lower prices and lower levels of offered service, and slowly begins to grow while impacting the mainstream market across hotel class segments (Dogru et al., 2019; Guttentag, 2015; Zervas et al., 2017). In other words, we contend that short-term rental sharing-economy platform listings in zones with high touristic attractions represent an alternative to hotels in semi-central areas that is equivalent in terms of price. This implies that hotels outside urban micro-zones with high touristic attractiveness may be the ones that suffer the most from the availability of rooms and apartments in the city centre. On the basis of these considerations, we have formulated the following hypothesis.

> H1. The attractiveness of the city zone where a hotel is located positively moderates the effect that the diffusion of home-sharing platforms has at the city level on the hotel's profitability growth, with hotels located outside the most attractive zones suffering the most.

The second critical success factor we have focused on is based on how well hotels run their core activities, as seen through the eyes of the guests and from the satisfaction they express in rating a hotel on traveller-generated review aggregators like Tripadvisor (Anderson & Sullivan, 1993; Lehto et al., 2015). There are multiple reasons why ordinary capabilities can reflect on the reputation associated with traveller reviews, and why they could be considered as a moderator of the relationship between the presence of Airbnb and the profitability growth of a hotel.

First, the capabilities necessary to achieve a high online reputation are somewhat ordinary (Schuckert et al., 2015), that is, they are related to 'the performance of administrative, operational and governance-related functions that are (technically) necessary to accomplish tasks' (Teece, 2014). Accordingly, a hotel's online reputation measures how well the hotel runs its core activities.

Second, reputation, as an outcome of a hotel's ordinary capability, plays a central role in attracting travellers, as it acts as a mitigation factor of the information asymmetry between hoteliers and customers (Schuckert et al., 2015). In other words, in industries where rankings are available, this information acts, according to customers, as the outcome of a firm's ordinary capabilities. In the case of hotels, the relevance of rankings and reviews has to do with the fact that hospitality belongs to the experience goods category, and its value can only be assessed when the service has been consumed. The online reputation of hotels with no brand (i.e. the majority of small hotels that are not part of an international chain), stemming from travellers' reviews, is a substitutive mechanism of the brand (Hollenbeck, 2018), which is able to address the choices of travellers about where to go and stay. Moreover, a hotel's reputation can reflect various phenomena that are related to a hotelier's superior managerial capabilities in offering hospitality services and managing customer relationship in the online world (Schuckert et al., 2015).

Third, positive customer rankings and reviews represent something ordinary that provides an accepted standard of hospitality and, in the eyes of the potential customers, a good reputation is something that is expected (Schoenmueller et al., 2018).

Provided the reputation reflects the extent of a hotel's ordinary capabilities, and for the reasons explained above, we contend that such a factor could be a way for hotels to contrast the business-model innovation capability of such disruptors as home-sharing platforms, and could allow the negative effect of Airbnb on the profitability growth of hotels to be moderated. Thus, we posit:

H2. The online reputation of a hotel positively moderates the effect that the diffusion of home-sharing platforms has at the city level on the hotel's profitability growth, with lower online reputation hotels suffering the most.

Methodology

The data collection involved a sample of 725 independent Italian hotels located in Rome, Milan, Venice, Florence, Turin and Naples. We chose these six cities because they are the six most representative artistic and historical cities in Italy regarding touristic flows, according to ISTAT data (www. istat.it). All the selected hotels were listed on the AIDA database (distributed by Bureau Van Dijk, https://aida.bvdinfo.com/), which is the main compendium of financial information on firms in Italy. The data for this research were also obtained from the TripAdvisor website (https://www.tripadvisor.it/), from AirDNA, a data analytics company that provides data about Airbnb properties (https://www.airdna.co/), from Trustyou, a website that collects reviews from various sources regarding hotels (https://www.trustyou.com/it/) and from ISTAT, the Italian National Institute of Statistics (www. istat.it).

The choice of focusing the empirical analysis on urban areas is in line with the focus that literature has had on the theme so far. As discussed in previous research, cities, rather than small towns, is the setting where the threats of sharing platforms may be higher, due to a tougher competition of resource, such as space, and a higher concentration of people (Sun et al., 2018).

Before running the models, all the data underwent an extensive cleaning process that is summarized hereafter. The starting point was the extraction of balance sheet data pertaining to all of the 17,234 Italian companies registered as hotels in the AIDA database ('Alberghi' category, ATECO code: 55100). We filtered the hotels' balance sheets and kept the ones that had their operating address in the selected cities. Since the address recorded in the AIDA database is not always the same address as the structure where the business takes place, we double-checked the position by looking at the VAT number on the web to be sure the financial data referred to a single hotel in one of the six cities under investigation. In this way, all the balance sheets referring to hotels not

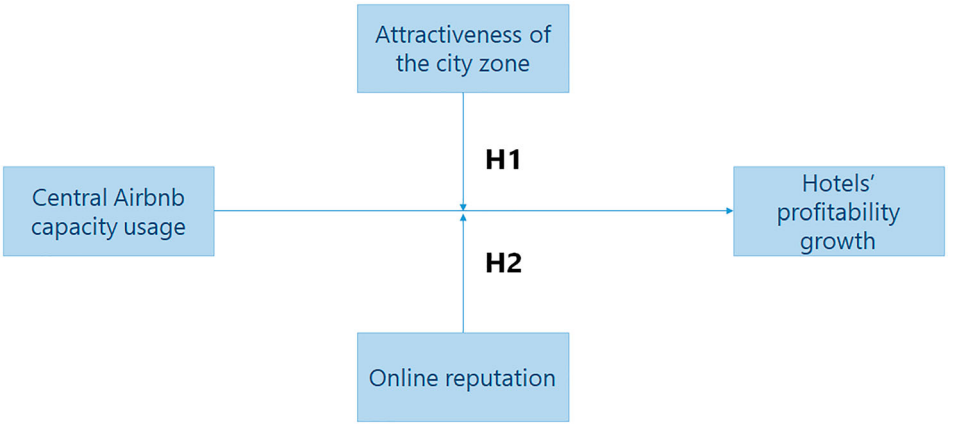

Figure 1. Research framework.

located in one of the six cities or related to more than one structure were deleted from the sample. This decision is justified by the fact that one of our targets was to analyse the relationship between the location of a hotel and its performance; considering economic measures that refer to a variety of hotels that aggregate financial results would lead to bias. Moreover, different effects of online reputation on hotels that are a part of a branded chain and on hotels without a brand have been shown in previous research, and the choice of focusing on independent hotels has therefore allowed us to explore the moderating role of online reputation, without any possible distortion arising from hotels that are part of a chain (Raguseo & Vitari, 2017). In this phase, we gathered the geographic coordinates of each hotel in order to pinpoint its exact location in the city.

After this phase, each selected hotel was linked to its TripAdvisor page, from which we extracted information about the services offered, and to its Trustyou page, to obtain the score that represents its online reputation. We merged the gathered data with the Airbnb data provided by AirDNA.

These data underwent a similar process: we counted the total number of equivalent and active Airbnb listings for each city and each year, and their actual usage by customers. We also triangulated the data with the ISTAT database from which we gathered some of the control variables included in the model, such as touristic flows, hotels in the city and size of the city. Given the availability of Airbnb data for three years, that is, 2016, 2017 and 2018, we finally built a panel dataset of 725 hotels that spanned the period of these three years.

Measures

Dependent variable

Hotels' profitability growth. The considered dependent variables are the differences from the previous year of two of the most frequently used profitability indexes: Return On Sales (ROS) and Return On Assets (ROA) of the hotels (Qian & Li, 2003). We use two variables, because a single measure may have generated criticism (Weiner & Mahoney, 1981). Both variables are obtained from the Bureau Van Dijk financial database, AIDA.

Independent variable

Central Airbnb capacity usage. This construct refers to the total number of room-nights booked in Airbnb listings in the attractive area in a year in the city under analysis (the definition of attractive area is discussed extensively in the description of the next variable, that is, 'attractiveness of the city zone'). We elaborated this variable using data from the AirDNA database. This operationalization is different from the typical way extant studies have operationalized the diffusion of Airbnb. There is in fact a tendency, in the extant studies, to focus on the number of active Airbnb listings as an expression of the available supply of rooms at the city level (Dogru et al., 2019; Zervas et al., 2017). Instead, in this study, we operationalized Airbnb as the product of the number of booked nights per listing per year and the number of bedrooms available in a listing. Therefore, this metric refers to the room's capacity, as orchestrated by the platform, which is actually used by the tourists. This variable was normalized to compute its interaction effect with the two moderating variables.

Moderating variables

Attractiveness of the city zone. The first moderating variable describes the location of each hotel with respect to the city centre, since, in previous literature, the position emerged as a possible source of hotel differentiation that led to higher profitability (Baum & Haveman, 1997; Sainaghi, 2011; Zhang et al., 2011). The Attractiveness of the city zone was operationalized with a dummy variable equal to 1, when the hotel was located in an attractive district, and 0 otherwise.

The selected cities, for historical reasons, are all characterized by a high concentration of tourist points of interest in their central areas. In the past centuries, in fact, the central area represented the political heart of urban aggregation and collected most of the powerful and influential people, who

were usually the same ones who cared about the works of art, architecture and beauty that we can nowadays admire in many museums, squares and gardens (Diaz-Parra & Jover, 2020; Purcell, 2014). Therefore, we identified the central area as being the most attractive in each city. Furthermore, the central areas in many cities are perceived by tourists as the safest and most well-maintained places, where the probability of having any problem (e.g. robberies) is minimized. Tourists generally prefer to stay in such areas, or reasonably close to them, that is, at a distance of a few minutes on foot, and the satisfaction of being in such a zone is very high, close to the maximum possible (Russo, 2002). Satisfaction decreases in zones just outside the 'best zone', because the time taken to reach the points of interest increases, and it may be necessary to use different means of transport to reach such areas, thus incurring expenses.

In order to operationalize the variable, we adopted the mono-centric model, which has the aim of describing land use patterns with two or more mono-centric rings, using the distance from the city centre as a discriminating factor, on the 'assumption that tourists are willing to pay more in return for easy access to the city centre' (Shoval, 2006; Yang et al., 2014; Yokeno, 1968).

To identify the area that refers to the city centre and therefore to the attractive zone, we identified the zones where the main touristic attractions are by using Google Maps to visualize them. After this step, we were able to trace a circle around each city centre that included the main touristic attractions. The radius of this circle was equal to 4 kilometres for Rome, 2 kilometres for Milan, 1.85 kilometres for Venice, 1.4 kilometres for Florence, 1.7 kilometres for Turin and 1.75 kilometres for Naples. The circles we located were then used to divide the hotel sample into two sub-samples, the hotels inside the circles (which were considered to be in the city centre) and the ones outside (which were classified as outside the city centre). In other words, the circles were drawn to include the main touristic attractions and the hotels close to them. This variable was normalized to compute its interaction effect with the independent variable.

Online reputation. The online reputation variable was operationalized through the cumulative average review score of a hotel from several trusted online sources. This information was taken from Trustyou.com, a portal that collects and aggregates all the certified reviews available on the web about hotels. The travellers' rate on this website is established on a five-point scale, where the scores are 'terrible', 'poor', 'average', 'very good' and 'excellent'. We chose the review score instead of the volumes of reviews since most of the earlier studies had found that the former is the dimension of a hotel's visibility that has the most impact on sales (Garrido-Moreno et al., 2018) and profitability (Litvin et al., 2008). Finally, online reputation was normalized to compute its interaction effect with the Airbnb capacity usage variable.

Instead, the variable is used in the post hoc analysis as a threshold to test whether a very high online reputation could behave as a moderator. Specifically, we test threshold values of 4.1, 4.3, 4.5, 4.7 and 4.9. In all these cases, we defined a new variable with a value of 1, if the reputation was higher than the threshold, and 0 otherwise.

Control variables

Touristic flows. The touristic flows were operationalized as the number of cumulative nights tourists spend on accommodation in the city under analysis. The considered data were taken from the ISTAT database, and allowed us to control for the total size of the touristic phenomenon (Zervas et al., 2017). The natural logarithm form of this variable was computed, since it made its distribution closer to a normal one.

Hotel capacity. The hotel capacity was considered in terms of the number of rooms. These data were collected from the TripAdvisor pages of each hotel, and they are a proxy of a hotel's supply size (Lee & Jang, 2012). The natural logarithm form of this variable was computed, since it made its distribution closer to a normal one.

Hotel competition. We modelled the internal competition the hotels face with the number of the same category hotel rooms in the city in the same year. This variable has the aim of controlling for direct competition in the model (Becerra et al., 2013). The logarithm of that number was used in the models, since it made its distribution closer to a normal one.

Restaurants near to a hotel. The number of restaurants in the vicinity of a hotel (within a 500 metre radius from the considered hotel) represents a proxy of the complementary services tourists can find in a city in the zone surrounding the considered hotel. Restaurants are part of the same system as hotels, and they act as a complement by reinforcing the competitiveness of a hotel (Terhorst & Erkuş-Özturk, 2011).

Hotel star category. As part of the main distinguishing characteristics of hotels, we included the category pertaining to the official star rating, as already used in the previous literature (Aznar et al., 2017). The aim of this variable is to control for the different effects that stem from different types of hotels, with different prices, services, and customer targets.

City size. We included the number of residents in each city, as taken from the ISTAT database, as a proxy of the development that the city itself has reached (Zervas et al., 2017). The natural logarithm form of this variable was computed, since it made its distribution closer to a normal one.

Age of the hotel. We operationalized the age of hotels by measuring each hotel from its year of foundation. Specifically, we extracted the year of establishment of each hotel from the AIDA database and calculated its age. The effect of age on profitability may be either positive or negative: on one hand, older firms should have more experience, and this can lead to superior performance; however, older firms may not have the flexibility required to adapt to rapid changes in market conditions, thus, exhibiting lower performances than younger firms (Stinchcombe, 1965). The logarithm of that number was used in the models, since it made its distribution closer to a normal one.

Hotel business friendly. Different proxies have been used in the recent literature to measure whether a hotel is able and willing to welcome business customers or not. Business and leisure travellers differ in the way they purchase their accommodation solution, with the former usually having the freedom to choose any destination hotel they want using the budget offered by the company; this feature should therefore be controlled for (Mccleary et al., 1993). In our studies, we modelled this variable, considering TripAdvisor data, by looking at the presence of three business-oriented facilities (Zervas et al., 2017): meeting room, conference hall and convention centre. If a hotel had at least one of these facilities, is was considered business-friendly, and the dummy variable was equal to 1, and 0 otherwise. We collected the business-friendly facilities from the TripAdvisor page of each hotel.

Table 2 summarizes the information about the operationalization, data source and reference of each variable considered in this study.

Sample composition

Table 3 shows the composition of the sample. We selected the six historical cities in Italy with the highest touristic flows. They are all characterized by a high number of nights spent by tourists during the year, even though Naples and Turin are not at the same scale as the other cities. Milan, Turin and Naples have populations of around 1 million each, while Florence and Venice have much smaller populations, even though their touristic flows are comparable with those of Milan. Rome is by far the city with the highest population and touristic flows. The massive number of tourists, compared to the relatively small population in Florence and Venice, could lead to the emergence of the 'touristification' phenomenon, which has a profound impact on the

Table 2. Operationalisation of the independent and the dependent variables.

Type of variable	Construct	Sub-construct	Operationalization	Data source	References to previous studies
Dependent variable	Growth in hotel profitability	Delta ROA	Difference between the income/ total assets of the current year of operation and that of the previous year	AIDA	Qian & Li, 2003
		Delta ROS	Difference between the income/ sales revenues of the current year of operation and that of the previous year	AIDA	Qian & Li, 2003
Independent variable	Central Airbnb capacity usage	–	Number of booked nights in the city centre * number of bedrooms	AirDNA	Dogru et al., 2019
Moderating variable	Attractiveness of the city zone	–	Dummy variable equal to 1 if the hotel is located in the city centre, and 0 otherwise	Elaboration on AIDA, TripAdvisor and Google Maps data	Zhang et al., 2011
	Online reputation	–	Logarithm of the cumulative average review score	Trustyou	Litvin et al., 2008
Control variables	Touristic flows	–	Logarithm of the number of nights spent in a hotel	ISTAT	Zervas, Proserpio, and Byers, 2017
	Hotel capacity	–	Logarithm of the number of rooms in a hotel	ISTAT	Lee & Jang, 2012
	Hotel competition	–	Logarithm of the number of hotels with the same number of stars in the city	ISTAT	Becerra et al., 2013
	Restaurants near the hotel	–	Number of restaurants in a radius of 500 metres from the hotel	TripAdvisor	Terhorst & Erkuş-Öztürk, 2011
	Hotel star category	–	Number of stars of the hotel	Hotel website	Aznar et al., 2017
	City size	–	Logarithm of the number of inhabitants (number of residents) in a city	ISTAT	Zervas, Proserpio, and Byers, 2017
	Age of the hotel	–	Logarithm of the number of years of operation of a hotel	AIDA	Stinchcombe, 1965
	Business-friendly hotel	–	Dummy variable equal to 1 if the hotel has services related to business customers	TripAdvisor	Mccleary et al., 1993

Note: n.a. stands for 'not available'.

residents (Sequera & Nofre, 2018). In the sample, there are more hotels in Rome; Milan, Venice and Florence are at the same scale, with a moderate number of hotels, while Turin and Naples are behind the other cities from the touristic offer point of view. As expected, the number of hotels is proportional to the touristic flows, regardless of the size of the city, thus confirming the existence of a more pronounced 'touristification' phenomenon in the smaller cities with high touristic flows, than in the larger cities impacted less by tourism. As mentioned above, only independent hotels, where the balance sheet data are linked to a single structure, were considered in the sample of hotels. This design choice has had the dual objective of univocally geo-referencing the considered

Table 3. City statistics.

City	Number of residents in 2017	Touristic flow in 2017 (nights spent in a hotel)	Number of hotels in the sample	Companies registered in a city – AIDA	Hotels in the city – ISTAT
Rome	2,873,494	26,944,569	339	980	1,191
Milan	1,351,562	11,852,973	113	350	427
Venice	261,905	11,685,819	108	213	404
Florence	382,258	10,056,157	105	193	390
Naples	970,185	3,243,737	36	246	157
Turin	886,837	3,717,634	24	95	132

financial data and of analysing the specific category of hotels that does not have a brand strategy to follow and instead takes all the decisions in complete autonomy.

Findings

Table 4 shows the descriptive statistics of the sample and provides several insights into the composition of the sample.

First, the attractiveness of a city zone, which is the variable that was used to split the hotels between those in the city centre and the ones outside the city centre, shows that the 67.3% of the hotels in the sample are in the city centre, and two balanced sub-samples were therefore created. Second, the online reputation of hotels is higher than 4, thus showing a skewness of the review distribution.

The considered hotels range from a tiny three-room hotel to a vast 1,000 room structure, with some hotels having just been founded and others with a long history of up to 100 years of activity. The hotels on average have 59 rooms, have been in operation for almost 22 years and are three or four-star hotels. They on average have 208 restaurants nearby that make them attractive, and face competition from another 13,311 rooms of the same category in the city. As far as the business services offered are concerned, 36% of the hotels are business-friendly, offering services related to the business segment, while the others do not offer any service to this customer segment.

Table 5, which contains pairwise Spearman correlation coefficients with a significance level for the variables of the models, shows several significant relationships between the variables; as a first step, we looked for significant correlations higher than 0.8, since high correlations may raise concerns regarding multicollinearity in the models (Tussyadiah & Pesonen, 2016). The first significant higher correlation than 0.8 is observed for the two profitability growth variables, but since they were treated in distinct models, it was not considered as an issue for the correctness of the models. We expected a high correlation between the two variables, since both of them act as a measure of a hotel's profitability. The touristic flow variable is highly and significantly correlated with two other variables: Central Airbnb capacity usage and City size. Since the space available in touristic cities constrains both the magnitude of touristic flows and the Airbnb offer, we were not surprised by the high correlation. We excluded the risk of multicollinearity by testing the VIF levels of all the variable combinations, as described in the section regarding the models. The other correlations were all found to be below the threshold of 0.8, and they therefore did not raise any concern regarding multicollinearity. It is interesting to note the significant positive correlation between Online reputation and Attractiveness of the city zone, which means that hotels in central areas have higher scores, and the significant negative correlation between Attractiveness of the city zone and Business friendly hotel, which means that those hotels that offer services to business travellers are located more frequently outside the city centre.

Table 4. Descriptive statistics.

No.	Variable	Mean	Std Dev	Min	Max
1	Hotels' profitability growth – Delta ROA [%]	0.037	10.488	−69.000	117.410
2	Hotels' profitability growth – Delta ROS [%]	−0.204	9.476	−51.370	55.990
3	Central Airbnb capacity usage [#]	2,732,934	1,729,826	223,489	5,183,925
4	Attractiveness of the city zone [dummy]	0.673	0.469	0	1
5	Online reputation [#]	4.157	0.354	2.300	4.900
6	Touristic flows [#]	19,014,039	8,689,877	3,243,737	27,774,461
7	Hotel capacity [#]	58.670	65.575	3	1,000
8	Hotel competition [#]	13,311.000	9,829.488	191	29,875
9	Restaurants near the hotel [#]	208.200	146.985	0	677
10	Hotel star category [#]	3.419	0.797	1	5
11	City size [#]	1,908,065	1,114,453	261,905	2,873,494
12	Age of the hotel [#]	21.870	18.805	2	100
13	Hotel business friendly [dummy]	0.362	0.481	0	1

Table 5. Spearman's correlation matrix.

No.	Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1	Hotels' profitability growth – Delta ROA	1.000												
2	Hotels' profitability growth – Delta ROS	0.871*	1.000											
3	Central Airbnb capacity usage	0.093*	0.077*	1.000										
4	Attractiveness of the city zone	−0.047	−0.029	0.103*	1.000									
5	Online reputation	−0.023	−0.014	−0.097*	0.218*	1.000								
6	Touristic flows	0.105*	0.096*	0.901*	0.023	−0.125*	1.000							
7	Hotel capacity	0.054*	0.038	−0.043	−0.196*	−0.017	0.055*	1.000						
8	Hotel competition	0.047	0.033	0.608*	−0.088*	−0.075*	0.689*	0.283*	1.000					
9	Restaurants near the hotel	−0.071*	−0.058*	0.026	0.686*	0.262*	−0.032	−0.205*	−0.091*	1.000				
10	Hotel star category	0.038	0.0253	−0.034	−0.026	0.306*	0.025	0.537*	0.384*	−0.077*	1.000			
11	City size	0.076*	0.051*	0.783*	0.013	−0.167*	0.858*	0.102*	0.625*	−0.050*	0.046	1.000		
12	Age of the hotel	0.015	0.005	−0.047	0.042	−0.028	−0.034	0.266*	0.019	0.038	0.037	−0.066*	1.000	
13	Hotel business friendly	0.044	0.039	−0.077*	−0.256*	0.122*	0.001	0.584*	0.194*	−0.282*	0.508*	0.073*	0.056*	1.000

Note: * p-value < 0.05.

Models

In order to verify the two hypotheses, we ran eight fixed-effect panel regression models with year-specific and hotel-specific effects to estimate the moderating effects of Attractiveness of the city zone and Online reputation on the direct effect of Central Airbnb capacity usage on the Growth of profitability of a hotel for the 2016–2018 period. We chose the panel analysis method since we wanted to consider both the time and individual dimensions (Davies & Lahiri, 1995; Greene, 2003).

We modelled the Growth of profitability of a hotel (measured with delta ROS and ROA from the previous year) of a hotel *i* at time *t* as a function of the Central Airbnb capacity usage, of the moderation effect of the two moderating variables considered in this study, as well as of the group of control variables mentioned above. We took advantage of the data panel structure and used a fixed-effects model, which can account for the time-invariant unobserved heterogeneity of a firm. We chose a fixed-effects model over a random effects specification to handle the unobserved factors, because the fixed effects model allows the unobserved firm-specific characteristics that are constant over time, such as managerial capabilities, to be taken into account. Specifically, we used fixed-effects models with a Least Square Dummy Variable estimator (LSDV) and included the dummy variables that referred to the years and the hotels' identification in the list of independent variables. The results of a Hausman specification test supported the choice of the fixed-effect model, since a random-model would lead to an inconsistent estimator (Hausman, 1978). Before running the econometric models, we tested for multicollinearity, which can be an issue in regression analysis. All

Table 6. Delta ROS regression results.

Dependent variable					
Independent variables	Hp	Delta ROS_t	Delta ROS_t	Delta ROS_t	Delta ROS_t
Model		M1	M2	M3	M4
Direct effects					
Central Airbnb capacity usage (AU)		−53.817**	−55.360**	−57.184**	−57.327**
		(18.175)	(18.169)	(18.407)	(18.381)
Attractiveness of the city zone (AT)		45.485*	64.065**	45.261*	62.075**
		(19.900)	(22.176)	(19.892)	(22.356)
Online reputation (OR)		−8.130†	−7.961†	3.508	−0.640
		(4.431)	(4.426)	(10.899)	(11.169)
Moderating effects					
AUxAT	H1	…	25.206*	…	22.694*
			(13.355)		(13.814)
AUxOR	H2	…	…	16.480	10.393
				(14.094)	(14.558)
Control variables					
Touristic flows		65.176**	60.266**	59.660**	57.280**
		(22.586)	(22.706)	(23.073)	(23.094)
Hotel capacity		55.735†	57.695*	56.201†	57.793*
		(30.492)	(30.470)	(30.496)	(30.478)
Hotel competition		−33.670**	−31.126**	−33.109**	−31.020**
		(11.487)	(11.551)	(11.494)	(11.555)
Restaurants near the hotel		−0.428*	−0.418*	−0.430*	−0.420*
		(0.178)	(0.179)	(0.179)	(0.179)
Hotel star category		54.605**	52.625**	54.277**	52.611**
		(20.464)	(20.464)	(20.462)	(20.469)
City size		122.039	109.873	129.996	116.056
		(210.451)	(210.273)	(210.558)	(210.505)
Age of the hotel		5.990	5.669	5.979	5.696
		(5.904)	(5.599)	(85.603)	(5.601)
Hotel business friendly		−361.999*	−357.271*	−367.128*	−360.947*
		(161.620)	(161.428)	(161.654)	(161.550)
Intercept		−2,605.069	−2,395.800	−2,622.000	−2,427.310
		(2,608.157)	(2,607.094)	(2,608.000)	(2,608.124)

Note: the dummy control variables related to the years and to the hotel have been omitted from the table.
*** $p < 0.1\%$, ** $p < 1\%$, * $p < 5\%$, † $p < 10\%$; *standard error adjusted in parenthesis.*

the variables were found to have an acceptable variance inflation factor (VIF) value and tolerance level, and multicollinearity was therefore not regarded as an issue (Greene, 2003).

Tables 6 and 7 show the model specifications estimated to test hypotheses H1 and H2.

Overall, we ran two groups of four models. The first group (from Model 1 to Model 4) had the Delta ROS as the dependent variable, while the second group (from Model 5 to Model 8) had the Delta ROA as the dependent variable. The first model of each regression group is the baseline model, where we included the direct effect of the central Airbnb capacity usage and the two moderating variables, namely the attractiveness of the city zone and the online reputation, as independent variables. The second model of the two regression groups contains all of the three direct effects mentioned above and the interaction term between central Airbnb capacity usage and the first moderating variable, namely the attractiveness of the city zone. The third model instead contains all of the three direct effects mentioned above and the interaction term between central Airbnb capacity usage and the second moderating variable, namely the online reputation. To be able to control for both of the interaction effects, the fourth model of each regression group includes both of the interaction terms under analysis.

Model 1 and Model 5 support the results of the majority of previous research on the direct effect of Airbnb capacity usage on the performance of hotels. We found that central Airbnb capacity usage has a negative but significant impact on the sales and asset profitability growth of a hotel (Delta ROS and Delta ROA, respectively). This result shows that Airbnb has a detrimental effect on the economic performances of hotels. These models also show that the online reputation of hotels has less impact

Table 7. Delta ROA regression results.

Dependent variable					
Independent variables	Hp	Delta ROA_t	Delta ROA_t	Delta ROA_t	Delta ROA_t
Model		M5	M6	M7	M8
Direct effects					
Central Airbnb capacity usage (AU)		−46.748**	−48.318**	−46.197*	−46.386*
		(18.806)	(18.801)	(19.048)	(19.020)
Attractiveness of the city zone (AT)		33.760†	52.650*	33.795†	54.610*
		(20.592)	(22.952)	(20.603)	(23.138)
Online reputation (OR)		0.262	0.434	−1.649	−6.781
		(4.585)	(4.581)	(11.273)	(11.555)
Moderating effects					
AUxAT	H1	…	25.627*	…	28.102*
			(13.822)		(14.297)
AUxOR	H2	…	…	−2.707	−10.245
				(14.587)	(15.062)
Control variables					
Touristic flows		41.343†	36.351	42.249†	39.298†
		(23.374)	(23.500)	(23.890)	(23.902)
Hotel capacity		49.957	51.949†	49.880	51.851†
		(31.556)	(31.535)	(31.575)	(31.544)
Hotel competition		−31.651**	−29.065*	−31.745**	−29.171*
		(11.887)	(11.954)	(11.904)	(11.959)
Restaurants near the hotel		−0.228	−0.217	−0.228	−0.215
		(0.185)	(0.185)	(0.185)	(0.185)
Hotel star category		58.310**	56.297**	58.365**	56.312**
		(21.178)	(21.179)	(21.191)	(21.185)
City size		11.268	−1.123*	9.942	−7.337
		(217.691)	(217.523)	(217.917)	(217.775)
Age of the hotel		−2.889	−3.212	−2.888	−3.239
		(5.799)	(5.795)	(5.802)	(5.796)
Hotel business friendly		−307.691†	−302.876†	−306.845†	−299.209†
		(167.243)	(167.055)	(167.388)	(167.188)
Intercept		−841.482	−628.447	−838.325	−595.918
		(2,697.932)	(2,697.015)	(2,699.323)	(2,698.183)

Note: the dummy control variables related to the years and to the hotel have been omitted from the table.
*** $p < 0.1\%$, ** $p < 1\%$, * $p < 5\%$, † $p < 10\%$; standard error adjusted in parenthesis.

on the economic returns of hotels. These findings highlight that hotels located in an attractive city zone are those that achieve higher growth in profitability indexes, since travellers show more willingness to pay for a hotel close to the points of interest in a city (e.g. museums, interesting architecture) and to the local transportation systems.

In Hypothesis H1, we postulated that the attractiveness of the city zone where a hotel is located positively moderates the effect that the central Airbnb capacity usage has on the profitability growth of a hotel, with hotels located outside the most attractive zones suffering the most. Models 2 and 6 support this hypothesis, as they show a positive and significant interaction effect between central Airbnb capacity usage and attractiveness of the city zone where the hotel is located on both the return on sales and the return on asset growth. In order to obtain further support for Hypothesis H1, we traced 2-way linear interaction graphs to illustrate the moderating effect of the attractiveness of the city zone for both the return on sales and the return on asset growth. Figure 2 shows that when a hotel is located in the city centre, where the attractiveness of the city zone is higher, the negative effect of central Airbnb capacity usage on the profitability growth of a hotel is reduced. In other words, the graphs show the different impacts of Airbnb on hotels in the city centre and outside this zone. It can in fact be observed that the slope of the segment related to the hotels in the city centre is less steep, which means that high central Airbnb capacity usage has a much more substantial impact on the other categories of hotels. This holds for both the return on sales and the return on asset growth, which are affected in a very similar way by the moderating variable, thus supporting Hypothesis 1.

In Hypothesis H2, we posited that the online reputation of a hotel is able to moderate the effect that central Airbnb capacity usage has on the growth in profitability of such a hotel. However, this hypothesis has not been supported by any empirical data. Models 3 and 7 include the interaction term between the Trustyou score and profitability indexes of hotels, which is not significant.

There could be various reasons why this result does not support Hypothesis 2. First, the capabilities needed to respond to the disruptive innovation introduced by the home-sharing platforms may have to do with radical innovation (Christensen & Raynor, 2013; Karimi & Walter, 2015) and with what Teece (2014) indicated as 'dynamic capabilities', namely 'higher-level activities that can enable an enterprise to direct its ordinary activities towards high-payoff endeavours' (Teece, 2014). This idea is based on the tenet in the disruptive innovation theory that well-established companies are able to resist and survive the entrance of a disrupter into their market when they can enact innovation endeavours which, at the same time, do not

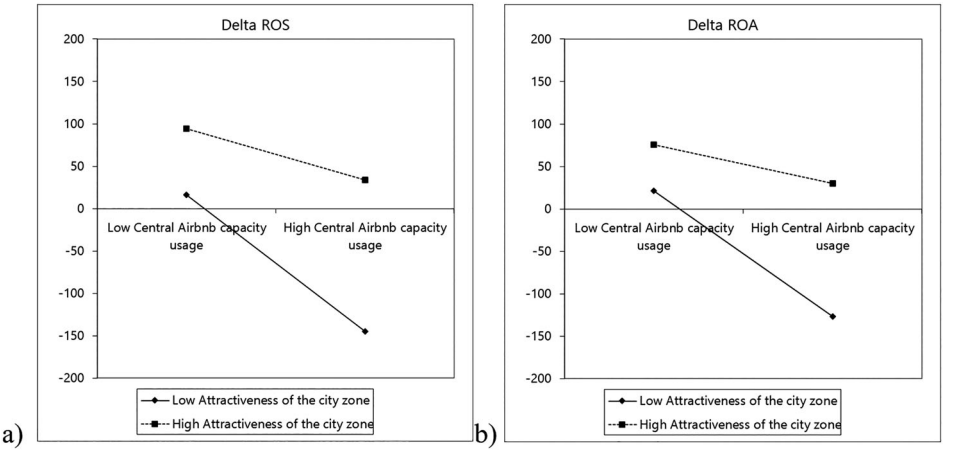

Figure 2. Interaction effect obtained when using ROS as a dependent variable (2a) and ROA as a dependent variable (2b).

increase their cost position and can serve more sophisticated and complex customer needs, thereby providing higher benefits to customers (Christensen, 2013). By developing their view on blue ocean strategies, Chan et al. (2005) reinterpreted such a tenet by contending that firms are successful when they redesign their products/services and they focus their value proposition on specific behavioural patterns of market segments that are easily identifiable with the classic market segmentation approaches (Chan Kim & Mauborgne, 2005). Such a service redesign includes raising or creating features that increase a buyers' willingness to pay, and reducing and eliminating the features customers do not associate particular benefits with and which worsen the firms' cost position. The above-mentioned effort of the Marriott chain to offer hybrid home-sharing logics goes in this direction, as does the attempt of hotels to compete on memorable experiences. Frei (2006) showed that excellence in this aspect can be achieved by asking customers to do part of the work that is usually done by the service provider (Frei, 2006). These arguments lead to contend that the ordinary capabilities reflected on the online reputation expressed by travellers may not reflect such a capability of hotels to redesign their service levels in new ways that could contrast the diffusion of the service offered by disruptors.

Second, it has been reported, in the recent literature, that reviews are currently skewed towards the higher part of the rating scale, thereby reducing the discriminating power when tourists make their choices (Schoenmueller et al., 2018). Because of this evidence, we investigated and found confirmation of this aspect in our data (Figure 3).

We also ran Model 4 and Model 8 to validate hypotheses H1 and H2, simultaneously. Since the interaction effect between central Airbnb capacity usage and the attractiveness of the city zone where a hotel is located is positive and statistically significant, and since the interaction

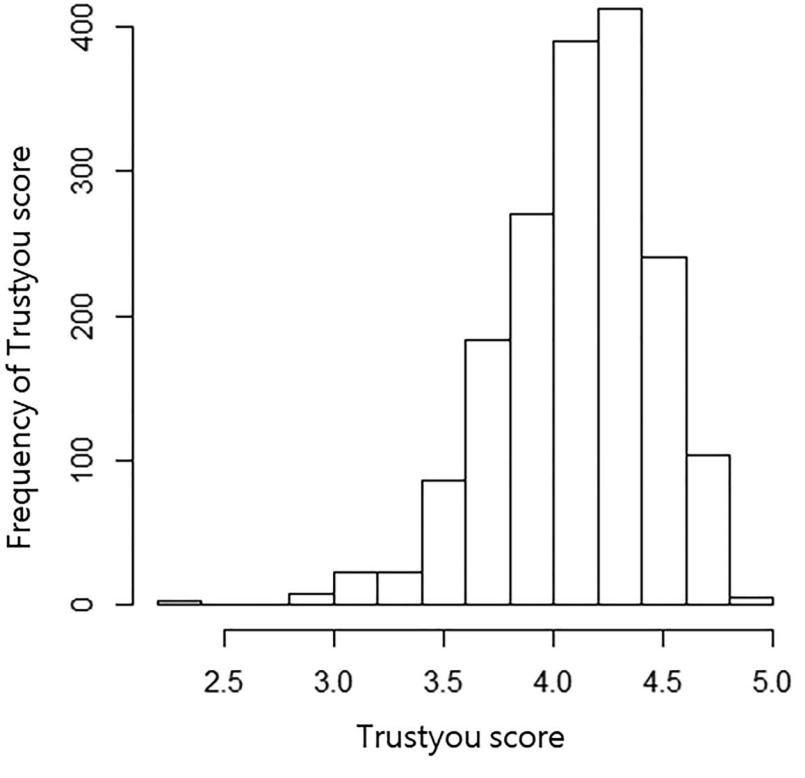

Figure 3. Distribution of the reviews in the sample.

effect between central Airbnb capacity usage and the online reputation is not significant in any of these models, it is possible to assert that they validate the results of the previous models.

Post-hoc analysis

In order to further explore the meaning of the non-significant interaction term between online reputation and central Airbnb capacity usage, we performed a sensitivity analysis to assess whether an extreme positive online reputation, as represented by very high values of online reputation, could have a moderating effect on the negative effect of Airbnb on the growth of profitability of hotels that the previous analyses were not able to catch. We therefore created a dummy variable that split the sample into hotels with a high reputation and hotels with a low reputation. The threshold value, which was very close to the average value, started at 4.1 and was then increased by steps of 0.2 until a maximum value of 4.9 was reached, in order to evaluate whether an extremely high online reputation could help hotels to face disruption. The used models are the same as the ones used in the previous analysis, with the only difference being that the online reputation was operationalized as a dummy variable. The results of this analysis are shown in Tables 8 and 9. The results are coherent with the results of the previous analysis, since the interaction effect between online reputation and the Airbnb variable is still not significant for any of the five thresholds tested.

In conclusion, the result of this post-hoc analysis is coherent with the result regarding H2, and it reinforces the lack of the moderating effect of online reputation, even in the case of an extreme online reputation.

Table 8. Robustness check – Delta ROS.

Dependent variable Independent variables	Delta ROS_t	Delta ROS_t	Delta ROS_t	Delta ROS_t	Delta ROS_t
Threshold value	High ≥ 4.1	High ≥ 4.3	High ≥ 4.5	High ≥ 4.7	High ≥ 4.9
Direct effects					
Central Airbnb capacity usage (AU)	−56.662**	−56.992**	−56.363**	−56.082**	−56.167**
	(18.080)	(18.077)	(18.078)	(18.086)	(18.087)
Attractiveness of the city zone (AT)	48.585*	49.419*	48.500*	49.696*	48.694*
	(21.522)	(21.546)	(21.549)	(21.535)	(21.548)
High online reputation – dummy variable (HOR)	0.545	0.720	0.267	−0.432	0.012
	(0.529)	(0.560)	(0.592)	(0.489)	(0.476)
Moderating effect					
AUxHOR	0.528	−0.0732	0.379	−0.230	0.450
	(0.511)	(0.540)	(0.563)	(0.477)	(0.474)
Control variables					
Touristic flows	64.493**	65.234**	64.357**	64.438**	64.703**
	(22.257)	(22.276)	(22.272)	(22.392)	(22.263)
Hotel capacity	54.655†	56.112†	52.663†	55.620†	54.841†
	(31.316)	(31.349)	(31.556)	(31.369)	(31.333)
Hotel competition	−32.208**	−33.136**	−32.187**	−32.974**	−32.639**
	(11.527)	(11.515)	(11.543)	(11.501)	(11.504)
Restaurants near the hotel	−0.418*	−0.422*	−0.423*	−0.433*	−0.418*
	(0.181)	(0.181)	(0.182)	(0.183)	(0.181)
Hotel star category	50.201*	51.573*	50.085*	51.251*	50.815*
	(20.264)	(20.258)	(20.300)	(20.247)	(20.249)
City size	46.946	59.021	44.017	50.413	44.136
	(209.089)	(209.781)	(209.381)	(209.355)	(209.478)
Age of the hotel	4.696	4.597	4.745	5.081	4.646
	(5.420)	(5.423)	(5.435)	(5.430)	(5.427)
Hotel business friendly	−336.692*	−347.878*	−332.633*	−346.129*	338.034*
	(166.013)	(166.239)	(166.447)	(166.043)	(166.085)
Intercept	−1651.178	−1814.829	−1605.268	−1690.849	−1617.736
	(2592.282)	(2600.283)	(2595.951)	(2597.333)	(2595.548)

Note: the dummy control variables related to the years and to the hotel have been omitted from the table
*** $p < 0.1\%$, ** $p < 1\%$, * $p < 5\%$, † $p < 10\%$; standard error adjusted in parenthesis.

Table 9. Robustness check – Delta ROA.

Dependent variable Independent variables	Delta ROA$_t$	Delta ROA$_t$	Delta ROA$_t$	Delta ROA$_t$	Delta ROA$_t$
Threshold value	High ≥ 4.1	High ≥ 4.3	High ≥ 4.5	High ≥ 4.7	High ≥ 4.9
Direct effects					
Central Airbnb capacity usage (AU)	−51.475**	−51.514**	−50.820**	−50.971**	−51.023**
	(18.696)	(18.645)	(18.687)	(18.712)	(18.707)
Attractiveness of the city zone (AT)	33.549	34.242†	33.097	33.407	33.304
	(22.263)	(22.235)	(22.283)	(22.288)	(22.272)
High online reputation – dummy variable (HOR)	0.700	1.233*	0.213	0.050	0.337
	(0.548)	(0.579)	(0.612)	(0.506)	(0.492)
Moderating effect					
AUxHOR	0.248	−0.030	0.272	0.013	0.227
	(0.529)	(0.557)	(0.583)	(0.494)	(0.490)
Control variables					
Touristic flows	44.377†	44.848†	43.966†	44.160†	43.863†
	(23.023)	(22.988)	(23.030)	(23.174)	(23.035)
Hotel capacity	49.681	51.001	49.124	49.584	49.395
	(32.397)	(32.361)	(32.633)	(32.467)	(32.415)
Hotel competition	−31.693**	−32.164**	−31.741**	−31.772**	−31.814**
	(11.927)	(11.884)	(11.939)	(11.906)	(11.907)
Restaurants near the hotel	−0.228	−0.231	−0.224	−0.226	−0.226
	(0.188)	(0.187)	(0.188)	(0.189)	(0.188)
Hotel star category	58.338**	59.030**	58.382**	58.456**	58.521**
	(20.967)	(20.906)	(20.996)	(20.960)	(20.948)
City size	−54.880	−38.276	−57.237	−56.956	−54.944
	(216.250)	(216.447)	(216.473)	(216.631)	(216.538)
Age of the hotel	−2.867	−3.117	−3.143	−2.963	−3.066
	(5.600)	(5.592)	(5.613)	(5.613)	(5.606)
Business-friendly hotel	−280.353†	−289.823†	−277.782†	−279.419	−279.953†
	(171.792)	(171.580)	(172.117)	(171.845)	(171.791)
Intercept	−68.299	−284.415	−29.409	−37.639	−56.893
	(2680.997)	(2684.186)	(2683.824)	(2687.547)	(2683.926)

Note: the dummy control variables related to the years and to the hotel have been omitted from the table.
*** $p < 0.1\%$, ** $p < 1\%$, * $p < 5\%$, † $p < 10\%$; *standard error adjusted in parenthesis.*

Discussion and conclusion

This study adopts a lens that is based on the disruptive innovation theory (Christensen, 2013) to investigate the effect of the diffusion of the leading sharing accommodation platform – Airbnb – on the profitability growth of independent hotels located in the vicinity of a hotel. We have focused on two essential properties of the portfolio of resources and capabilities that hotels can deploy to cope with the disruption exerted by new entrants, such as Airbnb. Such factors are the tourist attractiveness of the micro-zone in which a hotel is located and the extent of its ordinary capabilities, as reflected in the reviews generated by travellers on infomediary platforms. These two factors reflect 'what to sell and where to locate' (Baum & Haveman, 1997; Sainaghi, 2011), and they have been highlighted, under a situation of environmental stability, as being critical for the performance of a hotel and for its capability to survive in the long-term (Litvin et al., 2008; Zhang et al., 2011). We focused on this topic since the recent literature (Blal et al., 2018; Dogru et al., 2019; Zervas et al., 2017) has still not been able to disentangle all the complex relationships that can moderate the direct substitution effect. Accordingly, we tested whether these two factors mitigate the competitive threats to profitability posed by disruptors, and whether these factors allow hotels to survive and prosper in times of disruption. Overall, the findings of this study contribute to the literature by adding evidence to the on-going debate about how the tourism sector is changing and how incumbents can react to new entrants.

Theoretical contribution

This study contributes to the emerging literature debate on the economic impacts of the sharing economy on the incumbent hotel industry. Adopting a lens based on the disruptive innovation

theory (Christensen & Raynor, 2013), we support, with empirical evidence, the application of the theory to the rise in sharing economy short-term rental platforms.

It has already been analysed, in the literature, how the rise in sharing economy platforms in the hospitality service industry has affected the performance of hotels (Blal et al., 2018; Dogru et al., 2019; Zervas et al., 2017), but mixed results have been found, thus limiting the understanding of the circumstances under which hotels suffer the least from the disruption effects that sharing economy schemes introduce into this industry. Given these mixed results, and given the absence of studies that have investigated the capability of hotels to cope with the competitive threats exerted by such disruptors as home-sharing platforms, we contribute to the literature on disruptive innovation in the tourism context by investigating two essential properties of the portfolio of resources and capabilities that hotels can deploy to protect their competitive advantage from a substitute product offered by the disruptor. We have provided evidence that the first critical factor, that is, the attractiveness of the micro-zone where the hotel is located, allows incumbents to manage the disruption introduced by accommodation sharing platforms. In fact, since the central location of a hotel is a valuable resource that is challenging to imitate, and almost unique, due to the scarcity of free space in city centres, we see it as a Ricardian rent, which is able to grant a performance advantage over hotels outside the attractive zone. The Ricardian rent also depends on the fact that a hotel located in the city centre has the advantage of being more favourably located in an ecosystem with several points of interest, museums, restaurants, etc., which in turn provide additional opportunities and performance advantages to hotels.

We have also found that the second critical factor, that is, the extent of a hotel's ordinary capabilities, as reflected in the reviews generated by travellers on infomediary platforms, is not a significant factor in protecting the incumbents in the analysed context from the disrupters. We reinforced this evidence also with the post-hoc analysis where we considered the moderating role of extremely positive reviews. Such a result may suggest that hotels need to develop the capabilities that have to do with radical innovation, and which have been defined as 'dynamic capabilities' in the literature (Teece, 2007), to respond timely and effectively to the business model innovations introduced by home-sharing platforms.

Managerial implications

From a managerial point of view, some implications may be derived from our study. First, we support the point that underestimating sharing economy platforms may result in a significant threat in the future, since they first started focusing on low-value customers. Plans to counteract this threat should be deployed, and all the interested parties should be aware of the potential magnitude of the threat, which has been evolving quickly. For example, two of the factors that the literature has pointed out as being necessary to protect hotels are the services offered to the business customer segment and those for the high-end market, even though both of these factors are now explicitly targeted by Airbnb, which has developed the 'Airbnb plus' feature for high-end travellers (https://www.airbnb.co.uk/plus) and 'Airbnb for work' for business travellers (https://www.airbnb.co.uk/work?).

Second, this study informs managers about the fact that the location of a hotel is currently a salient variable that allows the hotel to recover from the disruption effects exerted by sharing economy schemes, whereas the ordinary capabilities that result in a high online reputation have no particular effects in this direction. In other words, our results indicate that within an urban context, the hotels outside the centres are the ones that need to reinvent their business model the most. Moreover, we suggest that independent hotel managers should take advantage of the knowledge they can derive from the innovative processes large hotel chains introduce. We in particular suggest focusing on creating alliances and/or networks with entities from other sectors, as large tourism firms are currently doing (Pikkemaat & Peters, 2006; Weiermair, 2006). These long-term mutual beneficial alliances/networks can have a positive effect on both costs and revenues,

since the traditional production factors in tourism have to share their relevance even more with other 'tourism structure and supra-structures' (Pine II & Gilmore, 1998; Wolf, 1999).

Limitations and future research

Although this study provides a research contribution to the circumstances under which hotels are protected from the disruption and substitution effect exerted by the diffusion of Airbnb, it suffers from some limitations that may be addressed in future research.

First, we have applied the disruptive innovation theory to a different context from the one for which it was originally considered. The main difference has to do with the fact that the disruptive innovation theory was initially developed for market contexts in which customer choices were oriented by objective elements related to how technology affected the performance of a product, while the characteristics of tourism services, such as hedonic goods, make emotions a factor that plays an essential role in the purchasing process.

Second, future studies could investigate the existence of other moderating effects in the relationship between the sharing economy and the growth in profitability of hotels in order to understand the conditions that allow managers to achieve less negative results, given the presence of Airbnb as a substitute product. From this point of view, our attention to the role of ordinary capabilities paves the way to taking into consideration how hotels can build dynamic capabilities (Teece, 2014). Christensen's theory would seem to suggest that incumbents have to reinvent their product in order to increase the benefits for customers in upmarket segments, albeit without excessively increasing costs. In the hospitality industry, this has probably to do with how hotels are capable of redesigning their services and business models in new ways, while taking advantage of the opportunities available in the technology environment and in the ecosystem represented by touristic services. This process of sensing and seizing opportunities (Teece, 2007) calls for studies to analyse how hotels can build dynamic capabilities to cope with the change in the industry introduced by home-sharing platforms.

Third, the study is based on a specific hotel subset (independent hotels) located in the six most attractive historical cities for national and international tourism in Italy. Accordingly, these findings cannot be generalized to settings with different touristic drivers. Further research could replicate the study in different settings, in order to understand how differences in the supply and demand conditions, due to the nature of the cities, affect the generalisability of the findings.

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Appendices

Appendix A1

Figure A1. Number of Airbnb listings worldwide.

Appendix A2

Table A2. Literature review.

Authors	Geography	Title	Hypotheses	Independent variables	Moderation variables	Dependent variable	Results	Airbnb impact on hotel (+/-)
Zervas et al., 2016	Main cities in Texas (Houston, San Antonio, Dallas, Austin, Fort Worth, El Paso, Arlington, Corpus Christi, Plano and Laredo)	The rise of the sharing economy: Estimating the impact of Airbnb on the hotel industry	Airbnb has a measurable and quantifiable impact on hotel revenues in the areas of interest	Airbnb supply		Hotel revenues	A 10% increase in Airbnb listings associated with a 0.35% decrease in monthly hotel room revenues	Direct negative
			Airbnb has a measurable and quantifiable impact on the Occupation rate of a hotel in the areas of interest	Airbnb supply		Hotel OCC	A 10% increase in Airbnb supply generates a near-zero decrease in the occupancy rate of about 0.0005%	Direct negative
			Airbnb has a measurable and quantifiable impact on the ADR of a hotel in the areas of interest	Airbnb supply		Hotel ADR	A 10% increase in Airbnb supply is associated with a price decrease of 0.19%	Direct negative
			Airbnb has a measurable and quantifiable impact on hotel revenues in the areas of interest, but high-end hotels suffer less	Airbnb supply	Hotel type	Hotel revenues	The negative impact of Airbnb increases as the price tiers decrease; an insignificant effect observed for the Upscale and Luxury segment	Moderating negative
			Airbnb has a measurable and quantifiable impact on hotel revenues in the areas of interest, but business hotels suffer less	Airbnb supply	Business hotel	Hotel revenues	A lack of meeting spaces is negative and statistically significant	Moderating negative
			Airbnb has a measurable and quantifiable impact on hotel revenues in the areas of interest, but hotels belonging to a chain suffer less	Airbnb supply	Chain hotel	Hotel revenues	Hotels of both operation structures are affected. However Airbnb has a slightly larger impact on independent hotels	Moderating negative
	Austin & Dallas, Texas		Airbnb reduces the pricing power of hotels (dynamic pricing during large events)	Airbnb supply		Hotel peak pricing power	The pricing power of hotels has declined significantly as Airbnb	Direct negative

(*Continued*)

Table A2. Continued.

Authors	Geography	Title	Hypotheses	Independent variables	Moderation variables	Dependent variable	Results	Airbnb impact on hotel (+/-)
						during large events	popularity has grown, despite the fact that SXSW attendance has continued to grow steadily over time	
Xie & Kwok, 2017	Austin, Texas	The effects of Airbnb's price positioning on the performance of hotels	The supply of Airbnb listings negatively impacts the performance of local hotels	Same Postal code listing supply		Revpar	The supply of the accommodation alternatives of Airbnb listings in the same Postal code area significantly impacts the revpar of hotels	Direct negative
			Price difference between a hotel and Airbnb listings in the vicinity has a significant impact on the performance of the hotel	Price difference between a hotel and Airbnb listings nearby		Revpar	The revpar of hotels increases along with the price difference between hotels and Airbnb with the same Postal code	Direct negative
			Price dispersion among Airbnb listings in the vicinity has a significant impact on the performance of a hotel	Price dispersion among Airbnb listings nearby		Revpar	The revpar of hotels increases along with the dispersion of prices for Airbnb with the same Postal code	Direct negative
			The price difference between a hotel and Airbnb listings in the vicinity moderates the relationship between the local Airbnb supply and the performance of a hotel, where a larger price gap will lower the negative impact of the local Airbnb supply on the performance of a hotel	Same Postal code listing supply	Price difference between a hotel and Airbnb listings nearby	Revpar	The moderation of the price difference on the impact of the Airbnb supply was found to be significant	Moderating negative
			Price dispersion among Airbnb listings in the vicinity moderates the relationship between the local Airbnb supply and the performance of a hotel,	Same Postal code listing supply	Price dispersion among Airbnb listings nearby	Revpar	The moderation of the price difference on the impact of the Airbnb supply was found to be significant	Moderating negative

			where a larger price dispersion will lower the negative impact of the local Airbnb supply on the performance of a hotel					
			The hotel class moderates the relationship between the local Airbnb supply and the performance of a hotel, where hotels in a lower-tier class are impacted more negatively by the local Airbnb supply than those in a higher-tier class	Same Postal code listing supply	Hotel class	Revpar	Not supported	Not significant
			The online ratings of a hotel moderate the relationship between the local Airbnb supply and the performance of the hotel, where hotels with lower review ratings are impacted more negatively by the local Airbnb supply than those with higher review ratings	Same Postal code listing supply	Online ratings	Revpar	Not supported	Not significant
Blal et al., 2018	San Francisco, California	Airbnb's effect on hotel sales growth	The total Airbnb supply is negatively associated with the sales pattern performance of a hotel (revpar)	Total Airbnb supply		Hotel revpar	Non-significant effect on revpar	Not significant
			The average prices of Airbnb rentals are positively associated with the sales pattern performance of hotels	Average Airbnb price		Hotel revpar	The Airbnb property prices showed a positive effect on the hotel revpar: the higher the price of the rentals posted on the platform, the higher the revpar of hotels	Direct positive
			The average satisfaction of Airbnb users is negatively associated with the sales	Average score of Airbnb listings		Hotel revpar	Negative relationship between hotel revpar and the average	Direct negative

(*Continued*)

Table A2. Continued.

Authors	Geography	Title	Hypotheses	Independent variables	Moderation variables	Dependent variable	Results	Airbnb impact on hotel (+/-)
			pattern performance of hotels				satisfaction rate of Airbnb guests	
			The effects of Airbnb on the sales pattern performance of hotels varies across different hotel segments	Average Airbnb price	Hotel star category	Hotel revpar	5 stars: increase in revpar of $0.651 for each increase in dollars in the average price 4 stars: lower effect ($0.459) for each increase in dollars in the average price	Moderating positive
Dogru et al., 2019	Boston, Massachusetts & Chicago, Illinois	Adding evidence to the debate: Quantifying Airbnb's disruptive impact on ten key hotel markets	The Airbnb supply negatively impacts hotel room revenues (revpar), i.e. the revpar of hotels decreases for an increased Airbnb supply.	Total cumulative active Airbnb listings for the last 12 months		Revpar	A 1% increase in Airbnb supply decreases the revpar of a hotel by 0.02%	Direct negative
			The Airbnb supply negatively impacts the average daily rates (ADR) of a hotel, i.e. the ADR of a hotel decreases for an increased Airbnb supply			ADR	A 1% increase in Airbnb supply (both total cumulative and active supply) decreases ADR by 0.02%	Direct negative
			The Airbnb supply negatively impacts the occupancies (OCC) of hotels, i.e. the OCC of hotels decreases for an increased Airbnb supply			Occupancy rate	A 1% increase in Airbnb supply decreases the OCC of hotels by between 0.001% and 0.004%	Direct negative
Ginindza & Tichaawa, 2017	Mbabane, Ezulwini, Matsapha and Manzini, Swaziland	The impact of sharing accommodation on the occupancy rate of hotels in the kingdom of Swaziland	The sharing accommodation platform has a statistically significant negative impact on the HOR	Airbnb rate		Hotel occupancy rate	The Airbnb occupancy rate has a statistically significant positive relationship with the HOR	Direct positive
Aznar et al., 2017	Barcelona, Spain	The irruption of Airbnb and its effects on hotel profitability: An analysis of Barcelona's hotel sector	Profitability is negatively affected when there is a major presence of apartments nearby	Airbnb supply in a radius of 1 km from a hotel		ROE	Positive correlation between the presence of Airbnb apartments and return on equity	Direct positive
			Profitability is positively affected by the size of a hotel	Hotel size		ROE	Positive but not significant	Not significant

			Profitability is positively affected by the star rating of a hotel	Hotel star category		ROE	Not supported	Not significant
Choi et al., 2015	Seoul, Busan, and Jeju, South Korea	The relationship between Airbnb and a hotel's revenues: The case of Korea	Airbnb's listings have a negative impact on the revenues of a hotel in Korea	Airbnb listing number		Hotel revenues	Not supported	Not significant
Roma et al., 2019	The main touristic cities in Italy (Bologna, Florence, Genoa, Milan, Naples, Padua, Palermo, Pisa, Ravenna, Rome, Turin, Venice and Verona)	Sharing economy and incumbents' pricing strategy: The impact of Airbnb on the hospitality industry	Low/medium-end incumbents (i.e. 1–3 star hotels) set lower average prices and the best deals in certain geographical areas (i.e. cities), where the players' penetration of the sharing economy is higher than in areas where the players' penetration of the sharing economy is less pronounced, ceteris paribus. However, these lower prices are only offered for weekend accommodation, and not for weekday accommodation.	Players' (Airbnb) penetration of the sharing economy	Weekend vs weekdays	The average prices and Minimum Price of 1–3 star hotels	Higher penetration of Airbnb, related to a price reduction during weekends in all the cities Airbnb penetration does not affect prices to any great extent on weekdays	Moderating negative
			High-end incumbents (i.e. 4–5 star hotels) set higher best deals and average prices in certain geographical areas (i.e. cities), where the players' penetration of the sharing economy is higher than in areas where the players' penetration of the sharing economy is less pronounced, ceteris paribus. Moreover, these higher prices are offered irrespective of the period of the accommodation search (weekends or weekdays)	Players' (Airbnb) penetration of the sharing economy	Weekend vs weekdays	The average prices and Minimum Prices of 4–5 star hotels	Higher penetration of Airbnb, related to a price increase, irrespective of the day of the week	Not significant