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Competitive Forces in the Sharing Economy: Airbnb vs Hotels

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Abstract

The entry of flexible-capacity home sharing platform, Airbnb, has potentially altered the structural landscape in traditional industries characterised by fixed capacity and stochastic and unpredictable customer demand. The paper exploits the staggered penetration of Airbnb across South African cities, showing that RevPAR if anything expanded after the entry of Airbnb. While the study finds no evidence of adverse impacts of Airbnb on hotel RevPAR, the findings show that the entry of Airbnb led to a decrease in RevPAR of budget hotels. A triple-difference design that compares variations in RevPAR of hotels relative to guest houses and lodges that were unaffected by Airbnb supply provides further supporting evidence that while Airbnb has had no negative impacts on the hotel industry in general, however, its impact is more pronounced during periods of peak demand, consequently disrupting the pricing power of hotels. To increase RevPAR, hotels should systematically change their pricing models to account for flexible capacity by rethinking the wisdom of seasonal pricing and reduce prices during peak seasons to avoid inviting more competition from Airbnb. Theoretical and practical implications are further discussed.

Keywords: Airbnb; RevPAR; disruptive innovation; seasonal pricing; triple-difference

Introduction

The emergence and rapid rise of app-based, on-demand home sharing has provoked mixed commentary over its role in the lodging industry. Whilst Airbnb advocates celebrate the shift towards a new model of trust and neighbourliness, its dissenters bemoan its negative impact on hotel performances, resulting in heated discussions, public outrage and scrambling legislators raising questions about appropriate regulatory and public policy responses within the hotel industry. However, the arguments on both sides are often supported by little more than personal observations and media rhetoric (Dogru et al., 2017). For instance, its dissenters argue that because of the unique competitive nature of the hotel industry which is characterised by fixed room supplies, stochastic and unpredictable customer demand, hotels normally use yield management strategies by varying prices with demand to optimise revenue (Mhlanga, 2018). In contrast, because of low marginal costs and low entry barriers, Airbnb is characterised by flexible room supplies which press down prices and negatively impact on hotel profitability. Consequently, Airbnb's flexibility and ease of adding room supplies, owing to a lack of regulation, mitigates hotels' abilities to extract higher prices during peak seasons and significantly impacts on hotel RevPAR (Dogru et al., 2019).

On the contrary, its advocates counter-argue that Airbnb is a fundamentally different business model, serving a whole new set of customers and thus not directly competing with the hotel industry (Trejos, 2016). This is affirmed by its founder, Brian Chesky who has communicated publicly that the company is not directly competing with hotels but complementing existing offering (Haywood et al., 2017). Therefore, the impacts of Airbnb on hotel performances continue to be blurred.

This drives the motivation of this study which seeks to contextualise and synthesize the impacts of Airbnb on hotel performances. In South Africa, the Federated Hospitality Association of South Africa (FEDHASA), a hotel industry body, and the Tourism Business Council of South Africa (TBCSA), which represents small and large tourism businesses, have been the most vociferous dissenters of Airbnb. Their narratives have been very aggressive, by not only lobbying for the regulation of Airbnb but also calling for the government to compensate hotels for their loss of business if Airbnb is legalised. Consequently, as Airbnb registers booming numbers in the world, and in South Africa in particular, it is imperative to examine how these new flexible-capacity firms are affecting traditional fixed capacity incumbents.

In South Africa, lawmakers are still grappling with the nuances of this emerging phenomenon and policy discussions about competitive market for Airbnb have fuelled heated discussions as hotels view Airbnb as a threat to status and profitability. However, there remains the danger of over-regulating Airbnb, given that there is still very little knowledge about effective ways of regulating these innovations in the sharing economy, thus stifling their potential. Moreover, due to the challenge of defining an appropriate competition market for disruptive business models, the Competition Commission South Africa has encouraged competition authorities to seek new approaches based on a theory of harm by using a quantitative methodological approach to account for the effects of innovation on hotel performances. Therefore, the need for a data-driven approach to Airbnb regulation remains paramount.

Although anecdotal evidence has shown that the impact of Airbnb on hotel performances varies across cities due to heterogeneous market characteristics, regrettably Airbnb regulations tend to be very similar across cities, without accounting for the specificities of a particular location, which makes the process perfunctory and superficial (Nieuwland & van Melik, 2018). However, to enable local governments to formulate appropriate regulatory policy there is a need to reflect locally specific market patterns and factors given that the impact of home sharing on hotel performances is generally affected by market characteristics. Consequently, determining the impact of Airbnb on the hotel industry to assess the magnitude of its disruptive potential from a developing context is germane to the formative literature on this topic.

Disruptive innovation theory

The innovative approach to the accommodation sector espoused by Airbnb and other similar companies can best be viewed through lens of disruptive innovation theory. According to Christensen (1997), there are two main types of technological innovations: sustaining and disruptive. Sustaining innovations are introduced to maintain a previously established performance curve favoured by mainstream customers, while Disruptive innovations 'result is worse product performance, at least in the near term…(but) bring to market a very different value proposition that what had been available previously' (Christensen, 1997:18). Additionally, sustaining innovations almost always favour incumbent firms, while disruptive innovations almost always favour new market entrants. Also, disruptive innovations almost always use existing materials and technologies packaged in a new or simpler way, while sustaining innovations are more likely to contain exotic or expensive components.

The process of disruptive innovation can occur in any economic sector, and hospitality is no exception. A recent example of this process within the tourism industry can be found in the rise of online travel agencies (OTAs), like Expedia, Travelstart and TripAdvisor. These websites cannot match the personalised service of a traditional brick-and-mortar travel agency, but an exchange they can offer potential convenience and cost-savings (Mayr & Zins, 2009).

Initial concerns with OTAs, such as security of booking a travel reservation online (Lang, 2000), have been mitigated, and over time OTAs have captured an increasing share of the mainstream market. Accordingly, OTAs have contributed to a significant decline in the number of traditional travel agencies, which also have been forced to focus more specifically on complex and higher-end purchases (Christensen, 2006). Given the tremendous growth of Airbnb, scholars have begun to examine the relationship between the traditional players in the hospitality industry and the sharing economy, epitomised by Airbnb.

Theoretical background

The entry of flexible capacity sharing economy platforms has potentially changed the competitive landscape in traditional industries characterised by fixed capacity, stochastic and unpredictable customer demand. This paper contributes to the literature on the role of seasonality and capacity on competition and firm profitability. Given seasonal demand, some industries exhibit seasonal strategies (e.g., Cooper & Haltiwanger, 1993 on automobile supply; Einav, 2007 on movie supply), while some industries exhibit counter-seasonal strategies (e.g., Warner & Barsky, 1995 on grocery pricing). In particular, counter-seasonal pricing can be explained by a loss-leader strategy during high-demand seasons with intensified competition (Chevalier et al., 2003), a lower aggregate price sensitivity (Nevo & Hatzitaskos, 2006), or changes in the ability of firms to sustain implicit collusion (Rotemberg & Saloner, 1986). In general, seasonal demand can provide mixed incentives for firms to price higher or lower. Sudhir et al. (2005) show that time-varying demand and cost have both a direct effect on prices (e.g., higher demand means higher prices) and an indirect effect on competition (i.e., higher demand causes more competition and lower prices).

Using South Africa as a case study, the purpose of this study was to examine the impact of flexible-capacity home sharing firms on fixed-capacity incumbents, as well as the repercussions resultant from the fluid regulation of the phenomenon. The broader aim was to make a useful contribution to the existing debates and narratives around the sharing phenomenon from a developing country perspective.

Related work

Despite the sharing economy being a popular subject in public and academic discourse, it is still not well understood in research or practice. It seems that academic discourse on sharing economy is lagging public discourse and practice as available empirical evidence on the implications of Airbnb expansion on the seasonality and capacity on hotels is scant. For instance, in their seminal work Zervas et al. (2017) used a difference-in-difference model to examine Airbnb's impact on hotel room revenue in the Austin, Texas marketplace. They find that Airbnb penetration had influenced the Texan hotel industry revenues by 8-10% from 2008 to 2014. Another interesting finding was that Airbnb supply increase had a 0.39% negative impact on RevPAR, whereas hotel supply increase had a 1.6 negative impact for RevPAR.

In a related study covering major U.S cities, Farronato and Fradkin (2018) estimated that hotel revenues would have been only 1.5% larger without Airbnb, as around half of its customers were not substituting for hotel stay. On the other hand, the impact varied across cities depending on market characteristics. Similarly, some research endeavours (Guttentag, 2015; Neeser, 2015; Lane & Woodworth, 2016; Coyle & Yeung, 2016; Dogru et al., 2018; Dogru et al., 2019) also used the same methodology to determine the impacts of Airbnb on hotel performances. For instance, Guttentag (2015) also used a difference-in-difference model and argued that the threat of entry and growth of Airbnb is directly felt by low-end hotels and traditional B&Bs because private room prices are generally on par with rooms offered by budget hotels because of their equally low cost. However, while these studies examined the

impact of Airbnb on hotel performances, they did not incorporate different growth and seasonality patterns between Airbnb supply and hotel performances. This is important for the identification of any relationships between Airbnb supply and hotel performances for the demand and supply sides.

Coyle and Yeung (2016) also used a difference-in-difference model to examine the activity of Airbnb in 14 European cities using scrapped data from Airbnb and data on hotel occupancy rate from a private source. The authors follow the same model as Zervas et al. (2017) to explain the hotel occupancy rate with the number of Airbnb listings. The authors found a negative effect on hotel occupancy rates, however, the effect on total hotel revenues and average hotel prices was positive. Neeser (2015) replicated Zervas et al's (2017) approach in Scandinavia and found that Airbnb negatively impacted hotels' average daily rates, but did not impact revenue per available room, and concluded that hotels were reducing rates in order to maintain occupancy levels. Several industry groups have also examined the impacts of this emerging phenomenon on hotels. Lane and Woodworth (2016) used a difference-in-difference model to examine U.S Airbnb and hotel data and found that Airbnb demand represented (a growing) 1.4% of hotel demand, and that Airbnb's footprint was larger in major urban markets. The authors concluded Airbnb would impact hotels primarily by limiting price premiums during peak periods and by stifling inventory growth.

In another study, Dogru et al. (2019) used a difference-in-difference model to examine the effects of Airbnb supply on hotel performances in ten major cities in the US and found that a 1% growth in Airbnb caused hotel RevPAR to decrease by 0.02% across all segments. Surprisingly, it was not just the economy but also the luxury hotel segment that was hit hard by Airbnb supply increases, experiencing a 4% real decline in RevPAR. In Boston, RevPAR decreased by 2.5%, on average, over the last ten years due to Airbnb supply increases. Consequently, these authors concluded that Airbnb impacts luxury hotels to the same extent that it impacts economy scale hotels.

In contrast, the hotel performance tracking firm STR compared Manhattan hotel data and Airbnb data and found no clear evidence that Airbnb was cannibalising hotel customers or undermining hotel pricing power even on very high occupancy nights (Haywood et al., 2016). Choi et al. (2015) investigated the relationship between Airbnb and the hotel revenue in Korea and found no relationship between the two. However, much extant work from these studies is conceptual and/or descriptive. A complementary paper to this study is the one by Heo et al.'s (2019), who explored the intricate relationship between Airbnb supply and hotel performances but primarily focused on one city, i.e., Paris and argued that Airbnb offers opportunities for travellers who would otherwise not have been able to travel. Interestingly, there were differences in seasonality patterns for Airbnb and hotels and also the number of compression nights had declined since the entry of Airbnb. While Heo et al.'s (2019) study is more closely related to this study by contributing empirical results to the literature that seek to explain the behaviour of firms in two-sided markets and understanding the supply-side labour market, however, in contrast, this study empirically investigates a setting where a peer-to-peer market offers a substitute for consumer services supplied by traditional firms.

Unlike most previous studies that have only relied on data from hotels not from Airbnb, this study incorporates data of Airbnb to further examine whether the aggregated RevPAR of Airbnb can compensate for the aggregated loss of hotel RevPAR. This type of analysis provides a broader evaluation scope regarding the overall effect of Airbnb on hotel RevPAR. On the supply side, there have been theoretical models on the implications of peer-to-peer sharing on product quality and distribution channel strategy (e.g., Jiang & Tian, 2016; Tian & Jiang, 2017). This study contributes to the literature by studying hotel RevPAR and supply decisions and proposing novel strategies for incumbent fixed-capacity firms.

Although this study builds on Zervas et al.'s (2017) demand model, unlike previous studies that used a simple difference-in-difference model, it uses a triple difference analysis by incorporating other types of lodging facilities to explore the roles of seasonality and the impact of Airbnb on hotel RevPAR. Therefore, this study applies a more sophisticated identification strategy and methodology, to have a direct comparison between the results of this study and other related studies in the area and thereby contributes to the ongoing debate.

Empirical strategy and data

To identify the impact of Airbnb on hotel RevPAR, the paper exploits its staggered spatial and temporal introduction across local hotel industry corresponding to three cities in South Africa using a difference-in-differences framework that compares changes in areas where Airbnb started operating relative to areas without Airbnb. The baseline difference-in-differences regressions take the following from:

$$y_{jit} = \alpha_i + \vartheta_t + \delta Airbnb_{it} + \gamma X_{jit} + \varepsilon_{jit} \quad (1)$$

where the dependent variable y is the log of Revenue per Available Room (RevPAR) for hotel j in city i at time t. RevPAR refers to the income generated from room sales at a given time, indicating the profitability of a hotel. The main variable of interest is Airbnb, taking the form of a dummy variable that switches to 1 in the month-year when Airbnb started operating in a specific city and takes the value 0 for all other cities and years. Due to the lack of information on the "take up" of Airbnb's services, the estimates of δ has an intent-to-treat flair and reflect the extensive rather than intensive margin of the spread of Airbnb.

All specifications include a full set of city fixed effects (α_i) to account for seasonal-invariant differences in hotel RevPAR across different geographic locations. Additional estimations also include linear geographic seasonal trends to account for potential trend differences in the fluctuation of hotel RevPAR across different geographic locations, thus taking into account that Airbnb may have targeted locations with a rising demand for lodging facilities, to reduce concerns that the estimated impacts of Airbnb is conflated with trends that existed already prior to its entry. As the demand for hotels is highly randomised the paper includes a full set of time fixed effects (ϑ_t) to account for national variations in hotel RevPAR that may be related to seasonal fluctuations in hotel occupancies.

In order to assess whether Airbnb penetration impacted on seasonal earnings for hotels, the study collected monthly data on hotel RevPAR from various cities and compared hotel RevPAR during peak seasons or compression periods (i.e., the periods when hotels reach 95% occupancy) and RevPAR during non-compression periods. There are three seasons in South Africa, namely the high season is between December through March, shoulder season is April and May whilst the low season is between June through November. Seasonality is captured by market-season dummies to allow for different seasonality patterns across cities. Finally, the paper also controls for a time-varying characteristic (X_{jit}) influencing hotel RevPAR, namely, the number of hotels or hotel rooms added to the market. This factor may be correlated both with Airbnb supply and hotel RevPAR.

Although city trends and the set of time varying variables are likely to soak up much of the variation in the fluctuation of hotel RevPAR that may be correlated with the entry of Airbnb, there is still concern that hotel RevPAR evolved differently in geographic locations where it was introduced due to unobserved time-varying revenue differences that are common across different cities. To further address the issue of differential trends in the fluctuation of hotel RevPAR the paper deploys a triple difference (i.e., difference-in-differences-indifferences) design, where there was a comparison between relative changes in hotel

RevPAR relative to other types of lodging facilities within the same geographic location and compare how these differences evolved before and after the entry of Airbnb. The triple-difference regressions take the following form:

$$y^{H}_{jit} - y^{O}_{jit} = \alpha_i + \vartheta_t + \delta Airbnb_{it} + \gamma X_{jit} + \varepsilon_{jit} \quad (2)$$

where $y^{H}_{jit} - y^{O}_{jit}$ corresponds to the difference in the log hotel performances *(H)* and other types of lodging facilities *(O)* and the other notation is as described above. The triple difference analysis focuses on the following hotel categories, namely, budget, mid-price and upscale hotels. Importantly, to the extent that many factors that drive RevPAR within geographic locations are likely to affect these lodging facilities in a similar way, the estimates are solely identified from changes among hotel RevPAR relative to other types of lodging facilities within the same location and how these differences evolved relative to other locations after the entry of Airbnb.

Research methodology

Data of monthly hotel RevPAR were drawn from the Desktop Survey on Hotel Service (SHS) conducted by Smith Travel Research (STR) and the data of Airbnb's listings from the Airbnb's homepage both for the period between July 2015 and December 2018. The SHS, an enumerative survey on hotel performances, is one of STR's primary sources for collecting and disseminating data on a wide range of hotel metrics. The SHS has been conducted every year since 2002, with the latest one released in 2018. The survey documents the financial performance of hotels during the survey year. In each survey, approximately 1 000 hotels were analysed using RevPAR as a key performance metric. The sampling design of the SHS is as follows. Based on the administrative profile of all the registered hotels in Cape Town, Johannesburg and Durban a two-level stratified sampling scheme was used to select a representative sample of hotels in these three cities. The motivation for choosing these three major South African hotel markets is because these cities included in the sample are top performing cities in South Africa in terms of both hotel room supply and Airbnb penetration. Although the sample does not represent the entire South African hotel and Airbnb supply, it closely represents the major South African hotel and Airbnb markets. Second, the selected markets allow for the comparison of the study findings with those of previous literature (e.g., Dogru et al., 2017, Heo et al., 2019). Monthly hotel RevPAR, which is a widely accepted measure of hotel performance, was the main dependent variable.

To construct the dataset, the study combined individual-level data drawn from STH samples that consisted of a 1-in-100 national random sample of the South African population with newly collected information on the diffusion of Airbnb across South African cities obtained from Airbnb. First, the study identified the year and month in which Airbnb was started in each city from a variety of sources, which was used to create the Airbnb variables described in the previous section. Airbnb started in Cape Town in June 2015 and expanded rapidly across major South African cities starting in 2016.

First, the study presents descriptive statistics for the variables used in this study and the relationship between Airbnb supply and hotel RevPAR generated (Table 1). From Table 1 it is clear that Airbnb's mean is positive. This implies the listing of Airbnb is on the increase, consistently. The whole hotel RevPAR is, on mean, ZAR 37 million. Second, the study matched the information on Airbnb's penetration to changes in hotel RevPAR in South African cities drawn from the STH samples (Figures 1 to 3). For each city the study calculated monthly RevPAR for each hotel category in Cape Town, Johannesburg and Durban, respectively.

Table 1: Descriptive statistics for hotel RevPAR and Airbnb

	Airbnb	Overall hotel industry	Upscale	Mid-price	Budget
Mean	11.3654	37521.189	5902.350	3560.552	621.4031
Median	3	19533.727	1005.853	1505.043	610.5027
Maximum	96	115000.000	23002.477	12510.402	194.197
Minimum	0	9020.529	369.1165	835.0617	4.204000
S.D	19.4835	26345.724	6102.056	3002.407	562.5241
Skewness	2.4501	0.624381	0.7770	0.7341	0.3176
Kurtosis	6.1074	1.555802	1.5481	1.5060	2.3064

Note: measurement unit is in thousand South African rands (ZAR)

The paper calculates the RevPAR by firstly creating the average daily rate that are based on hotel prices multiplied by the average hotel occupancy supplied in the STH samples. To ensure a sufficient number of observations of hotels, the analysis is restricted to 569 hotels. Therefore, Figures 1 to 3 show variations in hotel RevPAR in hotels before and after the entry of Airbnb, which is denoted by a vertical solid line.

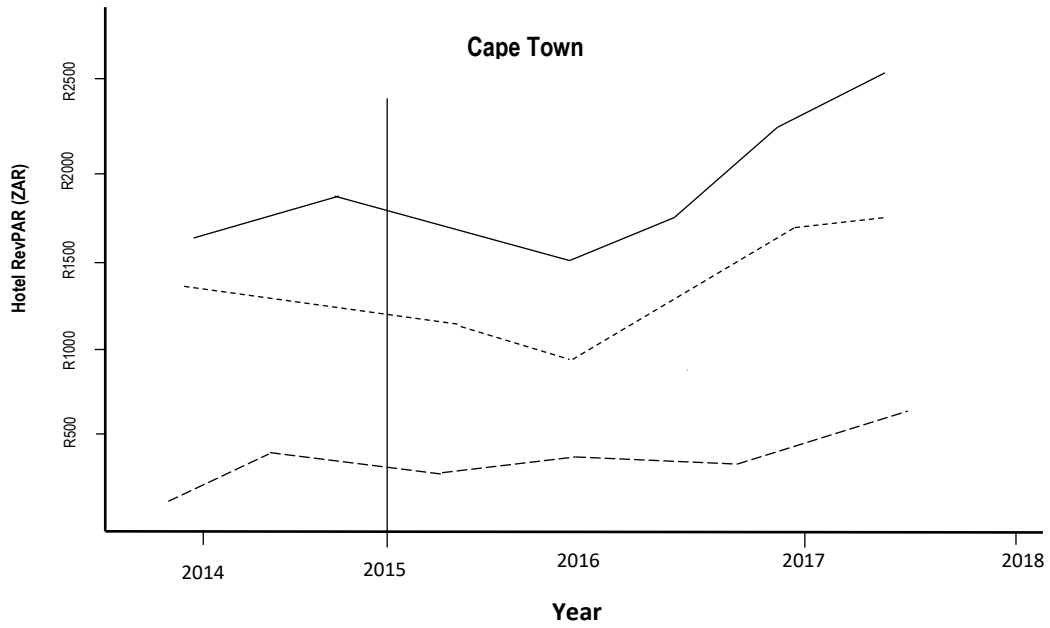

Figure 1: Variations in hotel RevPAR in Cape Town before and after the entry of Airbnb, which is denoted by a vertical solid line. Each figure reports the RevPAR for budget hotels (solid line), mid-price hotels (short-dashed line), as well as upscale hotels (long-dashed line).

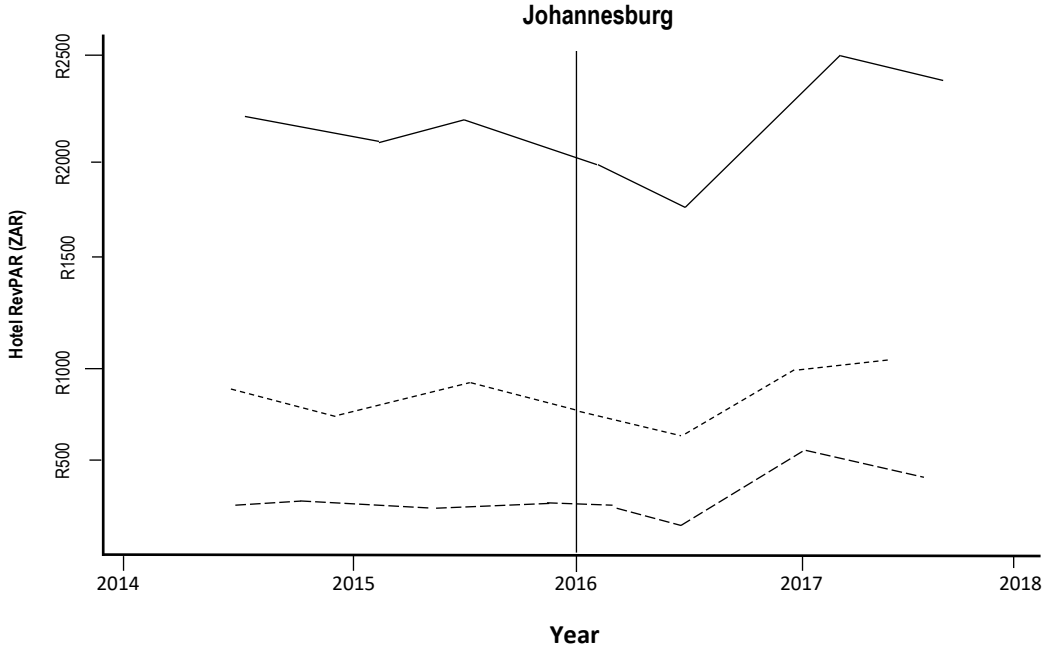

Figure 2: Variations in hotel RevPAR in Johannesburg before and after the entry of Airbnb, which is denoted by a vertical solid line. Each figure reports the RevPAR for budget hotels (solid line), mid-price hotels (short-dashed line), as well as upscale hotels (long-dashed line).

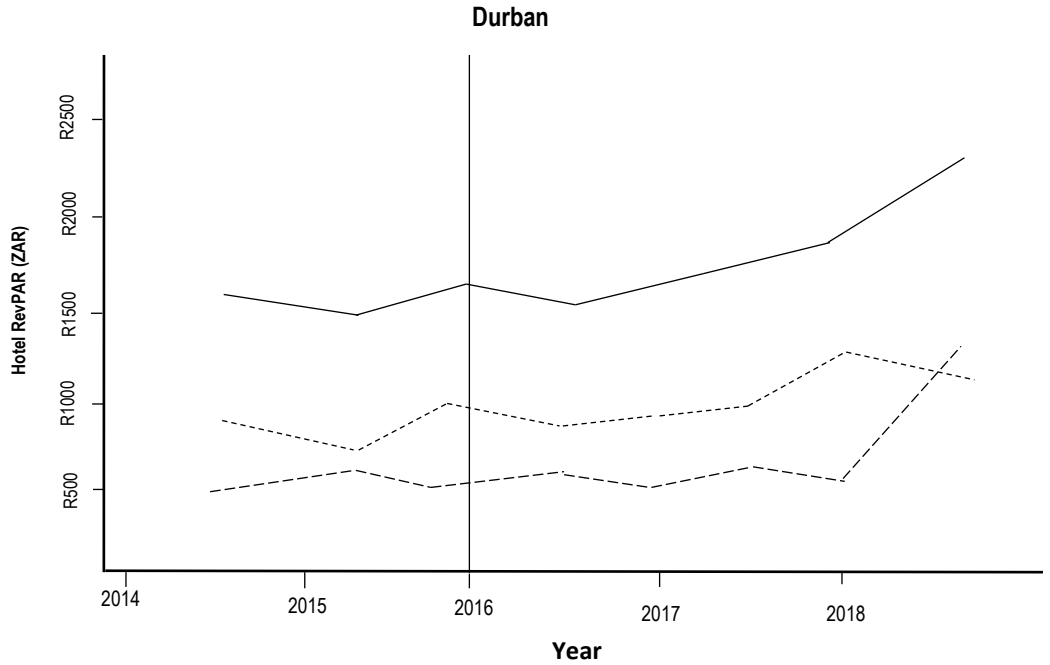

Figure 3: Variations in hotel RevPAR in Durban before and after the entry of Airbnb, which is denoted by a vertical solid line. Each figure reports the RevPAR for budget hotels (solid line), mid-price hotels (short-dashed line), as well as upscale hotels (long-dashed line).

Results

Figures 1 to 3 show variations in hotel RevPAR broken down by hotel categories in three cities, namely, Cape Town, Johannesburg and Durban with a solid line denoting the year in which Airbnb was introduced in each city. By so doing, Figures 1 to 3 present the results on the

differential effects of Airbnb on heterogeneous hotel segments. As is evident from these figures it is not obvious how Airbnb might have affected changes in hotel RevPAR. Although the RevPAR of hotels was trending downwards prior to the entry of Airbnb in 2015 in Cape Town it saw a sharp upward break after its entry, with particular growth among upscale hotels that mirrored similar but less pronounced patterns in Johannesburg. In Durban, however, the RevPAR of upscale hotels declined substantially after the entry of Airbnb in 2016 though it rebounded over subsequent years. The results vindicate the findings by Farronato and Fradkin (2018) who found that the impact of Airbnb on hotel performances varied across cities due to differences in market characteristics.

While these figures may be informative about changes in hotel RevPAR in these three cities, they remain silent about whether these changes were driven by Airbnb penetration or other confounding trends and whether RevPAR patterns in Johannesburg and Durban are most relevant in understanding the impact of Airbnb on changes in hotel RevPAR in South Africa. To that end, Table 2 presents baseline results for the impacts of Airbnb on hotel RevPAR in different hotel categories, namely, budget, mid-price and upscale hotels, respectively.

Table 2: Hotel RevPAR after the entry of Airbnb, 2015-2018

	Outcome: *ln* Hotel RevPAR											
	Panel A: Overall hotel RevPAR			**Panel B: Upscale hotels**			**Panel C: Mid-price hotels**			**Panel D: Budget hotels**		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Airbnb (=1)	0.078	0.092	0.092	0.043	0.066	0.066	0.097	0.187	0.187	-0.352**	-0.387	-0.387
	(0.070)	(0.079)	(0.079)	(0.082)	(0.095)	(0.095)	(0.101)	(0.076)	(0.076)	(0.241)	(0.325)	(0.325)
City FE?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year FE?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
City x linear time trend?	N	Y	Y	N	N	Y	Y	N	Y	Y	N	Y
Additional City controls?	N	N	Y	N	N	Y	Y	N	N	Y	N	Y
Observations	569	569	569	569	569	569	569	569	569	569	569	569

Notes: This table reports OLS estimates of equation (1) where the outcome is the log hotel RevPAR in 3 cities in South Africa. All specifications include a full set of city and year fixed effects. Additional city controls include changes in the number of rooms added in the hotel market. Statistical significance based on standard errors clustered at the city-level is denoted by: ***p<0.01, **p<0.05, *p<0.10.

Table 2 shows that there is little to suggest that Airbnb has had a negative and measurable effects on overall hotel RevPAR. As highlighted in Figures 1 to 3, there is a substantial difference in the changes in hotel RevPAR prior to Airbnb's entry, showing that there is little to suggest that Airbnb has had a negative and measurable effects on overall hotel RevPAR. To account for the fact that changes in hotel RevPAR in cities where Airbnb entered may reflect pre-existing different trends in the fluctuation of rooms sold in the hotel market, the study included linear time trends in and city-level changes in the total number of new hotel rooms added to the market that fall in three hotel categories (i.e., budget, mid-price and upscale hotels).

However, the results reveal nuances in Airbnb's impact on hotel RevPAR with point estimates revealing positive impacts among mid-scale and upscale hotels but, negative and relatively large (in magnitude) point estimates among budget hotels. Overall, across all specifications, the point estimates are positive and relatively large in magnitude; the estimate in column 1, for example, suggests that hotel RevPAR increased by some 8 percent after the entry of Airbnb relative to other cities without Airbnb.

Table 2, panels B, C and D, breaks down changes in hotel RevPAR by their hotel categories. Interestingly, the results vary across hotel segments. Again, all point estimates are positive among mid-scale and upscale hotels however, the point estimates are negative among budget hotels which suggests that the entry of Airbnb had seemingly a significant and negative impact (p<0.05) on RevPAR of budget hotels. Although the imprecision of the estimated impact of Airbnb on overall hotel RevPAR should caution any relative comparison, the larger

point estimates among budget hotels in panel C is not consistent with the notion that the entry of Airbnb led to a relative decline in hotel RevPAR. Taken at face value, these estimates suggest that the RevPAR of budget hotels declined by more than 35 percent relative to other cities without Airbnb.

To shed further light on this relative shift, Table 3 presents similar estimates where the outcome variable is the RevPAR of budget hotels.

Table 3: Variations in RevPAR of budget hotels after the entry of Airbnb, 2015-2018

Outcome: *ln* RevPAR of budget hotels			
	(1)	(2)	(3)
Airbnb (=1)	-0.027**	-0.023**	-0.023**
	(0.020)	(0.026)	(0.026)
Additional controls?	Y	Y	Y
City and year FE?	Y	Y	Y
City x linear time trend	N	Y	Y
Additional City controls?	N	N	Y
Observations	569	569	569

Notes: This table reports OLS estimates of equation (1) where the outcome is the impact of Airbnb on RevPAR of budget hotels in 3 cities in South Africa. All specifications include a full set of city and year fixed effects. Additional city controls include changes in the number of rooms added in the hotel market. Statistical significance based on standard errors clustered at the city-level is denoted by: ***p<0.01, **p<0.05, *p<0.10.

According to these estimates, the entry of Airbnb led to a decrease in RevPAR of budget hotels of some 2 to 3 percent points. It is worth mentioning to note that although these estimates consistently suggest that Airbnb, if anything, had a significant and negative impact (p<0.05) on the RevPAR of budget hotels it is important to note, however, that these estimates are associated with quite large standard errors when they are clustered at the city-level, which means that these estimates are not typically statistically significant at conventional levels. Alternative ways to estimate the standard errors, for example using robust Huber-White errors, reduce their size and lead to an increase in the associated *t*-statistics. Nonetheless, the author prefers to report the most conservative (i.e., clustered at the city-level) standard errors.

However, an empirical concern of this identification strategy is that, besides the entry of Airbnb, changes in hotel RevPAR are driven by unobserved factors that vary over time and are correlated with Airbnb supply. For example, if Airbnb specifically targeted cities with a growing demand for hotels the estimates may reflect changes that would have taken place even in the absence of Airbnb. As unobservable factors are likely to affect other types of lodging facilities in a similar manner, and also since Airbnb claims that it is not directly competing with hotels, the study uses a difference-in-differences-in-differences framework to test the placebo effect on other types of lodging facilities. By comparing relative changes in hotel RevPAR relative to, other types of lodging facilities (namely, guest houses, bnbs and lodges) before and after the entry of Airbnb the study exploits variations that stem from differences in RevPAR trends within similar lodging facilities.

Table 4 presents estimates of the baseline regressions where the outcome variable is the difference in the log of the RevPAR of lodges, guest houses and bnbs, respectively. Reassuringly, these estimates are similar in magnitude to those reported in Table 2, panel A, which solely relied on simple difference-in-differences comparisons across cities for hotels. Similar variations in hotel RevPAR after the entry of Airbnb also when compared to other types of lodging facilities within the same city provides further evidence that its entry did seemingly not contribute to a decline in hotel RevPAR. Therefore, these results fail to support the theoretical hypothesis that Airbnb has a negative impact on hotel RevPAR.

The study so far has focused on quantifying the extent to which Airbnb supply substitutes for hotel room supply and its differentiated impact across various hotel segments. But the study now shows how Airbnb has affected the competitive landscape in the hotel

industry by empirically evaluating the impacts of flexible-capacity Airbnb on the monthly RevPAR of traditional fixed capacity incumbents.

Table 4: Changes in RevPAR in lodges, guest houses and BnBs after the entry of Airbnb, 2015-2018: Triple difference estimates

Outcome: *ln* Hotels RevPAR - *ln* RevPAR of lodges, guest houses and bnbs			
	Lodges	**Guest houses**	**BnBs**
	(1)	(2)	(3)
Airbnb (=1)	0.093	0.091	0.086
	(0.101)	(0.083)	(0.066)
Additional controls?	Y	Y	Y
City and year FE?	Y	Y	Y
City x linear time trend?	Y	Y	Y
Observations	374	382	307

Notes: This table reports OLS estimates of equation (1) where the outcome is the log hotel RevPAR relative to either lodges, guest houses and bnbs in 3 cities in South Africa. All specifications include a full set of city and year fixed effects. Additional city controls include changes in the number of rooms added in the hotel market. Statistical significance based on standard errors clustered at the city-level is denoted by: ***p<0.01, **p<0.05, *p<0.10.

Impacts of Airbnb on monthly RevPAR

Figure 4 contain the graphs of Airbnb supply and hotel RevPAR in South Africa.

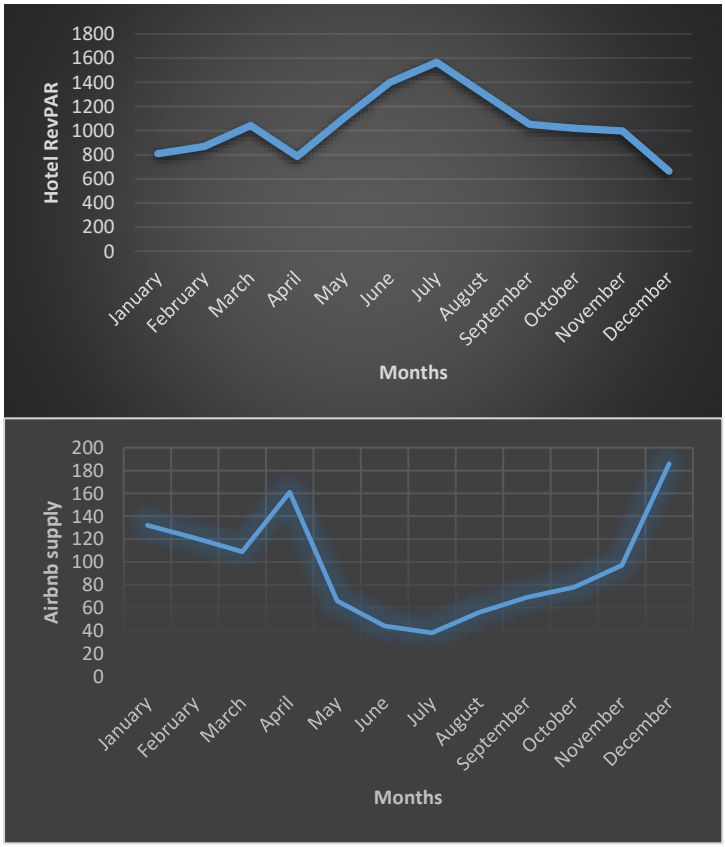

Figure 4: Monthly Airbnb listings and monthly hotel RevPAR

Figure 4 uncovers monthly data in Airbnb supply and hotel RevPAR. As Airbnb supply increases conversely RevPAR decreases. Figure 4 shows how the number of listings on the platform peaks in December before dropping in January whilst hotel RevPAR declines.

However, to ascertain the impact of Airbnb supply on hotel RevPAR Table 5 presents estimates of equation 1 where the outcome is the monthly-weighted mean log RevPAR among hotels and broken down for each month. Monthly RevPAR corresponds to the monthly-weighted average daily rate multiplied by the monthly-weighted average hotel occupancy. The estimates include the full set of city controls, city and monthly fixed effects, and linear city trends in evenly numbered columns to account for city-level changes and trends that may affect monthly RevPAR for hotels.

Table 5: Variations in monthly RevPAR for hotels after the entry of Airbnb, 2015-2018

Outcome: *ln* Monthly RevPAR for hotels												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Airbnb (=1)	-0.068*	-0.059**	-0.060**	-0.082	0.029	0.010	0.011	0.013	0.019	0.028	0.055	-0.091***
	(0.059)	(0.050)	(0.046)	(0.057)	(0.173)	(0.185)	(0.195)	(0.113)	(0.138)	(0.160)	(0.185)	(0.033)
Additional controls?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
City and year FE?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
City x linear time trend?	N	N	N	N	Y	Y	Y	Y	N	Y	Y	N
Observations	569	569	569	569	569	569	569	569	569	569	569	569

Notes: This table reports OLS estimates of equation (1) where the outcome is the log of the monthly-weighted mean log RevPAR of hotels in 3 cities in South Africa. All specifications include a full set of city and year fixed effects. Additional city controls include changes in the number of rooms added in the hotel market. Statistical significance based on standard errors clustered at the city-level is denoted by: ***p<0.01, **p<0.05, *p<0.10.

It is clear from Table 5 that Airbnb supply significantly impacted on monthly RevPAR. According to the table there is a relative decline in RevPAR during the following months, namely, December, January, February and March after Airbnb's entry. This is interesting because in South Africa the peak season period for hotels is December, January, February and March, which coincide with known natural and institutional determinants, such as school holidays and the timing of conference activities. This is line with the findings by Heo et al. (2019) who found that Airbnb reduces the pricing power of hotels during the high season period.

To further examine whether Airbnb supply significantly impacted on hotel RevPAR during peak and off-peak seasons Table 6 presents variations in hotel RevPAR during peak and off-peak seasons after the entry of Airbnb. The following months, namely, December, January, February and March is the peak season period for hotels whilst June, July and August is the low season period.

Table 6: Variations on hotel RevPAR during peak and off-peak monthly seasons after the entry of Airbnb, 2015-2018

Outcome: *ln* Seasonal RevPAR for hotels during peak and off-peak seasons.				
	RevPAR		**RevPAR**	
	Peak season		**Off-peak season**	
	-0.089**	-0.070*	0.240	0.206
Airbnb (=1)	(0.047)	(0.058)	(0.185)	(0.195)
Additional controls?	Y	Y	Y	Y
City and year FE?	Y	Y	Y	Y
City x linear time trend?	N	Y	N	Y
Observations	569	569	569	569

Notes: This table reports OLS estimates of equation (1) where the outcome is the log of the RevPAR of the peak season (columns 1 and 2) and off-peak season (columns 3 and 4) among hotels in 3 cities in South Africa. All specifications include a full set of city and year fixed effects. Additional city controls include changes in the number of rooms added in the hotel market. Statistical significance based on standard errors clustered at the city-level is denoted by: ***p<0.01, **p<0.05, *p<0.10.

According to Table 6 Airbnb's impact on hotel RevPAR is more pronounced during periods of peak demand and less pronounced during off-peak periods. Consequently, this introduces a competitive challenge to hotel RevPAR. To understand the dynamics underlying these Tables and the influencing factors, the results from a difference-in-differences framework are discussed below.

Discussion

The major aim of this study was to examine the impacts of Airbnb on hotel RevPAR and thereby provide further validation on their impact on the hotel industry. The use of a triple difference framework is in line with the study by Guttentag (2015) who used the disruptive-innovation theory to justify that peer-to-peer accommodation is a disruptive innovation which negatively impacts on incumbent firms on which they base their managerial practices, and thus Airbnb is expected to influence hotel performances. Given that this methodology is used for the first time in this area, in contrast to a difference-in-difference model, it is possible to discuss whether related studies have converged to similar conclusions in terms of the impact of Airbnb on hotel RevPAR.

In terms of the competitive threat that Airbnb can present, there was no clear significant relationship between Airbnb supply and hotel RevPAR. The fact that hotel RevPAR increased despite an increase in Airbnb supply might suggest that Airbnb is accommodating incremental demand. As Airbnb has boomed in Cape Town since its launch in 2015, the hotel industry has also remained solid with an increase in hotel RevPAR. However, the results further show that the effect of Airbnb supply varies across hotel segments with budget hotels being the only segment negatively affected. The results corroborate previous research scholars (Guttentag, 2015; Zervas et al., 2017) who also concluded that the impact of peer-to-peer accommodation on hotel performances varies across hotel segments.

A possible explanation of the significant and negative impact of Airbnb on the RevPAR of budget hotels might be that Airbnb prices are generally on par with rooms offered by budget hotels (Guttentag, 2015). Since Airbnb owes its origins to simple applications at the bottom of a market, it is expected to be a more attractive option for budget travellers. Conversely, business travellers and vacationers who frequent high-end hotels are less likely to substitute a hotel stay with an Airbnb stay because of Airbnb's lack of amenities that many business travellers demand. Business travellers, in particular, are often less price-sensitive, as they are typically reimbursed for their travel; moreover, they also make use of business-related hotel amenities not typically provided by Airbnb properties. Consequently, mid-scale and upscale hotels are less vulnerable to Airbnb.

Finally, the impact of Airbnb on hotel RevPAR during peak and off-peak seasons was tested, and it is clear that Airbnb's impact is more pronounced during periods of peak demand with hotels experiencing declining RevPAR following its entry, by some 9 percent after the entry of Airbnb relative to other cities without Airbnb. The paper conjectures that the same market fundamentals that buoy hotel prices also prompt more Airbnb hosts to list inventory. This viewpoint is also echoed by some scholars (Haywood et al., 2016; Lane & Woodworth, 2016; Heo et al., 2019) who argue that an increase in Airbnb supply softens the spike in demand, resulting in either a decrease in the number of compression nights; and/ or a lack of pricing power on compression nights.

The decrease in RevPAR among hotels during peak periods following the entry of Airbnb lends further support to the view that Airbnb benefits from flexibility due to their ability to match room supply with demand during high and low season periods. Particularly in the hospitality industry, hotels are characterised by high fixed costs and their financial performance is very dependent on the level of occupancy. Therefore, the vigorous and substantial increase

in accommodation provided by sharing platforms is now forcing hotels to reduce their prices in order to keep up the occupancy rate, but negatively affecting RevPAR.

Conclusions and implications

There is far-reaching concern that new technology associated with the sharing economy will fundamentally alter hotel performances by displacing traditional incumbents. The purpose of this paper was to examine how Airbnb has affected the competitive landscape in the hotel industry by evaluating the impact of the flagship of the sharing economy, Airbnb, on hotel RevPAR in South Africa. The motivation for this was to empirically contribute to the heated debate taking place worldwide by looking at a different market than those more typically covered using a triple difference methodology. The paper begins by showing that there is little to suggest that Airbnb has had a negative and measurable effects on the RevPAR of the overall hotel industry. However, the paper then reveals nuances in Airbnb's impact on different hotel categories with the RevPAR of upscale hotels expanding by up to 10 percent whilst the RevPAR for budget hotels declined by almost 35 percent following the entry of Airbnb.

The study also found that Airbnb's impact is more pronounced during periods of peak demand, resulting in either a decrease in the number of compression nights; and/ or a lack of pricing power on compression nights. Since hotels are characterised by fixed room supplies, stochastic and unpredictable customer demand, Airbnb flexibility diminishes hotels' abilities to extract higher prices during peak seasons. This is a new paradigm in which low-cost accommodation options disrupt the basis of hotels' pricing algorithms by pressing down prices in an industry with a non-flexible cost structure. The findings converge with newly developed knowledge in other markets (Lane & Woodworth, 2016) that found that Airbnb impacted hotels by limiting price premiums during peak periods and by stifling inventory growth.

The findings of the present study indicate that although Airbnb is changing the competitive landscape of the accommodation industry by creating demand and increasing the size of the market, it is not threatening the status quo of the traditional hotel industry. The exponential growth of Airbnb is consistent with the process-based tenets of the theory of disruptive innovation. Indeed, the disruptiveness of Airbnb is not a simple function of its emergence-the idea of sharing and of home sharing mediated by the internet has been around for some time. Rather, it is determined by whether its impact on the incumbent (hotel industry) provides evidence of the process through which a disruptive product transforms a market (Guttentag, 2015). However, the study did not find this to be the case.

The findings underscore the notion that innovations are not intrinsically disruptive, but only relative to another product. In so doing, the study adds to the limited body of work in the field on disruptive innovation and to the academic discourse on innovation in tourism more broadly. Methodologically, this approach provides a template for future research on this topic.

From a theoretical perspective, the study makes a key contribution to the limited formative empirical literature on the impacts of Airbnb on hotel performances and thereby documents two fundamental reasons why the sharing economy is valuable in the lodging industry. First, the findings suggest the impact on hotels tends towards Airbnb generally playing a largely complementary role rather than a diversionary one. Second, the hotel sector in many cities is frequently constrained by a limited number of available rooms, which lead to high prices during demand peaks because hotels cannot accommodate all potential travellers. The sharing economy expands available supply at exactly these times of peak demand, thus reducing hotel pricing power and increases consumer surplus.

These findings offer several useful implications for practitioners in the hotel industry. First, hotels should systematically change their pricing models to account for flexible capacity by rethinking the wisdom of seasonal pricing and reduce prices during peak seasons to avoid

inviting more competition from Airbnb. Second, in off-peak seasons, when fewer Airbnb hosts are listing their properties because demand is too low, hotels could raise their prices again to increase RevPAR. Finally, because of fixed room supplies, stochastic and unpredictable customer demand, seasonal pricing will remain important to a hotel's revenue strategy. Therefore, for hoteliers to increase RevPAR in this unique industry, they need to optimise each day and each stay pattern at the micro level in which there can be very distinct demand characteristics even within the same season.

Despite the importance of this study, it is not free of limitations. The research was based on the impact of Airbnb on hotel RevPAR in hotels situated in specific cities in South Africa. Caution is therefore required when generalising the findings of this study to other hotels in other geographic areas, since a replication of this study in other geographic areas might reveal different results. Moreover, if a longer time series dataset of hotels in the post-Airbnb time period could become available, it would be interesting to further investigate the time-varying dynamic effects of Airbnb on hotel RevPAR.

This study highlights the competition between fixed-capacity and flexible-capacity firms, which is a critical feature for many industries that have found themselves affected by the sharing economy. The results have implications for other industries where new sharing platforms are disrupting existing business models with a fixed capacity and could enhance pricing and revenue management with regards to incumbent firms (hotel pricing) in South Africa.

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