

## INFLUENCE OF AIRBNB ON HOTEL SECTOR PERFORMANCE INDICATORS IN CROATIA

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### **Abstract**

**Purpose** – The purpose of this research paper is to explore the influence of rising Airbnb supply on main hotel accommodation sector performance indicators: room revenues (RevPAR), average daily rates (ADR) and occupancy rates (OCC) in Croatia.

**Design** – Airbnb has achieved global success and has received much research attention from scholars. We used Airbnb data as a sample of total short stay accommodation sector in Croatia

**Methodology** – In order to quantify the extent of Airbnb influence on the hotel accommodation sector performance indicators in Croatia, a cross-section regression approach is undertaken. The data on key hotel performance indicators were obtained from Smith Travel Research (STR) while Airbnb data was obtained from Airdna, a third-party data provider. Due to data limitations the observed period were monthly observations, from January 2015 – December 2018.

**Approach** – Croatia is a small, open, tourism-oriented economy of South East Europe and therefore offers a good opportunity to observe the influence of Airbnb and the sharing economy on hotel sector performance in the European south – east

**Findings** – The findings indicate a statistically significant positive influence of rising Airbnb supply on main hotel sector performance indicators except occupancy.

**Originality of the research** – Research reported thus so far provides mixed findings on the influence of Airbnb on hotel sector performance indicators. This paper offers a first insight into the impact of Airbnb on Croatian hotel accommodation sector performance indicators. We used Airbnb data as a sample of total short stay accommodation sector in Croatia and report positive correlations with main hotel performance indicators. Recommendations for policy and future research are provided.

**Keywords** Airbnb, hotel, RevPAR, ADR, OCC

### **INTRODUCTION**

Airbnb has spurred much attention since its modest inception as a concept for advertising personal space on-line. It was conceived when two university students were trying to make some money by renting their apartment during a 2007 design conference in San Francisco. As the hotels were practically sold out, they figured they could offer their space to conference attendees who wanted to avoid high hotel prices in the few hotels that still had rooms available in the city at the time. The two students were not happy with the already available popular on-line short-term rental platform Craigslist, so they decided to make their own website to list their apartment. Joe Gebbia (2009) Airbnb cofounder, explained, that the main reason they chose to make their own website was that in his opinion, Craigslist was too – impersonal. Today, Airbnb is, an on-line marketplace containing more than 7 million listings, in over 100.000 cities, located in more than 191 countries around the world (Airbnb, 2019a). The surprising fast growth of Airbnb has spurred researchers' interest and (Guttentag, 2015) places Airbnb in the

theoretic framework of disruptive innovation pioneered by (Christensen and Raynor, 2003). Clearly, this implies that the traditional tourism accommodation sector, namely hotels, are the incumbent industry facing a new, innovative and potentially disruptive force in the market. Since then, one of the most important researched questions regarding Airbnb, is to investigate the effect Airbnb rising supply on hotel sector performance indicators of Occupancy (OCC), Average Daily rate (ADR) and Revenue per available room (RevPAR).

The research results thus so far, indicate that the size and nature of the effect of Airbnb on hotel performance indicators differs by hotel class segment (Dogru, Mody, and Suess, 2019). The sampled locations in previous studies include whole countries, large popular tourism destinations and metropolitan capitals, while at the same time the most research findings are based on results from the USA. There is limited evidence, if non-at all, reported in the literature from the region of South - East Europe. Located in the region is Croatia, a small, open, highly tourism dependent economy. The performance of the accommodation sector is highly important for the country's economy. Therefore, this paper addresses the research question of, how does Airbnb impact the Hotel Accommodation sector performance in Croatia while the primary research objective is to analyse and quantify the extent of Airbnb influence on the Hotel Sector and its performance indicators in Croatia.

This paper is structured in the following way: The Introduction is followed by a literature review, where relevant previous research results are presented and discussed. In the data section the data will be presented, alongside basic summary statistics and exploratory data analysis. Methodology and results section will present and summarise the statistical model results which will be further elaborated in the Discussion and conclusion section where new research recommendations will be provided and this paper concluded.

## **1. LITERATURE REVIEW**

Airbnb's rapid growth since its inception has raised significant interest from researchers worldwide across a variety of fields of study. The available literature on Airbnb can be broadly grouped into three categories. Supply characteristics – number, location, specification and pricing of Airbnb listings, demand characteristics – determinants of satisfaction, loyalty, quality and repurchase intention of people who use Airbnb and impacts, namely on the traditional hotel sector market but also including and not limited to employment, real estate price and the tourist destination. An extensive literature review is available in (Guttentag, 2019). Supply characteristics – A macroeconomic perspective of Airbnb global presence is explored in (Heo and Blengini, 2019). The findings indicate that Airbnb listings in world capitals are positively correlated with the technological development index, the contribution of trade and tourism to GDP and negatively with GDP per employed person. Implying, that Airbnb is more likely to emerge in countries in which the GDP is significantly influenced by trade and tourism and in which the population is adaptive of technology, while countries with higher productivity rates generally have less Airbnb listings. The main socio-economic characteristics of areas where Airbnb listings emerge is explored by (Quattrone et al, 2016) in the case of London. Correlating demographic data of inhabitants with areas of

the city where Airbnb emerged resulted in findings that younger people with less income levels as well people who own homes are found to live in areas of early Airbnb adoption.

According to (Adamiak, 2018, 2) European cities with the largest number of Airbnb listings are Paris, London, Rome, Barcelona, Berlin and Madrid, respectively. But highest concentration of Airbnb listings measured in number of listings per 1000 inhabitants are in the cities of Batumi, Split, Marbella, Venice, Florence, Lisbon and Syracuse, respectively. While the first group of cities are large European metropolitan capitals, the second group consists of more coastal resorts and cultural destinations in the south and southeast of Europe. We argue that this high concentration of Airbnb, measured by listings per 1000 inhabitants, in European South and Southeast or including Lisbon, southern peripheral regions, has relatively stronger economic impacts. More specifically, on hotel sectors performance indicators, than in the larger metropolitan areas with the highest number of listings from the first group. The reason for this could be that while hotel guests in large European metropolitan city areas are usually more diversified between leisure seekers and business travellers, that is not the case for the second group of cities which are from regions where more people come as leisure seekers and less as business travellers. For this reason, it will be interesting to compare if this hypothesis holds true in the European South East hotel market of Croatia. Demand characteristics – A theoretical model grounded in social exchange theory for exploring motivation of people to participate as hosts or guests on Airbnb platform are explored in (Kim, Yoon and Zo, 2015). Exploration of guests experience using Airbnb is presented in (Sthapit and Jiménez-Barreto, 2018). Research into Millennials` intention to book on Airbnb by (Amaro, Andreu and Huang, 2019) has shown that millennials` intention to book on the Airbnb platform is mostly influenced by their subjective norm, desire for unique accommodation and variety, attitudes and economic benefits. The lower level of service and professionalism on Airbnb (Bucher et al, 2018) can be offset by the perceived level of authenticity of Airbnb accommodation. Perceived authenticity has also been found (Liang, Choi, and Joppe, 2018) to have a significant effect in reducing Airbnb consumers` perceived risk and positively affecting their perceived value. Research into the factors of satisfaction of Airbnb guests (Tussyadiah, 2016, 70) has shown that enjoyment, economic benefits and listing amenities significantly influence guest satisfaction, while future intention of guests to use Airbnb is determined by their perceived enjoyment and value. (Chen and Chang, 2018) find that important precursors to purchase and repurchase intention are media richness, ratings and information quality. (Cheng and Jin, 2019) evaluate tourist`s stay on the platform in context of previous hotel experiences and identify three key attributes derived from their ratings of stays on Airbnb – location, host and amenities. Impacts – The effect of Airbnb on tourism industry employment is investigated by (Fang, Ye and Law, 2016) in the case of Idaho, USA. The panel data results indicate that Airbnb entry positively influences the tourism sector, generating new employment. However, the marginal positive effect on employment decreases as the size of the sharing economy sector, that is Airbnb, increases. This implies that some other part of the tourism sector is shrinking because of Airbnb. The results of the study of Airbnb presence in the Texas, USA market (Zervas, Proserpio and Byers, 2017) indicate that hotels that do not cater to business travellers and lower tier hotels are more greatly affected by Airbnb presence than upscale hotels with conference amenities. The relationship between Airbnb and tourism sector employment could be explained in a sense that while in the short-term Airbnb expands the whole sector with

new tourist arrivals, a substitution effect takes place when Airbnb enters in competition with the lower and mid-scale hotel segment where it disrupts the incumbent businesses and delivers better or same service for a lower price. That is in line with the theory of disruptive innovation which states (Christensen, Raynor and McDonald, 2015, 5) that the disruptive market entrants originate in low ends of the market but eventually move up to the mainstream segment, as the entrants' service improves in quality and becomes an acceptable alternative to the mainstream market segment of customers. In exploring and quantifying rising Airbnb supply influence on ten key city hotel markets of USA (Dogru et al., 2019) employ a panel data fixed effect regression model to examine the effect of rising Airbnb supply on key hotel performance metrics of RevPAR, ADR and OCC. The results indicate a negative effect of rising Airbnb supply in a multiple regression panel approach estimation. More precisely, the results indicate that a 1% increase in Airbnb supply decreases hotel RevPAR by a range of 0,02% - 0,04% depending on the hotel class segment. Furthermore, ADR is also negatively affected; a 1% increase of Airbnb supply decreases hotel ADR by a range of 0,003% - 0,03%, while the OCC variable is decreased by a range of 0,008% - 0,01%, depending on the hotel class segment. The results indicate a negative influence of Airbnb across all hotel class segments in the ten key city hotel markets of USA under study. An investigation into the Texas, USA hotel market (Zervas, Proserpio and Byers, 2017, 695) reveals that a 10% increase in the supply of Airbnb is associated with an average of 0,39% decrease of hotel revenue, 0,19% decrease in ADR and a small negative and weakly significant ( $p < 0,1$ ) impact on occupancy of 0,005%. On the other hand, (Neeser, 2015) employing a pre- and post- Airbnb study on the hotel markets in Nordic countries of Europe from 2004 - 2008 estimates the impact of Airbnb with a *difference in difference (DD)* panel model estimation and finds that Airbnb did not significantly affect hotel's RevPAR in the Nordic countries of Europe on average. However, it did contribute to a reduction in the ADR indicator in areas where Airbnb entered the most. (Coyle and Yu-Cheong Yeung, 2016) find no evidence of adverse effect of Airbnb in their study of 14 European city metropolitan hotel markets while (Xie and Kwok, 2017, 179) find that RevPAR of hotels increases with price difference of hotels and Airbnb listings implicating that an agglomeration effect between hotels and Airbnb is taking place. In other words, the hotels located in areas where Airbnb listings are priced higher and where in between Airbnb listing the price is more dispersed, between low- and high-end segments, on average the hotels grow their RevPAR in an agglomeration effect as proposed in (Canina, 2005). In an investigation of Parisian hotel market (Heo, Blal and Choi, 2019) report a non-significant influence of growing number of Airbnb listings on hotel RevPAR and a positive impact of Airbnb growth on average rates and hotel RevPAR in Paris, France. However, higher guest satisfaction rates of Airbnb in the Parisian market are negatively correlated with hotel RevPAR.

The research into impacts of Airbnb on hotel performance has produced mixed results thus far. Studies are either limited to observation of impacts in USA state, county or city markets. European evidence is limited to the Western Europe metropolitan capitals. We aim to address the gap in the literature and add further evidence to the debate of Airbnb impacts on traditional hotel industry with the investigation of Airbnb impacts on the national Croatian Hotel market. A hotel market more predominantly defined by coastal tourism destinations, rather than big metropolitan cities.

We summarise the literature review with our view of support to the theory of Airbnb as a disruptive innovation. As the perceived quality of Airbnb services increases, through perceived enjoyment, value, experience, or listing amenities offered on the platform the more, the substitution effect between hotels and Airbnb takes place. The disruptive innovation theory states that the disruptor begins business operation in the low end of the market offering a service that has lower quality of basic service attributes but is easier to use or with significantly lower price. Operating in the low end of an uncompetitive market segment with no competition, the incumbent or Airbnb, grows fast in quantity and slowly in quality, moving this way from the low end to the mid-range market segment. The hotel sector response is in the focus on the most demanding market segment, the upper end of the market. In doing so, inadvertently or not, slowly and steadily moves business operations from the mid-range market segment, abandoning it eventually to the incumbent, altogether. It is with this interpretation that mixed finding of studies of Airbnb influence on the traditional hotel sector markets can be explained. Observing markets in different levels of Airbnb penetration and maturity stage effects, yields different results. It would indicate that where and when Airbnb is observed to generally effect hotel performance sector performance negatively, through rising supply, a transition phase is observed, where Airbnb has grown its basic service attributes in quality sufficiently that it is being used preferably, evidently more than hotels of comparable segment. In view of this theoretical hypothesis, a typical hotel market significantly under Airbnb influence in a mature stage, should be an up-scale or upper scale hotel market, operating with high RevPAR and ADR performance, catering to the demanding market segment, but with altogether a much smaller total market share.

## 2. DATA

The research results thus far indicate that inference of the observed Airbnb effects in the market sampled in this investigation i.e. the Croatian market, would fill a gap in the literature and offer new and novel insight how Airbnb effects a small, open, sun and sea hotel market of South East Europe. Most tourism activities in the Croatia can be described as leisure and occurring in the summer season of the many costal destinations.

**Table 1: Bed-places in the Croatian accommodation market 2008/2018 and growth rate by segment**

|                          | 2008.   | 2018.   | Growth rate % |
|--------------------------|---------|---------|---------------|
| Hotels                   | 190,578 | 172,951 | -9.25         |
| Short stay accommodation | 442,839 | 817,437 | 84.59         |
| Camps                    | 224,438 | 241,071 | 7.41          |

Source: Authors calculation, 2008 – 2017 Croatian Statistical Bureau, 2018 eVisitor system

Table 1. describes the accommodation market in Croatia. In the ten-year period the hotel segment volume measured in bed places has decreased by 9.25%, while short stay accommodation, usually offered on platforms like Airbnb, has grown 84.59%, effectively almost doubling in the 10-year period. Bed places in camps have grown by a rate of 7.41%. The short stay accommodation segment, or the market segment offered

on Airbnb, grew strongly from 2012 onward, as shown in Figure 1. Compared to the traditional hotel market, which lost bed places and the camping market segment's modest growth. The new listings in the short stay accommodation sector do not belong to Airbnb exclusively, but we argue that this growth is fuelled by Airbnb adaptation among Croatia's short stay accommodation sector.

Figure 1: **Number of bed places of Hotels, Short stay and Camping accommodations**



Source: Authors calculation, 2008 – 2017 Croatian Statistical Bureau, 2018 e Visitor system

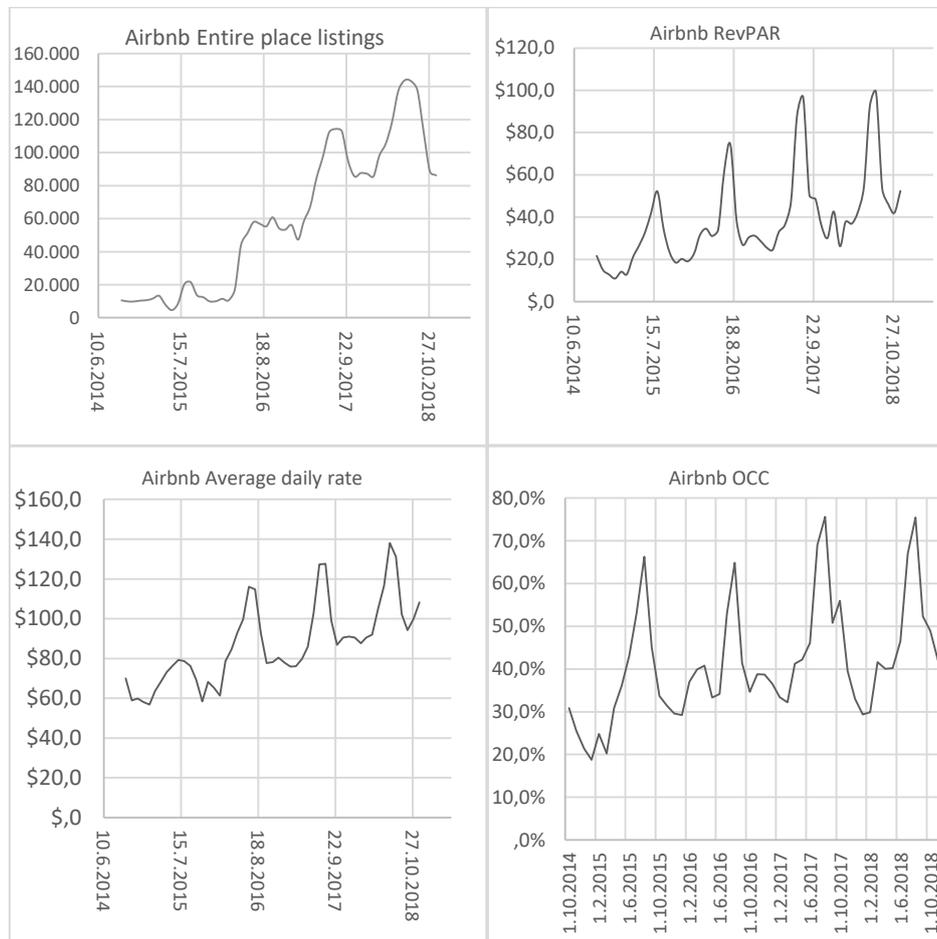
According to (Airbnb, 2020b) the company started its international expansion by opening their Berlin office in 2011. From 2012, the growth of the short stay accommodation segment in Croatia is continuous, with strong year on year (YOY) growth rates as displayed above the trend line in Figure 1. The simple beginning - end of time period percentage change, and growth rate data available in Table 1 and Figure 1 are useful for context of our analyses because this data covers a longer time period than our cross-section analyses investigation. We observe only the post Airbnb treatment period of 2015-2018. Our available data consists of monthly observations from January 2015 – December 2018. For hotel data we use monthly STR (Smith Travel Reports) displaying RevPAR, ADR and OCC of the hotel market in Croatia which we denominate, because of better comparability to Airbnb data, in USD. Airbnb data comes from Airdna, a third-party data provider which proprietary algorithm scrapes the Airbnb platform and delivers STR style reports. In this manner we have comparable performance data from data sources referred by most literature on impacts of Airbnb presented in the literature review section of this paper. We aim to measure the Airbnb influence on the Hotel market estimating how rising Airbnb supply impacts hotel RevPAR, ADR and OCC indicators in Croatia. We view Airbnb as a relevant sample of the total short stay accommodation market in Croatia portrayed in Figure 1. As presence of listings on Airbnb does not exclude their presence on other OTA (On-line travel agency) platforms, we argue that the Airbnb sample of the total short stay accommodation sector is valid for inferring the influence of the total short stay accommodation sector supply growth on hotel sector performance.

## 2.1. Airdna and STR Data

Airbnb data is obtained from Airdna, a third-party data provider used frequently in measuring Airbnb influence by researchers. As proprietary data on Airbnb is unavailable due to restrictions imposed by the company, Airdna is the best data source available regarding data on Airbnb. Airbnb total listings on the platform are comprised of entire place listings, private room and shared room. We are interested in entire place listing as they are most likely to compete with hotels, offering more amenities than regular or shared room listings. We use this variable to estimate the influence of rising Airbnb supply following (Dogru et al., 2019) and (Zervas et al., 2017). Airdna data is not calculated in the same way as STR data, Airdna estimates Airbnb RevPAR as = Entire Place ADR \* OCC differing from the hotel industry, where it is estimated as RevPAR = Room ADR \* Occupancy. Since an entire place can have more than one room this estimator could be biased upward for Airbnb, for a more detailed investigation see (Agarwal, Koch and McNab, 2019). ADR is estimated as the average daily rate charged per booking an entire place listing, it includes cleaning fees but no other service fees or taxes. OCC is estimated as booked listing nights divided by available listing nights. The selected variables of Airbnb used in our estimations are plotted in Figure 2. We denominate the RevPAR and ADR metrics of both Hotels and Airbnb in USD for easier comparability.

We report some data limitations and interpolation of the data. The fact that one Airbnb ADR monthly observation was a significant outlier to the overall data trend. We interpolated this observation with growth averages of month-on month trend from previous 2-year pairs trend of the same month. We also note here that STR data for November 2015/2016 and December 2015/2016 was not available to us and was interpolated with the European average STR values for 4 monthly observations. Interpolation counts for 1 observation in the ADR of Hotels variable and 4 observations in the STR performance group. Furthermore, STR dataset sample for Croatia is small counting on average about 20 hotels each month. If the STR sample is stratified by segments estimating ratios between segments in the sample as parameters of the total underlying hotel population this issue should be of little concern to the investigation in this paper and the consequent model specification. Only the national average of total STR sample for Croatia is available and a restriction is in this way imposed on the assessment of impacts by hotel class segments. In other words, we cannot investigate does Airbnb impact all hotel class segments in Croatia the same way due to data limitations.

Figure 2: Airbnb performance data and entire place listings data time trends



Source: Authors' calculation

Airbnb did not begin to scrap Airbnb data in Croatia before October 2014, so that is the first monthly observation in our data set. The trend lines in Figure 2 from upper left part in clockwise direction show a strong growing supply of new entire place listings on the platform and growth of Airbnb performance indicators. The scaling of available listings in regard to high and low tourist seasons can also be observed. The ability to scale supply so efficiently in orders of tens of thousands listings on monthly basis is one of determining features of Airbnb in Croatia but also the platform in general. RevPAR exhibits strong growth, though the growth rate seems to top off at just around 100 USD. ADR exhibits steady and significant YOY growth, while OCC growth is topped off at around 75%. Airbnb data is structured in monthly observations from Oct 2014 to December 2018. The STR data is also in monthly observation but from the period of January 2015 to December 2018. It is in this 4-year period that both Airbnb and STR data is complementary and it is primarily for this reason that we limit our investigation

to this time period. Summary statistics of both STR hotel and Airbnb samples are presented in Table 2.

**Table 2: Summary statistics of variables from Airbnb and hotel sector STR sample**

| Variable      | Obs | Mean     | Std. Dev. | Min      | Max      |
|---------------|-----|----------|-----------|----------|----------|
| Tot_Airbnb    | 48  | 62473.71 | 43613.46  | 4716     | 144050   |
| RevPAR_Airbnb | 48  | 39.85601 | 20.9627   | 10.87947 | 99.04242 |
| ADR_Airbnb    | 48  | 89.58536 | 21.52701  | 56.79183 | 145.1498 |
| OCC_Airbnb    | 48  | 42.41571 | 13.27054  | 18.738   | 75.614   |
| RevPAR        | 48  | 83.66354 | 63.50022  | 12.4     | 223.31   |
| ADR           | 48  | 125.5756 | 54.09424  | 63.53    | 258.02   |
| OCC           | 48  | 58.38958 | 23.19964  | 17.1     | 89.8     |

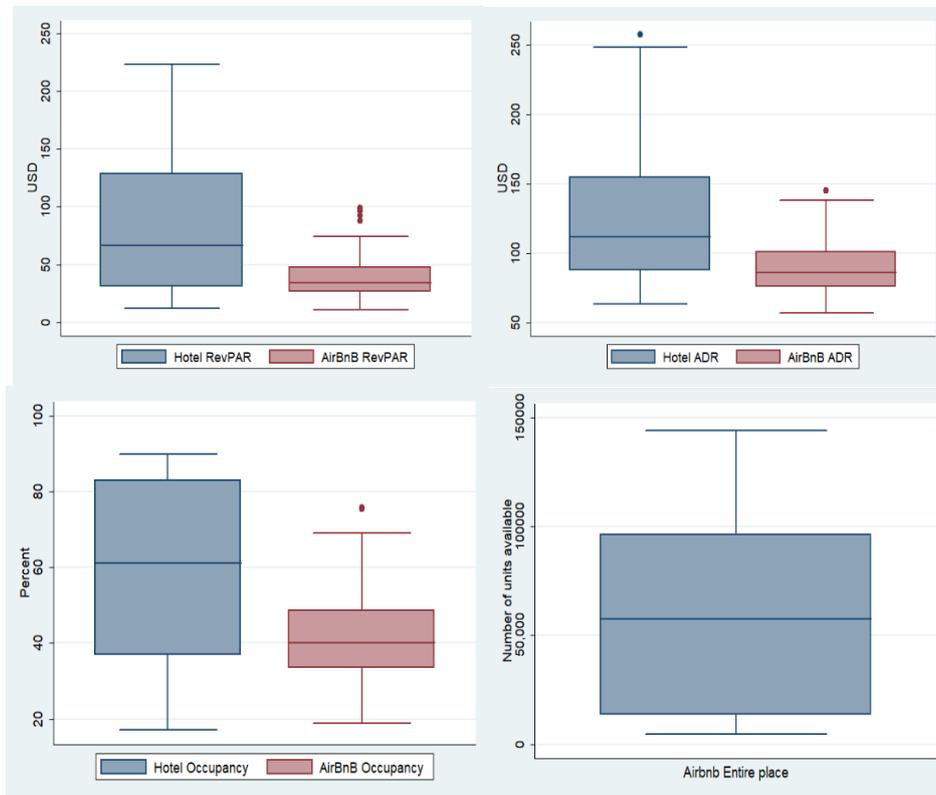
Source: Authors' calculation

Summary statistics, regression model estimations and boxplots were calculated with Stata 13.0 computational software. Table 1 and Figures 1 and 2 are presented and calculated with Excel 2016. The third grouped row of indicators in table 2 presents the hotel STR sample performance while the first two row groups present Airbnb supply and Airbnb performance respectively. It is shown in the summary statistics that Hotel sector has stronger performance in every indicator than Airbnb in Croatia. The average hotel RevPAR is more than double in size compared to Airbnb RevPAR. Average ADR is higher by around 40% for hotels and about the same for OCC. The std. dev. of hotels RevPAR is three times larger than Airbnb while std. dev. of ADR and OCC are about two times larger than those of Airbnb. This implies that the distribution of Airbnb RevPar, ADR and OCC is more concentrated to a range than the same statement holds for the hotel sector. The hotel sector is much more dispersed in price range. This is confirmed in Min and Max values range comparison. All values minimums are lower for Airbnb sample and this is usually the case because lower marginal costs are present for market entry and exit for an Airbnb listing than a typical hotel. Continuing the exploratory data analyses, boxplots of paired performance indicators from STR hotel sample and Airbnb Airdna sample are presented in Figure 3.

Hotel RevPAR interquartile range (IQR) is much wider than that of Airbnb as shown in upper left part of Figure3. Airbnb IQR is concentrated in the lower RevPAR segment with some significant outliers just topping 100 USD. Hotel RevPAR is at maximum between 200 and 250 USD. The lowest 25<sup>th</sup> percentile is similar for both samples of RevPAR. IQR of Airbnb RevPAR is placed in between 25 – 50 USD. Difference in median value is also evident, as hotels median price is well over 50 USD while Airbnb median is much lower than 50 USD. The ADR boxplots comparison is very similar to that of the RevPAR, Hotels sector ADR IQR is in between just under 100 USD and little over 150 USD, while Airbnb ADR IQR lays in between 50 – 100 USD. A 100 USD

ADR price is mainstream market segment price and Airbnb in Croatia is slowly moving to this price segment. The hotel sector is chasing the high-end price segment of the market as the maximum range of the distribution is from 150 – 250 USD. The OCC comparison shows that hotels have much larger OCC spread then Airbnb listings. The most of their OCC IQR distribution is spread between 40 – 80% while Airbnb is between 35 – 45%. The IQR of Airbnb Entire place is wide with the median value of just under 50.000 units This means that around 50.000 of Airbnb entire place listings exist in the Croatian market on average. Although hotel sector performance in Croatia is very strong and competitive, outpacing performance of Airbnb by factors of 2 or 3, the overall hotel sector accommodation market share is very small and it even decreased in number of bed-places from 2008-2018, by 9.25%.

Figure 3: Paired boxplots of Airbnb and hotel sector performance indicators with Airbnb supply



Source: Authors` calculation

### 3. METHODOLOGY AND RESULTS

Table 3 shows that all items are correlated with each at 1% significance levels. This is not surprising since Airbnb RevPAR is a function of ADR and OCC while it is not calculated the same way in STR samples. Nevertheless, total Airbnb supply is highly positively correlated with hotel sector performance indicating that Airbnb in Croatia is a complementary market offering and not a substitute for hotels.

Table 3: Correlation matrix of Airbnb and hotel sector STR variables

|                   | Tot_<br>Airbnb | RevPAR_<br>Airbnb | ADR_<br>Airbnb | OCC_<br>Airbnb | RevPAR    | ADR       | OCC  |
|-------------------|----------------|-------------------|----------------|----------------|-----------|-----------|------|
| Tot_<br>Airbnb    | 1.0000         |                   |                |                |           |           |      |
| RevPAR_<br>Airbnb | 0.6847***      | 1.0000            |                |                |           |           |      |
| ADR_<br>Airbnb    | 0.7805***      | 0.8549***         | 1.0000         |                |           |           |      |
| OCC_<br>Airbnb    | 0.5414***      | 0.9352***         | 0.6641***      | 1.0000         |           |           |      |
| RevPAR            | 0.5368***      | 0.8763***         | 0.6855***      | 0.8598***      | 1.0000    |           |      |
| ADR               | 0.5678***      | 0.9180**          | 0.7538***      | 0.8707***      | 0.9882*** | 1.0000    |      |
| OCC               | 0.4472***      | 0.6750***         | 0.5057***      | 0.7370***      | 0.9028*** | 0.8415*** | 1.00 |

Source: Authors calculation using Airdna and STR data, \*\*\* significant at (p<0,01%)

We estimate the following cross section regression models following (Dogru et al., 2019) and (Zervas, Proserpio, and Byers, 2017) and log transform our variables of interest. In this way our regression coefficients have a marginal elasticity effect interpretation and the trends are more normalised. To quantify the extent of Airbnb rising supply impacts on hotel sector performance we log transform the specifications and control for the log of Foreign Tourist arrivals, since OCC is already expressed as a percentage, we do not log transform it. The regression equations take the following forms:

$$\log RevPAR_t = \beta_0 + \beta_1 \log Airbnb Supply_t + \log Tourist arrivals_t + e_t \quad (1)$$

$$\log ADR_t = \beta_0 + \beta_1 \log Airbnb Supply_t + \log Tourist arrivals_t + e_t \quad (2)$$

$$OCC_t = \beta_0 + \beta_1 \log Airbnb Supply_t + X_1 \log Tourist arrivals_t + e_t \quad (3)$$

**Table 4: The effect of Airbnb supply on Hotel sector RevPAR (1)**

| log RevPAR             | Coef.       | Std. Err. | t         | P>t   | [95% Conf. Interval] |
|------------------------|-------------|-----------|-----------|-------|----------------------|
| log_Tot_av_air         | .1509149*** | .0552218  | 2.73      | 0.009 | .0396924 .2621374    |
| log_Foreign_Arr        | .5249525*** | .042604   | 12.32     | 0.000 | .4391437 .6107614    |
| _cons                  | -.3665288   | .2451199  | -1.50     | 0.142 | -.8602255 .127168    |
| R <sup>2</sup> =0,8186 |             | N=48      | p<0,01*** |       | Prob >F              |
| 0,0000                 |             |           |           |       |                      |

Source: Authors' calculation

The model (1) in Table 4 is good and statistically significant. The model explains R<sup>2</sup>=81,86% of the variance. Both coefficients of log of Total Available Airbnb listings and log of Foreign Tourist Arrivals are statistically significant (p<0,01). The p value for F test Prob >F indicates the independent variables reliably predict the dependant variable. The model suggests that a 1% increase in hotel comparable Airbnb listings supply i.e. Entire place listings, increases hotel sector RevPAR by 0,1509% holding foreign tourist arrivals fixed.

**Table 5: The effect of Airbnb supply on Hotel sector ADR (2)**

| log ADR               | Coef.       | Std. Err. | t         | P>t   | [95% Conf. Interval] |
|-----------------------|-------------|-----------|-----------|-------|----------------------|
| log_Tot_av_air        | .0923063*** | .028958   | 3.19      | 0.003 | .0339818 .1506307    |
| log_Foreign_Arr       | .2329694*** | .0223413  | 10.43     | 0.000 | .1879718 .2779671    |
| _cons                 | .9903969    | .1285395  | 7.71      | 0.000 | .7315051 1.249289    |
| R <sup>2</sup> =0,768 |             | N=48      | p<0,01*** |       | Prob >F              |
| 0,0000                |             |           |           |       |                      |

Authors' calculation

The model (2) specification in Table 5 is good and statistically significant. The model explains R<sup>2</sup>=76,8% of the variance. Both coefficients of log of Total Available Airbnb listings and the log of Foreign Tourist Arrivals are statistically significant (p<0,01). The p value for F test Prob >F indicates the independent variables reliably predict the dependant variable. The model suggests that a 1% increase in hotel comparable Airbnb listings i.e. Entire place listings supply, increases hotel sector ADR by 0,0923% holding foreign tourist arrivals fixed.

The model (3) specification in Table 6 is good. The model explains R<sup>2</sup>=79,05% of the variance. The coefficients of log of Total Available Airbnb listings, has no statistically significant influence on OCC while the log of Foreign Tourist Arrivals remains statistically significant in all tree specified models (p<0,01).

**Table 6: The effect of Airbnb supply on Hotel sector OCC (3)**

| OCC                    | Coef.      | Std. Err.             | t     | P>t               | [95% Conf. | Interval] |
|------------------------|------------|-----------------------|-------|-------------------|------------|-----------|
| log_Tot_av_air         | 5.688237   | 3.840283              | 1.48  | 0.146             | -2.046489  | 13.42296  |
| log_Foreign_Arr        | 34.8036*** | 2.962802              | 11.75 | 0.000             | 28.83621   | 40.77099  |
| _cons                  | -64.54698  | 17.04633              | -3.79 | 0.000             | -98.88005  | -30.21391 |
| R <sup>2</sup> =0,7905 | N=48       | p<0,01***<br>p<0,05** |       | Prob >F<br>0,0000 |            |           |

Source: Authors calculation

#### 4. DISCUSSION AND CONCLUSION

We found that the main variables of Airbnb supply and performance are highly positively correlated with STR data. Furthermore, we tested the relationships in 3 separate cross section regression models controlling for tourist arrivals each time and have in this manner gauged the influence of Airbnb on the dependant variables with more precision in the explored case of Croatia. A 1% increase in available Airbnb listings increases hotel sector RevPAR by 0,1509% and ADR by 0,0923% controlling for tourist arrivals. The influence on hotel occupancy coefficient has a positive sign but is not statistically significant. This could be because hotels increase their RevPAR in a different revenue management strategy than the sharing economy. Effectively decreasing capacity to obtain higher RevPAR levels, but also in this way entering the upper and upscale class of market segments. The hotel sector in Croatia although performing very good in relation to the performance metrics of RevPAR, ADR and OCC which were examined in this paper, holds almost a marginal market share compared to the sharing economy and is beginning to give up even the middle segment of the market as evidenced by the trend in the data. Implications for further research are to confirm these conclusions and results for Airbnb in Croatia in much more robust panel data methods. Evidence in motivations of Croatians to host on Airbnb should be explored in order to investigate the general welfare contributions to average households. Airdna data measures performance of each individual listings and this information can be very useful to destination planning and fiscal management strategies. A progressive tax rate in the Short term rental markets is advised. Holding to the fact that a host with an annual income of 5.000\$ a year from short term rentals should not have the same tax rate as host with a 50.000\$ annual turnover.

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