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The Sharing Economy in Belize:  
Exploring the Relationship between Airbnb and  
the Hotel Industry

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50<sup>th</sup> Annual Monetary Studies Conference  
Caribbean Economic Research Team Secretariat (CERT)  
6 – 8 November, 2018 | Bridgetown, Barbados

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## Abstract

Online accommodation platform, Airbnb, has revolutionised consumption in the hospitality industry, causing policymakers and stakeholders to question the impact of this innovation on the traditional accommodation industry. In Belize, increasing tourist arrivals but lower hotel occupancy rates have triggered an urgent interest in exploring the extent of Airbnb's presence in the accommodation marketplace and the magnitude of the effect it is having on traditional hotels. This study uses spatial analysis techniques to conduct a location pattern analysis of Airbnb rentals and traditional hotels in Belize. Univariate and bivariate spatial autocorrelation revealed that there exists a close spatial relationship between Airbnb rentals and traditional hotels, with both categories of accommodations concentrated in main tourist areas. The impact of Airbnb listings on hotel revenue is then examined using a panel regression model with fixed effects. The findings reveal that overall Airbnb rentals have a positive but statistically insignificant effect on total hotel revenue but when disaggregated by quintile groups, the relationship differs. Airbnb rentals tend to compete more directly with lower-end hotels.

## 1.0 Introduction

With the emergence of peer-to-peer networks, people are now able to employ underutilised resources via pay-based sharing in what is being called the “sharing” or “digital” economy. The platforms that enable consumers to connect in this regard, such as Airbnb, have experienced significant growth in recent years. Airbnb defines itself as a “global travel community” that allows its users to book accommodations, activities and hosts via their online marketplace (Airbnb, 2018). Despite its success, Airbnb has often been critiqued as having an unfair advantage over traditional hotels due to the lack of regulation and the failure of hosts to pay required taxes to local authorities. Some cities have fought for the regulation of Airbnb in their territories, but use of the platform remains widely unchecked. In Belize, the popularity of Airbnb is often cited as a possible cause for the decline in hotel occupancy rates, in spite of rising numbers of stay-over arrivals (Statistical Institute of Belize, 2017). Though hotel revenues amounted to BZ\$ 263.67mn<sup>1</sup> and continue to grow, Airbnb revenues amassed BZ\$ 48.8mn in 2017<sup>2</sup>. This study examines the relationship between Airbnb accommodations and traditional hotels in Belize by quantifying the impact of Airbnb listings on hotel revenue using a panel regression model and by analysing patterns of spatial distribution of Airbnb listings relative to traditional hotels.

The remainder of the paper is structured as follows. Section two provides an overview Airbnb and its disruptive impact on the hotel industry. Section three summarises the methodologies used to examine the dynamics of the relationship between Airbnb and traditional hotels. Section four presents and discusses the results of this study, while section five concludes.

## 2.0 Literature Review

The popularity of the sharing economy continues to grow rapidly as consumers become more interested in leasing and sharing products, rather than buying and owning (Matzler, Veider, & Katham, 2014). The underlying concept is people renting unused resources from one another. The Internet has revolutionized the processes involved in this form of collaborative consumption by streamlining entry to virtual markets for suppliers with searchable listings as well as supply-side flexibility with low transaction and overhead costs (Guttentag, 2013). One of the most successful start-ups established via an online platform is Airbnb, which enables its users to access a marketplace where they can book accommodations and other activities in addition to hosts for tours around the locale (Airbnb, 2018).

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<sup>1</sup> Data at December 2017 and obtained from the Belize Tourism Board.

<sup>2</sup> Data at December 2017 and obtained from Airdna.com

The speed at which consumers have embraced sharing systems, such as Airbnb, is widely considered a threat to the prosperity of conventional accommodation markets (Guttentag, 2013). It is for this reason, that companies and policy makers must understand this emergent system in order to be able to regulate, manage and adapt to current and future business models (Matzler, Vieder & Katham, 2014).

With its inception in 2008 in the United States, Airbnb's cutting edge business model, which offers the distinct appeal of authentic local experiences and cost-saving accommodation, has enabled it to become the most successful peer-to-peer platform in the tourism industry (Airbnb, 2016). Airbnb has transformed the hospitality industry through its innovative approach to tourism, qualifying it to be considered a disruptive product (Guttentag, 2013). According to Guttentag (2013), disruptive products either create an entirely new market, or begin by appealing to the low-end of an existing market. The disruptive innovation theory explains that these emerging products are often ignored by the dominant players in a market due to their initial small market size. However, over time, the disruptive product gains momentum by appealing to customers through innovative approaches, until the performances of leading companies are significantly impacted. Mancini (2016), posits that markets in Latin America and the Caribbean are already being revolutionized by disruptive innovations that are foreign owned and web or mobile based. Though these disruptive innovations now exist in almost every industry, the main concerns of local businesses in tourism are large players, such as Uber and Airbnb (Mancini, 2016).

Airbnb's rapid growth in popularity has not been without issue, as many of its rentals operate outside of rental and tax regulations. By offering alternative lodging with a set of new suppliers that bare no significant fixed costs, Airbnb is believed to be impacting the profitability of traditional hotels, which are characterized by the importance of fixed costs in their cost structure. (Aznar, Sayeras, Rocafort, & Galiana, 2016). While it has yet to be determined whether Airbnb is competing directly with hotels or simply complementing them, the hotel sector is beginning to recognize the threat to the industry posed by peer-to-peer accommodations (Koh & King, 2017).

Bailey and Gatrell (1995) define spatial analysis as the quantitative examination of spatial phenomena that are situated in a geographical space. Spatial data analyses utilize models to interpret the behaviour of a process occurring in geographical space, along with its potential relationship with other spatial situations (Fisher & Wang, 2011). According to Bailey and Gatrell (1995), analysing spatial data may provide different and more relevant results than research which does not consider it. Studies employing the use of spatial data analysis to examine short-term rentals are few and recent. Using bivariate spatial autocorrelation, Gutierrez, Romanillos, Garcia-Palomares, and Salas-Olmedo (2016)

found that the spatial relationship between Airbnb rentals and hotels in Barcelona had a clear centre-periphery pattern, with hotels actually outnumbering Airbnb rentals in the outskirts of the city. Their research further concluded that Airbnb rentals actually profit more from proximity to touristic areas than traditional hotels. Sakar, Koohikmamali, and Pick (2017) used spatiotemporal patterns of Airbnb rentals in Los Angeles, California to investigate host participation. Results from this study indicated that host participation in Los Angeles is influenced by a young dependency ratio, the potential of supplemental income and the sustainability potential of collaborative consumption.

Airbnb positions its product as significantly different to “mainstream” consumption, where its rentals enable users to access authentic local experiences, and the client profile is comprised of young, adventurous and budget-conscious tourists (Gutierrez, Romanillos, Garcia-Palomares, Salas-Olmedo, 2016). Therefore, it is argued that the spatial distribution of Airbnb rentals should be more scattered than hotels, since targeted patrons are more likely to be interested in spending time in neighbourhoods less frequented by tourists (Guttentag, 2013). According to Airbnb (2016), 74% of the properties listed on its platform are outside main hotel districts. However, it is also likely that a high concentration of Airbnb rentals exist in main tourist locations and city centres (Aznar, Sayeras, Rocafort, & Galiana, 2016). Notwithstanding, Airbnb possesses the comparative advantage over hotels of expanding supply where houses and apartment buildings already exist. Given that location is a key strategic variable in hospitality industry, it is important to account for the spatial patterns of Airbnb when assessing its impact on hotels. (Sakar, Koohikmamali, & Pick, 2017).

The most expected effect of Airbnb’s entrance into the market, is a drop in hotel profitability and a reduction the traditional sector’s capacity to generate revenue (Aznar, Sayeras, Rocafort, & Galiana, 2016). The first study to explore the relationship between Airbnb and its economic impact on hotels was conducted by Zervas, Propserpio, and Byers (2016), who measured the causal impact of Airbnb on hotel revenue in Texas using a Differences in Differences identification strategy. Their findings revealed that Airbnb impacted only the revenue of lower-end hotels and hotels not catering to business travellers. Similarly, using a panel regression model, Choi et al. (2015) found budget and economy hotel revenue to have an inverse relationship with Airbnb listings, however the size of the coefficients were deemed too small to be statistically significant. Coyle and Yeung (2016) also measured the impact of Airbnb rentals on hotel revenue using a panel regression model and had ambiguous results, suggesting that Airbnb may not be as harmful as presumed to the hotel industry.

Airbnb has expanded its reach in the Caribbean, with several countries signing on to memorandums of understanding to collaborate toward fostering the growth of the peer-to-peer platform legally and sustainably. Studies investigating the effects of Airbnb’s presence in the Caribbean are very limited

with most research being conducted on datasets from the US or Europe. For Jamaica, Johnson and Neuhofer (2017) examined value co-creation through local authentic experiences in an Airbnb hospitality context. The authors use a theoretical framework grounded in the service-dominant logic to illustrate what renders Airbnb rentals the unique experience they claim to have. Lord et al. (2017) investigated the price-setting behaviour of Airbnb hosts in the Caribbean using a hedonic pricing approach. They found that most amenities offered by Airbnb positively and significantly affect price setting in Caribbean destinations.

### 3.0 Methodology and Data

The aim of this study is to analyse the spatial distribution of Airbnb accommodations in relation to hotels across Belize and to examine the impact of Airbnb business on hotel revenue. Data compiled on Airbnb listings were obtained from AirDNA.com, spanning from January 2016 to August 2018. Attributes extracted included, revenue, geographical coordinates, property types (specifically, shared room, private room and entire apartment/house) and average daily rates of Airbnb rentals for Belize's six districts. See Appendix for summary statistics. Using GeoDa, an open source software package for data analysis, a point layer map was generated from the extracted coordinates. Descriptive mapping illustrates relevant visual cues that indicate where Airbnb rentals are most likely to be situated and how they compare to the spatial distribution of hotels (Sakar, Koohikmamali, & Pick, 2017). The information revealed Airbnb locations, points of concentration as well as dispersion of property types and average daily rates. Average daily rates were used to secede properties into quintile groups—budget, economy, midscale, upscale and luxury accommodations.

For comparative purposes, data on hotels were obtained from the Belize Tourism Board for a congruent period—from January 2016 to August 2018. The data obtained included hotel earnings, addresses for registered hotels, hotel types<sup>3</sup>, number of employees and hotel size by revenue (micro, small, medium or large enterprises). See Appendix for summary statistics. Using the address matching tool from another graphical interface software, ArcGIS, the geolocation of each hotel was determined and used to generate a point layer map. Thereafter, the Airbnb and hotel data were each aggregated by census tracts<sup>4</sup> and then combined in order to create maps that showed the area density distribution of hotels and Airbnb listings.

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<sup>3</sup> Hotel types included: resorts, guesthouses, bed and breakfasts, hostels, condominiums, camp grounds and other.

<sup>4</sup> The Statistical Institute of Belize uses 723 census tracts, each of which contains a minimum of 150 households.

In order to measure the spatial relationship between Airbnb rentals and hotels, spatial autocorrelation was estimated in GeoDa using Global Moran's Index (GMI) tests and Local Indicators of Spatial Association (LISA) analysis. LISA tests were used to identify spatial clusters and local tendencies of Airbnb rentals and hotels. Local analysis estimates high (hot spots) or low (cold spots) densities of dependent values, along with the relationships between the clusters of dependent values and neighbouring clusters of independent values (Anselin, 1995). Spatial clusters identified may exist in clusters of high density with high density neighbours (high – high), clusters with low density with low density neighbours (low – low), as well as spatial outliers (high – low and low – high).

Meanwhile, a GMI test was utilised to evaluate clustering of the aforementioned variables. The most widely used index in spatial autocorrelation literature, the GMI, was used to calculate the correlation strength between variables as a function of distance (Oliveau, 2005). The correlation coefficient of the dependent densities of the GMI test identifies how statistically significant patterns of agglomerations of high or low values are distributed or if they are randomly spatially distributed. The global test is illustrated in the form of a Moran scatterplot (Anselin & Smirnov, 1996), with Moran's I statistic corresponding to the slope of the regression line (Anselin, Syabri, & Youngihn, 2009). The significance of the global statistic is determined by a permutation test.

The economic impact of Airbnb accommodations on hotel revenues was examined using panel estimation techniques. The benefit of this approach allows for flexibility when ascertaining differences in behaviour across individual locations (Choi, 2015). Using an ordinary least square (OLS) equation as the base model, the Hausman Test is applied to determine whether a random or fixed effects model is most appropriate. The balanced panel includes data from six districts and spans from January 2016 to August 2018. To mitigate the impact of missing monthly data points, the data was averaged across quarterly periods (Dollar and Kraay, 2003). The base model is calculated using the following regression:

$$HRev_{i,t} = \alpha_0 + \alpha_1 WHOLE_{i,t} + \alpha_2 X_{i,t} + \varepsilon_{i,t}$$

Thereafter, the following Fixed Effects model is employed to control for other factors that were not accounted for in the base model and in groups of similar economic structure.

$$HRev_{i,t} = \beta_0 + \beta_1 WHOLE_{i,t} + \beta_2 X_{i,t} + \eta_{i,t} + \varepsilon_{i,t}$$

where  $i$  represents a specific district,  $t$  is the time period for the quarterly average,  $X$  is a vector of control variables,  $\eta$  denotes an unobservable district effect, and  $\varepsilon$  is the disturbance term.

The dependent variable (**HRev**) is aggregated hotel revenue and the primary independent variable (**WHOLE**) is overall Airbnb earnings. The vector of controls include: Airbnb property quintiles, number



of Airbnb listings, nominal GDP growth and unemployment rates by district. These variables are necessary to reduce the risk of omitted variable bias. Logarithmic transformations were done to all variables except for the nominal GDP and unemployment rates. Given the potential need to reduce specification errors by controlling for unobserved heterogeneity, it is expected that the Fixed Effect model will be selected.

## 4.0 Results and Analysis

### 4.1 Spatial Analysis

Up to August 2018, there were almost 2,500 Airbnb listings and around 850 hotels across the country of Belize. Both Airbnb listings and hotels were found to have the highest number of accommodations available in the Belize<sup>5</sup>, Ambergris Caye, Stann Creek<sup>6</sup>, and Cayo Districts, as seen in Table 1. In order to more closely analyse the spatial distribution of the listings, both accommodation types were sorted according to their corresponding census tracts. Figure 1: a) illustrates the dispersion of Airbnb listings in Belize, with lighter shades indicating a higher density of rentals in a certain census tract. The census tracts with the highest density of Airbnb rentals are areas in Ambergris Caye and coastal areas of Stann Creek, widely recognised as the most popular tourist destinations in the country.

Table 1. Basic data on Hotels and Airbnb listings in Belize

	Total Hotels/Airbnb Listings	Total Bedrooms	Corozal	Orange Walk	Belize	Cayo	Stann Creek	Toledo
Hotels	841	8,196	31	21	379	140	235	35
Airbnb	2,480	4,352	56	27	1,381	441	527	48

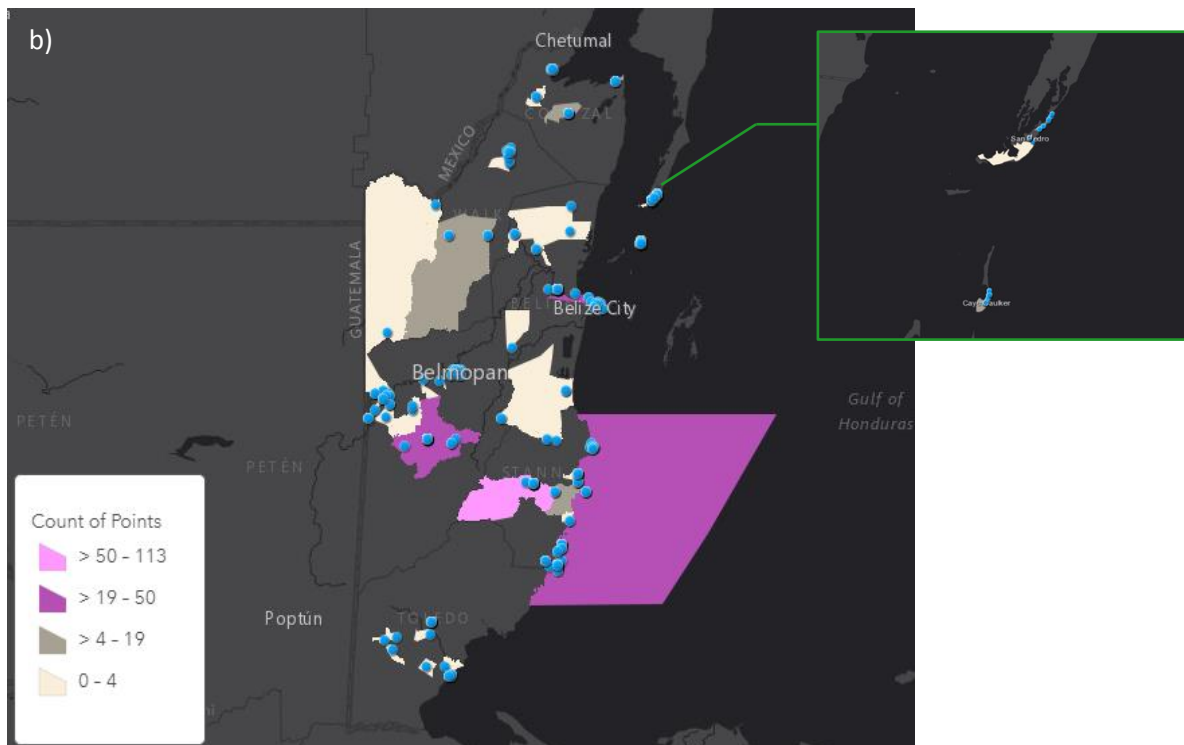
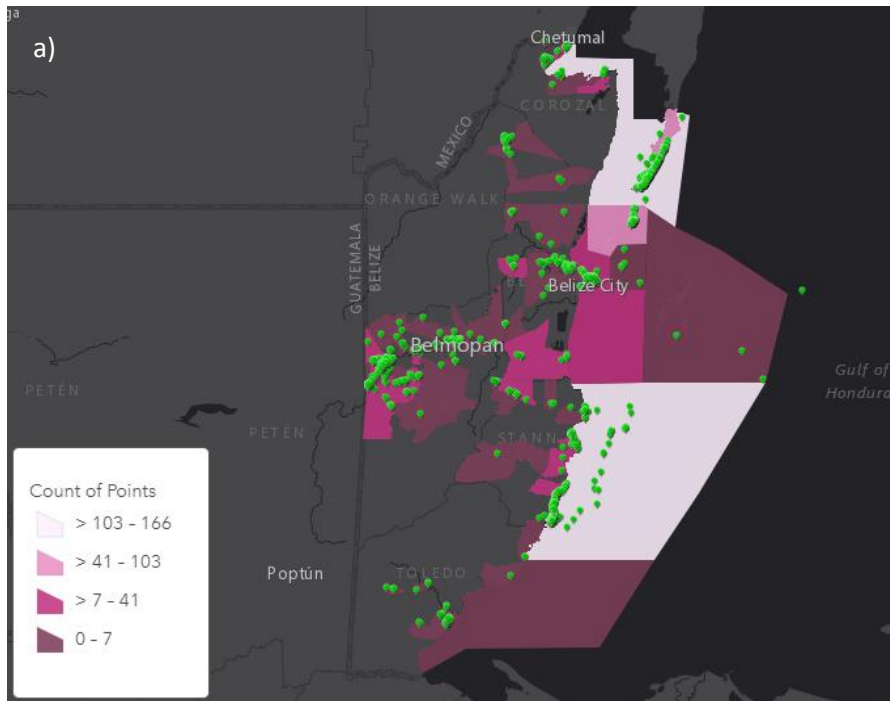
Though hotels in Belize supply double the number of bedrooms than those listed on Airbnb, there are only 841 in the country. Figure 1: b) illustrates the distribution of individual hotels (blue dots) and their concentration in the census tracts, where the lighter purple shade depicts the highest density of hotels, and the beige census tracts contain the lowest concentration. The spatial distribution of hotels is less extensive than that of the Airbnb listings with the average. As seen in Table 2, there are on average roughly one hotel per census tract, relative to an approximate three Airbnb rentals. The traditional accommodation type is most dense in the Belize and Stann Creek districts, demonstrating a visually similar distribution pattern as Airbnb rentals, with peak concentration in census tracts that

<sup>5</sup> The Belize District contains many popularly visited islands, such as Ambergris Caye and Caye Caulker.

<sup>6</sup> The Stann Creek District contains many popularly visited coastal villages, such as Placencia and Hopkins.

contain Ambergris Caye and villages along the coast of Stann Creek. Also visible is a high concentration of hotels in census tracts within Belize City, which encompass areas dedicated to business and finance.

Figure 1: Accommodation densities by census tracts for: a) Airbnb listings and b) hotels



\*Each point represents the geolocation of individual accommodations.

Table 2: Statistics on the distribution of Airbnb and Hotel accommodations by census tract.

	Hotels	Airbnb Listings
Min.	0	0
Max.	113	166
Median	0	0
Mean	1.16	3.43
Std. Dev.	7.14	13.41

In order to determine the statistical significance of visually observed patterns of the spatial distribution of hotels and Airbnb rentals, the accommodation types were tested for clustering using the GMI test, respectively. According to Anselin (1995), interpretation of Moran's I is based on a null hypothesis of spatial randomness, where the Moran's I statistic is equal to zero. Using univariate spatial autocorrelation, hotels were found to have statistically significant clustering behaviour with a positive GMI of 0.022 and p – value of 0.019. Clustering for Airbnb rentals was found to be more strongly statistically significant, with a GMI of 0.184 and a p – value of 0.001. The aforementioned results indicate that Airbnb rentals tend to be more abundant in a single location, while hotels are more dispersed. Bivariate spatial autocorrelation was, then, used to assess the clustering relationship between the Airbnb rentals and the hotels, revealing a strong positive spatial autocorrelation with a Global Moran's Index of 0.153 and a p – value of 0.001. Results are summarised in Table 3. This confirms that the distribution of hotels and Airbnb rentals available in Belize have a close spatial relationship and tend to cluster in the same areas.

Table 3: Statistics for GMI tests for hotels and Airbnb rentals

	Hotels	Airbnb Rentals	Hotels - Airbnb Rentals
Global Moran's Index	0.022	0.184	0.153
Mean	-0.0018	-0.0016	-0.0004
Std. Dev.	0.0092	0.0103	0.008
p - value	0.019	0.001	0.001
z - score	2.645	18.108	19.342

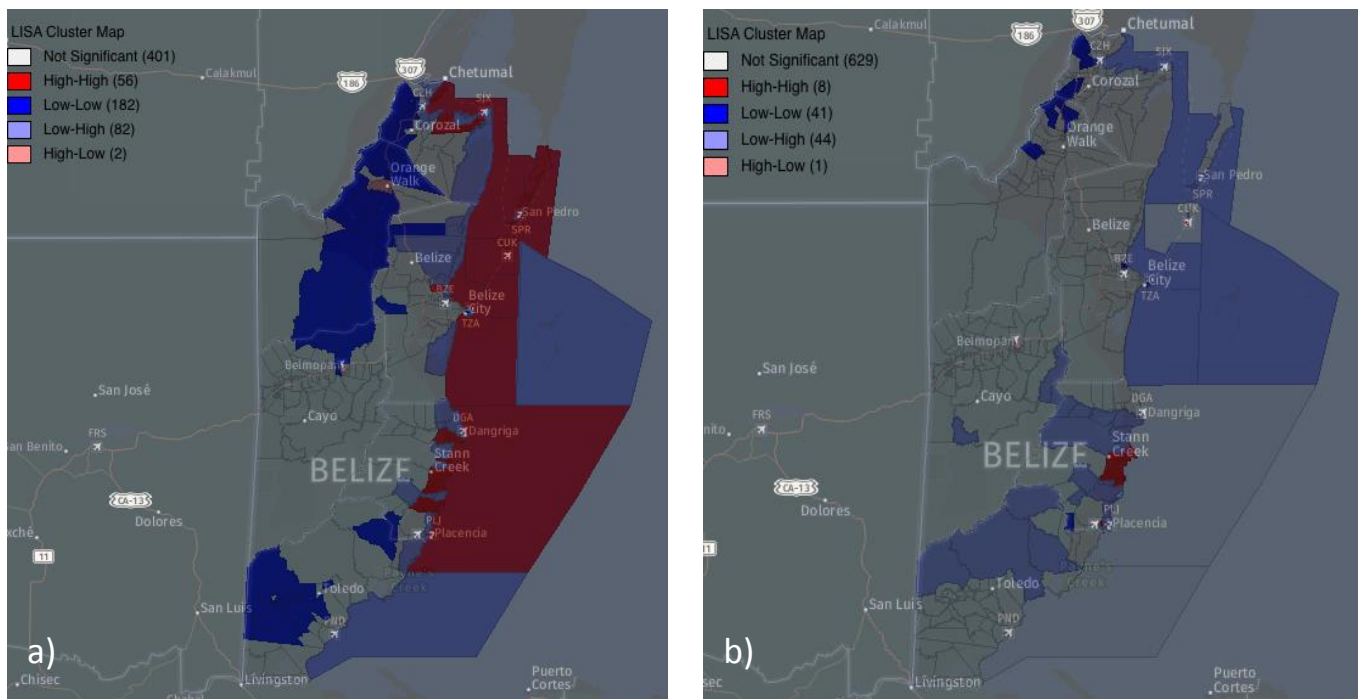
LISA was used to identify and visualise the spatial clusters of hotels and the Airbnb rentals. As seen in Figure 3: a) Airbnb rentals had the strongest concentration (HH) of accommodations in census tracts along the coast, which include islands and villages that are major tourist attractions in Belize. As a result, many coastal census tracts appear as HL outliers due to neighboring census tracts with high densities of Airbnb rentals. Additionally, Airbnb hotspots were identified in areas of the Belize District further away from the coast, including residential areas. Hotels had considerably less hotspots, limited to census tracts in the Stann Creek district and a few in Caye Caulker and Ambergris Caye. Both

accommodation types displayed cold spots (LL) in the peripheries of the Corozal, Orange Walk and Toledo districts, which are areas less popularly visited by tourists.

Table 4: Statistics for LISA tests for hotels and Airbnb rentals

	Hotels		Airbnb Rentals		Hotels - Airbnb Rentals	
	Total	Percentage	Total	Percentage	Total	Percentage
High - High (HH)	8	1.11	56	7.75	28	3.87
Low - Low (LL)	41	5.67	182	25.17	180	24.90
Low - High (LH)	44	6.09	82	11.34	110	15.21
High - Low (HL)	1	0.14	2	0.28	3	0.41
Not Significant	629	87.00	401	55.46	402	55.60
Total	723	100.00	723	100.00	723	100

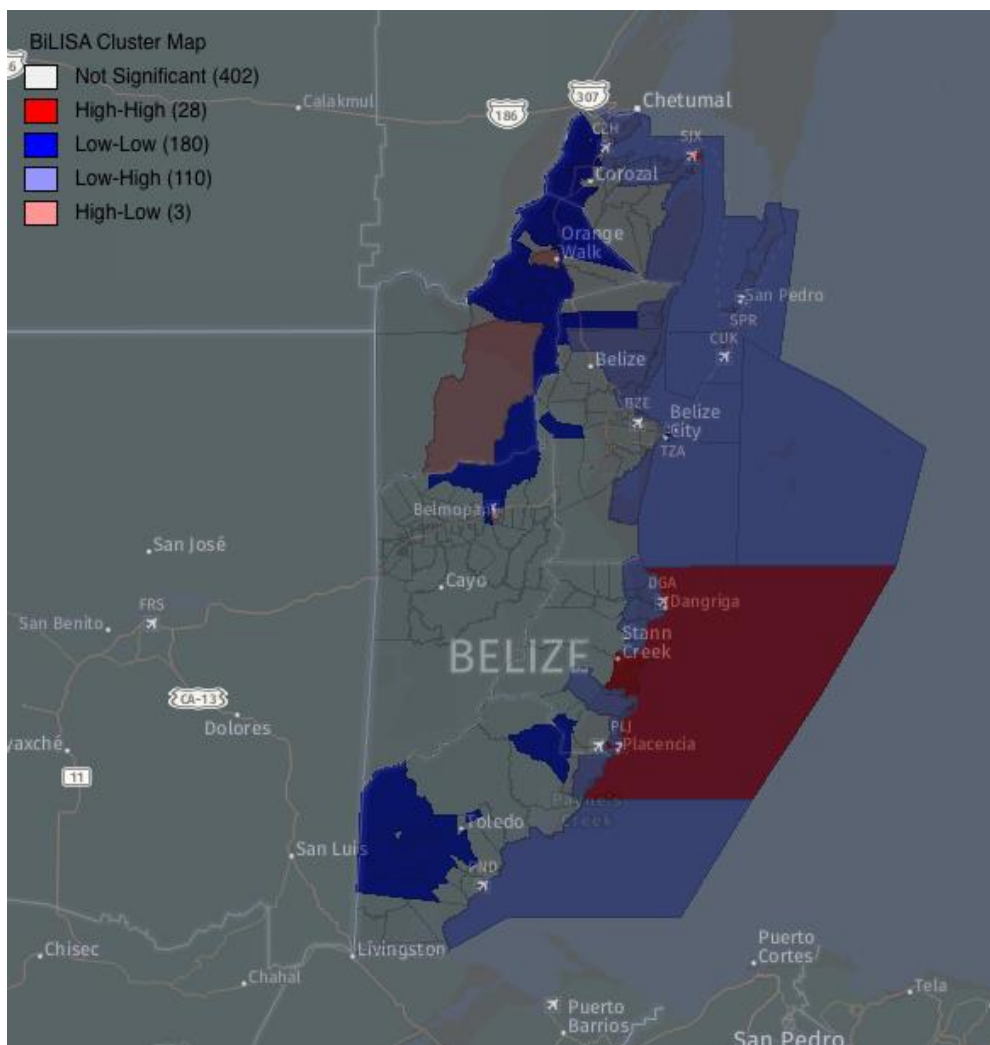
Figure 2: LISA visualization for: a) Airbnb rentals and b) hotels



The spatial relationship between Airbnb and hotel accommodations were also analysed locally using bivariate autocorrelation indicators. Hotspots (HH) were identified for census tracts containing both touristic and residential areas of the Stann Creek District, while a less expected hotspot was identified for a census tract in the northern village of Sarteneja. Areas with great tourist and commercial activity in the Belize district were categorised as LH, meaning hotels being surrounded by a higher number of Airbnb rentals. Only census tracts in the Orange Walk district displayed areas that had a high degree of hotels being surrounded by less Airbnb accommodations. Both types of accommodations were in low density (LL) in the rural areas of the Toledo, Corozal, Cayo and Orange Walk districts.

Ultimately, the census tracts with higher proximity to the sea, which are the areas most trafficked by tourists, displayed the highest concentration of the accommodation types. As is expected, LH outliers surrounded these major centers with a higher concentration of Airbnb listings. Meanwhile, low densities of both Airbnb and hotel accommodations exist in less commercialised areas of the country. These findings contradict the perception of Airbnb rentals as those which provide accommodations for less visited and unique areas and imply that a competitive relationship with hotels may exist, rather than a complimentary one.

Figure 3: LISA visualisation for the spatial patterns of Airbnb rentals and Hotels



## 4.2 Fixed Effects Model

Using panel data on the districts of Belize, a Pooled OLS model is used as the starting point; however, due to the potential likelihood of omitted variable bias and unobserved heterogeneity ensuing from the use of panel data, a supplemental Fixed Effects model was selected in favour of a Random Effects model in order to conduct thorough analysis<sup>7</sup>. Table 5 reports the econometric estimates of the impact of Airbnb categories on hotel revenue.

Table 5: Impact on Hotel Revenue

Dependent Variable: <i>Hotel Revenue</i>	Pooled OLS (1)	Fixed Effects (2)	Fixed Effects (3)	Fixed Effects (4)
Constant	3.332 (6.699)	2.008 (5.601)	14.323 (0.403)	9.699 (2.596)
Whole	4.058 (3.589)	4.663 (3.038)	-0.041 (0.048)	- -
Budget	0.835 (0.416)	-0.054** (0.024)	- -	-0.189** (0.208)
Economy	-2.066 (1.182)	-0.098** (0.608)	- -	-0.033** (0.499)
Midscale	2.153 (0.835)	0.041 (0.548)	- -	0.896 0.466
Upscale	-0.902 (0.765)	-0.025* (0.524)	- -	-0.104 (0.112)
Luxury	-2.869 (2.148)	-2.727 (1.617)	- -	-0.263 (0.195)
Airbnb Listings	0.008 (0.002)	0.002 (0.001)	0.000 (0.019)	0.001 (0.001)
GDP Growth Rate	-0.036 (0.051)	0.1148* (0.022)	0.111 (0.019)	-0.039 (0.229)
Unemployment Rate	0.074 (0.039)	-0.004* (0.019)	-0.029* (0.017)	-0.024* (0.186)
<i>N</i>	31	31	61	31
<i>R</i> <sup>2</sup>	0.577	0.775	0.3832	0.518
<i>F</i>	15.99	30.99	22.05	30.26

Standard errors in parentheses

\*  $p < 0.10$ , \*\*  $p < 0.05$ , \*\*\*  $p < 0.01$

Model 1 presents the estimated coefficients of the baseline scenario and accounts for a high degree of variability of the data but given the insignificance of the variables of interest, further computations prove necessary. Models 2-4 are Fixed Effects regressions which alter the control variables used. Given

<sup>7</sup> The Hausman test had a p-value of 0.005. See Appendix.

the low explanatory power of the Model 3 and the statistical insignificance of the controls (not including the Airbnb categories), this model was not considered meaningful.

Model 4 utilises the different Airbnb categories along with other macroeconomic variables which enables a better fit for the dataset. Additionally, key variables exhibit statistical significance. Despite these attributes that appear in favour of Model 4, Model 2 was selected as the model of best fit for the selected sample. The relationships among variables gain further significance which allow for an all-encompassing model that captures a great degree of data variability and also account for other socio-economic aspects of the Belizean economy.

Of note is the relationship and statistical insignificance of overall Airbnb earnings (Whole) and hotel revenue. It could be conjectured that when overall Airbnb earnings are combined with proceeds from each quintile, then the estimation technique renders that coefficient obscure. Despite this estimation deficit, the direction of the relationship is in alignment with a similar study done by Coyle and Yeung (2016) whereby Airbnb listings have a positive impact on total hotel revenue. Concentrating on the Airbnb categories, preliminary results indicate that almost all Airbnb-type listings are statistically significant and have a negative effect on hotel revenue in Belize, with the exception of midscale accommodations. Budget and economy type Airbnb accommodations, which are on the lower end of the pricing gamut, can adversely influence hotel earnings by as much as five and nine percent, respectively. Similarly, upscale-type listings such as beach-front villas can decrease hotel revenues by upwards of three percent. These opposing relationships, particularly with low cost accommodations, are corroborated with the fact that private rentals and traditional hotels compete for the same number of visitors. While the economic impact does appear weighty in logarithmic terms, when placed in the context of overall hotel revenues, the magnitude of the financial loss could be millions of local dollars.

Given that higher economic growth has the potential to attract more tourists, it is envisaged that an expansion in activity will garner additional hotel revenues. In this instance, a one percent increase in GDP growth could increase hotel earnings by 11.4 percent. Intuitively, it is expected that both variables would grow together as a boost in local economic activity should have a spill over effect on the tourism industry. Studies have shown that unemployment rate, on the other hand, could reduce hotel earnings (Choi 2015). Surprisingly, this is the case with Belize indicating that as unemployment rate rises, hotel revenues could remain muted or decline by 0.4 percent. In the Belizean context, the unemployment rate may unfavourably sway hotel revenues via a decline in domestic tourism; however, this relationship is inconclusive as locals are not considered to be the target market for conventional hotels but rather, international visitors. The unemployment rate best describes the

present economic situation in Belize, but not necessarily for the American and European economies—where most visitors originate. The above-mentioned relationships are statistically significant and in line with the final results listed in Table 5.

## 5.0 Conclusion

Studies have not been able to definitively pinpoint the exact impact that Airbnb accommodations have on hotels. Some studies have shown that Airbnb accommodations tend to compliment hotels, as they enable a new demographic of tourists to stay in more unconventional places. This study on Belize finds that Airbnb rentals are more extensively distributed throughout the country, but are mostly found in areas with high concentrations of hotels, which are located in popular tourist destinations. Airbnb rentals and hotels have a strong positive spatial correlation, indicating that similarly priced hotels in the same areas may be impacted the most.

Previous studies have found lower priced Airbnb listings to have a competitive relationship with traditional hotels. While earnings generated from total Airbnb listings have a complementary relationship with aggregated hotel revenue, when segmented by quintile groups, Airbnb accommodations were observed to have a negative impact on hotel earnings. Specifically, these are the upscale, budget and economy type listings, with the latter being most significant. Similar results for budget and economy listings were found in the United States, Korea and a few European countries. However, upscale rentals can now be seen to have an impact on the hospitality industry. The diffusion of Airbnb into this new segment suggests the growth of its share in the accommodation market, qualifying it as a disruptive innovation. This finding is substantial as Belize has traditionally been considered a unique destination with a niche market for more affluent tourists. Notwithstanding this typecast, the average daily expenditure for tourists visiting Belize has been on the decline implying that the visitor profile is evolving. One possible explanation is that these types of Airbnb rentals can reduce the demand for hotels from the new influx of financially conscious tourist, while providing alternative accommodation options for upscale tourists.

Given the limited data that is currently available for Airbnb accommodations in Belize, this research can only expand and reveal findings distinct to the tourism industry. As more statistics become available, further evidence can substantiate the need for the development and regulation of this new industry which has the potential for advancement in the country.



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## Appendix I

Table 1. Basic data on Airbnb listings in Belize

		Room type			Total
		Entire Home/ Apartment	Private Room	Shared Room	
Listings		1831	585	64	2480
Average Daily Rate	Mean	186.12	90.94	71.92	185.06
	Std. Dev.	223.15	69.34	49.19	221.84
Availability	Mean	20.47	20.53	20.79	20.48
	Std. Dev.	11.41	11.37	11.32	11.41
Bedrooms	Mean	1.75	1.76	1.06	1.76
	Std. Dev.	1.23	1.28	0.06	1.28

Figure 1: Airbnb accommodations by listing types

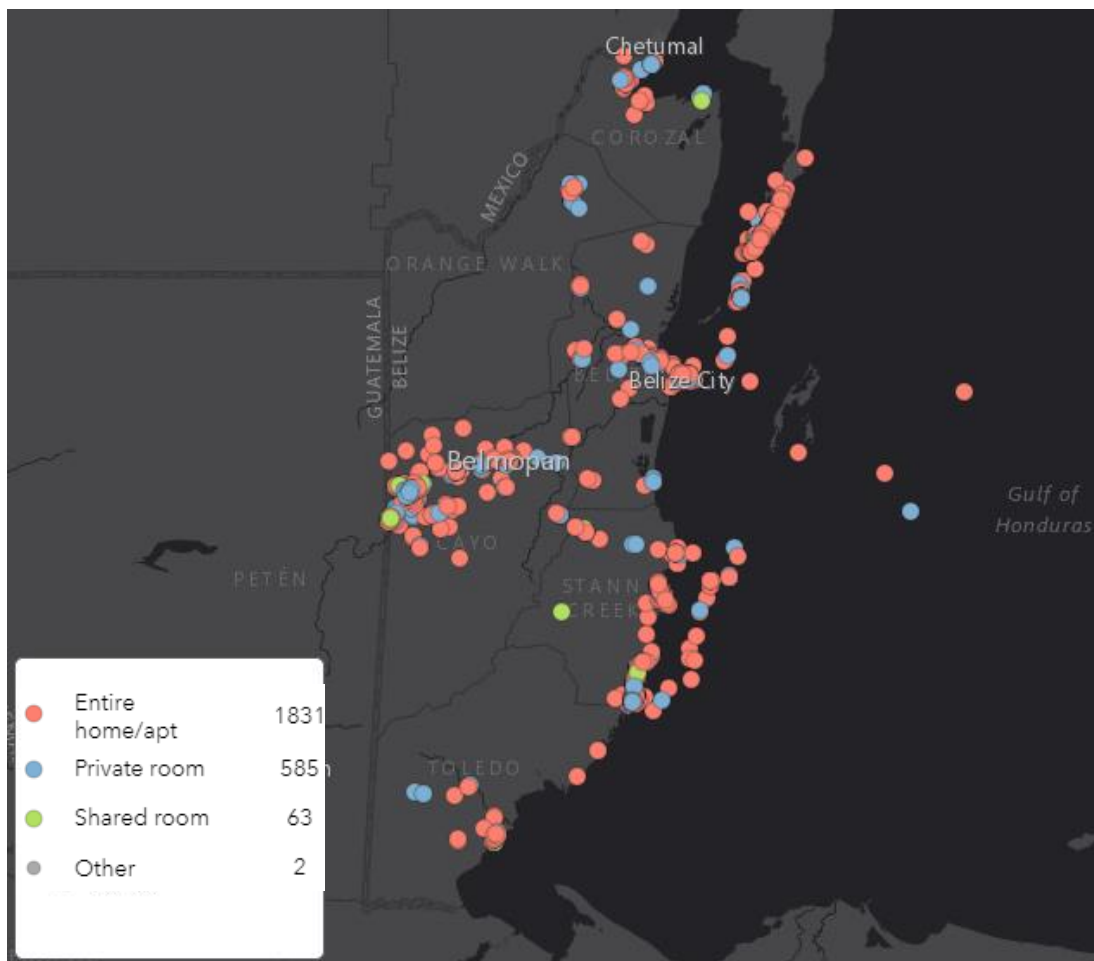


Figure 2: Summary of areas of concentration for Airbnb: a) Revenue and b) average daily rate



Table 2. Panel Data Summary Statistics

Variable		Mean	Std. Dev	Min.	Max.	Observations
Revenue	Hotel	13.944	1.661	11.911	16.909	66
	Airbnb	9.238	1.307	6.516	10.913	61
Type of Accommodation	Budget	6.479	0.705	4.564	7.854	59
	Economy	7.314	0.495	5.704	7.974	59
	Midscale	7.854	0.468	6.025	8.538	48
	Upscale	8.499	0.751	6.396	10.051	39
	Luxury	9.695	0.459	8.188	10.254	35
Airbnb Listings		401.852	614.806	1.000	2446	61
GDP Growth Rate		1.274	2.094	-1.185	5.435	66
Unemployment Rate		8.893	3.244	3.400	17.700	66

Table 3. Hausman Test Statistics

	-Coefficients-		(b-B) Difference	sqrt(diag(V <sub>b</sub> -V <sub>B</sub> )) S.E.
	(b) Fixed	(B) Random		
Airbnb Revenue	1935.846	-215.2813	2151.127	1476.497
Budget Accommodation	-667.2732	1997.309	-2664.582	1318.658
Economy Accommodation	-613.083	4009.521	-4622.604	3219.291
Upscale Accommodation	-1932.577	212.6006	-2145.178	1534.149
Airbnb Listings	624.1226	4415.096	-3790.973	808.92
GDP Growth Rate	-40498.36	-357719.2	317220.8	.
Unemployment Rate	57290.75	55967.23	1323.522	42377.52
chi2(8)	=(b-B)'[(V <sub>b</sub> -V <sub>B</sub> ) <sup>(-1)</sup> ](b-B)			
	= 20.51			
P-Value (Prob>chi2)	= 0.0046			
Decision Rule	<b>Fixed Effects</b>			