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**SHARING ECONOMY IN THE CONTEXT OF**  
**SUSTAINABLE DEVELOPMENT -**  
**THE EMPIRICAL EXAMINATION OF THE**  
**ACCOMMODATION SHARING**

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# **1. RESEARCH BACKGROUND AND THE CHOICE OF THE TOPIC**

Considering the global issues, one of our biggest challenges is to find a sustainable, long-term working system which is good for society, the environment and the economy as well. Heinrichs states that “despite the success of some environmental and sustainability initiatives and measures in policy-making, business and society, overall trends follow an unsustainable path” (Heinrichs, 2013. p.228). From this perspective, a positive picture of a fair, trustworthy, low-carbon economy which is more transparent sounds really promising, so the sharing economy, also called collaborative economy or access economy or connected consumption; in other words, a more collaborative approach to the exchange of goods and services can be a possible solution.

The main aim of this dissertation is to examine the accommodation sharing, the biggest sharing economy service sector (Vaughan and Hawksworth, 2014), from sustainable development perspective.

At the beginning of my research I was reluctant to believe that the sharing economy can contribute to sustainable development, because my friends and acquaintances had good and bad experience with UBER and Airbnb, and I simply assumed these are new and cheaper forms of travelling and short-term accommodation. However, I started to dig into the sharing economy literature and while I was getting more and more familiar with the concept, I recognized that the idea and model of the sharing economy could enhance long-term sustainability. The research area came from my personal experience as well; I like travelling and I had the opportunity to try Airbnb in different cities and I collected various experience with this accommodation sharing platform. For instance, the first case when I was

in Malaga where our rented room was in an apartment where the owner-family lived, and they shared their home with us. We used the same kitchen and bathroom, they gave us information about sightseeing, restaurants and so on. This experience was really local and quite personal. We encountered an entirely different experience in Paphos, where after we confirmed the booking, it turned out that we rented an apartment from a company who builds its business based on this new economic system: they have more than 10 flats that they advertise on Airbnb and we did not even meet the company representative (or our host); we could get in the flat with the help of a smart lock. Consequently, ***the question came up: where is the personal experience and community building? If more and more entire apartments are used for short-term accommodation purposes, how does it affect local markets and communities?*** Considering this question and exploring the accommodation situation in bigger cities (where the accommodation sale and renting prices getting higher and higher), my main research question is: ***does the accommodation sharing in its current form contribute to sustainable development? Does it enhance the fulfilment of sustainable development goals?*** If so, that should be welcomed, and promoted; if not how can the current system be changed? I believe that we do have a theoretically good, new economic system that can contribute to the strong sustainability and I find really exciting to examine how it works in practice.

## 2. THE GOAL OF THE DISSERTATION. RESEARCH QUESTIONS AND HYPOTHESES

According to several authors, the model which bring economic interests in line with positive environmental and social impacts, the sharing economy has been considered a promising pattern towards more sustainable economy (Cohen and Kietzmann, 2014; Curtis and Lehner, 2019; Heinrichs, 2013). However, other researchers declare that *sharing is not caring*: it is growing network of unregulated digital marketplaces and it creates unfair competition (Ranchordás, 2015; Martin, 2016, Schor, 2017). My research assumes that ***the concept of the sharing economy supports sustainable development theoretically; however, the accommodation sharing is only a new and rebranded form of the old economy.***

Several studies examine the sharing economy from users' perspective (eg. Havas, 2014; Nielsen, 2014, Hamari et al., 2015) but I find interesting to study this from supply side as well. Therefore, in my empirical research I focus on Airbnb, the biggest accommodation sharing platform, and I investigate the characteristics of Airbnb accommodations in 45 European cities.

Initially, Airbnb was used by hosts offering cheap bed and breakfast in their permanent homes for travellers for a short period of time (The Economist, 2013a). Local communities can benefit from this idea or business model of such non-professional, peer-to-peer service by earning income from their unused space also supporting local small businesses (Gyódy, 2019). Furthermore, using Airbnb can contribute to decrease the feeling of loneliness in case of people who live alone by enabling them to being hosts in this new business and accommodate guests in their houses.

However; this trend has changed, and only small part of Airbnb listings can be categorized as *traditional* sharing economy services and bigger share of listings represent professional and commercial offers on the platform (Gyódy, 2019) with its all negative consequences. Various negative outcomes can be identified: accommodation sharing will be attractive among property investors for the purpose of providing business-to-consumer services. Consequently, it can enhance the gentrification of the popular tourist areas (Gutiérrez et al., 2017). If hosts prefer the short-term rentals over long-term rentals, the supply of available accommodations is reduced which can contribute to the higher rental prices and it could potentially affect the domestic rental market and the quality life of residents as well.

My research concentrates on the relevant and selected Sustainable Development Goals (SDGs). In this context the relevant refers to SDG's that Airbnb has direct effect on via local communities, such as Reducing Inequality or Sustainable Cities and Communities or Decent Work and Economic Growth. I do not exclude environmental and social factors of sustainable development; however, in my empirical research the main focus is on economic factors and I examine Airbnb from economic perspective.

In my dissertation I would like to answer the following research questions:

- How does the new economic system shake up the traditional markets? What is its novelty and disruptive effect?

- Does the accommodation sharing contribute to the fulfilment of the relevant Sustainable Development Goals?
  - Are there regional differences between the poorer and richer regions in Europe on the Airbnb market?
  - Which factors do influence the number of listings on Airbnb? How does the change in GDP or change in unemployment rate influence the number of available listings? Do changes in hotel room supply influence Airbnb supply?
  - Does the housing situation (such as tenure status: owning or renting a property and average size of dwelling) have an effect on Airbnb market? Who do rent out their apartments: the owners or the tenants? Is the bigger the dwelling the higher chance to rent it out?
- How can we describe the accommodation sharing in its current operation: sustainable lifestyle or new form of the neoliberal economy?

At the beginning of my research I formulated the **hypotheses** that I would like to test during my examination:

- **We can identify regional differences on Airbnb market in Europe.** I assume that GDP is negatively associated with Airbnb supply and GDP and income are negatively correlated with share of multi-listing hosts (I measure the share of professional hosts with the number of multi-listing hosts). Also, I expect that belonging to Eurozone affects significantly the number of booked Airbnb accommodations, the number of multi-listing hosts and the Airbnb supply.

- **Changes in economic and market conditions have strong impact on Airbnb supply.** I assume that there is strong correlation between income of households and unemployment rate and Airbnb penetration: income is negatively, while unemployment is positively associated with the number of available accommodations on Airbnb. Furthermore, I assume that short-term accommodation market regulation strongly affects the Airbnb supply.
- **The effect of increasing tourism is more significant in case of available Airbnb entire home supply than private room supply.** All Airbnb accommodation types (entire home, private room, shared room) significantly correlate with the number of hotel rooms and the strongest correlation can be observed between entire homes and the number of hotel rooms. Number of hotel rooms is positively associated with available Airbnb supply.
- **The housing situation (such as tenure status: owning or renting a property and average size of dwelling) significantly affects Airbnb market.** I assume that there is a correlation between the average dwelling size and the number of available short-term accommodations: the higher the dwelling size is the stronger correlation with Airbnb supply. If host has bigger house or apartment there is a higher chance it is rented out via Airbnb. Also, I expect that the ownership structure correlates the Airbnb supply: changes in the ownership structure cause change in the Airbnb supply.



### **3. THEORETICAL FRAMEWORK**

In my dissertation I use the sharing economy as a concept of the new economic system and I use this logic and theoretical framework during my examination. My work has two main parts: the first part describes the theoretical background and literature review as well as its assessment followed by my empirical research in the second part.

In the first section I present the sharing economy as a new economic system: from business model perspective, why it is disruptive innovation or why we can say that sharing economy is the new trust system. In the following chapter I analyse the sustainability elements of the collaborative or sharing economy. The sharing economy, also called collaborative economy or access economy or connected consumption, is an expression for the emerging type of business models, platforms and exchanges (Allen and Berg, 2014) where people share their intangible assets and underutilized tangible assets for money or for free with the help of the Internet (Cohen and Munoz, 2016). It is a fast-growing sector which is disrupting mainstream industries (Cohen and Munoz, 2016): since the sharing economy started to become more popular, consumption patterns have been changed and reached the traditional industries such as tourism, hospitality, transportation, education, job market and so on (Botsman and Rogers 2010). One huge advantage of the sharing economy business is the low barrier to entry, namely the platform companies without any assets or strong financial background can easily be established and users can reach services quickly and cheaper. To run a successful business, platform owners don't have to have or produce goods and services, they have to provide the connection and communication between supply and demand.

In the business world, the whole sharing economy concept became well-known between 2011 and 2012 with the success stories of Airbnb and UBER (Martin, 2016).

Chris J. Martin (2016) published a comprehensive article about the potential outcomes of the sharing economy. He states that this new phenomenon is understood contradictory ways: some researchers say that this is the potential pathway to sustainability, while others declare that this is a new form of neoliberalism. He states that if the sharing economy keeps moving on the same trajectory as it is now, it will not disrupt the current practices and established structures, they can operate parallel with each other but the radical change will not happen. Therefore, my goal is to examine the accommodation sharing within the sharing economy from the selected Sustainable Development Goals (SDGs) perspective.

The next part of my paper deals with the housing market in Europe and the accommodation sharing along with its real and potential consequences on the long-term accommodation renting market.

The second part contains my empirical research that I conducted on the accommodation sharing. The aim of the empirical examination is to investigate the hypotheses underlying the Airbnb's role as a sharing economy platform in contributing to the fulfilment of the relevant Sustainable Development Goals in the selected European cities.

## **4. DATA AND METHODOLOGY**

To examine the hypotheses and answer to my research questions, I gathered data for 45 major European cities. European capitals and other well-known tourism destinations (Table 1) have been selected. These

cities are top tourist destinations, namely the primary motivation of tourists and visitors is to spend a couple days in the city.

|            |           |            |           |           |
|------------|-----------|------------|-----------|-----------|
| Amsterdam  | Dublin    | London     | Oslo      | Stockholm |
| Athens     | Edinburgh | Luxembourg | Paris     | Sofia     |
| Berlin     | Florence  | Madrid     | Porto     | Tallinn   |
| Barcelona  | Geneva    | Malaga     | Prague    | Vienna    |
| Bratislava | Helsinki  | Manchester | Reykjavik | Valletta  |
| Brussels   | Istanbul  | Milan      | Riga      | Venice    |
| Bucharest  | Kraków    | Munich     | Rome      | Vilnius   |
| Budapest   | Lisbon    | Nice       | Rotterdam | Warsaw    |
| Copenhagen | Ljubljana | Nicosia    | Seville   | Zagreb    |

*Table 1 List of the examined cities (own elaboration)*

In my dissertation I use publicly and freely available dataset with mainly web-scrapped information on Airbnb listings. Furthermore, the selected variables can be found on EUROSTAT, World Bank, AirDNA and InsideAirbnb.

### ***Characteristics of the short-term accommodation sharing***

As a first step, I collected data regarding Airbnb performance in the selected European cities. I chose Airbnb because it has the biggest market share in case of the short-term accommodation sharing. AirDNA was the data source I used: this is a data company and it is the world's leading provider of short-term vacation rental analytics and data. The first stage of data collection was during the period of September- November 2018. Since then AirDNA has changed the city level available data and unfortunately, some of them are not accessible for free of charge.

After the selection process and fine-tuning, I chose the most relevant Airbnb variables which help answer to my research questions.

Table 2 shows the selected Airbnb variables that I use during my analysis.

| <b>Variable</b>   | <b>Description</b>   | <b>Year</b> | <b>Data source</b> |
|---|--|-------------|--------------------|
| Nr of Active Rentals/ Rental Growth (number and %)  | This number shows the development of the available rentals                 | 2015-2019   | AirDNA             |
| Rental Type:<br>Entire Home (number and %)<br>Private Room (number and %)<br>Shared Room (number and %) | Type of accommodation:<br><br>Entire Home<br>Private room<br>Shared room   | 2018        | AirDNA             |
| Multi-listing Hosts (number and %)  | Number and % of multi-listing hosts (hosts who has more than one property) | 2018        | AirDNA             |
| Actual booked accommodations (number)   | Number of actual booked accommodation in 2018                              | 2018        | AirDNA             |

*Table 2 Characteristics of the short-term accommodation sharing - list of employed variables (own collection)*

My aim is to examine the Airbnb market from supply side and I have identified four main variables that I test in this study: Airbnb supply data, share of multi-listing hosts, number of booked accommodations and rental type (entire home, private room, shared room).

In case of Airbnb supply data, I have data for 4 consecutive years (2015-2018); however, in case of the other three variables I found available data for one year only (2018). I asked AirDNA to send me data for the missing years but unfortunately, I did not get reply. Thus, I use the

database for 2018 which does not give us as meaningful results as time data series but it provides us valuable input and support for my research.

### ***Factors That Influence the Airbnb supply market***

In order to identify the factors that affect the number of Airbnb listings, the number of multi-listing hosts, the number of booked accommodations and the number of rental types (entire home, private room, shared room) I selected different variables. Part of the variables are from the previous literatures: for instance, *economic variables* (GDP, income, unemployment), *tourism related* (Air transport of passengers, Nights spent at tourist accommodation establishments), *hotel industry related* (Number of hotel rooms) *social variables and Population*. Part of them are based on my assumptions: social variables (share of single person household, youth-dependency ratio, old-age-dependency ratio). Furthermore, I tested my research questions with nominal variables as well. I assume that belonging to Eurozone has an effect on Airbnb market, therefore I added Eurozone as a dummy variable to the list (Choi et. al. 2015). Also, I think that Airbnb regulation influences the Airbnb supply, therefore I added it as Yes or No nominal variable (the Airbnb market is regulated or not in the selected city). Table 7 shows the full list of selected variables.

| <b>Variable</b>   | <b>Years</b> | <b>Data source</b>              |
|---|--------------|---------------------------------|
| GDP (million EUR)   | 2015-2018    | Eurostat                        |
| Unemployment rate (%)   | 2015-2018    | Eurostat                        |
| Income of households (million EUR)  | 2015-2018    | Eurostat                        |
| Air transport of passengers (Foreign travellers) (Thousand passengers)                        | 2015-2018    | Eurostat                        |
| Population (number)   | 2015-2018    | Eurostat                        |
| Average dwelling size   | 2011         | Eurostat, Census                |
| Nights spent at tourist accommodation establishments (number) reference as number of tourists | 2015-2018    | Eurostat                        |
| Number of hotel rooms   | 2015-2018    | Eurostat, Collins International |
| Housing type: Owner, with and without mortgage or loan (%)                                    | 2015-2018    | Eurostat                        |
| Housing type: tenant (%)  | 2015-2018    | Eurostat                        |
| Share of single person household (%)  | 2018         | Eurostat                        |
| Youth-dependency Ratio (%)  | 2018         | Eurostat                        |
| Old-age-dependency Ratio (%)  | 2018         | Eurostat                        |

|                   |        |
|-------------------|--------|
| Euro zona         | Yes/No |
| Airbnb regulation | Yes/No |

*Table 3 Selected variables in my research models (own collection)*

## ***Methodology***

I test the hypotheses with the help of statistical and econometric methods.

I apply quantitative methodology during my examination.

At the beginning of the research, I developed different models and tested them: I conducted the examination in two main steps: in the first step I used ***correlation analysis*** one by one because my aim was to investigate possible relationships among various variables then I used ***regression analysis***.

Due to the nature of data, I used correlation tests in case of all main variables and I ran regression analysis in case of selected main variables. Correlation is a bivariate analysis that examines the existence, directions and strength of a relationship between variables and the possible connections between two or more existing, non-manipulated variables (Rovai et al., 2013: 81).

After correlation analysis, I applied *multiple regression analysis*. The regression analysis examines the effect that some independent variables have over one dependent variable and it can be used for predicting and forecasting (Turóczy-Liviu, 2012). I selected *stepwise regression* which is a method of regressing multiple variables while simultaneously adding or removing those that are not statistically significant. In my research I chose the *stepwise regression backward selection method*. In this method we begin with a full model and then, the variables that do not (significantly) predict anything on the dependent measure are removed from the model one by one.

In the second stage of my examination I estimated and analysed the relationship between the Airbnb supply and selected variables by *regression analysis on my panel dataset*. Panel data allows the researcher to control variables it cannot be observed or measured like cultural factors or variables that change over time (Torres-Reyna, 2017) and it helps us to get relatively unbiased estimation. The fundamental advantage of a panel analysis is that it provides the researcher with great flexibility in modelling differences in behaviour across individual observations. I am interested in time related changes in Airbnb penetration, panel data analysis is an excellent tool for this examination.

When we deal with the panel data analysis *fixed effects* and *random effects* models are the two most commonly used models. Fixed effects

model controls for entity-specific characteristics, thereby allowing it to be correlated with the explanatory variables. Random effects model however, assumes that the above-mentioned characteristics are random and completely uncorrelated with the independent variables.

The common panel data regression model is

$$Y_{i,t} = \beta_0 + \beta x_{it} + \epsilon_{i,t}$$

For n observations and t time periods:  $i = 1, 2, \dots, n$  and  $t = 1, 2, \dots, n$ .

$Y_{i,t}$  is the dependent variable

$\beta_0$  is the intercept

$\beta$  is the matrix of parameters based on the number of independent variables

$x_{it}$  represents an independent variable

$\epsilon_{i,t}$  is the error term.

To determine the preferable model (fixed effects or random effects) a Hausman test is often used. In the Hausman test the null hypothesis is that the random effects model is preferred and as a consequence, if we reject the  $H_0$ , the fixed effect model will be the appropriate model.

The significance of nominal variables (belonging to Eurozone, Airbnb regulation) is examined by ***nominal by interval relationship***. During this test one variable is categorical and the other is quantitative. In this case we measure the association with Eta coefficient. (IBM SPSS Statistics)

All data was analysed using Statistical Package for the Social Sciences 22.0 (SPSS 22.0) and STATA version 15.



## 5. RESULTS

### ***Results of correlation analysis***

I ran the Pearson correlation test for the three ***different accommodation categories*** (entire home, private room, shared room) and examined the correlation with the selected variables (Table 3). (The tables about the correlation results can be found in the dissertation). The number of entire homes was strongly positively correlated with income (0.843) and air transport of passengers (0.797), number of tourists (0.798) and the number of hotel rooms (0.846). The number of private rooms was strongly positively correlated with income (0.732), number of hotel rooms (0.799) and it has the strongest correlation with number of tourists (0.853). Due to the increasing number of tourists and air passengers, I assumed that there is a strong correlation between the Airbnb market and hotel market: one of my hypotheses (H3a) is that *all accommodation types (entire home, private room, shared room) correlate with the number of hotel rooms and the strongest correlation is between the entire homes and the number of hotel rooms*. Based on the results of my correlation analysis (see more in Table 10 in the dissertation), we can conclude that we ***can accept this hypothesis***. Additionally, the strongest correlation is observed between the entire homes and number of hotel rooms. If the number of hotel rooms increase, the number of available entire homes also rise and greater extend that the share of private rooms.

I ran the Pearson correlation analysis and test the factors which correlate with the ***number of multi-listing hosts*** (see more in Table 11 in the dissertation). The strongest correlation can be observed in case of the nights spent at tourist accommodation establishments (Pearson coefficient

is 0.845) and number of hotel rooms (0.881). The results are logical and not really surprising: more guests will result more interest from the accommodation sharing and investors' perspective, given it is a blooming business. From economic angle, income shows strong positive correlation (0.734) meaning increasing income may result increasing number of multi-listing hosts, however, GDP shows a moderate correlation (0.572). One of my sub-hypotheses is that *GDP is negatively correlated with the number of multi-listing hosts*, meaning increase in **GDP causes decrease in the number of multi-listing** hosts. In reference to the moderate correlation, we cannot state the strong relationship between these two variables, therefore, this hypothesis is *rejected*.

One of my main research questions is which factors influence the number of listings on Airbnb. I collected data for the actual Airbnb supply for four consecutive years: 2015- 2018 and first I ran the correlation test for all years (see more in Appendix in the dissertation).

The strongest correlation can be observed in case of the income (the coefficient is above 0.8 in case all years), air transport (passengers) (the coefficient is above 0.77 in case all years), number of hotel rooms (above 0.8) and GDP (above 0.7). This *correlation analysis supports my hypothesis about the existence of the association between Airbnb supply and hotel accommodation supply*. Similarly to my results earlier, higher demand (measured by passengers travel by airplane, number of tourists) results higher Airbnb supply.

**Income and GDP** both highly and positively correlated with Airbnb supply in case of all selected years. Based on this result *we cannot accept our hypotheses* (that *GDP is negatively associated with Airbnb supply* and that *there is strong correlation between income and Airbnb supply*).

*Income is negatively associated with Airbnb supply*). My expectation was strong but negative correlation, namely if GDP or income decreases, Airbnb supply increases. However, the correlation analysis gives us different outcomes. With panel data regression ***I examine this further.***

In my analysis no significant correlation was observed between the unemployment rate and the Airbnb supply. Therefore, based on this result, we cannot accept this hypothesis. (***There is a significant association between unemployment and Airbnb supply.***) I investigated this further.

Weak and negative but not negligible correlation can be discovered in case of the dwelling owners which means if the share of dwelling owners (with and without mortgage) decrease (more people become tenant) the Airbnb supply increase. Its pair variable is the share of tenants where the correlation factors is 0.235- 0.336 which indicates a weak positive correlation with Airbnb supply. My sub-hypothesis is that ***the ownership structure correlates the Airbnb supply: changes in the ownership structure cause change in the Airbnb supply. Based on the correlation analysis, I cannot accept*** this assumption.

I expected to find ***correlation between the average dwelling size and the Airbnb supply*** and I assumed that the higher the dwelling size is the stronger correlation with Airbnb supply. If host has bigger house or apartment there is a higher chance it is rented out via Airbnb. The correlation coefficient is between 0.4- 0.5 regardless of the dwelling size meaning that the ***dwelling size is not significant factor in case of Airbnb supply.***

In case of the Airbnb supply I have data for different years, therefore I applied panel data regression analysis.

### ***Examination of Airbnb supply with panel data regression***

In order to investigate the impact of the selected variables on the Airbnb supply growth, I estimate the following general panel model:

$$Y_{i,t} = \beta_0 + \beta(Econ_{i,t} + Controls_{i,t} + Tourism_{i,t} + Hotel_{i,t} + Owner_{i,t} + Dwell_{i,t} + Dum_{i,t}) + \epsilon_{i,t}$$

where  $Y_{i,t}$  is the Airbnb supply growth,  $\beta_{0i}$  is an unobserved individual fixed effect,  $\beta$  is the matrix of coefficients,  $i$  refers to the individual, and  $t$  denotes a time period ranging from 2015 to 2018.

*Econ* contains GDP and Income at any given year at each region.

*Controls* are control variables (population, unemployment rate in each area for each year). Population is used as a proxy for demographic change and unemployment is used as a proxy for economic activity in a region. These two variables are applied separately in the model.

*Tourism* refers to the variables of air transport of passengers and nights spent at tourism accommodation establishments at any given year at each region. I applied these two variables in the model separately.

*Hotel* is a number of hotel rooms at any given year in each region.

*Owner* category represents the dwelling ownership at any given year at each region. In this category one independent variable is the housing type: owner, with mortgage or loan, also we have a variable about the share of tenants (these are used separately).

*Dwell* meaning the average dwelling size. This is a time fixed variable.

*Dum* category refers to the dummy variables, namely, belonging to eurozone = 1, and 0 if not. “Rich” and “poor” categories are also tested within this category, rich = 1, 0 if not; poor = 1, 0 if not.

First, I tested the ***multicollinearity*** of the chosen variables with a VIF test (variance inflation factor) which showed that income and GDP are not totally independent, which makes sense interpretation wise, therefore I chose to remove income (it has the highest VIF score) from the model. After removing income, I tested it again and there was no significant multicollinearity among the variables. Then I conducted the Hausman test for the above panel estimation model. The  $\text{prob} > \chi^2$  value is 0.0001 and it is not greater than the critical value (0.05). Therefore, I reject the null hypothesis and adopt the fixed effect model for the empirical analysis. Table 4 shows the results of the panel regression with fixed effect model. Due to the nature of fixed effect model it cannot handle the variables where the change over time is really small or not exist at all, therefore, the model cannot pick and test the *dwelling size* variable (we have data for one year) and the dummy variables (belonging to *eurozone* yes or no), therefore I cannot test these variables with this test.

As I assumed, the relationship is significant with the ***air transport of passengers*** meaning that 1 more passenger will lead to an increase of 0.54 in Airbnb supply. It is not surprising, because it also proves the growing popularity of tourism and higher demand contributes to the greater supply.

The correlation is significant with the ***number or hotel rooms***, so my hypothesis regarding this variable is confirmed, namely 1 more hotel room will result an expand of 0.471 Airbnb supply.

The impact of the ***population*** on Airbnb supply is positive and significant. An increase of 1 additional person in population will lead to an increase of 0.013 in Airbnb supply which is again can be explained by the supply demand equilibrium.

I found negative correlation between **GDP** and the Airbnb supply, namely *decrease in GDP can cause increase in Airbnb supply*. It is interesting result that in the regression analysis GDP shows negative correlation with Airbnb supply, although it was positively correlated with it when I checked it independently, without any other variables. Surprisingly, I could not prove significant association between **unemployment rate** and the number of available Airbnb accommodation. I did not find relationship when I tested the Pearson correlation between these two variables, therefore I controlled it with other factors as well. However, I could not find any association between the unemployment rate and the Airbnb supply with this examination either, consequently I *reject* my hypothesis (*there is a significant association between unemployment and Airbnb supply*). The **owner with mortgage** rate and **tenant** rate variables do not show correlation with Airbnb supply either. If we had absolute values about the exact number of unemployed people and precise number how many people have their own dwellings with and without mortgage and how many people rent out apartments or houses with long-term accommodation contracts, the result might have been different. However, the available data did not allow me to measure this at this stage unfortunately.

| VARIABLES           | Airbnb                 |
|---------------------|------------------------|
| Air transport       | 0.540**<br>(0.233)     |
| Hotel rooms         | 0.471***<br>(0.0657)   |
| Unemployment        | 79.19<br>(308.0)       |
| Population          | 0.0135**<br>(0.00547)  |
| GDP                 | -0.207***<br>(0.0541)  |
| Nights spent        | 0.000278<br>(0.000317) |
| Owner with mortgage | -31.04<br>(296.7)      |
| tenant2015          | -54.81<br>(506.4)      |
| Y2015               | -3,672***<br>(1,274)   |
| Y2016               | 38.66<br>(1,022)       |
| Y2017               | 617.8<br>(765.3)       |
| Y2018 (omitted)     | -                      |
| Constant            | -21,332<br>(22,390)    |
| Observations        | 180                    |
| Number of id        | 45                     |
| R-squared           | 0.707                  |

*Standard errors in parentheses*  
\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

*Table 4 Results of panel data regression (own elaboration)*

### ***Stepwise regression analysis in case of entire homes and shared rooms***

The applied stepwise regression analysis belongs to the Ordinary Least Squares (OLS) linear regression, meaning that its model is the following:

$$Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_n x_n + \epsilon \quad \text{for } n \text{ independent variables}$$

In the equation, the betas ( $\beta$ ) are the regression coefficients that OLS estimates.  $\epsilon$  is the error term.  $\beta_0$  is the intercept and  $x$  represents the independent variables. With stepwise regression analysis I examined which variables have impact on the number of entire homes and private rooms. The dependent variables ( $Y$ ) are the number of available entire homes and number of available private rooms. The independent variables are the following: GDP, Unemployment rate, Air transport of passengers, Population, Number of tourists, Number of hotel rooms, Housing type: Owner, with mortgage or loan, Housing type: tenant and Dwelling size (I built three categories based on this: ‘small’, ‘average’ and ‘big’ dwellings. ‘Small’ dwelling category is less than 50 square meters, ‘average’ is between 50 and 100 square meters and ‘big’ category is above 100 square meters).

First, I tested multicollinearity among dependent variables. Based on its outcome, I excluded the unnecessary variables and ran the stepwise regression with backward selection method for both selected dependent variables.

My third main hypothesis is that ***the effect of increasing tourism*** (measured by number of tourists, air transport of passengers and number



of hotel rooms) ***is more significant in case of available Airbnb entire home supply than private room supply.*** The test results (the test can be found in the dissertation) show that the number of entire homes mainly depends on the tourism related variables. According to the results of stepwise the number of available private rooms are explained by different variables (mainly control variables and GDP also is considerable). Based on this I accept my ***hypothesis*** that the effect of increasing tourism is more significant in case of number of available Airbnb entire homes than private rooms.

### ***Examination of belonging to Eurozone and Airbnb regulation by nominal by interval relationship***

One of my hypotheses is that ***belonging to Eurozone significantly affects the number of booked Airbnb accommodation, the number of multi-listing hosts and the Airbnb supply.*** This relates to my assumption that there are regional differences on Airbnb market. I assume that guests prefer the cities where they do not need to exchange currency or they can invest in Euro. For this examination I applied nominal variables and I measured it with nominal by interval relationship. In this test I measure the association with Eta. The conducted test shows that Eta is close to 0 in case of all main variables, meaning that Eurozone nominal variable does not correlate with all of them and do not have an effect on the examined variables. Consequently, according to this examination, I ***cannot accept*** my hypothesis that ***belonging to Eurozone significantly affects the Airbnb supply.*** Due to the fact that short-term accommodation sharing market and Airbnb is quite new, at this stage I could not apply the time variable (before and after the selected areas joined to Eurozone) and

measure it with other method for instance difference-in-difference analysis.

I ran this test for the Regulation nominal variable too. I assume that if the Airbnb market is regulated in the selected cities, it has effect on the supply. In this test Eta does not show any correlation between the regulation and the selected variables. Based on this result, at this point I ***reject*** the hypothesis that ***Airbnb market regulation affects the Airbnb supply*** and regulation does not have effect on share-of multi-listing hosts, or the number of available accommodation type. In case of cities where the local governments have already implemented law about short-term accommodation sharing, it would be great to compare the number of available Airbnb homes before and after the year of regulation and it is good starting point for future research.

The final results of the hypothesis examination can be found in Table 5.

|                |   |  |
|----------------|---|--|
| Hypothesis (1) | We can identify regional differences on Airbnb market in Europe.  | FALSE                                  |
| Sub-hypotheses | <p><i>Sub-hypothesis 1a:</i> GDP is negatively associated with Airbnb supply.</p> <p><i>Sub-hypothesis 1b:</i> GDP and income are negatively correlated with share of multi-listing hosts.</p> <p><i>Sub-hypothesis 1c:</i> Belonging to Eurozone affects significantly the number of booked Airbnb accommodation, the number of multi-listing hosts and the Airbnb supply.</p>   | <p>TRUE</p> <p>FALSE</p> <p>FALSE</p>  |
| Hypothesis (2) | Changes in economic and market conditions have strong impact on Airbnb penetration.   | FALSE                                  |
| Sub-hypotheses | <p><i>Sub-hypothesis 2a:</i> There is a strong correlation between income and Airbnb supply. Income is negatively associated with Airbnb supply.</p> <p><i>Sub-hypothesis 2b:</i> There is a significant association between unemployment and Airbnb supply. Unemployment is positively associated with the number of available accommodations on Airbnb.</p> <p><i>Sub-hypothesis 2c:</i> Short-term accommodation market regulation strongly affects the Airbnb supply.</p> | <p>FALSE</p> <p>FALSE</p> <p>FALSE</p> |
| Hypothesis (3) | The effect of increasing tourism is more significant in case of available entire home supply than private room supply   | TRUE                                   |
| Sub-hypotheses | <p><i>Sub-hypothesis 3a:</i> All accommodation types (entire home, private room, shared room) correlate with the number of hotel rooms and the strongest correlation is between entire homes and the number of hotel rooms.</p> <p><i>Sub-hypothesis 3b:</i> There is a correlation between hotel accommodation supply and Airbnb supply and the growth in hotel rooms supply is positively associated with the growth in Airbnb supply.</p>                                  | <p>TRUE</p> <p>TRUE</p>                |

|                |  |              |
|----------------|--|--------------|
| Hypothesis (4) | The housing situation (such as tenure status: owning or renting a property and average size of dwelling) significantly affects the Airbnb market.  | FALSE        |
| Sub-hypotheses | <i>Sub-hypothesis 4a:</i> There is a correlation between the average dwelling size and the Airbnb supply. The higher the dwelling size is the stronger correlation with Airbnb supply. If host has bigger house or apartment there is a higher chance it is rented out via Airbnb. | <i>FALSE</i> |
|                | <i>Sub-hypothesis 4b:</i> The ownership structure correlates the Airbnb supply: changes in the ownership structure cause change in the Airbnb supply.  | <i>FALSE</i> |

*Table 5 Results of the hypothesis analysis (own elaboration)*

## 6. CONCLUSIONS, RECOMMENDATIONS

Based on the results of my examination I cannot state that there are regional differences among different cities on Airbnb market in Europe. Although, I have found minor negative correlation between GDP and the Airbnb supply, namely decrease in GDP can cause increase in Airbnb supply, my other two sub-hypotheses need to be rejected. In case of the share of multi-listing hosts, I assumed that in cities with higher GDP the accommodation sharing is ‘real’ so they share their spare rooms and spaces and in municipalities with less income we have more multi-listings hosts. However, GDP correlated moderately and income shows strong positive correlation with the share of multi-listing hosts, therefore I have concluded that increasing income may result growing number of multi-listing hosts, consequently, I cannot accept my hypothesis. My assumption regarding belonging to Eurozone is also rejected, because I

have not found correlation between this variable and the Airbnb supply, the number of booked Airbnb accommodation and the number of multi-listing hosts.

The second hypothesis, that changes in economic and market conditions have strong impact on Airbnb penetration, also needs to be rejected. Income of households highly and positively correlated with Airbnb supply in case of all selected years. Based on this result I cannot accept the hypotheses (although there is a strong correlation between income and Airbnb supply, income not negatively associated with Airbnb supply as I assumed). Furthermore, I cannot prove association between the unemployment rate and the number of available Airbnb accommodation. Neither the simple correlation analysis nor the panel data regression analysis do show association. The reason behind this can be that unemployment rate does not really matter in case of Airbnb supply and people (hosts) participation in the short-term accommodation sharing for other purposes. It would be exciting to examine with exact data (not ratio data); however, in case of the examined 45 cities the actual number were not available. In terms of Airbnb regulation, the selected methodology has not found connection between the regulation and the number of available accommodations.

My third hypothesis is that the effect of increasing tourism is more significant in case of available entire home supply than private room supply. Looking at the share of short-term accommodation types, much more entire homes are available on Airbnb than private rooms. Originally (and theoretically), the sharing economy is the share of excess capacity. It does not mean that we should buy more products or build more buildings so that they can be rented out on the short-term accommodation market, it means that we should rent out our existing “extra” which is already ours.

However, data shows (Fig 12 in the dissertation) that investment into apartments is a flourishing business. There can be specific reasons behind this (for instance interest rate is low and it is not worth to have savings account and/or this is the best investment option) but this is also a trend. Therefore, I have assumed that the impact of growing tourism is more significant in case of entire homes. First, I examined it with correlation analysis. I found that the selected tourism variables (I measure it by number of tourists, air transport of passengers and number of hotel rooms) are all correlated with the number of available entire homes and shared rooms as well. In case of the hotel rooms, if its number increases, the Airbnb supply increases and the number of available entire homes also rises and by greater extent than the share of private rooms. The difference between entire homes and private rooms is not significant but taking into consideration that the highest share of available accommodations are entire homes it can be concluded that more hotel rooms can cause more available entire apartments (in share and number more than shared rooms or private rooms). This was examined by stepwise regression analysis as well where the results strengthen my previous results and confirmed my hypothesis, namely increasing tourism is more significant in case of available entire home supply than private room supply.

My last assumption is that the housing situation (such as tenure status: owning or renting a property and average size of dwelling) significantly affects the Airbnb market. My test results show that weak and negative but not negligible correlation can be discovered between the dwelling owners and Airbnb supply which means if the share of dwelling owners (with and without mortgage) decreases (more people become tenant) the Airbnb supply increases. Its pair variable is the share of tenants where the

correlation coefficient indicates a weak positive correlation with Airbnb supply, meaning that the share of tenant increases, the Airbnb supply also increases. Given that these numbers show very weak correlation, I cannot accept my sub-hypothesis. Additionally, the panel regression does not show any impact on Airbnb supply either. Furthermore, I assumed that the higher the dwelling size is the stronger correlation with Airbnb supply. If a host has bigger house or apartment there is a higher chance it is rented out via Airbnb. However, during my test I have not found connection between the dwelling size and the Airbnb supply. Similarly, to my methodology related assumption at unemployment rate, I used ratio data (that was available) not exact numbers which may have an influence the outcome. Also, it can mean that the Airbnb market size depends on other factors.

To summarize the findings, general consequence is that the demand related factors (such as number of tourists, passengers carried by air transport, number of hotel rooms), GDP and income showed correlation, but unemployment rate, average dwelling size, ownership structure did not demonstrate relationship with Airbnb supply.

Although, other literatures have different outcome, my analysis proves that Airbnb is a blooming business everywhere regardless the geographical location and economic circumstances. It has an impact on real estate market that influences the quality of life of local residents. More and more investments go into the short-term accommodation market that has an effect on apartment selling and long-term renting prices, meaning that inhabitants can enter to the real estate market much harder. Based on my findings I agree with Mi and Coffman (2019) who said that the sharing economy has the potential to enhance the necessary shift from our current consumption behaviour towards a sustainable

model and support the Sustainable Development Goals (SDGs), however additional governmental support and control would be highly recommended. Although, I have not found correlation between Airbnb regulation and Airbnb supply, I assume that law and governance control can enhance a fair and transparent operation, therefore further investigation needed on this area. For instance, price cap in case of long-term accommodation sharing or dwelling selling prices would allow people who have less to purchase an own house or apartment and not only wealthy investors could have the possibility to buy more and more apartments so that it could be rented out via Airbnb. Furthermore, the maximum number of entire homes by the same owner should be regulated as it also contributes to higher renting and selling prices.



## 7. NEW SCIENTIFIC RESULTS

- My examination is novelty in terms of regional analysis. The study of Airbnb phenomenon in “richer” and “poorer” municipalities is a new area and it includes several future research possibilities. Although, based on my results, I cannot accept my hypothesis that there are regional differences, it has confirmed that the trend of thriving Airbnb is the same on city level apart from its economic and social dissimilarities.
- I found that more and more entire homes are available on the Airbnb market, and although Airbnb originally rented out spare rooms, this trend has changed and due to the growing number of tourists and travellers, hosts invest in entire homes, they do not share their existing extra places. From this perspective it does not contribute to the responsible consumption and production.
- The supply demand equilibrium can be followed nicely on Airbnb market: more guests will result more interest from the accommodation sharing and investors’ perspective, resulted in a blooming business.
- I did not find correlation between the dwelling size and Airbnb supply. I assumed that higher the dwelling size is, higher the chance it will be rented out but my analysis showed that the size does not matter.
- I assumed that changes in housing conditions such as in ownership with or without mortgage and changes in the share of tenants with long-

term contracts have an effect of Airbnb supply. I expected that more tenants and more owners with loan result higher number of available Airbnb accommodations, however, I did not find correlation and relationship between these factors.

- Airbnb is growing due to the general factors of market growth and social and environmental factors are less important. Increasing number of tourists, number of hotel rooms and growing number of passengers carried by air transport are the most important determinants behind its expansion. It contributes to the economic growth but does not support the locals who are not hosts.

## 8. LIST OF AUTHORS' PUBLICATION IN THE FIELD OF THE DISSERTATION

List is retrieved from:

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Data is up-to-date until 06/12/2019

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