



# Measuring non-commercial tourism traffic in Croatia: Challenges of using administrative data

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## Abstract

National statistical authorities are under pressure to provide reliable and readily accessible data with minimum costs and respondent burden. To this end, a use of administrative data, defined as those not primarily collected for statistical purposes, is increasingly encouraged to supplement sample and census surveys. In this paper, a possibility to produce new statistics by combining several sources where at least one is the administrative data is tested. This exercise was applied to measure a volume of tourists (residents and non-residents) staying in non-commercial accommodation facilities in Croatia. Four data sources were analysed: (i) administrative data from eVisitor system, a unique online central information system for tourists registration in Croatia that provides insights into tourist traffic and accommodation capacities (commercial and non-commercial), (ii) Croatian Bureau of Statistics Survey on Tourist Activity of the Croatian population, that provides information on number of domestic trips and nights in commercial and non-commercial accommodation establishments, (iii) Croatian National Bank Survey on foreign visitors in Croatia, that estimates number of foreign tourist nights in Croatia in, both, commercial and non-commercial type of accommodation, and (iv) administrative data from Tax Register on paid taxes on second homes – holiday houses and apartments. The results clearly demonstrated that two survey-based data sources and the administrative one regarding the second homes taxes had not provided a quality foundation to improve the current estimations of tourist traffic in non-commercial accommodation provided by the eVisitor system.

**Keywords:** administrative data sources, non-commercial accommodation, tourism statistics, tourists' overnights.

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## Introduction

During the last decades national statistical authorities are coming under increasing pressure to provide high quality statistics that accurately and reliably portray reality, that are comparable across regions and countries, and that are readily accessible by a large number of users. Additionally, statistical authorities are asked to focus to increasing effectiveness and efficiency of their recourses. At the same time, the burden on respondents to statistical surveys should be decreased and limited to what is necessary. Given these, somewhat contradictory requirements, statisticians are increasingly being forced to replace direct statistical data collection with new approaches. Supported by the United Nations Economic Commission for Europe (UNECE), the administrative sources have become the valuable alternative to the traditional survey approach in data collection (UNECE, 2011). In the last years, proactive efforts are made to use administrative data sources as an additional source to data collected from samples and census surveys (Cerroni, Di Bella, Galiè, 2014). The application of administrative sources has partly been encouraged and supported by technological advances during the last decades as well (Nordbotten, 2010).

The definition of administrative sources/data has also been evolved from that used by Brackstone (1988) to the one proposed recently by UNECE (2011) that is taking the terms “administrative sources” and “secondary sources” as the synonyms. The proposed definition is: “Administrative sources are data holdings containing information which is not primarily collected for statistical purposes” (UNECE, 2011).

As the importance of tourism industry is steadily growing worldwide (World Tourism Organization, 2019), at least prior to the COVID-19 crisis, there is also a growing need for data describing tourist activity. It is therefore not surprising that the use of administrative sources in tourism statistics today occupies the interest of many scholars. Some authors (Delaney, MacFeely, 2014) used administrative registers and business statistics in order to define a new set of tourism supply-side indicators at both national and sub-national level, such as a monthly tourism production index. The others, such as Demunter (2017) and Volo (2018) go a step further and introduce big data into tourism statistics, while Pan and Yang (2017) have already exercised the use of big data for monitoring and forecasting tourist activity. Despite numerous applications of administrative data into the system of tourism statistics, scholars also emphasize the heterogeneity in data collection between countries and the need to harmonize the use of different data sources (Antolini, Grassini, 2020).

The use of administrative sources in tourism statistics occupies also the interest of the international organizations that focus on the development of tourism statistics. The United Nations Statistics Division (UNSD) places great emphasis on the administrative data sources while supporting development of national system of tourism statistics worldwide (United Nations Statistics Division, 2010), while experts, discussing pros and cons of the administrative data are arguing that the use of such

data is in line with the United Nations fundamental principle of the official statistics (Laimer, 2010).

Eurostat, as the statistical office of the European Union, is also highly supporting better use of administrative data in the production of official statistics. The latest support has been through the European Statistical System (ESS) Vision 2020 ADMIN series of projects from 2013 (Eurostat, 2020), aiming at capacity building of national statistics offices in administrative data. Among them, the Eurostat grant agreement ESS.VIP on administrative sources (ESS.VIP. BUS. ADMIN) was focused on the Activity 1 - Tourism data with a specific objective of producing new statistics by combining several sources where at least one is administrative data.

Within this Activity, this paper is presenting the results of the analysis of several administrative and statistical data sources suitable for the estimation of number of residents and non-residents staying in non-commercial, i.e. non-rented, accommodation facilities in order to produce statistical outputs in line with the Regulation (EU) No. 692/2011, Annex I, Section 4 (European Commission, 2011). New data sources were identified and analysed in order to improve the coverage of the administrative data in the segment of non-commercial accommodation, both, from the supply and demand side. The analysis was conducted on the case of Croatia where administrative data is one of the main data sources for tourism statistics since 2016, primary for the occupancy and capacity of commercial tourist accommodation. The research question was therefore twofold. First, what is the coverage of the existing administrative data source in the segment of non-commercial tourist accommodation? Second, to what extent do new administrative source(s) and the existing statistical surveys provide an opportunity to improve the coverage of the existing administrative source in the segment of non-commercial tourist accommodation?

The second chapter of the paper is giving a brief review on the use of administrative data, followed by a thorough description of data sources used in this exercise and the methodological framework applied for measuring volume of residents and non-residents staying in non-commercial accommodation in Croatia. The fourth chapter presents the results of the analysis and illustrates similarities and discrepancies between the different data sources used, while the final chapter gives short conclusions and implications, and suggests further steps in better use of administrative data in tracking tourism flows in the non-commercial accommodation facilities.

## **Administrative data sources**

Collection of administrative data is usually not in line with the statistical standards and requirements and therefore statistical pre-processing and quality evaluation are needed before data can be used (Cerroni, Di Bella, Galiè, 2014). Many authors and international statistics organizations (European Commission, 2017, Laimer, 2010, Perko, 2019, United Nations Statistics Division, 2010) agree that disadvantages of the administrative data are often due to a discrepancy between administrative and statistical concepts. Secondly, and related to the first, the administrative data owners have focus on administrative process not the statistical one, causing usually the mismatch between the administrative and statistical unit. Thirdly, the administrative data may be subject to change (e.g. effects of legislative change on continuity of administrative data) causing eventually an unacceptable delay in data collection/publication. Finally, there is often a lack of documentation on processing and quality of administrative data.

Despite the listed issues that are evaluated as solvable, there are a numerous advantage of using administrative data that should be noted, as stated by majority of authors in the field. The primary advantages of the administrative data are costs savings and lower burden on respondents. The second important advantage is that the administrative data is timelier and, therefore, a production of the statistics is quicker. Related to the reductions in cost and response burden, a further advantage is that statistics could be produced more frequently, with no extra burden. Other important advantage is better, often complete coverage of the target population and very low non-response rate.

Hand (2018) gives a thorough review of statistical challenges of administrative and transaction data and concludes that despite many official and economic statistics are based on administrative data, or on a combination of administrative and survey data, there is still "no a substantial literature in the leading methodological statistical journals describing the statistical challenges and how to overcome them" (Hand, 2018).

The main results of the 64 reports under the ESS Vision 2020 ADMIN grants (Eurostat, 2020) pointed to the certain data deficiencies and data gaps of the administrative sources, and the need of thorough analyses of the administrative data sources and their mapping to statistical requirements. The key lessons learned concerning the use of administrative data were: (i) close and continuous collaboration with the administrative data owners is crucial, (ii) an inventory of administrative (or other) sources and the detailed assessment of the characteristics of those sources should be the first step, and (iii) in addition to 'traditional' administrative sources like population registers, tax and social security data, many other sources may and should be used for statistical purposes.

In summary, there are still many lessons to be learned about the use of administrative data as a source in the production of official statistics. Measurement of the quality of administrative data sets is very important for statisticians and the most effective methods for use of administrative data are still needed. In line with that, and following the steps suggested in the literature, this paper is presenting assessment of the existing administrative data source in a production of new tourism statistics, i.e. data concerning non-rented accommodation in Croatia. However, it should be noted that, according to the European regulations (European Commission, 2011), these data are still collected on a voluntary basis. Furthermore, there is no evidence of similar attempts listed in the literature.

## Data and methods

To test the use of administrative data in measuring non-commercial tourism traffic in Croatia, multiple data sources were assessed: two administrative data sources, and two survey type data sources. Written agreements with data owners were provided in order to access the microdata. The administrative sources cover: (i) eVisitor system, i.e. the central electronic system for checking in and checking out tourists in the Republic of Croatia, and (ii) Tax Administration (TA) data concerning the taxes on second homes. Survey type data sources are: (i) Croatian Bureau of Statistics (CBS) Survey on Tourist Activity of the Population of the Republic of Croatia, and (ii) Croatian National Bank (CNB) Survey on expenditures of foreign visitors in Croatia. The data sources are described in the following subchapters with focus on data concerning supply and demand side in non-commercial accommodation.

## eVisitor system

The eVisitor system has officially become the central electronic system for checking in and checking out tourists in the Republic of Croatia since 1st of January 2016. It is based on the legal obligation and regulations for the registration and check-out of guests staying within the territory of Croatia and enables the automation and control of the collection of overnight tourist taxes, in both, commercial and non-commercial accommodation facilities. The eVisitor is also a unique online information system that provides insight into tourist traffic (number of tourist arrivals and overnights) and accommodation capacities (commercial and non-commercial) in Croatia. It generates statistical reports and marketing indicators in real time (i.e. length of stay, location, gender, age, country of residence, type of facility, destination, etc.), which enables more efficient monitoring of tourist traffic and revenues, allowing better control over the collection of accommodation fees creating a synergistic effect of all Croatian tourism stakeholders and contributes to ensuring their competitiveness.

Establishing and running the eVisitor system is the responsibility of the Croatian National Tourist Board (CNTB). It is worth mentioning that the eVisitor system was awarded by UNWTO as the third best innovation in the world among 128 registered innovations from 55 countries in 2018.

The eVisitor system has a variety of users: more than 300 tourist offices, more than 100,000 different accommodation providers, CNTB, Ministry of Tourism and Sports, Ministry of Public Administration, Ministry of Interior Affairs, Customs Administration, Tourism Inspection and CBS. These institutions can use data from the eVisitor system for realization of their legally set tasks without additional administrative requirements or barriers. Also, CBS has a legal framework that gives the right to access the administrative data needed to meet obligations under European statistical legislation. Furthermore, one of the main activities of CBS on improving statistical system is strengthening the role of administrative data sources for statistical purposes. The introduction of eVisitor system, as a central system for checking in and checking out tourists in Croatia, influenced the main CBS's method of conducting the statistical survey on accommodation capacities and their occupancy. In 2016, CBS has collected data for survey on the accommodation capacities and their occupancy from two sources, the first being survey on tourist accommodation establishments and the second one being the eVisitor system. Because of all the benefits provided by the eVisitor, since 2017 CBS has been taking over data on tourist traffic (the number of tourist arrivals and nights) and accommodation capacities exclusively from CNTB, extracting them from the eVisitor system, and further processing them statistically (Croatian Bureau of Statistics, 2019). The accommodation statistics concerning rented accommodation (capacity and occupancy) in Croatia is therefore completely based on the administrative data source, and it is in line with the European regulations (European Commission, 2011).

Within the eVisitor system there is also a tourist registry for the owners of summer houses and apartments who are obliged to register (check-in and check-out) all persons spending nights in such house or apartment. In addition, every citizen of a tourist town/municipality has an obligation to check in tourists staying in their house or apartment. Both, owners of a summer house/apartment and citizens are obliged to check-in all persons staying in their property within 24 hours of their arrival.

However, it should be noted that not all overnights in non-commercial accommodation have to be registered in the eVisitor since not all owners of non-commercial accommodation are obligated by legal Sojourn Tax Act to check-in/check-out the tourists in the eVisitor system. For example, the citizens of a tourist

town or municipality are not obligated to check-in close family members/relatives when staying in the house.

## **Tax Administration data**

Tax Administration is the administrative organization within the Ministry of Finance whose basic duty is to implement tax regulations and regulations concerning the payment of obligatory contributions. The successful introduction of TIN as unique identifier of each person in the Croatian legal system preconditions data exchange between different public authorities, including TA and other public authorities. TIN allowed the official records of public authorities on persons and property interrelate and exchange information based on established and well-defined agreements and protocols.

Tax Administration has information about each person who has obligation to pay taxes on second homes for vacation, i.e. holiday homes. These are in fact the owners of non-commercial accommodation establishments.

Technical frameworks, and secure data transmission channels were developed and applied between TA and CBS in order to be able to merge TA and eVisitor data. Tax Administration data included: name of the owner of the non-rented establishments, TIN, address of the establishments, and the size of the establishments. However, TA does not cover all territory of Croatia because the tax on second homes (house/apartment) used for vacation is a local tax. Each municipality can decide whether to have that tax, as well as who will be responsible for the tax collection. Tax Administration collected tax on second homes for only 37.2% of all municipalities in Croatia in 2018.

## **Croatian Bureau of Statistics Survey on Tourist Activity of the Population of the Republic of Croatia**

The purpose of the statistical survey Tourist Activity of the Population of the Republic of Croatia is to gather data on national tourism, that is, the data on the number and characteristics of travels of the Croatian population outside their usual environment. The goal is to assess to what extent does the Croatian population travel, their reasons for going on a trip, where and when they travel, how long do the trips last and what the trip expenditures amount to. For the surveyed persons who did not go on a private trip with overnight stays, the data on the reasons for not going on a trip were gathered.

The data on tourist activity of the Croatian population in 2018 were gathered through telephone interviews with computer support (CATI method) on a representative sample of a total of 22 000 Croatian citizens aged 15 and over. The data were gathered by carrying out four waves of CATI research. A quarter is taken as the reference period.

The characteristics of trips are monitored on the level of three overnight stays and three same-day visits as the upper limit. The following data are gathered for each individual trip: type of trip (private, business/professional), the main reason for going on the trip, the month in which the person went on the trip, the duration of the trip with overnight stays (the number of nights), the destination country for trips abroad, the organisation of the trip (self-organised, through an agency), the main transportation vehicle, the type of accommodation on trips with overnight stays, the number of persons for which expenditures are presented, the trip expenditures, the structure of expenditures on trips with overnight stays. Data are also gathered on the

socio-demographic profile of the population (age, sex, level of education, number of persons in the household, status in employment, county).

The CBS Survey collects data on number of domestic trips and nights in commercial and non-commercial accommodation establishments. Regarding the non-commercial accommodation establishment, CBS Survey distinguishes the following types of accommodation: (i) Own holiday home (second home), house or apartment, (ii) Accommodation provided free of charge by relatives or friends (VFR), and (iii) Other non-rented accommodation including accommodation on non-commercial boats (personally owned or owned by friends or relatives).

## **Croatian National Bank Survey on expenditures of foreign visitors in Croatia**

Croatian National Bank is one of the institutions designated as a producer of official statistics of the Republic of Croatia. One of the main data sources concerning the tourism statistics in Croatia is CNB's survey on expenditures of foreign visitors in Croatia. The survey is conducted on a big sample of foreign visitors exiting Croatia on numerous border crossings (road and air). Data are collected from visitors by personal interview (CAPI). The focus of the CNB survey is to estimate total incoming tourist consumption in Croatia for the purpose of calculating the National Accounts in the segment of export of services. The survey content is therefore focused on tourism consumption variables and other variables necessary for describing the tourism demand segments (type of accommodation, length of stay, main purpose of the trip, travel party and country of citizenship as well as country of permanent stay).

Based on the survey, CNB estimates number of foreign tourist nights in the Republic of Croatia according to type of accommodation, depending on whether a foreign tourist has paid or not for the accommodation.

Regarding the type of non-commercial (non-paid) accommodation establishment, CNB Survey on expenditures of foreign visitors in Croatia distinguishes the following types of accommodation, in line to CBS Survey on Tourist Activity of Croatian residents: (i) Own holiday home (second home), house or apartment, (ii) Accommodation provided free of charge by relatives or friends (VFR), and (iii) Other non-rented accommodation including accommodation on non-commercial boats (personally owned or owned by friends or relatives), motor vehicle and other.

## **Methodological framework**

The methodological framework for the analysis of administrative data and other secondary data sources in order to produce data on residents and non-residents staying in non-commercial accommodation consisted of two major steps: (i) the first step was focused on estimate of the eVisitor coverage of tourism demand in the segment of non-commercial accommodation establishments based on the use of two secondary survey type data sources (CBS and CNB surveys); (ii) the second step was focused on eVisitor coverage of tourism supply in the segment of non-commercial accommodation establishments examining the possibilities of combining two administrative data sources (eVisitor and TA data on second/holiday home taxes).

Regarding the eVisitor coverage of tourism demand in the segment of non-commercial accommodation, four main variables have been analysed: (i) number of tourist arrivals to non-commercial accommodation, (ii) number of trips with stay at

non-commercial accommodation, (iii) number of overnights in non-commercial accommodation, and (iv) type of non-commercial accommodation.

Visitor data were compared to the estimates from CBS survey (residents) and the estimates from CNB survey (non-residents). Due to comparison of different data sources, there were some methodological issues and, therefore, some necessary assumptions were needed in order to enable the comparison:

- Number of arrivals of residents to accommodation establishment (eVisitor variable) is comparing to the number of trips within Croatia (domestic trips in Croatia) (CBS survey variable);
- The eVisitor variable referring to the type of non-commercial accommodation 'at resident's house or apartment' is comparing to 'accommodation provided free of charge by relatives or friends' (CBS and CNB survey variables);
- The analysis focused on two types of non-commercial accommodation only since they cover most of the tourist traffic in the non-commercial accommodation segment ('own holiday home/second home' and 'accommodation provided free of charge by relatives or friends/VFR');
- The final estimates are based on the analysis of tourist (residents and non-residents) overnights since only the annual data on tourism nights in non-commercial accommodation should be transmitted (on optional bases) to the Eurostat, according to the Regulation (EU) No. 692/2011.

In comparison of two administrative data sources with the aim to estimate eVisitor coverage from the supply side, certain inconsistencies were detected such as missing codes for city/municipality in some of the eVisitor/TA records, differences in codes between the eVisitor and TA records, and differences in formats of property address between the eVisitor and TA records. Therefore, some assumptions were made in order to enable further analysis and merge of the two data sources:

- Merge of eVisitor and TA records was done based on TIN and city/municipality name;
- Duplicate records (by TIN and city/municipality name) were omitted.

## Results

The results on the eVisitor coverage of data on domestic (resident) arrivals and overnights in non-commercial accommodation (Table 1) are pointing to the following conclusions: (i) eVisitor is underestimating the total number of domestic arrivals and overnights in non-commercial accommodation since the eVisitor coverage is 8% of all arrivals and 52% of all overnights that are estimated by CBS survey; (ii) the coverage of overnights is not underestimated in the segment of own holiday home; on the contrary there is slightly more overnights recorded in the eVisitor; (iii) the coverage of overnights is highly underestimated in the segment of VFR (accommodation provided free of charge by relatives or friends); (iv) the coverage of arrivals is highly underestimated in both types of non-commercial accommodation facilities.

The reason for the exact coverage/slight over coverage of eVisitor data in the segment of own holiday home could lie found in the following. The owners of a summer house or apartment and the citizens of a tourist town or municipality are obligated by law to check-in the following data of tourists staying in their house or apartment: Surname and first name; Place, country and date of birth; Citizenship; Type and identification document reference number; Place of residence (temporary residence) and address; Date and time of arrival, i.e. departure from the facility; and Sex. The entered data is based on the information listed in the identity card or some other travel identity document that provides required information on a tourist. If all



data are entered correctly, the eVisitor system will successfully authenticate tourist's data to the system. A problem could arise if Croatian citizens temporarily working abroad decide to register in the eVisitor system with the Croatian identity card. In that case place of residence and address will not be register correctly, in line with the EU Regulation 692/2011 (i.e. they will be recorder as domestic tourists, instead as foreign tourists).

Table 1 eVisitor coverage of domestic (resident's) arrivals and overnights in non-commercial accommodation establishments in Croatia in 2018

Data source	Type of non-commercial accommodation	Number of domestic arrivals in non-commercial accommodation	Number of domestic overnights in non-commercial accommodation
CBS Survey	Total	1,818,522	11,308,496
	Own holiday home, second home	664,354	5,670,682
	Accommodation provided free of charge by relatives or friends	1,154,168	5,637,814
eVisitor	Total	141,531	5,921,673
	Own holiday home, second home	129,078	5,711,306
	Accommodation provided free of charge by relatives or friends (at resident's house or apartment)	12,453	210,367
eVisitor coverage according to CBS survey	Total	7.8%	52.4%
	Own holiday home, second home	19.4%	100.7%
	Accommodation provided free of charge by relatives or friends (at resident's house or apartment)	1.1%	3.7%

The results on the eVisitor coverage of data on foreign (non-resident) overnights in non-commercial accommodation (Table 2) are pointing to the following conclusions: (i) eVisitor is underestimating the total number of non-resident overnights in non-commercial accommodation since the eVisitor coverage of CNB estimates of total overnights is 13%; (ii) the coverage of overnights is highly underestimated in both types of non-commercial accommodation.

Table 2 eVisitor coverage of foreign (non-resident) overnights in non-commercial accommodation establishments in Croatia in 2018

Data source	Type of non-commercial accommodation	Number of foreign overnights in non-commercial accommodation
CNB Survey	Total	52,335,984
	Own holiday home, second home	36,312,038
	Accommodation provided free of charge by relatives or friends	16,023,946
eVisitor	Total	6,669,827
	Own holiday home, second home	5,146,515
	Accommodation provided free of charge by relatives or friends (at resident's house or apartment)	1,523,312
eVisitor coverage according to CNB survey	Total	12.7%
	Own holiday home, second home	14.2%
	Accommodation provided free of charge by relatives or friends (at resident's house or apartment)	9.5%

The results on the total coverage of eVisitor data on overnights in non-commercial accommodation (Table 3) are pointing to the following conclusions: (i) eVisitor is underestimating the total number of overnights in non-commercial accommodation since the eVisitor coverage of CBS and CNB surveys' estimates on total overnights is 20%, and (ii) the coverage of overnights is highly underestimated in both types of non-commercial accommodation, although the level of underestimation is even higher in the segment of VFR, as expected.

Table 3 eVisitor coverage of all (resident and non-resident) overnights in non-commercial accommodation establishments in Croatia in 2018

Data source	Type of non-commercial accommodation	Number of overnights in non-commercial accommodation
CBS Survey + CNB Survey	Total	63,644,480
	Own holiday home, second home	41,982,720
	Accommodation provided free of charge by relatives or friends	21,661,760
eVisitor	Total	12,591,500
	Own holiday home, second home	10,857,821
	Accommodation provided free of charge by relatives or friends (at resident's house or apartment)	1,733,679
eVisitor coverage according to CBS and CNB surveys	Total	19.8%
	Own holiday home, second home	25.9%
	Accommodation provided free of charge by relatives or friends (at resident's house or apartment)	8.0%

The underestimation of the eVisitor data on, both, resident and non-resident overnights in the segment of non-commercial accommodation is, at least, the consequence of the following facts:

- Not all overnights (such as overnights at close family members) in non-commercial accommodation have been obliged by law to be recorded in the eVisitor;
- Since there is a possibility for accommodation provider of non-commercial accommodation to pay a lump sum tax for the overnights, the provider is not obliged to record the exact number of overnights;
- The quality of the eVisitor data in the segment of non-commercial accommodation depends mostly on the discipline of an accommodation provider to register persons staying at that accommodation establishments, and the operation of authorities supervising that process.

Tax Administration data set on tax on second homes used for vacation recorded 67,972 records (note that the coverage of TA data is 37% of all municipalities in Croatia). Among them, there were 113 completely identical records (duplicates) in the data base. Further, there were 1,208 persons/taxpayers owning two or more objects in the same municipality. Only the unique records from TA (65,409 records with single occurrence of TIN\*municipality) were merged with eVisitor base. The merge resulted in total of 67,045 records. Again, there were some multiple records for the same person in the same county.

There are several reasons for multiple occurrences of a person owing properties in the same municipalities in the eVisitor base. For example, a subject has 5 entries for 3 different addresses. Obviously, the same object appears twice, once as a commercial accommodation and once as a non-commercial accommodation. It

was not possible to connect object from the TA database with the object in the eVisitor. In addition, in the eVisitor base the same object has two different versions of the same address. The same holds for most of multiple entries in the eVisitor data base. Again, only single records (by TIN and municipality) were used in the further analysis (a total of 63,850 records).

Merging the eVisitor data (supply side) of non-commercial accommodation with TA data (for those municipalities for which TA provides data) resulted in the following:

- Only 3% of all accommodation units registered in TA are registered in the eVisitor data base as commercial accommodation;
- 16% of all accommodation units registered in TA are registered in the eVisitor data base as non-commercial accommodation;
- 81% of all accommodation units in TA are not registered in the eVisitor (98% of units in the Continental Croatia and 67% of units in the Adriatic Croatia).

## Conclusions and implications

This paper presents, to the best of the authors' knowledge, a pioneering effort in estimating the volume of non-rented accommodation within the system of tourism statistics. The results of the conducted analysis pointed out that the eVisitor data underestimate the total number of overnights realized at non-commercial accommodation, mostly for the non-resident tourism demand, and the VFR segment. However, prior to deriving new variables on the number of overnights in non-commercial accommodation based solely on the two surveys, a more thorough analysis of the survey data regarding, both, spatial and temporal distribution of data is required, taking into account the precision of the surveys' estimates.

Further, the merge of the two administrative sources (eVisitor and TA data) in order to increase the coverage of non-commercial accommodation capacity of the eVisitor pointed to the major shortcomings that arise from different method and different purpose of data collection. For example, while the main scope of tourism accommodation statistics, for both, commercial and non-commercial accommodation, should be an accommodation establishment providing short stay accommodation, the main scope of TA record is a taxpayer, while the main scope of the eVisitor data is an accommodation provider. Furthermore, when second home has been identified, there are difficulties to distinguish a clear line between a vacation home and home owned for other purposes, such as for work (e.g. so called 'agriculture house'). For the illustration, TA data include second homes that are usually used for same day visits also, especially in the Continental Croatia, and therefore are not registered in the eVisitor system.

The general conclusion of the paper is therefore that the two survey-based secondary data sources and the administrative data source (TA) considered in the analysis have not provided a base of a sufficient quality to improve the current estimates of tourist traffic in non-commercial accommodation provided by the eVisitor.

Future steps towards more efficient use of administrative data sources in order to obtain more quality estimates of the non-commercial tourism demand in Croatia are foreseen in the following: (i) establishment of a register of dwellings, including the register of second homes, (ii) improvement of metadata for both, administrative and secondary data sources, and (iii) establishment of an agreement among administrative and secondary data owners regarding the use of micro-data. It is also of utmost importance for the national statistical office to continue to cooperate with different data owners/providers, to continuously check their relevant administrative data sources, and give an adequate feedback in order to improve

the quality of data they provide. Finally, ad-hoc surveys, e.g. a survey on the average level of use of second homes per year (occupancy), can provide valuable information needed for better understanding of the administrative data sources and their better fit in the production of official statistics.

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