

COVID-resistant domestic short-term rentals in Europe

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Abstract

During the COVID-19 pandemic, platform-mediated short-term rentals are believed to have performed better than traditional tourism accommodation due to tourist preferences and the possibility of evading some sanitary regulations. The paper investigates this difference in 31 European countries by combining conventional hotel statistics with novel data on short-stay accommodation (SSA) gathered by Eurostat from four major platforms mediating in home rentals. The first hypothesis that short-term rental accommodation lost fewer tourists during the pandemic than hotels is supported if domestic tourism is concerned. The second hypothesis that the loss of tourists in short-term rental accommodation was less dependent on the stringency of restrictions than in hotels is only confirmed for domestic tourism in small, primarily outbound tourism-generating countries. The study results shed light on the pandemic-induced travel substitution, discussion on the regulation of short-term rentals, and the utility of Eurostat SSA statistics as a new research data source.

Keywords: COVID-19; short-term rentals; short-stay accommodation; Airbnb; Eurostat; Europe

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1. Introduction

The growth of platform-mediated short-term rental of apartments became a significant trend in the tourism economy in the years preceding the COVID-19 pandemic (Adamiak, 2022a). It developed into an essential topic in academic and policy discussion due to its quantitative growth and impacts on traditional hospitality businesses, tourism behaviour, housing markets and urban quality of life (Dolnicar, 2019; Guttentag, 2019; Hall *et al.*, 2022). The novel and complex nature of the phenomenon positions global platform owners and short-term rental hosts as new entrants into the pre-existing tourism and housing economies and their regulatory frameworks. The platforms disrupt existing markets by adapting to or evading regulations, including hotel licensing, zoning, housing, anti-discrimination, and employment regulations. This causes opposition from actors, including the hotel industry and representatives of residents and tenants (Nieuwland & van Melik, 2020; Smigiel, 2020).

The current COVID-19 pandemic has affected the entire tourism system. Apart from the resignation from travelling, tourists often changed their travel behaviour. Some studies suggest that short-term rentals were chosen instead of catered traditional accommodation due, e.g. to less contact with staff and the possibility of preparing own meals (Bresciani *et al.*, 2021; Medeiros *et al.*, 2022). Hence, the crisis did not end the development of short-term rentals and home-sharing platforms despite hosts limiting rental supply (Gyódi, 2022; Medeiros *et al.*, 2022). The pandemic triggered some adjustments in their business models and marketing strategies (Dolnicar, 2021; Meenkeshi, 2021; Miguel *et al.*, 2022) and, as we claim, added new opportunities to compete against traditional accommodation forms.

This paper explores the changes in the use of two types of accommodation: short-term rentals and hotels, during the COVID-19 pandemic. Following the literature review, we hypothesise that first (H₁), short-term rental accommodation lost fewer tourists during the pandemic than hotels, resulting from altered consumer preferences and adaptations made by the platforms and hosts. We also suspect (H₂) that the loss of tourists in short-term rental accommodation was less dependent on the stringency of restrictions than in hotels because of the different strictness or execution of these regulations in the two kinds of accommodation. To verify these hypotheses for 31 European countries, we use novel data on short-stay accommodation (SSA) gathered by Eurostat from four major platforms mediating in home rentals. We combine it with traditional statistics on hotel occupancy and perform separate analyses for international and domestic tourism. We conclude that short-term rental accommodation was more resistant to the pandemic than hotels, but only in the case of domestic tourism. The difference in the effects of stringency was noticeable only in some countries.

2. Literature review and hypothesis development

The current COVID-19 pandemic and non-pharmaceutical interventions employed to contain the spread of the disease have profoundly affected the tourism system (Gössling *et al.*, 2021; Yang *et al.*, 2021). During the pandemic, tourists and the tourism industry employed various adaptation strategies to cope with the crisis. Apart from the resignation from travelling, tourists often changed their travel behaviour: frequency of trips, the choice of destination, means of transportation and type of accommodation. The most notable momentary change in tourism behaviour was the resignation from international travel, at first caused by the closure of international borders – one of the first sanitary restrictions introduced by many national authorities. However, even after international mobility was reenabled, tourism anxiety associated with international travel, uncertainty about future regulations, and public policies designed to support domestic tourism contributed to the more persistent shift towards domestic tourism (Arbulú *et al.*, 2021; Gyimóthy *et al.*, 2022; UNWTO, 2020). The changes in the importance of international and domestic travel force us to treat these two tourism segments separately in the empirical analysis.

Existing studies also suggest that people tended to avoid crowded city centres and large resorts in favour of smaller towns and rural destinations. It is partially explained by the high dependence of cities and popular coastal or ski resorts on international tourism and air transportation. Also, sports and cultural events were cancelled, while online meetings replaced business gatherings (Baert *et al.*, 2020; Müller & Wittmer, 2023). Tourists reduced their interest in crowded sites and attractions (González-Reverté *et al.*, 2022; Jiricka-Pürer *et al.*, 2020; Silva Lopes *et al.*, 2021; Šulc & Fuerst-Bjeliš, 2021). They turned to less populated rural destinations seeking proximity to nature (Marques *et al.*, 2022; Seraphin & Dosquet, 2020; Vaishar & Šťastná, 2022).

Tourists also changed accommodation preferences. Early industry reports showed that the use of short-term rentals did not fall so steeply as hotel accommodation (Fox, 2021; Sanford & DuBois, 2020). Tourists tended to choose this kind of accommodation instead of catered traditional accommodation due to less contact with staff and the possibility of preparing own meals (Bresciani *et al.*, 2021; Medeiros *et al.*, 2022). However, more nuanced differences existed between specific characteristics of accommodation. Travellers preferred entire flats to hotel rooms but were reluctant for shared accommodations on Airbnb (Bresciani *et al.*, 2021). They also opted for accommodations equipped with a kitchen (Hidalgo *et al.*, 2022). The need to test the universality of the relative preference for short-term accommodation during the pandemic motivates us to propose the first hypothesis (H1) that short-term rental accommodation lost fewer tourists during the pandemic than hotels.

On the supply side of the tourist system, instant responses of the platform owners to the pandemic included revising booking cancellation policies and introducing sanitary protocols (Miguel *et al.*, 2022), while hosts limited rental supply (Medeiros *et al.*, 2022; Gyódi *et al.*, 2022). Platforms also applied marketing strategies that adapted to and further induced adjusted consumer preferences, including promoting domestic and local travel and extended stays (Meenakshi, 2021). However, we claim that one of the factors affecting short-term rentals' popularity during the pandemic was their unregulated nature which gave them an advantage over legacy accommodation industries in avoiding closure or limitation of operation due to sanitary restrictions. It is supported by Adamiak's (2022b) observation from some rural regions of Poland where the use of short-term rentals increased compared to the pre-pandemic years during lockdowns when hotel services were suspended or reserved for essential public servants only. Also, Dogru *et al.* (2023) noticed that Airbnb offers were resilient to restrictions in many US states. Therefore, we formulate the second hypothesis (H2) that compared to hotels, the loss of tourists in short-term rental accommodation depended less on the stringency of restrictions.

3. Data and methods

Access to short-term rental data has long been a sticking point between the platforms, public administration, and researchers. Scholars used mostly third-party suppliers' data from Inside Airbnb and AirDNA (Pawlicz & Prentice, 2021), having no control over the quality of the data, which may be inaccurate (Alsudais, 2021) or incomparable with other data sources (Agarwal *et al.*, 2019). However, in 2019, four major home-sharing platform owners (Airbnb, Booking, Expedia and Tripadvisor) reached a data-sharing agreement with European Commission. They started to provide aggregated statistical data on short-term rentals, later named short-stay accommodation (SSA) in 31 countries: members of the European Union and the European Free Trade Association. Monthly data on bookings and nights spent in SSA since 2018 is now published in the Eurostat database. It is aimed to supplement traditional tourism statistics based on the reports of accommodation businesses, which usually do not include most of the short-term rental sector. However, data on SSA accommodation may be double counted in both sources (Eurostat, 2021). Hence, we only considered the "hotels and similar accommodation" category within the broader sector of traditional tourism accommodation.

Starting the analysis, we predicted the domestic and international nights in both kinds of accommodation in the contrafactual no-pandemic scenario. We based the estimation on monthly data of nights spent in registered accommodation in 2013–2019, modelled by linear regression against the country population and mean earnings (of a 2+2 household with two adults earning 100% of the national average, according to Eurostat). For modelling domestic tourism, we used the numbers for a given country. For modelling international tourism, we used aggregated data for 31 countries (sum of population and average earnings weighted by population). We also included years to acknowledge a general trend. The seasonality effect was incorporated by adding the month of the year as a categorical variable. The model formula was:

$$Nights = \beta_1 Population + \beta_2 Earnings + \beta_3 Year + \beta_{4,...,15} Month$$

Due to the short data series for SSA, we modelled the nights values only for hotel accommodation. To predict the stays in SSA, we used the modelled values for hotels and multiplied them by SSA to hotel nights factor calculated for each month of 2019.

In the second step, we focused on residuals remaining after subtracting counterfactual predictions from the actual values of nights in the months of the pandemic years. We then created simple linear regression models where the ratio of residual to predicted value was explained by the stringency of sanitary restrictions in a country measured by the Oxford COVID-19 Government Response Tracker (Hale *et al.*, 2021). We used the arithmetic means of the presence of eight policies from the category “C – containment and closure policies” (each measure was first recoded into 0–1 scale) for each month in each country in the analysis.

$$\frac{Residual}{Predicted} = \alpha + \beta OCGRT$$

In these models, intercept (α) can be interpreted as the baseline change in the given month during COVID-19 compared to no-pandemic scenario, assuming no local restrictions exist in a country ($OCGRT=0$). Slope (β) shows the change induced by the introduction of maximal restriction ($OCGRT=1$). Applying linear regression leads to some unrealistic negative predictions, yet the ease of interpretation of the results and normality in residual distribution compensate for this flaw. As OCGRT values are normally distributed, and about 90% are between 0.2 and 0.8, we present estimated values at stringency 0.2 and 0.8. They can be easily interpreted as expected change assuming low and high local stringency. We estimated 124 models (31 countries and all countries together $\times$ 2 origins of tourists $\times$ 2 types of accommodation), each based on 24 observations (months). Comparing values predicted by models for hotels and SSA, combined with previous descriptive analysis, will verify H1. Comparing distances between predictions for low and high local stringency can support H2.

The analysis was performed using R software, including the restatapi library (Mészáros, 2022) to access the Eurostat database and ggplot2 (Wickham, 2016) to visualise the results. R code enabling full reproduction of the study is available as a supplementary file.

4. Results

In the year preceding the pandemic, tourists spent 524.5 million nights in SSA, compared to 1,926.3 million nights in hotels and similar accommodation (Table 1). The use of SSA grew faster (15.7% compared to 2018) than hotels (1.9% compared to 2018; average yearly growth of 3.3% since 2013). Platform-mediated short-term rentals were also relatively more popular among international than domestic tourists. Individual countries differed in the popularity of SSA.

Comparing changes in the number of nights during the two pandemic years (2020–2021) relative to previous years (2018–2019) shows major differences in dynamics between tourism segments. The number of foreign tourist nights decreased by a large percentage in all countries (64.8% in hotels and SSA combined), while the drop in domestic tourism was much lower (23.9%) and more varied between countries. Hotel accommodation lost more (49.6%) than SSA (33.1%). Interesting conclusions come after intersecting these two factors (Table 1, Figure 1): nights spent by domestic tourists in SSA grew in almost all countries (by 18.2% in total), sometimes over twofold (e.g. in the Netherlands, Sweden and Switzerland).

Table 1. *Tourism nights in 2019 and change in 2020–2021 compared to 2018–2019 in EU+EFTA countries*

Country	2019				2020–2021 compared to 2018–2019 (% change)			
	Hotels		SSA		Hotels		SSA	
	Nights (mln)	% of foreign	Nights (mln)	% of foreign	Domes- tic	Foreign	Domes- tic	Foreign
Total								
EU+EFTA	1,926.3	50.9	524.5	67.1	-31.0	-67.3	18.2	-57.5
Austria	95.3	72.8	15.6	92.0	-27.3	-53.0	18.8	-50.4
Belgium	20.8	60.9	7.0	76.8	-32.4	-68.8	100.9	-46.8
Bulgaria	24.9	68.3	3.0	72.8	-8.1	-64.1	18.5	-53.7
Croatia	25.9	89.4	25.6	95.4	-15.8	-60.3	2.3	-39.8
Cyprus	17.6	94.2	4.2	92.5	37.0	-67.0	24.7	-54.9
Czechia	42.0	58.2	9.4	82.9	-13.6	-74.6	7.1	-76.5
Denmark	16.9	43.3	4.7	78.5	-15.7	-68.3	57.8	-55.0
Estonia	5.5	67.9	1.5	79.6	1.6	-69.8	50.9	-64.1
Finland	18.8	31.7	2.9	63.3	-18.4	-69.6	58.0	-60.5
France	219.2	35.2	99.5	42.7	-29.3	-70.6	31.6	-55.5
Germany	306.8	23.7	37.2	36.9	-38.2	-66.7	11.0	-56.5
Greece	109.2	84.6	24.3	86.0	-42.6	-62.5	-6.0	-45.9
Hungary	25.8	52.0	9.2	87.6	-32.9	-72.6	0.8	-70.6
Iceland	5.8	89.8	2.2	97.4	47.4	-67.1	36.0	-73.3
Ireland	30.8	53.6	6.9	78.3	-61.1	-81.8	50.5	-76.9
Italy	280.9	50.0	76.0	74.1	-29.2	-66.3	-4.6	-61.8
Latvia	4.3	76.0	1.3	87.4	-9.7	-70.8	107.1	-58.8
Liechtenstein	0.1	98.6	0.0	98.2	63.7	-14.0	-27.2	-20.4
Lithuania	4.8	60.3	1.6	70.9	-6.8	-68.3	65.6	-61.7
Luxembourg	1.7	88.8	0.3	93.1	-13.6	-40.5	65.6	-22.6
Malta	9.6	95.1	3.2	96.2	36.9	-66.8	33.5	-66.9
Netherlands	54.4	55.4	9.4	81.9	-16.1	-66.6	100.2	-58.5
Norway	25.0	28.2	4.0	71.4	-22.2	-71.9	61.3	-64.7
Poland	53.7	28.1	19.7	48.1	-29.4	-64.5	10.5	-53.5
Portugal	59.9	70.1	31.1	88.7	-25.3	-69.2	38.5	-60.9
Romania	24.3	19.7	4.2	51.8	-33.6	-72.8	25.2	-56.3
Slovakia	11.8	38.9	2.2	74.7	-32.6	-69.3	37.3	-60.3
Slovenia	8.3	74.1	2.6	92.7	32.7	-70.2	-7.6	-60.4
Spain	343.0	65.1	105.6	67.5	-40.0	-72.4	-4.0	-61.5
Sweden	39.5	25.0	3.7	73.4	-22.1	-64.2	106.6	-43.8
Switzerland	39.6	54.7	6.4	75.0	5.8	-63.0	119.7	-42.3

The results of regression models were presented using the ratio of residual to counterfactual prediction in the conditions of low and high policy stringency. The models evaluated for all 31 countries combined (Table 2) once again point to a clear difference between international and domestic tourism dynamics. Foreign tourism dropped by 1/4–1/3 even at low local restrictions and almost stopped in both kinds of

accommodation at high local restrictions. Domestic tourism, on the other side, grew at low restrictions. While the difference between hotels and SSA was moderate in the case of foreign tourism, it became evident in domestic tourism: hotels lost 3/4 of guests at high restrictions and kept pre-pandemic attendance at low restrictions. SSA, in turn, lost only 1/3 and gained the same amount in respective situations. It confirms H₁, but only concerning domestic tourism. However, the differences in the strength of the reaction to local restrictions (measured by the slope of the model) were only minor between all four combinations of tourist origins and accommodation types. In all cases, the difference in expected change between low restrictions and high restrictions scenarios was 71–77%, which does not provide support for H₂.

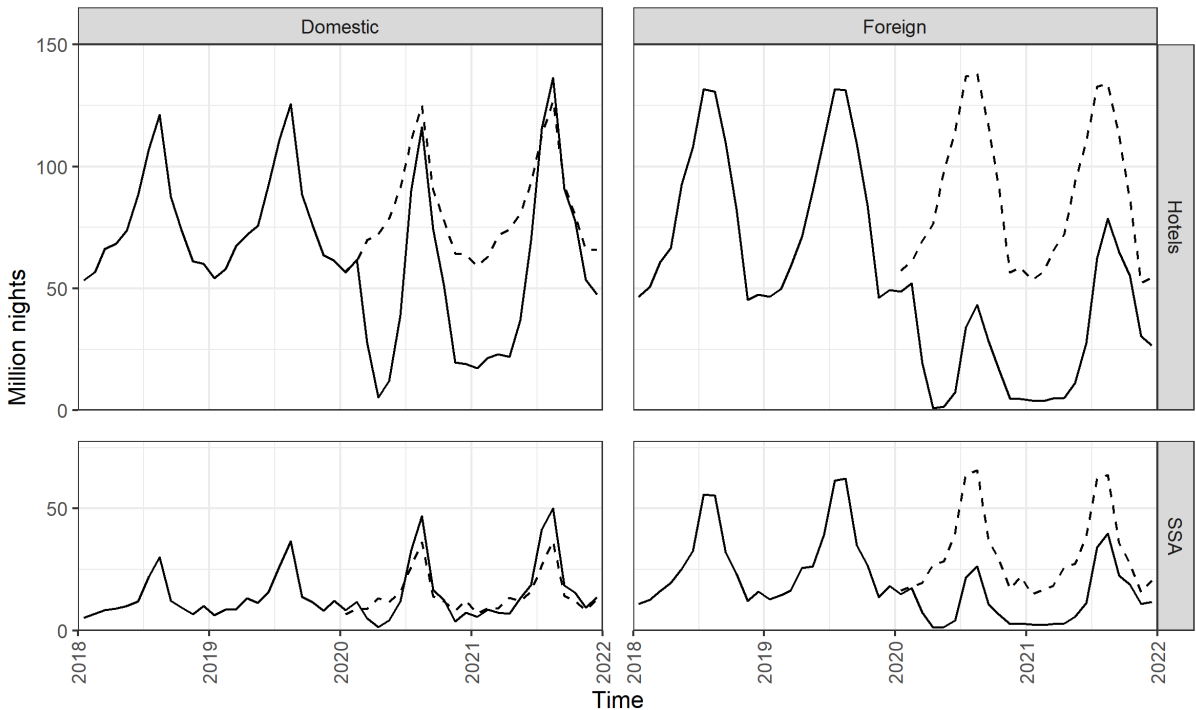


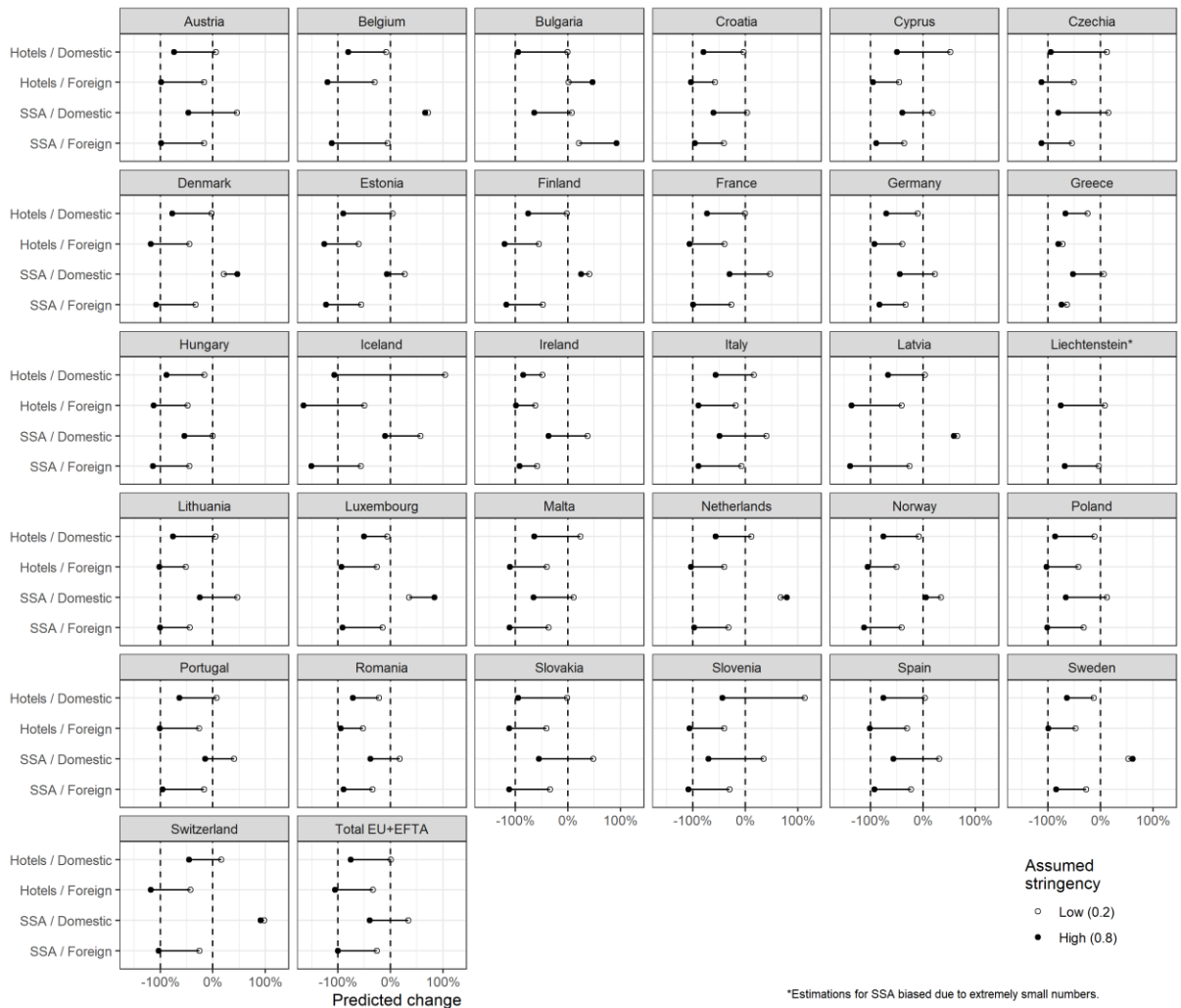
Figure 1. Numbers of nights spent by tourists in EU+EFTA countries in the years 2018–2021 (solid lines – actual values, dashed lines – counterfactual values in the no-pandemic scenario)

Source: own elaboration.

There were international differences in the dynamics of tourist activity at various stringency levels (Figure 2). The differences between foreign and domestic tourism are apparent in all countries, and the contraction of international tourism does not depend on the accommodation type. In domestic tourism, better performance of SSA compared to hotels can be noticed in most countries, but this effect is varied internationally. Finally, while the drop in domestic tourism in hotels positively correlates with restriction stringency in most countries, this correlation is null or even negative in the case of SSA in some countries. In Belgium, Iceland, and Switzerland, high stringency does not reduce domestic tourism activity in SSA so much as in hotels. In extreme cases of Denmark, Luxembourg, the Netherlands, and Sweden slope for SSA is negative, indicating that domestic tourism grew with stricter restrictions. It confirms H₂ in the case of domestic tourism in these countries.

Table 2. Regression results for all EU+EFTA countries together

	Hotels		SSA	
	Domestic	Foreign	Domestic	Foreign
Intercept (α)	1.267	0.911	1.588	0.994
Slope (β) for OCGRT	-1.273	-1.204	-1.228	-1.241
Predicted change at low stringency (OCGRT=0.2)	1.2%	-33.0%	34.3%	-25.4%
Predicted change at high stringency (OCGRT=0.8)	-75.2%	-105.2%	-39.4%	-99.9%

**Figure 2.** Predicted changes in nights assuming two stringency levels for individual countries and all EU+EFTA countries together

Source: own elaboration.

5. Discussion

Descriptive statistics of Eurostat data, joint models and models for individual countries all confirm the proposed H₁ that SSA was less affected by the pandemic than hotels, but only if domestic tourism is concerned. The differences are calculated based on the trend projection in the counterfactual no-pandemic scenario, so most of the effects of the pre-pandemic dynamics were ignored. Hence, relatively high visitation rates to SSA cannot be only attributed to the continuation of the pre-pandemic trend. The relatively high growth of SSA in domestic tourism may result from the preference for this type of accommodation. However, it may also be an effect of the characteristics of an added demand from domestic tourists that stayed in their countries instead of travelling abroad. Before the pandemic, Europeans used SSA relatively more often in outbound than domestic trips, and during the outbreak, they may have transferred these practices to domestic travel behaviour. H₂ on the lower vulnerability of SSA (than hotels) to the restrictions is only confirmed for domestic tourism in some countries. These relatively small countries traditionally generate significant outbound tourism flows, so the substitution of international with domestic tourism may largely explain this outcome.

The study results shed light on the pandemic-induced travel substitution, discussion on the regulation of short-term rentals and the theory of tourism governance, and methods of further studies on the topic. First, they add empirical knowledge on the different reactions of various tourism segments (domestic and international, hotels and short-term rentals) to the pandemic. While individual differences have been studied before, the study points out that considering the interaction of the two factors enables us to notice that tourists turned towards domestic SSA accommodation during the pandemic. Omitting one of the two factors by either looking at international/domestic tourism differences through hotel statistics only (Allan *et al.*, 2022; Dogru *et al.*, 2023; Duro *et al.*, 2022) or at SSA focusing on cities which usually rely on international tourism (Gyódi, 2022) may result in underestimation of the travel substitution generated by the pandemic.

The study also points to the new dimension of regulatory issues related to short-term rentals. We did not find general proof of SSA benefitting from stricter mobility restrictions. Nevertheless, the results indicate that this accommodation sector lost less due to the pandemic than traditional accommodation services. It may indicate that restrictions did not limit SSA so much as serviced accommodation. It was partially due to consumer preferences and partially due to the unregulated character of short-term rentals, positioning them in the legal grey area in terms of sanitary restrictions. It forms another advantage of platform-mediated business over legacy players, on top of dodging zoning, tax or labour regulations (however, on the other hand, platform-dependent micro-entrepreneurs often lacked access to public support for legacy firms, Miguel *et al.*, 2022). Hosts did have to adjust to certain sanitary restrictions yet imposed by the platforms (Meenakshi, 2021). It is another articulation of Airbnb's and other platforms' pursuit to become a "regulatory entrepreneur" (Smigel, 2020), taking the traditional role of public authorities. By achieving this status, platforms attempt to become co-creators rather than subjects to sectorial policies, hybridising tourism and housing governance (Rajala *et al.*, 2022). It is further exemplified by the fact that they provide data used in the study directly to Eurostat, omitting traditional hierarchical channels of national sectorial statistics.

Despite these policy implications of the data collection process and some methodical limitations it still presents (Eurostat, 2021), access to Eurostat short-stay accommodation statistics is an essential step towards more informed research on tourism and the effects of short-term rental platforms. As the first to date to employ SSA statistics, this study exemplifies these opportunities. First, this data enables us to present a more comprehensive statistical picture of tourism mobility. Apart from new information on the pandemic tourism trajectories, it provides evidence that convectional hotel statistics alone underestimated the growth of tourism in Europe in the pre-pandemic years. Second, SSA data can help

in the need to research short-term rentals beyond large cities (Adamiak, 2022a), as the dataset is available for sub-national territorial units of European countries.

Eurostat data can also validate other data sources used in short-term rental studies: Inside Airbnb and AirDNA. Guest night statistics at Eurostat can be compared to the listing nights booked estimated by the AirDNA algorithm. Taking monthly data from Poland divided into 17 NUTS-2 statistical regions as an example, there is a clear correlation between the two data series ($R^2=0.803$, Fig. 3a). Numbers of nights spent in SSA according to Eurostat are systematically higher than AirDNA's booked nights (4.148 times on average). It is first because a booked listing usually hosts more than one guest. Second, AirDNA covers only data on two platforms: Airbnb and Expedia's Vrbo, while SSA data also includes Booking.com and Tripadvisor rentals. However, some temporal and spatial discrepancies between Eurostat and AirDNA data can be noticed. AirDNA reported more use of such accommodation in low-demand lockdown periods than Eurostat (Fig. 3b and 3c). Also, in a coastal leisure tourism region, the distance between Eurostat and AirDNA numbers is much higher than in an urban region (Fig. 3c). These differences emphasise the future importance of Eurostat SSA data. It will be essential to evaluate the effects of home-sharing platforms on tourism mobility and measure the impacts of short-term rentals on destinations.

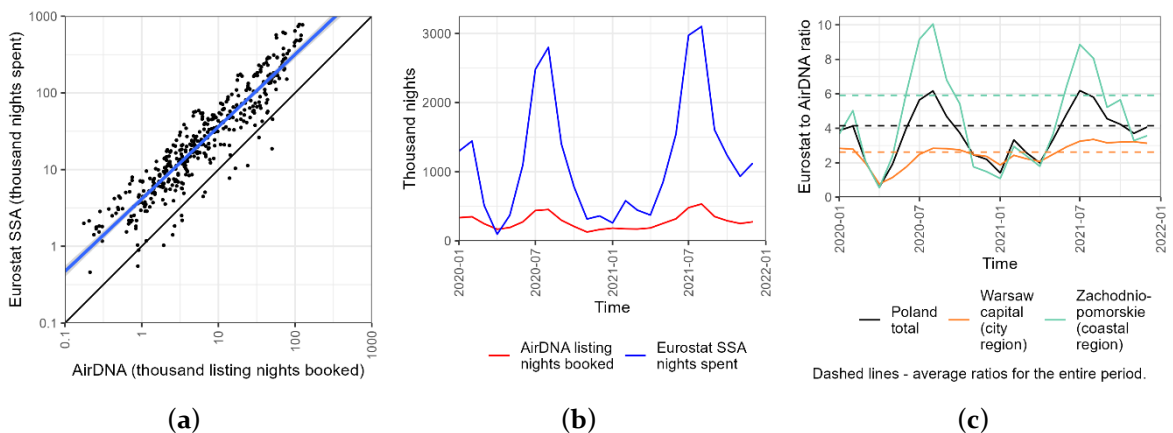


Figure 3. Comparison of Eurostat data on nights spent in SSA with AirDNA data on listing nights booked in 2020 and 2021 in 17 NUTS-2 regions of Poland: (a) Correlation between AirDNA and Eurostat numbers in individual month-region observations; (b) Changes in the number of AirDNA and Eurostat numbers over time; (c) Changes in the Eurostat to AirDNA ratio over time in entire Poland and two selected regions.

Source: own elaboration.

It is evident that the generalised level of the study does not allow us to fully understand the dynamics of travel destination and accommodation choices made by tourists. However, such international-scale statistical sources should complement local-scale surveys and qualitative studies more suited to explore and understand the complex decisions of tourists taken in uncertain and dynamic structural settings.

6. Conclusions

The paper used the combination of conventional hotel statistics with novel Eurostat data on short-stay accommodation (SSA) to investigate the dynamics of tourist stays in 31 European countries during two years of the COVID-19 pandemic. It clearly showed the difference in the trajectories of domestic and international tourism. Out of the two hypotheses regarding the differences between hotel

accommodation and short-term rentals, the empirical results confirmed that traditional hotels lost more domestic tourists than short-term rentals. In some small, outbound tourism-generating countries, domestic stays at short-term rental accommodation were also less dependent on the stringency of restrictions than hotels. Therefore, the study results shed more light on the pandemic-induced mobility transformations. They also add to the discussion on regulating short-term rentals. As it is the first research to employ Eurostat SSA statistics, the paper presents the opportunities and challenges of using this new data source in tourism research.

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