EFFECTS OF TRANSPORTATION, COMMERCE, AND SPILLOVER ON AIRBNB

Ruggero Sainaghi, *IULM University, Milan (Italy)*
Jorge Chica-Olmo, *Granada University, Granda (Spain)*

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Agenda

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Object

Focus

This study explores the effects of **three new groups of location variables** on Airbnb listing performance:

- **healthy and sustainable transportation systems** (metro, tourist bus and bike-sharing)
- **commerce** (food and non-food establishment and shopping centers)
- **spatial spillover**

Literature – Transportation systems

Accessibility is the most popular locational variable and is usually operationalized considering the distance to city center (Tong & Gunter, 2020), transportation (Deboosere et al., 2019), local point of interests (Önder, Weismayer & Gunter, 2019), nightlife (Perez-Sanchez et al., 2018), convention center (Zhang et al., 2017). This variable is usually measured as a "**distance to**" and for this reason it usually shows a **negative** correlation with listing performance

Transport	Accessibility to local **public transportation** has a vital location advantage for guests because it can reduce travel costs and improve guest satisfaction Public transport is a **sustainable urban tourism** mode that has been little covered in the Airbnb literature This study explores three transportation services: **metro**, **tourist buses**, **bicycle**

Literature – Commerce and spatial spillover

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Commerce

As suggested in many previous papers, **shopping** is an important activity for tourists

In this study, two different types of shops are analyzed. The first group includes **food and beverage** (many Airbnb listings offer the kitchen service). The second type of commerce are **non-food shops**, as local crafts, fashion etc.

Spillover

Focusing on listing price (the object of this paper), the **spillover effect** is the ability of **neighboring apartments** to influence the **rate of another listing**

The spillover effect can be positive or negative. The **positive** effect identifies **complementary interaction** among neighbors while the **negative** one suggests the presence of **direct competition**

Literature – Location variables

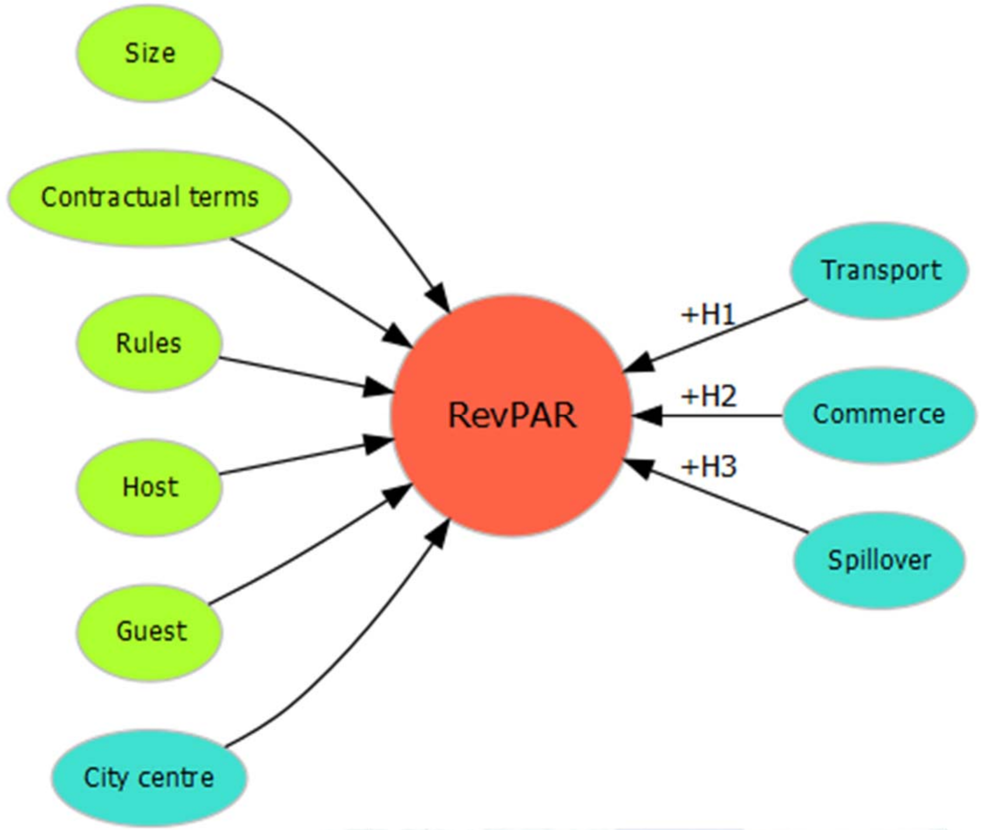

Figure 1. Groups of factors and hypothesis. No-location (green) and location (turquoise) factors, and control (left side) and interest (right side) factors and hypothesis (H).

Literature – Listing performance

Performance

The listing performance is traditionally measured using **price**, variously operationalized

To solve some counter-intuitive results, as the negative relationships between number of guest reviews and price, some authors have used **revenue** (variously operationalized), showing some important differences in the performance antecedents

This study focuses on RevPAR, considering its ability to combine **rate** and **occupancy**

Methodology

This study has chosen the city of **Milan**, the second largest Italian tourism destination after Rome

A) AirDNA data

2019: pre-Covid

Daily data were used

10,000 listings

Operating performance: AirDNA considers the **available** and **sold listings** as well as the **price** for **each day** and for **each listing**

B) Location (GIS)

This study has chosen the city of **Milan** due to its **prevalent focus** on **business** and **trade-fair clients** on one side but in association with its non-marginal presence of **leisure travelers** on the other

With the help of a **geographic information system (GIS)**, **distances** and **spatial density** indexes have been obtained

Methodology – control variable

Size

Bedrooms	Number of bedrooms
Bathrooms	Number of bathrooms
MaxGuests	Maximum number of guests allowed

Contractual terms

CancePolic	1 if apartment has cancellation policy, 0 if other
Security	Security deposit (in hundreds of €)
Cleaning	Cleaning fee (€)
ExtPeopFee	Extra people fee (in hundreds of €)
Checkin	1 if check-in is after 7:00 p.m., 0 if other
Checkout	1 if check-out is 11:00 a.m., 0 if other
MinimumStay	Minimum stay (days)

Host

Superhost	1 if host is superhost, 0 if other
ResponR	Response rate
ResponT	1 if response time is within an hour, 0 if other
NPhotos	Number of photos
Experience	Number of years apartment has been in database

Guest

Nreviews	Hundreds of reviews
OverRat	Overall rating

Methodology – location variables

City center	**Spatial trend**	
	DtCityCenter	Distance from Duomo (km)
Transport	DtMetro	Distance from nearest metro station (km)
	DtTuribus	Distance from nearest tourist bus stop (km)
	DBikePark	Bike-share parking density (index)
Commerce	DFood	Density of medium-to-large commercial food establishments (index)
	DNon-Food	Density of medium-to-large commercial non-food establishments (index)
	ShopCenters	Number of shopping centers in district
Spillover	WRevPAR	Mean revenue per available room (€) of apartments within a radius of 3.3 km
Dependent	RevPAR	Revenue per available room (€)

Methodology – model specification

Two types of spatial models which allow to control spatial effects are **spatial autoregressive (SAR)**, which consider substantive spatial dependence, and **spatial error model (SEM)** with spatial nuisance dependence (Anselin, 1988)

SAR $y = \rho W y + X\beta + \varepsilon$

SEM $y = X\beta + u$, with: $u = \lambda W u + \varepsilon$

Methodology – model specification

Four nested classical models estimated using **OLS** are developed and **two SAR models** estimated with 2SLS are proposed

OLS 1	The first model (Mod1.ols) includes **non-location traditional independent variables** largely used in previous papers
OLS 2	The second model (Mod2.ols) annexes the location classical variable (**distance to city center**)
OLS 3	The third model (Mod3.ols) adds the **transport variables**
OLS 4	The fourth model (Mod4.ols) appends **commerce variables**
SAR 1,2	The spatial models Mod4.2sls with W1 and Mod4.2sls with W2, include the **spatial spillover effects** with two different weight matrix, inverse distance and k-nearest, respectively

Methodology – VIF

	Mod1.ols	Mod2.ols	Mod3.ols	Mod4.ols	Mod4.2sls (W_1)	Mod4.2sls (W_2)
VIF (max.)	2.434	2.441	2.443	3.656	--	--
Tests						
Normality	3.031	2.964	2.935	2.932	--	--
BP test	651.25***	904.29***	939.97***	938.41***	--	--
Moran's I error	0.191***	0.065***	0.041***	0.025***	--	--
LM-error	825.3***	95.51***	38.16***	15.02***	--	--
RLM-error	0.697	0.171	0.242	0.004	--	--
LM-lag	1004.5***	123.08***	50.69***	18.22***	--	--
RLM-lag	179.85***	27.74***	12.77***	3.21*	--	--
Goodness-fit						
R-squared	0.295	0.397	0.413	0.422	0.423	0.425
Adjusted R^2	0.294	0.396	0.411	0.421	0.422	0.424

The maximum VIFs of the four OLS models are **considerably lower** than the threshold of ten suggested by Hair et al. (1998), so **there are not serious multicollinearity problems**

Findings: H1 Transport

H1. The **accessibility** to **sustainable and healthy transportation** positively affects the revenue per available room of Airbnb listings

Variable	Mod1.ols	Mod2.ols	Mod3.ols	Mod4.ols
Effect	**Direct**	**Direct**	**Direct**	**Direct**
Constant	2.743***	3.103***	2.985***	2.897***
Transport				
DtMetro	--	--	-0.063***	-0.057***
DtTuribus	--	--	-0.022***	-0.031***
DBikePark	--	--	0.025***	0.016***

All coefficients of the transport variables (DtMetro, DtTuribus and DBikePark) are **significant and have the expected sign**. Therefore, Airbnb apartments that are located in areas close to **sustainable means of transport**, such as metro stations and tourist bus stops, or where there is a high density of shared bike park (which is a healthy means of transport), **have high revenue from available rooms**

Findings: H2 Commerce

H2. The spatial distribution of **commercial shops** positively affects the revenue per available room of Airbnb listings

Variable	**Mod1.ols**	**Mod2.ols**	**Mod3.ols**	**Mod4.ols**
Effect	Direct	Direct	Direct	Direct
Constant	2.743***	3.103***	2.985***	2.897***
Commerce				
DFood	--	--	--	-16.921
DNonFood	--	--	--	15.898***
ShopCenters				0.029***

A **positive and significant** relationship has been detected both between RevPAR and the **number of shopping centers** in the district where the apartment is located (ShopCenters), as with the **density** of **commercial non-food establishments** in the area (DNon-Food). This may be due to the fact that tourists prefer to stay near commercial establishments related to shopping (fashion, gift, etc.)

However, **the proximity of food stores has not been detected to have a significant effect on RevPAR**

Findings: H3 Spatial spillover

H3. The **spillover effect** positively influences the revenue per available room of Airbnb listings

Variable	Mod1.ols	Mod2.ols	Mod3.ols	Mod4.ols	Mod4.2sls (W_1)		Mod4.2sls (W_2)	
Effect	Direct	Direct	Direct	Direct	Direct	Indirect	Direct	Indirect
Constant	2.743***	3.103***	2.985***	2.897***	--	--	--	--
Spillover effect								
WlnRevPAR	--	--	--	--	0.050*		0.356***	

The results indicate that both, global effect and the explanatory variables (indirect effects), are **more significant if the k-nearest (W2) are considered versus the inverse of the distance (W1)**

Part of the presence of global spillover effect could be due to the presence of **spatial contagion**, that is, as in real estate, **apartment owners tend to imitate the prices of their neighbors**, and therefore revenue will also be similar

Conclusions

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Theoretical implications

This study basically **confirms** the relevancy of **control variables (non-location antecedents)** used in previous studies (not reported in this presentation)

Size is the most relevant determinant in term of adjusted R^2

The three tested hypotheses are confirmed: **healthy and sustainable transport systems**, **commerce** and **spillover** effects significantly and **positively** affect the listing **RevPAR**

Practical implications

The new variables used in this study can **orient** the **location choices** and the **communication strategies** implemented by **Airbnb listings** with their guests

The **spillover effect** is supportive of **agglomeration strategies**

Conclusions

Limitations

This is an explorative study based on **single case study**

Despite the **sample size is robust** (more than 10 thousand listings), the findings must be confirmed in **other different empirical settings**