SPATIAL DEPENDENCE IN MUSEUM SERVICES: AN ANALYSIS OF THE ITALIAN CASE

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PURPOSE AND RESULTS

We investigate whether the services offered by museums are affected by the choices of neighbors

Specifically, we take into account the Italian case

Q1. Are dependence effects operative, in the case of museum services provision in Italy?

Results: Yes, the spatial dependence effect is significant.

However, its strength is not homogeneous across museum types.

Q2. Can these pieces of evidence document that competition processes are at work?

Our discussion casts several doubts that the evidence can be solely due to sound competition among museums.

STRUCTURE OF PRESENTATION

1. **Conceptual background**
2. **Empirical background**
3. **Methods**
4. **Data**
5. **Results**
6. **Refinements**
7. **Discussion**
8. **Comments and conclusions**

1. CONCEPTUAL BACKGROUND

Museums are institutions that offer different services (multi-product or multi-services firms)

The weight of the different functions and the way in which the museum functions are perceived have been changing over time.

Conservation , valorization, education and entertainment activities are expected today. ➔*edu-tainment*

1. CONCEPTUAL BACKGROUND

The services under our investigation concern:

- activities aimed to **enlarge the accessibility** (e.g., evening openings, upon-request openings, etc.),
- supporting activities to **improve the collection fruition** (e.g., the availability of brochures, the presence of audio-guides, guided tours, childcare activities, etc.),
- the presence of **web-services**.

In the present investigation, “quality” means visitors’ satisfaction.

We investigate whether the availability of such services in a museum is influenced by the availability of similar services in neighboring museums.

1. CONCEPTUAL BACKGROUND

As it happens in the supply of other public services (e.g., education and healthcare) the reasons to expect that spatial influence in services' provision does exist can be related to a number of factors:

- competition pressure,
- imitation mechanisms among the managers (peer effect),
- institutional rules leading museums to make similar choices.

1. CONCEPTUAL BACKGROUND

On the one hand, museum collections can be public or chargeable goods: apart from congestion, there is not rivalry in the consumption. Both charged and free entrance (or a combination of them) are possible and the marginal cost of a visitor is negligible.

On the other hand, museum services to support the visit are private goods that each visitor can decide whether or not to buy: they are rival and excludable, and therefore they usually have a price.

Interestingly, museum buildings –that are sometimes designed by famous architects or “archi-stars” – can be interpreted as public goods for the area where located.

1. CONCEPTUAL BACKGROUND

Institutional relevance of these distinctions:

The ownership of museum buildings and collections can be public or private (non-profit-oriented private institutions prevail in Anglo-Saxon countries; public ownership and management prevail in Europ countries).

In both contexts, private subjects (individuals or companies) are usually involved as donors or financiers for the maintenance of museum buildings & collections;

A more direct involvement of private companies occurs for the supply of complementary services to support the visit: such complementary services can be outsourced to external private (profit-oriented) companies, also by part of governmental museums.

1. CONCEPTUAL BACKGROUND

What competition (among museums) means

Competition can be **among policy-makers** that consider the museums' endowment & accessibility and new museums' establishment as tourism attractors.

Competition can be also **among museum directors**, concerning their ability ***in attracting visitors***, but also concerning their ***scientific reputation*** among peers, based on activities concerning conservation, research projects, academic publications and exhibitions for niche audiences.

Finally, competition can be **among private enterprises *to gain the grant*** for supplying the museum supporting services.

2. THE CASE STUDY (ITALY)

Italy is rich of museums: nearly 5,000 sites, including museums, monuments, archeo-areas, histor. parks;

most of them are small in terms of visits while others can be considered as world-level superstars.

Private museums coexist with governmental museums (endowed with different degrees of autonomy).

Governmental: 63.4% (State, Regions, local public administrations [provinces and municipalities], public school and universities, network of public subjects).

A larger degree of autonomy for governmental museums has been thought as a tool to enhance competition providers, and hence to promote the service quality.

2. THE CASE STUDY (ITALY)

FEATURES OF THE MUSUEMS' UNIVERSE

Istitutional Feature	Obs	%
Total	4,976	100
Gallery or museum	4,158	83.6
Archeological area/park	282	5.7
Monuments / Buildings	536	10.8
Private ownership	1,820	36.6
Public sector ownership	3,156	63.4
State	*439*	*8.8*
Public sector – Autonomous institute	*546*	*11.0*
Public sector- Outsourced	*993*	*20.0*
Part of a network	2,581	43.4

2. THE CASE STUDY (ITALY)

FEATURES OF THE MUSUEMS' UNIVERSE

Type of collection	Obs	Percentage on total	Percentage on museums
Museums and Galleries			
Arts Museums	1,081	21.7	26.0
Arts (unitl 1800s)	*660*	*13.3*	*15.9*
Contemporary Arts (since 1900s)	*421*	*8.5*	*10.1*
Ethnographic museums	694	13.9	16.7
Archeology museums	611	12.3	14.7
History museums	476	9.6	11.4
Natural sciences and natural history museums	347	7.0	8.3
Religious museums	201	4.0	4.8
Science and technology museums	143	2.9	3.4
Industry / Enterprise museums	118	2.4	2.8
Thematic museums	426	8.6	10.2
Other	61	1.2	1.5
Monuments			
Churches and religious buildings	193	3.88	
Civil buildings and monuments	325	6.54	

3. METHOD

We employ the **SAR (Spatial Auto-Regressive)** model. We consider a very large cross-section sample of museums (observed in 2015).

We investigate whether spatial autocorrelation is significant (in the number and type of offered services).

The number and nature of available services is investigated conditional on the type of museum, and other individual, institutional, environmental features.

The **auto-Poisson** model and the **auto-binomial model** –that could be alternative and appropriate regression models, in front of the dependent count-variable– fully confirm the evidence from the simpler SAR specification.

4. DATA

Data source: The museum census (*Indagine sui musei e le istituzioni similari*) provided by ISTAT.

The most recent census refers to **4,976** cultural institutions in 2015.

This census covers all Italian cultural heritage institutions (i.e. museums and similar institutions).

It collects information on the type of services and activities provided by them.

After having cleaned for missing values, the final sample for the present analysis consists of **2,165** museums and similar cultural institutions, for which we can recover full information on the variables of interest.

The dependent variable in our analysis is the total number of services (*N_TOT_SERV*) provided by museums and other similar institutions.

4. DATA

The census includes separate information on services related to:

- museum accessibility (*N_SERV_ACCESS*),
- supporting experience (*N_SUPPORT_SERV*),
- web services (*N_WEB_SERV*)

Here, a total of 37 services have been selected from the survey:

- 5 related to the museum accessibility,
- 23 to supporting services,
- 9 to web services.

Admittedly, here we can simply observe the presence of these services; nothing can be said on how they really work, and their effectiveness in increasing visitors' enjoyment.

4. DATA

Table - Museum services under investigation

ACCESSIBILITY	14. Presence of info material for disabled
1. Predefined opening hours	15. Presence of tickets and visits reservation
2. Opening upon request	16. Presence of parking space
3. Evening openings	17. Presence of cloakroom
4. Full year opening	18. Presence of cafeteria and restaurant
5. Open house days	19. Presence of bookshop
SUPPORTING SERVICES	20. Presence of guided visits
1. Presence of museum service charter	21. Presence of childcare services
2. Presence of map at entrance with visiting paths	22. Presence of assistance services for disabled
3. Presence of info point	23. Presence of free Wi-Fi
4. Presence of info poster at entrance	***WEB SERVICES***
5. Presence of signs highlighting visiting paths	1. Presence of website
6. Presence of brochures	2. Presence of online catalogue for visitors
7. Presence of captions describing single displays	3. Presence of online ticket purchase
8. Presence of audio guides	4. Presence of online virtual visit
9. Presence of video guides	5. Presence of account in social media
10. Presence of proximity systems	6. Presence of online bookshop
11. Presence of multimedia devises	7. Presence of online merchandising
12. Presence of AV room	8. Presence of newsletter
13. Presence of info material for children	9. Presence of online community

4. DATA

On average, the museums in our sample offer 14 services (i.e., 38% of the considered services).

However, descriptive statistics show a large variability across museums.

A similarly heterogeneous picture emerges for the three categories of services.

(Basic statistics in the following Table)

4. DATA - *BASIC STATISTICS ON SERVICES*

Variables	Mean	Std. Dev.	Min	Max
Total number of services (N_TOT_SERV)	14.40	6.33	1	35
Num of services relating to accessibility (N_SERV_ACCESS)	3.06	1.14	0	5
Services supporting visitor experience (SN_SUPPORT_SERV)	9.17	4.30	0	22
Number of web services (N_WEB_SERV)	2.17	1.92	0	9
Governmental museums (GOVERN)	0.39	0.49	0	1
Autonomous governmental museums (AUTON)	0.12	0.33	0	1
Outsourced governmental museums (OUTS)	0.21	0.41	0	1
Private museums (PRIV)	0.34	0.47	0	1
Gallery or museum (MUS)	0.84	0.37	0	1
Part of a network (NET)	0.49	0.50	0	1
Opened before 1946 (BEF1946)	0.12	0.33	0	1
Educational activity (EDU)	0.61	0.49	0	1
Presence of director (DIR)	0.59	0.49	0	1
Presence of scientific curator (CUR)	0.45	0.49	0	1
“Friends of the museum” club (FRIENDS)	0.30	0.46	0	1
Part of inter-institutional agreement (INTERINST)	0.49	0.50	0	1
Exhibition surface (SURF)	3969.27	24050.69	2	500000
Number of employees (EMP)	10.78	20.86	0	411
Number of employees per unit of surface (EMPRATIO)	2.73	5.04	0	66.67
Number of museums in the province (NMUSPROV)	69.91	44.80	9	204
Number of beds in accommodations in the province (BEDS)	65855.13	68001.32	2324	366341
Population in the province (POP)	835605.1	970836.1	57480	4341260

5. REGRESSION ANALYSIS DESIGN

Dependent Variable: N_TOT_SERV (and then, the number in the specific areas: access, fruition, web).

Explanatory variables (belonging to three groups):

- Ownership type and organizational structure (*PRIV, GOVERN, AUTON, OUTS*)
- Other individual characteristics (*MUS, NET, BEF1946*, *DIR, CUR, FRIENDS, INTERINST, and also SURF, EMP, EMPRATIO)*.
- Environmental features (*NMUSPROV, BEDS, POP* in the province)
- and the SPATIAL AUTOCORRELATION VARIABLE

5. REGRESSION ANALYSIS DESIGN

Regression specification:

$$y_i = \alpha + \rho W y_i + X_i^{1'}\beta + X_p^{2'}\gamma + \varepsilon_i$$

y_i is the number of services (*N_TOT_SERV*) provided by museum *i*,

X_i^1 is the vector of the control variables at the museum level,

X_p^2 is the vector of the control variables at the province level,

ε_i is a normally distributed error term $\varepsilon \sim N(0, \sigma^2 I)$.

Wy_i is the term capturing the spatial lag of the number of services provided by museums.

5. REGRESSION ANALYSIS DESIGN

The spatial weights matrix W in the term $+\rho W y_i$

The element w_{ij} of the spatial matrix W indicates the interaction effect between *i* and *j*;

the strength of the spatial effect is given by the unknown spatial parameter ρ , to be estimated.

The estimation of parameters of the model, namely, α, ρ, β, γ, σ^2,
can be carried out by maximum likelihood
(Le Sage and Pace, 2009).

5. REGRESSION ANALYSIS DESIGN

The element w_{ij} is as follows:

$$w_{ij} = \begin{cases} 0 & if\ i = j \\ \frac{1}{n_r - 1} & if\ r_i = r_j \\ 0 & if\ r_i \neq r_j \end{cases}$$

r_i is the region where museum *i* is located
n_r indicates the total number of museums (in our final sample) located in region r.
So, the spatial lag is the average number of services provided by the other (with respect to *i*) museums in the same region (… or province).

5. REGRESSION ANALYSIS DESIGN

At the province level, the element w_{ij} is as follows:

Then, we also consider the same spatial weights matrix at the province level:

$$w_{ij} = \begin{cases} 0 & if\ i = j \\ \frac{1}{n_p - 1} & if\ p_i = p_j \\ 0 & if\ p_i \neq p_j \end{cases}$$

p_i is the province where museum *i* is located

n_p is the total number of museums (in our final sample) located in province *p*.

Therefore, the spatial lag is the average number of services provided by the other museums in the same province.

5. REGRESSION ANALYSIS DESIGN

A potential limitation of model (1) is that the dependent variable y_i is a count variable (it provides the number of services offered by museums), while the standard SAR model is more appropriate for continuous variables.

However, previous literature has shown that a count random variable can be well approximated by a normal random variable when the expected count is sufficiently large (such as, greater than 10), (e.g., Griffith, 2006). – This is the case here (the mean num of services is 14);

therefore, the specification of the SAR model could b e appropriate in our empirical application.

However, we will perform also the auto-Poisson model and the auto-binomial model (appropriate for count variables as dependent variable).

5. REGRESSION ANALYSIS DESIGN

Auto-Poisson model (e.g., Besag, 1974),

The dependent variable conditional on its neighbors $N_j(i)$ follows a Poisson distribution, that is

$$y_i \left| \{y_j, j \in N_j(i)\} \sim Po(\mu_i) \right.$$

With $\mu_i = exp\left(\alpha + \rho W y_i + X_i^{1\prime}\beta + X_p^{2\prime}\gamma\right)$

Examples with count variables: Mears and Bhati, 2006; Andersson et al., 2009).

However, the auto-Poisson model suffers from the limitation that, with $\rho > 0$, might cause the process to be explosive (e.g., Besag, 1974; Cressie, 1993). As a result, it is usually stated that the auto-Poisson model can accommodate only negative spatial autocorrelation, which makes it of limited use (e.g., Besag, 1974; Cressie, 1993).

5. REGRESSION ANALYSIS DESIGN

To overcome the limitation of the auto-Poisson model, a suggested route is to estimate the following auto-binomial model (e.g., Besag, 1974; Griffith, 2006):

$$log\left(\frac{y_i/N}{1-y_i/N}\right) = \alpha + \rho W y_i + X_i^{1'}\beta + X_p^{2'}\gamma$$

where *N* is the upper limit of the count random variable, in our case 37 museum services.

(Idea; a Poisson random variable can be approximated by a binomial random variable).

No explosive-problem arises.

The parameters of the auto-binomial model (5) can be consistently estimated by pseudo-likelihood estimation **(e.g., Besag, 1974; Griffith, 2006).**

5. REGRESSION ANALYSIS DESIGN

We will provide the results of three models:

SAR
Auto-Poisson
Auto-binomial

Note that the (marginal effect associated to the) spatial parameter of the auto-binomial specification captures the dependence of the *proportion* of counts (over the upper limit) upon the neighbors' counts, and has to be interpreted accordingly when compared to the estimates of the SAR and auto-Poisson model.

6. RESULTS

Preliminary evidence: Moran's I test

The Moran's *I* statistics evaluate departures from spatial randomness.

We find significant positive spatial correlation in *N_TOT_SERV*, irrespective of considering the regional or provincial spatial matrixes.

This means that significant spatial dependence in data is present, both if the regional level is considered, and in the case of the provincial level.

Variables	Moran's I Statistics	p-value
$N\_TOT\_SERV_{REG}$	0.058	0.000***
$N\_TOT\_SERV_{PROV}$	0.079	0.000***

6. RESULTS

The SAR Model

- We perform the estimation, considering the spatial autocorrelation at the regional level, and at the provincial level.
- The specification goes from the particular to the general specification, including:
  - institutional variables,
  - institutional and individual variables
  - institutional, individual and environmental variables.

- The spatial autocorrelation term is always present (and significant!

- See Table 5 of the paper

6. RESULTS

The SAR Model

	(1)_	(2)_	(3)_	(4)_	(5)_	(6)_
	SAR	SAR	SAR	SAR	SAR	SAR
SPATIAL LAGGED Y_{REG}	0.602	0.298	0.312			
	(0.057)***	(0.055)***	(0.056)***			
SPATIAL LAGGED Y_{PROV}				0.357	0.203	0.221
				(0.042)***	(0.037)***	(0.039)***
AUTON	4.365	2.063	2.072	4.412	2.079	2.082
	(0.401)***	(0.333)***	(0.333)***	(0.402)***	(0.334)***	(0.334)***
OUTS	0.776	1.575	1.512	0.912	1.618	1.541
	(0.331)**	(0.269)***	(0.271)***	(0.329)***	(0.267)***	(0.269)***
PRIV	0.015	0.808	0.806	0.048	0.827	0.826
	(0.306)_	(0.228)***	(0.228)***	(0.306)_	(0.227)***	(0.228)***
MUS		2.911	2.925		2.956	2.975
		(0.290)***	(0.290)***		(0.290)***	(0.291)***
NET		1.010	0.974		1.042	1.009
		(0.207)***	(0.208)***		(0.208)***	(0.208)***
BEF 1946		-0.018	-0.039		0.010	0.034
		(0.312)_	(0.313)_		(0.313)_	(0.312)_
EDU		3.593	3.605		3.627	3.628
		(0.227)***	(0.227)***		(0.228)***	(0.228)***
DIR		1.425	1.469		1.472	1.504
		(0.232)***	(0.235)***		(0.233)***	(0.235)***
CUR		1.619	1.617		1.598	1.591
		(0.221)***	(0.222)***		(0.222)***	(0.222)***
FRIENDS		-0.057	-0.036		-0.025	-0.031
		(0.221)_	(0.221)_		(0.221)_	(0.222)_
INTERINST		1.479	1.488		1.530	1.528
		(0.209)***	(0.209)***		(0.210)***	(0.210)***
SURF		0.970	0.979		0.973	0.968
		(0.082)***	(0.083)***		(0.082)***	(0.083)***
EMP		0.041	0.041		0.039	0.040
		(0.005)***	(0.006)***		(0.005)***	(0.006)***
EMP RATIO		-0.013	-0.013		-0.012	-0.012
		(0.023)_	(0.023)_		(0.023)_	(0.023)_
MUS IN PROV			0.008			0.012
			(0.003)**			(0.007)*
BEDS			-0.099			-0.096
			(0.129)_			(0.128)_
POP			-0.211			-0.267
			(0.169)_			(0.166)_
CONSTANT	5.022	-4.302	-0.208	8.504	-3.023	2.015
	(0.809)***	(0.934)***	(2.236)_	(0.609)***	(0.775)***	(2.202)_
Observations	2165	2165	2165	2165	2165	2165
Log pseudolikelihood	-6952.74	-6337.34	-6334.23	-6960.09	-6336.31	-6332.81
AIC	13917.47	12708.68	12708.47	13932.19	12706.60	12705.61

Note: Robust standard errors in brackets. * significant at 10%, ** significant at 5%, *** significant at 1%.

6. RESULTS

The SAR Model

Spatial autocorr

Institutional

Individual features

Environmental features

Statistics

REGIONAL

Provincial

	(1)_	(2)_	(3)_	(4)_	(5)_	(6)_
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6. RESULTS

The SAR Model-

Spatial effects:

always positive and significant

- **Both at the regional and at the provincal level**
- **Irrespective of the covariates included**

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6. RESULTS

The SAR Model-
Institutional and individual variables

(here, at the regional level; but similar at the province level)

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			(0.290)***
			0.974
			(0.208)***
			-0.039
			(0.313)
			3.605
			(0.227)***
			1.469
			(0.235)***
			1.617
			(0.222)***
			-0.036
			(0.221)
			1.488
			(0.209)***
			0.979
			(0.083)***
			0.041
			(0.006)***
EMP RATIO		-0.013	-0.013
		(0.023)	(0.023)

POSITIVE AND SIGNIFICANT

PRIVATE, AUTON, OUTS, NET
DIR, CUR
(Confirming Bertacchini et al. 2018)

NOT SIGNIFICANT

BEF1946, FRIENDS

6. RESULTS

The SAR Model-
Institutional and individual variables

(here, at the regional level; but similar at the province level)

AUTON	4.365	2.063	2.072
	(0.401)***	(0.333)***	(0.333)***
OUTS	0.776	1.575	1.512
	(0.331)**	(0.269)***	(0.271)***
			0.806
			(0.228)***
			2.925
			(0.290)***
			0.974
			(0.208)***
			-0.039
			(0.313)
			3.605
			(0.227)***
			1.469
			(0.235)***
			1.617
			(0.222)***
			-0.036
			(0.221)
			1.488
			(0.209)***
			0.979
			(0.083)***
			0.041
			(0.006)***
			-0.013
			(0.023)

POSITIVE AND SIGNIFICANT

SURF, EMP

(showing a “size-effect”)

NOT SIGNIFICANT

EMPRRATIO

(Employees are not used to improve services!)

6. RESULTS

The SAR Model- Environmental variables

(here, at the regional level; but similar at the province level)

AUTON	4.365	2.063	2.072
	(0.401)***	(0.333)***	(0.333)***
OUTS	0.776	1.575	1.512
	(0.331)**	(0.269)***	(0.271)***
			0.806
			(0.228)***
			2.925
			(0.290)***
			0.974
			(0.208)***
			-0.039
			(0.313)
			3.605
			(0.227)***
			1.469
			(0.235)***
			1.617
			(0.222)***
			-0.036
			(0.221)
			1.488
			(0.209)***
			0.979
			(0.083)***
			0.041
			(0.006)***
EMP RATIO		-0.013	-0.013
		(0.023)	(0.023)

POSITIVE AND SIGNIFICANT

MUS_IN_PROV

(confirming the spatial correlation)

NOT SIGNIFICANT

BED, POP

(No pressure form the demand side!)

6. RESULTS

The Auto-Poisson model

- (Nearly) all the results are confirmed:

- Spatial autocorrelation is positive and statistically significant (1%);
- PRIVATE, AUTON, OUTS, NET; DIR, CUR have positive and significant coefficient;
- SURF adn EMP positive and significant;
- *The only difference:* EMPRATIO is positive and significant;
- MUS_IN_PROV is significant (10%), while BED and POP are not significant

- Coefficient sizes are very similar!

6. RESULTS

The Auto-binomial model

- All the results are fully in line with SAR and Poisson models.

- The marginal effect of the spatial autocorrelation coefficient entails that the increase of 1 service (on average) in the museum located in the region entails an increase of 0.3-0.9 services in each museum located in the same region (accordin to the specification).

- The coefficient is always positive and statistically significant; its size depends on the covariates included, rather than on the model considered

7. RESULTS FOR SUB-GROUPS OF MUSEUMS

Private and governmental museums

Does the spatial dependence factor differ between governmental and private museums?

The point is interesting *per se*, but it may provide further insights on the source of spatial dependence.

GUESS:

If the dependence is induced by competition to attract more visitors, one would expect it is stronger (or, at least, not weaker) in private museums;

If the spatial dependence is due to reputational concerns and/or common institutional factors, one would expect it is stronger in public museums where reputational concerns should be more salient and institutional factors more stringent.

7. RESULTS FOR SUB-GROUPS OF MUSEUMS

Private and governmental museums

Evidence: Spatial dependence is significant for PUBLIC museums, not for PRIVATE museums!
(Dependence evaluated at the regional level)

Table 8 - Offered services: public vs. private museums

	Public			Private		
	SAR	POISSON	BINOMIAL	SAR	POISSON	BINOMIAL
SPATIAL LAGGED Y_{PUBLIC}	0.345 (0.057)***	0.033 [0.484] (0.005)***	0.055 [0.013] (0.008)***			
SPATIAL LAGGED $Y_{PRIVATE}$				-0.019 (0.037)	0.008 [0.105] (0.009)	0.001 [0.000] (0.013)
Museum type controls	YES	YES	YES	NO	NO	NO
Museum other controls	YES	YES	YES	YES	YES	YES
Provincial controls	YES	YES	YES	YES	YES	YES
Observations	1427	1427	1427	738	738	738
Log pseudolikelihood	-4170.33	-4190.09	-625.33	-2135.58	-2156.84	-313.73
AIC	8378.67	8416.19	1286.67	4305.16	4345.69	659.47

Robust standard errors in round brackets, marginal effects (at means) in square brackets. * significant at 10%, ** significant at 5%, *** significant at 1%.

7. RESULTS FOR SUB-GROUPS OF MUSEUMS

Categories of services

Does the spatial dependence in museums' behavior differ between different service categories (i.e., accessibility, fruition, web-services)?

In principle, the reasons inducing spatial dependence, could be more or less relevant in the three categories of services. E.g., accessibility and supporting services are particularly important for competition in attracting visitors; web services are important for the visibility and for the valorization of the scientific content of the exhibitions.

Moreover, common institutional factors might be more binding for the museums' behavior related to the accessibility, and museum managers (in public museum without autonomy) cannot compete in this type of service.

7. RESULTS FOR SUB-GROUPS OF MUSEUMS

Categories of services

Table 9 reports the results for *N_SERV_ACCESS*, *N_SUPPORT_SERV*, and *N_WEB_SERV*, as the dependent variable, respectively (also distinguishing between private and public museums).

The results for the three categories of services do not significantly differ from those obtained when considering the total number of services.

For private museums, no significant spatial effect.

For governmental museums, all models provide spatial autocorrelation coefficients that are statistically significant and included in the interval (0.35, 0.55)

8. DISCUSSION

Can the spatial dependence be interpreted as a result of competition among museums?

The evidence that spatial dependence holds for public, but not for private, museums, casts some doubts on the fact that neighborhood effects are motivated by true, sound competition.

The institutional context in which public museums operate might suggest that spatial dependence is due to reputational concerns and/or common institutional factors, rather than sound competition.

Some further elements could support this view.

8. DISCUSSION

In Italy, a conservative approach to the cultural heritage and museums' collections still prevails;

several rules for governmental museums are set at the central level, and several management decisions are taken by regional administrative bodies.

The process towards the administrative and accounting autonomy of museums and archaeological sites has started later than in other European countries and appears to have been a stop-and-go process.

Today, only a limited number of (superstar) museums and sites benefit from a large degree of autonomy; generally 'autonomy' concerns a limited set of choices (Zan *et al.*, 2018).

Public management lacks from managerial formation.

8. DISCUSSION

Directors of public museums usually believe that competition on scientific reputation is more important than competition in attracting visitors.

Thus, the institutional framework drives managers to be mainly concerned with the conservation of cultural heritage.

However, stringent public budget constraints, and the need to fill the gap with the different concepts of museums, have encouraged public administrators and public museum directors to allow the entrance of private enterprises to supply additional services.

Since 1993 (Ronchey Law), private firms have applied for granting the supply of supporting, web and, sometimes, accessibility services in governmental museums.

8. DISCUSSION

However, private firms that provide such services have to serve a large number of museums and cultural sites, in order to exploit economies of scale and to make a profitable business.

Thus, spatial dependence in the provision of complementary services by part of public museums can be generated by the fact that the *same* set of services is offered by the *same* private firms to a set of similar (and nearly located) museums.

These private firms are involved in a NOT competitive process: This has been observed in a recent investigation on museums, by the Italian Court of Auditors (*Corte dei Conti*).

Guess: the spatial dependence could depend on the design of the race rules governing the grants for the outsourced provision of services rather than sound competition among museums.

9. CONCLUDING REMARKS

In Italy spatial correlation exists, in the museum complementary services' provision, like in other public service sectors.

Spatial dependence concerns public, rather private, museums.

However, we have argued that this spatial dependence is not only interpretable as a sign of sound competition, entailing quality improvements.

Of course, we do not disregard that competition could be important to improve the quality of offered services, also in the museum sector. Nor we have argued that competitive motivations are absent in the museum sector.

Simpy, further legal and administrative reforms for public museums are perhaps necessary, along with a truly deep change in the feeling about the museum mission, to make competition a clearer factor in enhancing spatial dependence.

Thanks,

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