EUROPEAN REAL ESTATE SOCIETY- ANNUAL MEETING - STOCKHOLM - JUNE 2009

Integrating a Location Value Response Surface model with Bootstrap Technique. A Case of Mass Appraising in Bari

Session 2H - Valuation

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1. Mass Appraisal – Automated Valuation Models in Italy

There is a growing interest in the Italian Real Estate Market for Mass Appraisal and Automated Valuation Models

1.NATIONAL CADASTRAL AGENCY

Agenzia del Territorio is working on a general reform of our cadastral system basing the tax on the real value and income of property (Mass Appraisal)

2.BASEL II

Because of Basel II limits on banking activities Bank of Italy asked a annual re-appraisal of producing properties and three-years re-appraisal of residential properties also using "mathematical and statistical modelling" (AVM)

3. IVS RICS INTRODUCTION

The third Italian Property Valuation Code and the recent translation of RICS Red Book in italian introduced the IVS methods inside Italian Real Estate Market (AVM - Mass Appraisal)

4. CHANGE IN LEGAL FRAMEWORK

According to italian law since the 2005 it is possible to read the real value in residential property transactions. More data than in the past are available (AVM - Mass Appraisal)

5.ACCREDITATION AND CERTIFICATION PROCESS

RICS - APC ; CRIF ITALY - ISO 17024 VALUERS ; EVALUATIONS with specific courses on MA

2. Location Value Response Surface Modelling: A Brief Outline

Modelling location is an important problem. Normally traditional MRA model are location blind assuming constant term as a proxy for location variable

Using fixed neighbour may represent an option. The neighbourhood should be well defined.

LVRS represents an option. It is applied especially by professionals.

The idea is using spatial interpolation techniques to analyse the influence of location on property value

This technique was introduced to model location variable in residential single familiy house (O'Connor, 1982). It has been appliied (Eichenbaum, 1989 & 1995; Ward et al., 1999), in England (Gallimore et al., 1996), and Northern Ireland (McCluskey et at ., 2000)

Although LVRS modelling in mass appraisal and AVM is a group of techniques it is possible to distinguish three different approaches to generate a surface in order to model the location variable

2. Location Value Response Surface Modelling: A Brief Outline

Modelling a Surface based on MBV to find VIC in order to calculate a Location Adjustment Factor

Modelling a Surface based on Percentage Errors and using it to "adjust" location blind model

Modelling a Spatial Interpolation of error in the immediate proximity of observation adjusting the model

THREE DIFFERENT APPROACHES TO MODEL LOCATION FACTOR

The first one will be used in this scientific work

The sample is composed by 78 observations residential properties sold between 1991 - 2004. They are in an urban area called CARRASSI SAN PASQUALE near Bari downtown.

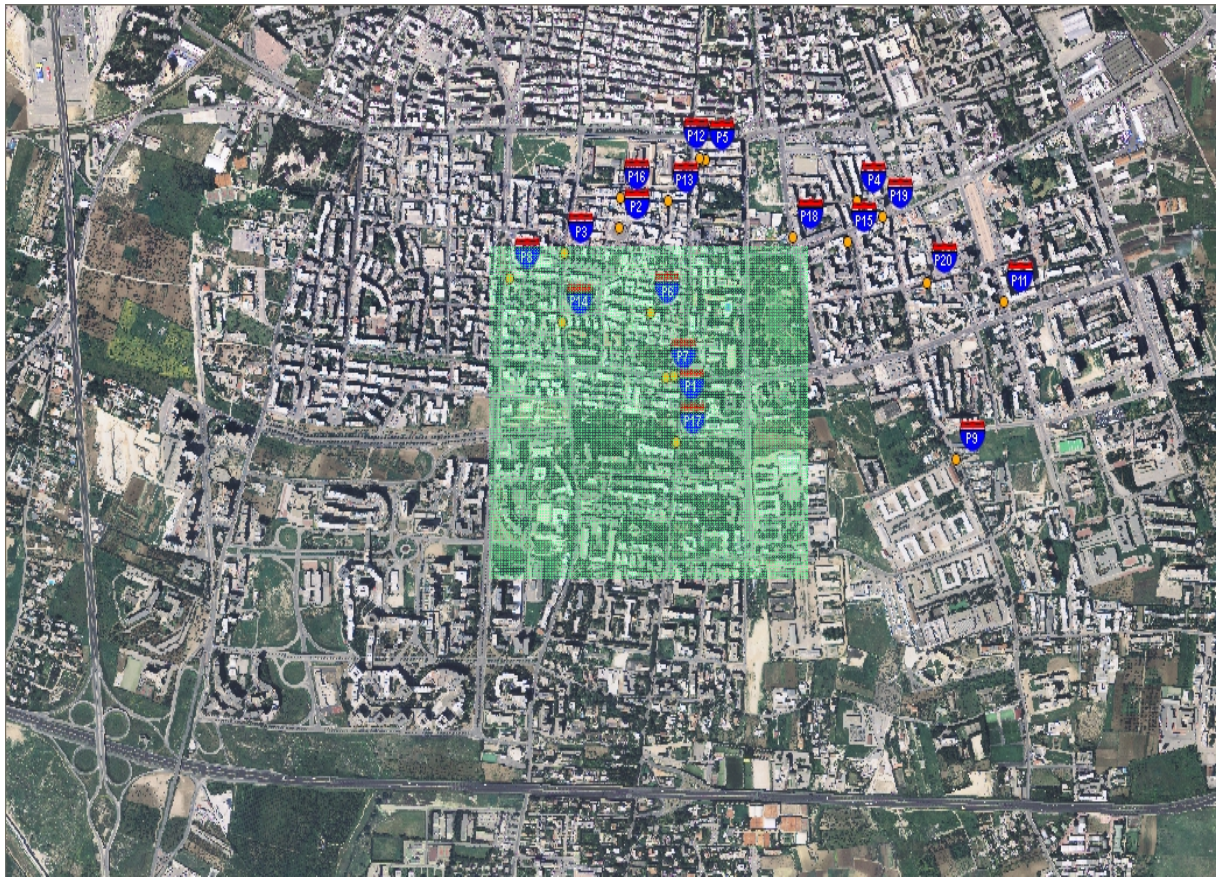
This work is the second application of LVRS models to italian reality, the first one has been done by the author and submitted for the special issue on property valuation of IJSPM

The sample is indicated in the photo

The area

Minimum	€	50.850,00
Maximum	€	320.000,00
Mean	€	150.684,67
Standard Deviation	€	61.873,99

DATE	Date of Sales	month
SQM	Square Meters of Flat	sqm
SQM_BAL	Square Meters of Balcony	sqm
PARK	Presence of Parking	dichotomic
PRICE	Price of the Property	euro



The first model location blind

$$PRZ = 101.039,443 + SQM \bullet 1447,953 + 338,36 \bullet BALCONY - 1198,96 \bullet DATE + PARK \bullet 31689,82€ + \varepsilon$$

Variables	Coefficient	t-statistic	F-ratio	Adj R2	MAPE
Constant	101039,443	4,51	62,709	76,20	0,19
SQM	1447,953	10,17			
BALCONY	338,36	0,587			
DATE	-1198,965	-6,276			
PARK	31689,827	1,92			

Model n.1 Location Blind

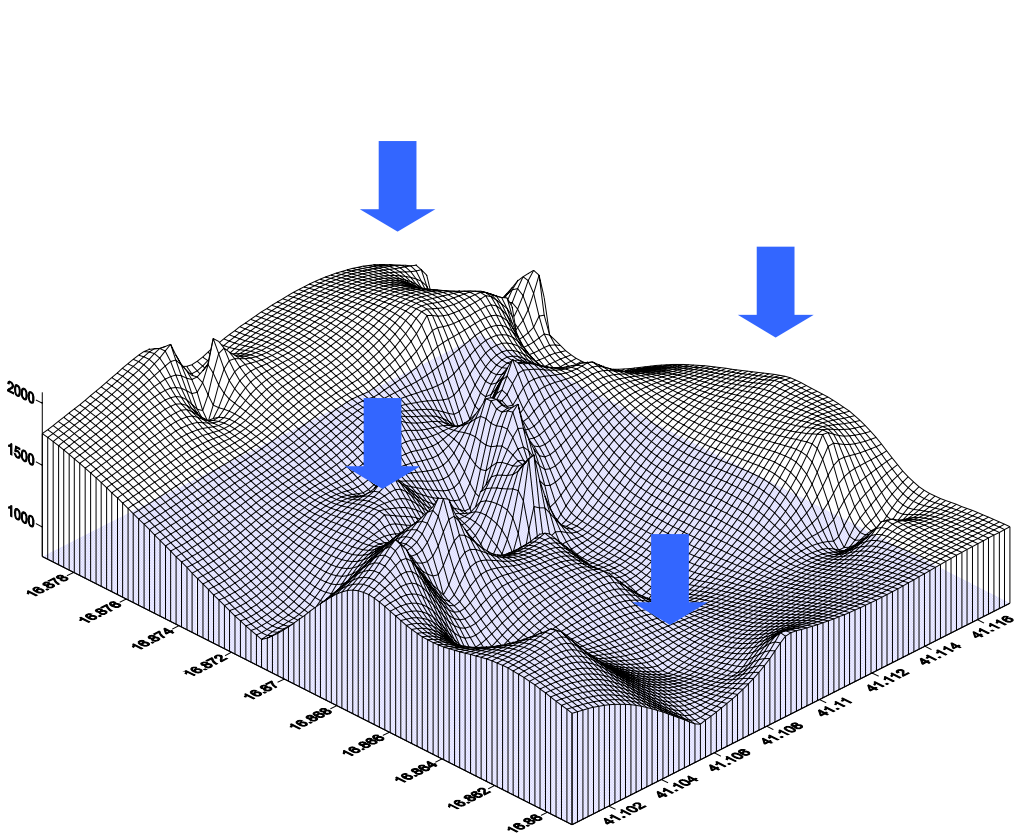
The second model fixed neighbourhood

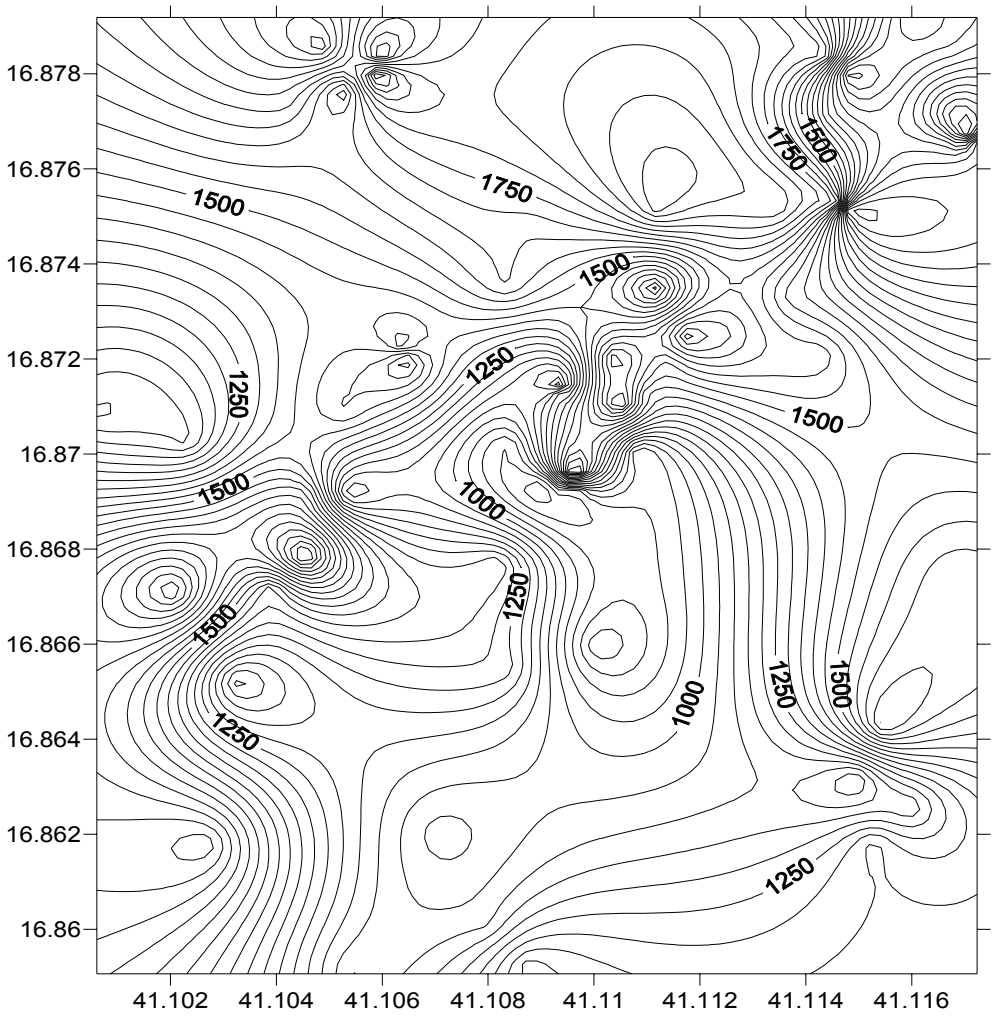
$$PRZ = 95.181,478€ + SQM \bullet 1457,645€ + BALCONY \bullet 389,006€ - DATE \bullet 1152,826€ + PARK \bullet 28274,177$$
$$- NG\_1 \bullet 11.459,26€ + NG\_2 \bullet 15.180,634 + \varepsilon$$

Variables	Coefficient	t-statistic	F-ratio	Adj R2	MAPE
Constant	95181,478	4,35	46,208	77,80	0,16
SQM	1457,645	10,567			
BALCONY	389,006	0,697			
DATE	-1.152,86	-6,221			
PARK	28274,177	1,757			
NG_1	-11459,266	-1,501			
NG_2	15180,634	1,906			

Model n.2 Fixed Neighbours

The third model LVRS - PLOTTING MBV





A Contour Map and a Wireframe have been developed using SURFER 8 with a linear variogram modelled with a kriging technique. Four VICs have been selected

The third model LVRS - PLOTTING MBV

$$PRZ = -10.306,660€ + SQM \bullet 1433,172€ + BALCONY \bullet 107,72€ - DATE \bullet 973,536€ + PARK \bullet 34.209,39€ + LAF \bullet 95.289,326€ + \varepsilon$$

Variables	Coefficient	t-statistic	F-ratio	Adj R2	MAPE
Constant	-10306,66	0,291	62,647	80,00	0,15
SQM	1433,172	10,974			
BALCONY	107,72	0,202			
DATE	973,536	-5,272			
PARK	34209,39	2,259			
LAF	95289,326	3,852			

Model n.3 LVRS

The fouth model LVRS + BOOTSTRAP

$$PRZ = -45.116,776€ + 1572,8552€ \bullet SQM - 956,1247€ \bullet DATE + 114.411,830€ \bullet LAF + 30.849,4674 \bullet PARK + \varepsilon$$

Variables	Coefficient	t-statistic	F-ratio	Adj R2	MAPE
Constant	-45116,776		99,2	82,58	0,18
SQM	1572,855	13,485			
DATE	-956,125	5,221			
PARK	30849,467	2,42			
LAF	114411,830	4,373			

Model n.4 Integrating LVRS and Bootstrap Analysis

5.Final Remarks

The work demonstrated that LVRS may have a potential to be a useful tool form avm-mass appraising modelling also in Italy

The second application in Italy confirm that it is possible applying it in specific contexts in residential flat and with scarcity of data

Although the empirical results are not clear an integration with bootstrap technique may represent an interesting option in absence of large quantity of data

Further works may be required improving the quantity of simulations of Bootstrap

thank you for your attention