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Real estate market values and land revenue analysis in the metropolitan city of Milan

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Real estate market values and land revenue analysis in the metropolitan city of Milan

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Abstract. The report illustrate the results of the survey have been evaluated in the Research Project for Relevant National Interest "Metropolitan cities: economic-territorial strategies, financial bonds and circular regeneration". Among its objectives, the research aims to represent a compendium of the financial picture, the economic dynamics and the territorial structure in which the new metropolitan institutions will operate, by means of the structural changes of economics and legislative system. The phenomenon of urbanization of the Metropolitan Cities is analyzed proposing a framework for the analysis of the real estate profile on a metropolitan scale, in order to understand the role of this entity in relation to the aspects of social cohesion and economic-environmental sustainability. Through the use of dynamic and interactive instruments, a reading system for the real estate market value profile in the metropolitan cities has been developed. The framework for the analysis of the real estate profile on a metropolitan scale is experimentally applied to the case study of Milan, but can be reproduced on a national scale.

1. Introduction

With the foundation of metropolitan cities, we witnessed a highly positive transition, in line with the best practices, which implemented in the big cities the change and innovation drivers, the internationalization gateways of national economies, as well as the preferred centers for the production of knowledge and all the necessary resources in order to face the international competition and overcome possible structural crises on a territorial basis.

This significant transition, however, requires to overcome criticalities and bonds that metropolitan cities face on different scales and dimensions – mainly economic, environmental and social – including aspects relating to the variation of the settlement/functional trends and the complexities of urban transformation/regeneration and building restoration processes.

In this scenario, which reveals an increasingly growing competitiveness between territory, cities, geographic areas and territorial systems, public institutions are engaged in the activity of relaunching and redevelopment aware of the fact that in the competition between urban areas will be rewarded the "systems" more dynamic able to combine the protection of their territory with the development hypotheses [1].

2. Research questions and methodology of investigation

In the last ten years, extensive researches have sought to assess the dynamics involved in the metropolitan cities by comparing them with one another. Most of these studies have defined synthetic indicators to measure urban smartness [2] and also its dimensions and productivity [3].

Some observers note that although indicators are a powerful means of describing complex phenomena and supporting decision-making processes to define effective strategies and urban actions, they may sometimes be ineffective for measuring elements such as social, demographic, and cultural differences between cities [4] [5].

The Research Project of Relevant National Interest - PRIN "Metropolitan cities: territorial economic strategies, financial constraints and circular regeneration" his aimed to improve the knowledge system regarding the functions, structure and performance of Metropolitan Cities, as well as the role to be assigned to second and third order cities, "territorial order centers", in a context of reduced functionality and tendential disappearance of the Provinces.

One of the aims of the research is in fact that of representing a profile of the real estate income and values of the 10 metropolitan cities by assessing the intensity of the current fracture at the border between the central and hinterland cities and at the border with the metropolitan area.

The analysis of the real estate profile implies data processing, after gathering information from the principal official sources reporting the national real estate market behavior, with particular focus on data from the Real Estate Market Observatory (Italian OMI – Osservatorio del Mercato Immobiliare), accessed on the basis of a partnership deal between Italian IRS "Agenzia delle Entrate" and Politecnico di Milano ABC Department.

By this partnership the research group of Milan Polytechnic ABC Department, shares its scientific knowledge with the Italian IRS to elaborate, on integrated and multidisciplinary vision, an analysis of Italian real estate dinamics.

Then, for representative purposes, we will focus on the specific case of Metropolitan city of Milan for the preparation, transformation and computation of data processing through the creation of apposite indices used to monitor and mapping the real estate performance.

3. Metropolitan cities

The metropolitan cities are an important institutional reality, symbol of the change and of the territorial innovation, both at a productive and environmental socio-economic level.

In Italy, the law of April 7, 2014 no. 56 approved the establishment, redefining the provincial system. The measure identified ten metropolitan cities.[1] According to the geographical areas defined by the Italian National Institute of Statistics (ISTAT), the 10 cities were structured into three classes (figure 1) [6]:

- Northern metropolitan cities: Turin, Milan, Genoa and Bologna;
- Central metropolitan cities: Florence and Rome;
- Southern metropolitan cities: Bari, Naples, Reggio Calabria.

As acquired by the main institutional sources [7] [8] [9], the Italian metropolitan cities are very heterogeneous in terms of both population size and area, as well as levels of wellbeing and socio-economic development and, more generally, the extent of urban infrastructure.

By referring just to demographic for example, ISTAT data show that in 2017 the population of the 10 capital cities was about 8,000,000 (16% of the Italian population), while that of the metropolitan areas was about 18,5 million (33% of the Italian population).

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[1] Four other metropolitan cities have been identified by the special statute regions Cagliari (Sardegna); Catania (Sicilia); Messina (Sicilia); Palermo (Sicilia).
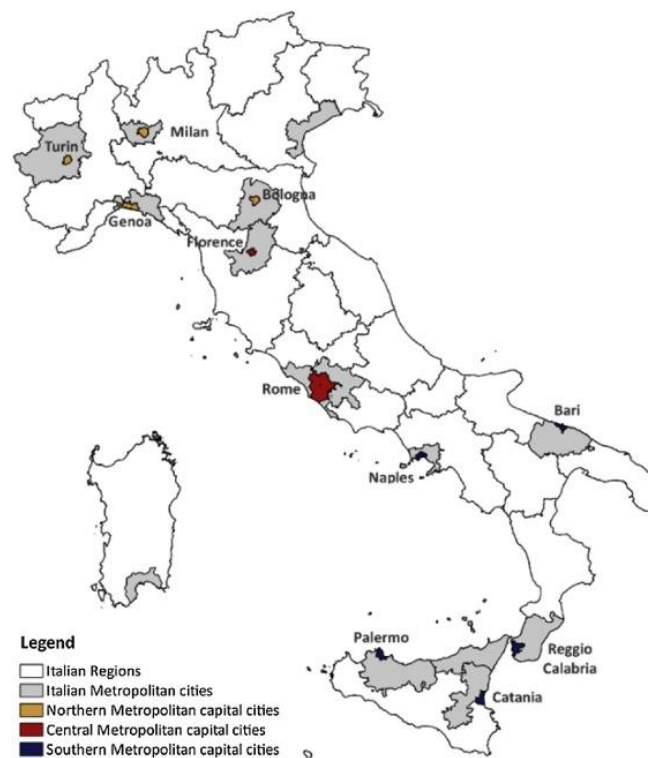
Figure 1. Map of Italian metropolitan cities (Battarra, R. et al, 2016).

Table 1. Population, area and density of the metropolitan cities (Polytechnic elaboration on data from "ISTAT 2017").

Capital city	Dimension	Population	Capital City density	Metropolitan area	Dimension	Population	Metropolitan area density
	(kmq)	(Istat 2017)	(inhab./kmq)	n° municipalities	(kmq)	(Istat 2017)	(inhab./kmq)
Roma	1.287,36	2.873.494,00	2.232,08	121,00	5.363,28	4.353.738,00	811,77
Milano	181,67	1.351.562,00	7.439,65	134,00	1.575,65	3.218.201,00	2.042,46
Napoli	119,02	970.185,00	8.151,45	92,00	1.178,93	3.107.006,00	2.635,45
Torino	130,01	886.837,00	6.821,30	316,00	6.817,28	2.277.857,00	334,13
Bari	117,39	324.198,00	2.761,72	41,00	3.862,88	1.260.142,00	326,22
Firenze	102,32	382.258,00	3.735,91	42,00	3.513,69	1.014.423,00	288,71
Bologna	140,86	388.367,00	2.757,11	55,00	3.702,32	1.009.210,00	272,59
Genova	240,29	583.601,00	2.428,74	67,00	1.833,79	850.071,00	463,56
Venezia	415,90	261.905,00	629,73	44,00	2.472,91	854.275,00	345,45
Reggio Calabria	239,04	182.551,00	763,68	97,00	3.210,37	553.861,00	172,52
	2.973,86	8.204.958,00	2.759,03	1.009,00	33.531,10	18.498.784,00	551,69

The cities vary greatly as regards population and density: Rome, for example, has over 2,800,000 inhabitants while Reggio Calabria has about 240,000. The population share of the capital city compared to the metropolitan area (figure 2) varies between the maximum value of Genoa, where about 70% of the population is concentrated in the capital, and Bari (26%).
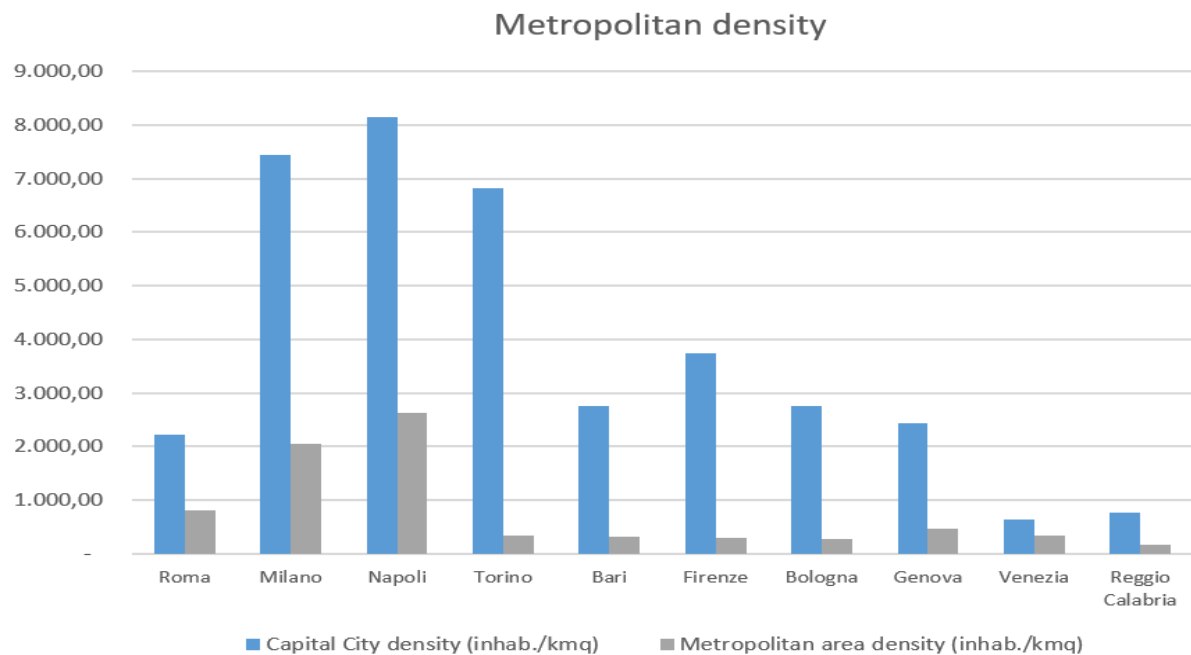
Figure 2. Capital city density share compared to the whole metropolitan area (Polytechnic elaboration on data from "ISTAT 2017").

The lack of homogeneity is also highlighted by a series of critical issues including:

- the lack of a true integration between the city center and the metropolitan hinterland, beyond a historical structure that sees the hinterland hosting mainly industrial activities [10];
- the difficulty for the metropolitan belts to find true new economic vocations capable of compensating for the tendential reduction of industrial jobs;
- the fiscal-financial crisis of the new CMs, lacking - as is the case in the French case - of their own taxation and of adequate resources for the important tasks assigned to them [11];
- the absence in our country of a tradition of strategic planning on a vast, metropolitan scale;
- the collapse, which occurred in the last decade and not only since the crisis, of public, national and local investments, as a result of the overall fiscal crisis in the country, with the major cities leading the decline [12].

4. Analysis of real estate dynamics by the OMI data

The Real Estate Market Observatory (OMI) is responsible for the collection and processing of technical and economic information relating to real estate values, the rental market of the archives of the Agenzia delle Entrate (IRS).

It analyses the national real estate market producing confidence intervals of real estate data for all the municipalities of the national territory. Data are collected using standardized data sheets on which data are processed statistically. The properties surveyed, which cover about 70% of the national real estate assets, are stratified by homogeneous area and type of property based on socio-economic and urban characteristics. The information is collected for various types of real estate: residential, commercial, garage, office, industrial based mainly on selling prices but also considering supply or estimated values.

The Observatory's database made available to the Politecnico di Milano for the Research Project

of National Interest (PRIN), is categorized as follows: a) property prices; b) sales; c) rents; d) volumes of sales in the 2006-2017 first half of the year.

As described by the Observatory in its manual [13], the real estate data are defined every six months and identify, for each delimited zone and homogeneous territorial band (OMI zone) of each

municipality, a minimum/maximum interval, per unit of surface area in euro per square meter, of the market values and rent, by type of real estate and state of preservation.

The sales and rents used to calculate the minimum and maximum quotations for each OMI zone, contain samples of transactions and offers of sale/rental provided by legal documents or by real estate agency announcements.

Finally, the volumes of trading represent the volumes of real estate traded during the sixmonth periods of each year and the dynamism of the homogeneous zones through the Normalized Transaction Numbers (NTN) and the Real Estate Market Indicators (IMI).

The OMI data are structured as follows:

- Band: Aggregation of contiguous homogeneous zones. It represents a territorial area with a precise geographical position in the municipality and reflects a consolidated urban planning position. In the municipalities whit a medium and small population and dimension. the territory is divided into the following bands: Central, Semi-Central, (Historic center, neighbourhood, district), Peripheral, Suburban (Localities, neighbourhood), Extra-urban (rural areas). Each OMI zone is assigned, in addition to the identification code containing the indication of the band to which it belongs, a summary description representative of the specific zone.

- Zone: A portion of the territorial area that reflects a homogeneous sector of the local real estate market, in which there is a substantial uniformity of appreciation for economic and social-environmental conditions. This uniformity is translated into the uniformity of the market values of the real estate units included in a range with a deviation between the minimum and maximum values, as a rule, not exceeding 50%.

- Land use: Aggregation of building types according to their homogenous intended use, divided into: a) Residential use; b) Commercial use; c) Directional use; d) Productive use.

- Building typology: Classification of buildings or groups of buildings according to their homogeneous distribution, organizational and functional characteristics.

- Conservation and maintenance status: Condition of the building unit taking into account the general level of internal finishes and the efficiency of the technological systems present. It is distinguished by: a) Excellent, b) Normal and c) Expiring.

The structure of OMI's data about property prices structure has been summarized in the figure 3:
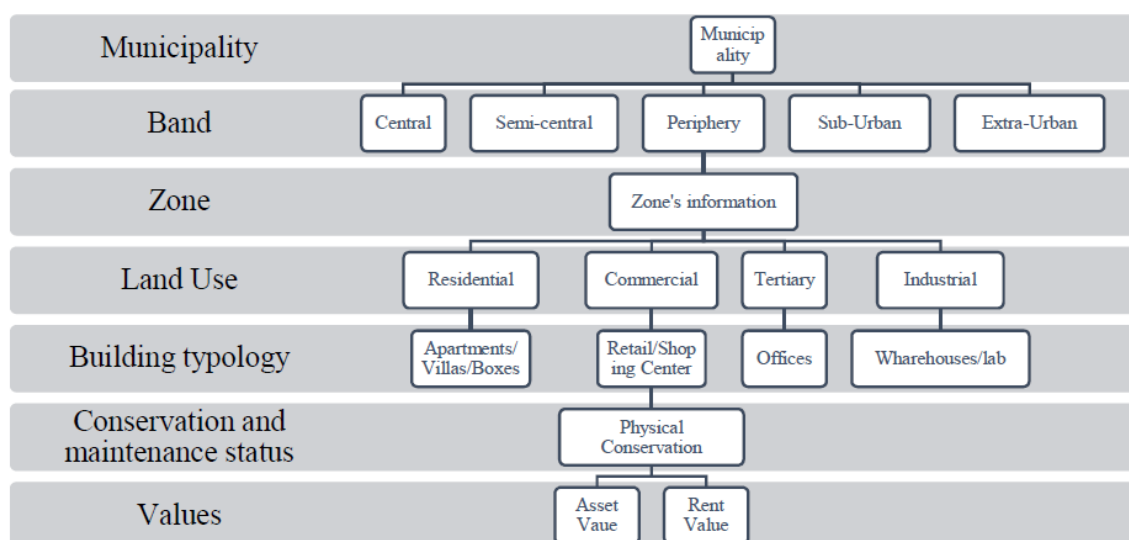

Figure 3. OMI's data structure about property prices - OMI. (Polytechnic elaboration on OMI Manual)

4.1. Data processing and representation of real estate performance

The work aims to provide an empirical contribution to the calculation of the capitalization rates of real estate, the search for the profitability test is examined in the presence of data from the OMI Database.

Selecting the municipality included in the metropolitan area of Milan and building an index that monitors the correlation between its confinements and those of other municipalities, as well as those of the entire metropolitan city with respect to the municipality of Milan, means indexing and monitoring the behavior of a single municipality over time with respect to the behavior of the strongest municipality, namely the Municipality of Milan. The creation of this index will be further developed with the creation of a map for the entire metropolitan city of Milan using GIS technology, trying to interpret the possible changes in the perception of real estate values by the market as a consequence of the new potential for territorial integration of a large area between the capital and the metropolitan hinterland, and therefore the possible dynamics of a crucial driver for investments in cities, private but also public, consisting of the relative trends of real estate.

We propose an analysis framework for the real estate profile on a metropolitan scale, to understand the role of this entity in the real estate industry.

Our proposal for the analysis framework has led us to develop an index to monitor the correlation of six-months variations in GCR (gross capitalization rate) for each of the municipalities of the Metropolitan City with respect to the prevalent Municipality.

The concept of the profitability is widely used in the techniques of analysis and evaluation of phenomena related to the real estate market. It should be noted that the rents taken into consideration are gross of the various expenses that weigh on the building.

Usually, for the purposes of estimation, the individual cost items are calculated as analytically as possible, albeit on the basis of estimates. In this work, in order to proceed only with an initial calculation of the profitability rate, it was preferred to omit the estimate of the expense components, thus determining Gross Capitalization Rates (GCR):

GCR = Gross Annual Rent/Gross Property Value

Anno	Semestre	Comune_descrizione	Fascia	Zona	Destinazione d'uso	Descr_Tipologia	Stato	Media compr	Media loc y	GCR
2006	1	ABBIATEGRASSO	B	B	Residenziale	Abitazioni civili	NORMALE	1700	70,80	0,041
2006	1	ABBIATEGRASSO	B	B	Residenziale	Abitazioni civili	SCADENTE	1325	55,20	0,041
2006	1	ABBIATEGRASSO	B	B	Residenziale	Abitazioni civili	OTTIMO	2250	94,20	0,041
2006	1	ABBIATEGRASSO	C	C	Residenziale	Abitazioni civili	NORMALE	1350	54,00	0,040
2006	1	ABBIATEGRASSO	C	C	Residenziale	Abitazioni civili	SCADENTE	1025	41,40	0,040
2006	1	ABBIATEGRASSO	C	C	Residenziale	Abitazioni civili	OTTIMO	2000	81,00	0,040
2006	1	ABBIATEGRASSO	D	D	Residenziale	Abitazioni civili	NORMALE	1300	51,60	0,039
2006	1	ABBIATEGRASSO	D	D	Residenziale	Abitazioni civili	SCADENTE	925	36,60	0,039
2006	1	ABBIATEGRASSO	D	D	Residenziale	Abitazioni civili	OTTIMO	1750	69,60	0,039
2006	2	ABBIATEGRASSO	B	B	Residenziale	Abitazioni civili	NORMALE	1700	70,80	0,041
2006	2	ABBIATEGRASSO	B	B	Residenziale	Abitazioni civili	SCADENTE	1325	55,20	0,041
2006	2	ABBIATEGRASSO	B	B	Residenziale	Abitazioni civili	OTTIMO	2250	94,20	0,041
2006	2	ABBIATEGRASSO	C	C	Residenziale	Abitazioni civili	NORMALE	1350	54,00	0,040
2006	2	ABBIATEGRASSO	C	C	Residenziale	Abitazioni civili	SCADENTE	1025	41,40	0,040
2006	2	ABBIATEGRASSO	C	C	Residenziale	Abitazioni civili	OTTIMO	2000	81,00	0,040
2006	2	ABBIATEGRASSO	D	D	Residenziale	Abitazioni civili	NORMALE	1300	51,60	0,039
2006	2	ABBIATEGRASSO	D	D	Residenziale	Abitazioni civili	SCADENTE	925	36,60	0,039
2006	2	ABBIATEGRASSO	D	D	Residenziale	Abitazioni civili	OTTIMO	1750	69,60	0,039
2007	1	ABBIATEGRASSO	B	B	Residenziale	Abitazioni civili	NORMALE	1700	70,80	0,041
2007	1	ABBIATEGRASSO	B	B	Residenziale	Abitazioni civili	SCADENTE	1325	55,20	0,041
2007	1	ABBIATEGRASSO	B	B	Residenziale	Abitazioni civili	OTTIMO	2250	94,20	0,041
2007	1	ABBIATEGRASSO	C	C	Residenziale	Abitazioni civili	NORMALE	1350	54,00	0,040
2007	1	ABBIATEGRASSO	C	C	Residenziale	Abitazioni civili	SCADENTE	1025	41,40	0,040
2007	1	ABBIATEGRASSO	C	C	Residenziale	Abitazioni civili	OTTIMO	2000	81,00	0,040
2007	1	ABBIATEGRASSO	D	D	Residenziale	Abitazioni civili	NORMALE	1300	51,60	0,039
2007	1	ABBIATEGRASSO	D	D	Residenziale	Abitazioni civili	SCADENTE	925	36,60	0,039
2007	1	ABBIATEGRASSO	D	D	Residenziale	Abitazioni civili	OTTIMO	1750	69,60	0,039
2007	2	ABBIATEGRASSO	B	B	Residenziale	Abitazioni civili	NORMALE	1700	70,80	0,041
2007	2	ABBIATEGRASSO	B	B	Residenziale	Abitazioni civili	SCADENTE	1325	55,20	0,041
2007	2	ABBIATEGRASSO	B	B	Residenziale	Abitazioni civili	OTTIMO	2250	94,20	0,041

Figure 4. Example of GCR calculation (Polytechnic elaboration from OMI Data)

In support of these index we have proposed and developed, Correlation Matrices and Georeferentiation based Maps, which form and complete the framework of analysis with more dynamic

and interactive data visualization tools and indicate the reciprocal behavior between the 134 municipalities of the metropolitan city.

A specific index indicate and monitor the correlation of each of the municipalities of the metropolitan city with respect to the Municipality of Milan.

Selecting the municipality of Milan and building an index that monitors the correlation between its borders and those of other municipalities, as well as those of the entire metropolitan city with respect to the municipality of Milan, means indexing and monitoring the behavior of a single municipality over time with respect to the behavior of the strongest municipality, namely the Municipality of Milan.

Explicative examples are represented in figure 5, that shows the general quotations of the first 24 Municipalities of the Metropolitan City and the respective change in €/sqm over the period 2006-2017 and in the figure 6, that shows the general quotations of all the Municipalities of the Metropolitan City of Milan. For the representation, a classification for equal intervals was used as a shade and color gradation.

Figure 5. Real estate trends of the first twenty-four municipalities of the Metropolitan City of Milan (Polytechnic elaboration fom OMI Data).
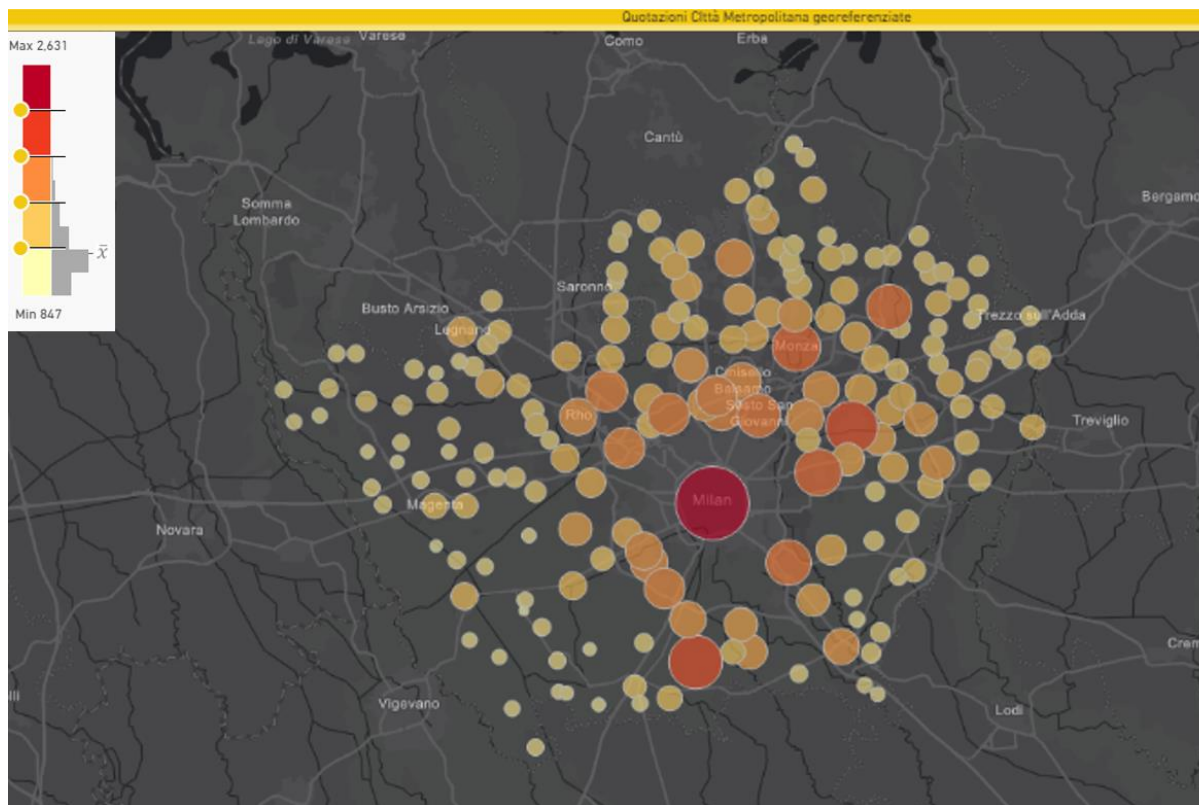
Figure 6. Geolocation of the Municipalities of the Metropolitan City (Polytechnic elaboration from OMI Data).

The creation of this index is further developed with the creation of a map for the entire Metropolitan City of Milan using GIS technology (Geographic Information System), trying to interpret the possible changes in the perception of real estate values by the market as a consequence of the new potential for territorial integration of a large area between the capital and the metropolitan hinterland, and therefore the possible dynamics of a crucial driver for investments in cities, private but also public, consisting of the relevant trends in the real estate.

We have previously defined this mode of visualization as dynamic, representative and intuitive, in fact these three characteristics reflect the potential of such a visualization tool for our correlation index. A book print cannot make full use of this potential, a task that is possible through a dynamic presentation of slides or through a web page. In fact, in this aspect, the data entered are many, the result of all the work done so far, we will try to give an example in the figure 7.

In a more dynamic form of such graphics, moving with a cursor, or with the gesture of a hand on touch screens, it would be possible not only to view the municipalities that "follow" the behavior of Milan, and display accurately the correlation index created precisely based on the values of the six-month variations of the capitalization rates, but also, for each municipality, the values of the capitalization rates, previously calculated divided into 4 sectors analyzed and for the period of analysis, precisely that of the previous semester and that of the current semester with respect to the graph.
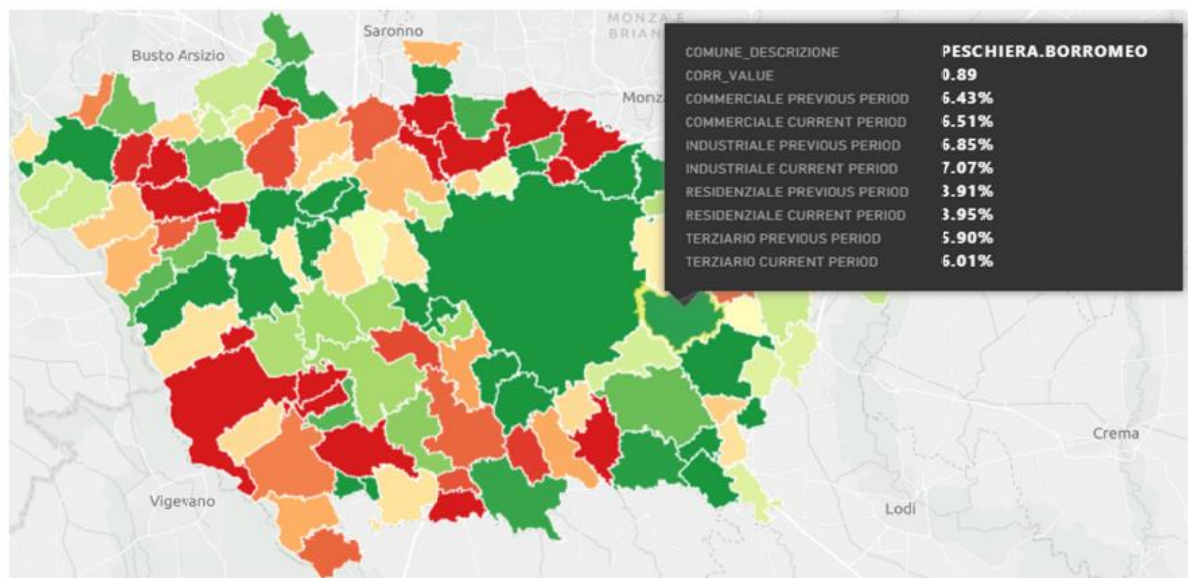
Figure 7. A dynamic, representative and intuitive GIS Correlation Map (Polytechnic elaboration from OMI Data).

5. Final consideration

The evaluation of the real estate profile in the Metropolitan City of Milan has led us to formulate an analysis framework usable for the analysis of Italian Metropolitan Cities.

This approach, however, is not limited to being reproducible only to other Italian Metropolitan Cities, but also on territorial scales different from the Metropolitan City and outside the Italian borders. In fact, homogenous zones could be analyzed without confinement in an entity such as a city or region, as a touristic area or even real estate areas in different countries.

Acknowledgments

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