Urban Green Spaces and Housing Prices: The Impact of Metric Choice on Econometric Models

Pierluigi Morano[1], Debora Anelli[2], Francesca Fariello[2(✉)], Marco Locurcio[1], and Felicia Di Liddo[1]

[1] Department of Civil, Environmental, Land, Building Engineering and Chemistry (DICATECh), Polytechnic University of Bari, 70126 Bari, Italy
{pierluigi.morano,marco.locurcio,felicia.diliddo}@poliba.it
[2] Department of Architecture and Design, "Sapienza" University of Rome, 00196 Rome, Italy
{debora.anelli,francesca.fariello}@uniroma1.it

Abstract. It is widely recognized that green urban areas play a significant role in enhancing environmental quality, social and economic well-being within cities. In the context of urban planning and sustainable development, the study of their impact on housing prices can guide administrations more effectively in the design and allocation of green spaces. However, the choice of metrics for this purpose has the potential to influence the results. The present study aims to investigate how the choice of urban green space metrics influences the econometric analysis of real estate prices in a densely populated Italian city. The case study focuses on the city of Rome, which, being one of the European capitals with the largest extension of green urban surface, represents a particularly relevant context for investigating the effects on real estate values. The investigation employs a regression-based methodology, utilizing three green space metrics: total absolute surface, percentage coverage, and the presence or absence of green areas. The dependent variable in this study is housing prices, while the independent variables relate to socio-economic and environmental issues, including construction and social quality. The findings of this study underscore the significance of judicious selection of metrics in order to achieve reliable results. In contrast to the extant literature, which has hitherto concentrated exclusively on the presence of green spaces, this research examines how different metrics influence their estimated impact on property values. The findings offer valuable insights for urban planners and policymakers in optimizing the integration of green spaces into urban valuation models.

Keywords: housing prices · econometric analysis · urban green space metrics · decision support tools · spatial configuration · housing prices

1 Introduction

The analysis of real estate prices is a central theme in urban economics and spatial planning, as it enables a deeper understanding of market dynamics and supports strategic decision-making in investment and sustainable development. Various factors influence property values, including socio-economic, infrastructural, and environmental variables.

© The Author(s), under exclusive license to Springer Nature Switzerland AG 2026
O. Gervasi et al. (Eds.): ICCSA 2025 Workshops, LNCS 15889, pp. 320–331, 2026.
https://doi.org/10.1007/978-3-031-97603-2_20

Among these, the quality of the urban environment has become increasingly relevant, in line with the growing focus on sustainability and public well-being [1]. In particular, the availability of urban green spaces is considered a key element in enhancing quality of life and attracting investments in the real estate sector. In order to ensure that these benefits translate into a sustainable increase in property values, public policies must promote the creation and optimal management of green spaces through appropriate regulations. The regulatory framework plays a crucial role in urban green space management, as it impacts both spatial planning and real estate valuation. Several policy guidelines have been introduced to preserve and incentivize the creation of green areas in urban environments. At the European level, the EU Green Infrastructure Strategy promotes the integration of green spaces into spatial planning [2].

At a national level, various countries have implemented regulations to manage and enhance urban greenery. In Italy, Legislative Decree 152/2006 introduced environmental criteria into spatial planning, while the National Recovery and Resilience Plan (PNRR) allocated funds for urban regeneration, with a particular focus on creating new green spaces and protecting landscapes [3]. Some cities have adopted more advanced urban planning tools, such as Urban Green Plans, which assign specific ecological functions to green areas, or the concept of Urban Forestry, which involves the strategic planting of trees to counteract the urban heat island effect and improve air quality [4].

Further confirmation of the importance of green spaces in urban dynamics comes from Report [5], which analyzed the environmental performance of Italian cities. The report highlights the growing attention of local administrations toward increasing pedestrian areas and green spaces factors that enhance quality of life and, consequently, the real estate attractiveness of affected areas. Additionally, the report indicates that in several Italian cities, the expansion of green spaces has coincided with an increase in both housing demand and average residential property prices.

Environmental certifications in the real estate sector are also playing an increasingly significant role. Systems such as LEED (Leadership in Energy and Environmental Design) and BREEAM (Building Research Establishment Environmental Assessment Method) accredit higher scores to buildings located near green areas or integrated with private green spaces, thereby increasing the market value of certified properties [6]. This aspect has direct implications for the real estate market, as environmental certifications are becoming a competitive factor for new developments and the renovation of existing building stock.

However, to ensure the effectiveness of these policies, it is essential to understand how the measurement of green spaces influences econometric estimates of property values. This study examines how different metrics used to quantify urban greenery affect econometric analyses of real estate values, identifying the most effective measures in capturing the relationship between green spaces and housing prices in high-density urban contexts.

2 Aim

The aim of the work is to analyze how different metrics for measuring urban green spaces affect econometric models of housing prices, focusing on the city of Rome. As one of the greenest European capitals in terms of total urban surface, Rome offers an ideal context

to assess the impact of greenery on real estate dynamics. The city's urban complexity and environmental policies make it a valuable case for understanding how metric choice influences valuation outcomes. In order to understand this, a case study application with multiple regression analysis is proposed. Through the application of a linear regression model to a dataset related to a city in central Italy, three metrics are compared to quantify the presence of urban green spaces: absolute surface area in square meters, percentage incidence on the territorial surface of the considered urban areas, and the presence or absence of green areas (dummy variable). The objective is to assess whether and how the choice of metric affects the significance of the urban green space variable and the robustness of econometric estimates. Comparing the regression results across the three different metrics will allow for an evaluation of whether the urban green space variable is significant in predicting real estate prices and which metric is most effective in capturing its impact in the case under study.

The reminder of the work is as follows: Sect. 3 analyses literature, underlining the different metrics for measuring urban greenness and their effect on econometric estimates; Sect. 4 describes the sample dataset and the case study; Sect. 5 presents the discussion of the obtained results; Sect. 6 outlines the conclusions of the work and the future possible insights.

3 Background

In recent years, econometrics applied to the real estate sector has developed various regression models to identify the key factors influencing property prices. Hedonic analysis is one of the most robust methods for determining the market value of residential properties, assigning specific weights to each characteristic of the property and its surrounding area [7].

Traditional econometric models, such as the Hedonic Pricing Model (HPM) and Spatial Regression Models (SRM), are commonly used to estimate the impact of socio-economic, environmental, and infrastructural factors. Additionally, non-linear models are sometimes employed when a more detailed identification of the functional relationship between urban green spaces and property values is required [8–10].

Socio-economic variables include indicators such as the average income of the area, the education level of the resident population, and the employment rate. Average income is considered a key determinant of property prices, as higher purchasing power among residents tends to drive up housing values in the area [11]. Education levels also have a significant impact: areas with a more educated population attract buyers with higher purchasing power, contributing to real estate market appreciation [12]. Furthermore, the employment rate is closely linked to housing demand and can influence price dynamics, particularly in areas characterized by high job stability [13].

Among environmental factors, the presence of urban green spaces has been widely analyzed in the literature [14]. The predominant variable considered in determining real estate prices encloses a broad range of urban greenery types, including public parks, wooded areas, community gardens, tree-lined avenues, and green roofs. In the article by [15], it is highlighted that the economic and social value of green spaces depends not only on their size but also on maintenance quality, accessibility, and their ability to integrate with the surrounding urban fabric, an idea also restated in the study by [16].

The presence of well-maintained green areas is associated with an increase in property values, due to benefits such as urban temperature reduction, improved air quality, and the creation of spaces for social interaction and physical activity. Empirical studies confirm this relationship: in Seville, an increase of one square meter of green space per inhabitant led to an average rise of €120/m^2 in housing values, while in Los Angeles, greater tree cover resulted in an 8% increase in real estate prices [11, 13]. A study on urban regeneration in Milan highlights a positive correlation between the expansion of green areas and property appreciation in certain microzones [9].

Recent research has expanded this perspective by including blue spaces (urban water bodies, lakes, rivers, fountains), emphasizing their beneficial effects on health and psychological well-being. The combined access to green and blue spaces not only enhances quality of life but also helps reduce inequalities, promoting greater stability in real estate values in areas where these features are present [17].

However, the impact of urban green spaces varies depending on their type and maintenance. A study conducted in San José, Costa Rica, found that metropolitan parks have a stronger positive effect on real estate prices compared to neighborhood parks, whose impact depends more on size and quality than on mere proximity. Conversely, undeveloped natural areas, such as riverbanks and urban forests, can have negative effects if perceived as degraded or unsafe [18–20].

A similar dynamic was observed in Beijing, where proximity to parks is beneficial only within an optimal distance of 850–1,604 m; beyond this range, issues such as overcrowding and degradation may arise [21, 22].

Finally, the presence of poorly maintained, dimly lit, or unsafe green spaces can generate negative perceptions, leading to a devaluation of residential properties [23]. Similarly, excessively dense tree cover can reduce natural light and the perception of safety, negatively impacting real estate prices [12].

Understanding the effect of metric selection on econometric estimates is not just a methodological issue but has direct implications for urban planners, investors, and public administrators. As reported by [5, 9], if the presence of green spaces is measured inconsistently, there is a risk of over- or underestimating its impact on the real estate market, compromising the effectiveness of urban enhancement policies. Moreover, professionals in the sector may prefer one metric over another depending on the territorial context or the objective of the analysis, assigning different levels of importance based on the socio-economic characteristics of the study area.

Among the key measurement variables, additional factors can be considered, such as the absolute surface area of green spaces in m^2 or km^2, the percentage of urban greenery relative to the total reference area [24], the distance to green spaces measured in meters or walking time [11], perceived accessibility to green spaces [21], maintenance quality, and perceived safety of green areas [25].

The choice of metric can significantly influence the results: while absolute surface area emphasizes the total amount of greenery available, it does not account for its spatial distribution or accessibility for residents. In reverse, the percentage of green cover relative to the urban surface may better capture the actual usability of green spaces in high-density cities. The literature has proposed different metrics to quantify green space presence,

including both absolute extension in square meters or kilometers and the percentage of green space relative to total urban area [7, 8].

Recent studies have introduced quantitative and qualitative indices to support the evaluation of green spaces impacting real estate prices. These indices include Urban Green Index (UGI) which measures the percentage of urban surface covered by vegetation [26], Normalized Difference Vegetation Index (NDVI) which uses satellite imagery to quantify urban vegetation density [8], Green Space Ratio (GSR) which calculates the percentage of green space relative to the total surface of an urban area [1].

The heterogeneity of results found in the literature highlights the need for a careful selection of measurement metrics in econometric analyses. Differences in metric choice can lead to divergent results, making comparisons between studies challenging.

4 Sample Dataset and Case Study

The empirical analysis was conducted in the city of Rome, selected due to its extensive urban green infrastructure and high spatial variability among neighborhoods. With over 30% of its territory covered by green areas, including parks, historical gardens, and ecological corridors, Rome represents a highly relevant case for examining how greenery affects housing prices. Its socio-economic heterogeneity and current environmental planning strategies further support the city's suitability as a case study in this domain. In the present research a sample dataset is constructed. The unique difference is in the metric used for taking into account the extent of the urban green spaces. In Table 1 the independent and dependent variables considered with their metrics, the employed acronym, the description and main descriptive statistics (minimum value, maximum value and standard deviation) are reported.

Table 1. Independent and dependent variables' main features

Variable	Dependent/Independent variable	Metric	Acronym	Min	Max	Standard Deviation
Average housing value	Dependent	€/m^2	Y	1,125	1,125	1,066.48
Population	Independent	Inhabitants/km^2	Po	536	79,837	14,352.58
Disposable per-capita income	Independent	€/per person/per year	Di	8,837	57,571	7,526.26
Abandoned spaces	Independent	Km^2	As	8,837	57,571	1.11
Social disease	Independent	Score	Sd	1.06	4140	6.04
Building disease	Independent	Score	Bd	1.12	5.95	1.55
Urban green spaces	Independent	m^2	Gsm	0	3.51	0.51
	Independent	Percentage incidence (on total territorial surface)	Gsi	0	0.64	0.14
	Independent	Dummy	Gsd	0	1	0.4

Each variable refers to a specific sub-urban area of the Italian city. Specifically, they refer to 117 out of 155 of the homogeneous zones defined by the Real Estate Market Observatory of the Italian Revenue Agency for the first semester of 2024. The excluded zones have no retrievable housing values data, due to their tertiary and productive vocation, therefore they could not be considered in this work.

The dependent variable (Y) is the average housing selling value per each homogeneous zone expressed in €/sqm and its source is the Real Estate Market Observatory's quotations updated to the first semester of 2024 (last available update).

Among the independent variables, the population (Po) and the disposable per-capita income (Di) represent, respectively, the number of individuals that live per square kilometer of the homogeneous zone and the gross domestic product potentially produced by an individual within it. The employed sources of data are the population census of 2011 of the Italian Statistic Institute (ISTAT) and the socio-economic database of *Urbistat Geosoftware.*

The independent variables related to the social disease (Sd) expresses the weighted average of the rate' deviations of unemployment, employment, youth concentration and education values, referring to the second semester of 2023, from the national average values, detected by the ISTAT census.

The building disease (Bd) derives from the comparison of maintenance state of buildings in each homogeneous area with the national average value, considering the residential buildings in very bad conditions and in mediocre conditions and the total residential buildings of each zone, detected by the ISTAT census.

The variable of abandoned spaces (As) represents the square kilometers of each homogenous zone characterized by critical presence of degradation in both un-built and built environments. It is calculated by ISTAT for the "Call for the submission of proposals for the preparation of the national plan for the social and cultural redevelopment of degraded urban areas (DPCM 21 October 2015)".

The independent variable related to the extent of green space (Gs) is the one for which the metrics will vary according to as follows: in the first case it is calculated as the square meters of each homogeneous zone occupied by green surfaces likes declared public parks; instead in the second case the used metric is the percentage incidence of the surface occupied by green public parks within the entire territorial extension of the homogeneous zone. In the third case, the dummy variable is used for checking the presence or the absence of green spaces in the urban area. The source of data is https://download.geofabrik.de/europe/italy.html.

The performed correlation analysis shows a weak level of interdependence of the set of chosen variables. In the first case – when the presence of green urban area is calculated through square kilometers of surface -, only for the variable Di and the dependent one (Y) the Pearson coefficient is equal to 0.93 with a positive sign. Other correlation levels are between the variables Di and As (−0.18), Po with Sd (−0.06) and Po with Bd (−0.05). Similar correlation levels figure for the second case – when the presence of green urban area is expressed as incidence on total territorial surface -.

5 Regression Results

Through a multiple regression analysis, three different methods for measuring and quantifying urban green spaces were tested: i) Gsm: surface area measured in square meters; ii) Gsi: surface area expressed as a percentage of the total urbanized area; iii) Gsd: binary variable indicating the presence or absence of urban greenery.

Multiple regression was chosen for its ability to isolate the specific effect of explanatory variables on real estate value, ensuring interpretability and robustness in the results.

The following Tables 2, 3 and 4 present the coefficient values, standard errors, t-statistic, and significance levels of each independent variable, based on the selected method for measuring urban green space.

Table 2. Regression Results with Gsm

Regression results with Gsm: surface area measured in square meters				
$R^2 = 0.8734$	Coefficients	Standard errors	T-stat	p-value
Intercept	50.344	132.244	0.381	0.704
Sd	−450.849	246.992	−1.825	0.071
Bd	33.490	144.386	0.232	0.817
Po	248.486	200.560	1.239	0.218
Di	7396.199	280.252	26.391	0.000
As	-577.902	205.883	−2.807	0.006
Urban green spaces (m^2)	211.453	242.488	0.872	0.385

Table 3. Regression Results with Gsi

Regression results with Gsi: surface area expressed as a percentage of the total urbanized area				
$R^2 = 0.8751$	Coefficients	Standard errors	T-stat	p-value
Intercept	50.750	131.059	0.387	0.699
Sd	−435.441	245.703	−1.772	0.079
Bd	31.129	143.453	0.217	0.829
Po	227.855	199.195	1.144	0.255
Di	7343.208	281.035	26.129	0.000
As	−544.960	206.315	−2.641	0.009
Urban green spaces (%)	248.506	166.525	1.492	0.138

Table 4. Regression Results with Gsd

Regression results with Gsd: binary variable indicating the presence or absence of urban greenery				
$R^2 = 0.8746$	Coefficients	Standard errors	T-stat	p-value
Intercept	−26.728	146.505	−0.182	0.856
Sd	−433.127	246.452	−1.757	0.082
Bd	70.866	146.211	0.485	0.629
Po	152.168	218.430	0.697	0.487
Di	7303.585	288.367	25.327	0.000
As	−524.665	211.079	−2.486	0.014
Urban green spaces (dummy)	146.679	110.268	1.330	0.186

The analysis of the three regressions shows how the measurement of urban green space influences the predictive power of the model and the relationships with real estate values. The F-statistic is very high in all three models, with values exceeding 134, indicating that at least one of the independent variables is significantly different from zero and contributes to explaining the dependent variable. The model with green space measured as a percentage (Gsi) presents the best balance between the quality of explanation (highest F) and prediction accuracy (lowest standard error). The use of green space in square meters (Gsm) is the least effective specification, with the highest standard error and the lowest F-value. The F-significance (p-value of the F-test) is extremely low ($< 10^{-48}$), suggesting that all models are highly significant overall. This means that, although some individual variables may not be significant, the overall model is statistically robust. The Variance Inflation Factor (VIF) shows the absence of multicollinearity for all cases considered.

From the perspective of model quality, the relative measurement of green space (Gsi) delivers the best performance, with a higher adjusted R^2 (0.8751) and a lower standard error (376.91) compared to the measurement in square meters (Gsm) and the dummy variable (Gsd). Similarly, the model's standard error decreases from 379.40 (Gsm) to 376.91 (Gsi) and 377.68 (Gsd).

Analyzing the coefficients of the green variable, it is observed that property values increase with the expansion of green space, regardless of the measurement method. However, only the percentage-based measurement (Gsi) approaches statistical significance (p-value = 0.138), while the other two methods are not significant (p-value > 0.18). The results indicate that the incidence of green space on the urbanized area is a more representative measure of its influence on property values than the absolute quantity or mere presence/absence. This implies that buyers place greater value on the proportional distribution of green space rather than on its mere territorial extent. This result aligns with the principle that the perception of green space is more closely tied to its accessibility and distribution than to the absolute amount available.

The change in the measurement of green space not only affects model quality but also alters the strength and significance of the other independent variables. The other variables confirm some of the expected trends.

Social degradation (Sd) exhibits consistent behavior across the different models, with a p-value ranging between 0.070 and 0.081, always close to the significance threshold. However, the introduction of the relative measure of green space (Gsi) tends to diminish its importance. This could suggest that the presence of urban green space and social degradation share a certain degree of correlation, whereby the percentage-based measurement of green space absorbs part of the effect of social degradation on the dependent variable. Social degradation (Sd) shows a negative effect on property values.

Building degradation (Bd) is never significant in any model (p-value $>$ 0.6–0.8). This result suggests that the state of the building stock does not directly affect the average unit sale price, at least not within the context of this analysis. Moreover, the method of measuring urban green space does not appear to alter the role of this variable in the model.

The resident population (Po) is never significant in the model (p-value $>$ 0.2), but its p-value increases when moving from an absolute to a relative measurement of green space (Gsi, Gsd). This might indicate that the resident population has a lesser influence on property values when green space is measured in percentage or binary terms.

Disposable income (Di) is the most stable and significant variable in all models (p-value $<$ 0.001). The coefficient ranges between 7,300 and 7,400, indicating a strong positive effect on property values. This result confirms that income is the primary predictive factor for the value of residential properties.

The area of degraded urban space (As) is always significant (p-value $<$ 0.05) and shows a negative coefficient in all models, confirming that an increase in degraded area reduces property values. However, its p-value increases slightly when green space is measured using Gsi or Gsd, suggesting that the relative measurement of green absorbs part of the negative effect of degraded areas.

The economic interpretation of the regression coefficients allows for an estimation of the marginal price associated with the presence of urban green space. When green space is measured in square meters (Gsm), an increase of 1 m^2 of urban green area is associated with an average increase of €211.45/m^2 in property values.

In contrast, when considering the relative metric (Gsi), the results show that a 1% increase in the territorial area covered by urban green corresponds to an average increase of €248.51/m^2 in property values. The analysis of marginal prices provides concrete insights for urban planning, demonstrating how policies aimed at increasing urban green space can have positive effects on property values and, consequently, on investments in the residential sector.

These results are consistent with the study by [24], which highlights that the density of urban green has a greater impact than its absolute extent.

6 Conclusions

This study addresses the topic of urban green spaces and their influence on property values, highlighting how the choice of metric significantly affects the results. In particular, it has been emphasized that the presence of urban green areas improves quality of life

and increases the attractiveness of residential zones, but it is crucial to select the most appropriate metric to evaluate its effects on real estate prices.

The objective of the present study was to analyze how the choice of metric used to measure urban green space influences the outcomes of econometric analyses. To this end, a linear regression model was applied to a dataset of socio-economic, environmental, and real estate data related to a city in central Italy, comparing three metrics: the total green area calculated in absolute terms (m^2), its percentage incidence relative to the total territorial surface of each suburban area, and its presence and/or absence as a dummy variable.

The study demonstrated that the way green space is measured can alter the result of the econometric analysis; indeed, when using either the variable representing total area or its presence/absence, the results are less precise, whereas using the percentage of urban green leads to more accurate predictions of real estate prices, concluding that the more evenly distributed the green space is, the more valued the properties become. The results of this study offer valuable insights for urban planners and policymakers in the design and management of urban green spaces. The analysis shows that the proportional distribution of green within the urban fabric is more relevant than its mere absolute extent in determining property value. This suggests that targeted interventions aimed at the redevelopment and optimization of green distribution could have a more significant impact than simply creating new, large green areas. A strategic planning approach to green distribution, taking into account population density and accessibility, could maximize both economic and social benefits.

Furthermore, the results highlight that the quality and perceived safety of green spaces play a crucial role: policies of regular maintenance, adequate lighting, and integration with pedestrian infrastructures could promote greater usability, reinforcing the positive effect of urban green on property values.

These findings can support environmental offset policies, where local administrations encourage urban forestry and the improvement of public green areas in under-served neighborhoods, contributing to greater territorial equity. Moreover, the results could be integrated into environmental impact assessment processes and urban regeneration strategies, guiding both public and private investments toward more effective solutions for sustainability and real estate enhancement [27, 28].

For future developments, the proposed model could be applied in additional urban contexts, both nationally and internationally, in order to verify the standardization of the relationship between the distribution of urban green and property values. Nevertheless, it is essential to consider some limitations: for example, the analysis does not examine the quality of green spaces, their actual accessibility, or the perception of safety, factors that may further influence property values. Future insights could expand to include additional variables and compare the implementation of machine learning methodologies to further improve predictions [29–33]. From a decision-making perspective, the results of this study underline the importance of selecting the most appropriate metric for evaluating the impact of green spaces on property values. The superior performance of the percentage-based metric (Gsi) suggests that spatial policies should prioritize the relative distribution of greenery across districts, rather than focusing solely on the overall

surface. These insights can inform urban regeneration plans, green infrastructure investments, and environmental offset strategies aimed at maximizing both economic value and urban equity.

References

1. Gibbons, S., Mourato, S., Resende, G.M.: The amenity value of english nature: a hedonic price approach. Environ. Resource Econ. **57**(2), 175–196 (2014) (Springer)
2. Commissione Europea: Strategia dell'Unione Europea per le Infrastrutture Verdi. Commissione Europea, Bruxelles (2020)
3. Ministero della Transizione Ecologica: Piano Nazionale di Ripresa e Resilienza (PNRR) e Rigenerazione Urbana. Ministero della Transizione Ecologica, Roma (2022)
4. ISPRA: I Piani Comunali del Verde: Strumenti per Riportare la Natura nella Nostra Vita? Istituto Superiore per la Protezione e la Ricerca Ambientale, Roma (2024)
5. Legambiente: Ecosistema Urbano 2024: Rapporto sulla Qualità Ambientale delle Città Italiane. Legambiente, Roma (2024)
6. Rebuild Italia, CBRE, GBCI Europe: L'Impatto della Certificazione LEED sul Valore degli Immobili. Green Building Council Italia (2021)
7. Mauri, F.: La Valutazione Economica di Grandi Progetti Urbani: La Metodologia dei Prezzi Edonici. Politecnico di Milano, Facoltà di Ingegneria, Corso di Laurea Magistrale in Gestione del Costruito (2011)
8. Acierno, A., Coppola, E.: Tools for green cities in urban planning: building sustainable and livable urban environments. Territory Res. Settle. Environ. **16**(1) (2023) (Federico II University Press)
9. Massimo, D.E., De Paola, P., Musolino, M., Malerba, A., Del Giudice, F.P.: Green and gold buildings? Detecting real estate market premium for green buildings through evolutionary polynomial regression. Buildings **12**(5), Article 621 (2024) (MDPI)
10. Xu, Y., Chen, R., Du, H., Chen, M., Fu, C., Li, Y.: Evaluation of green space influence on housing prices using machine learning and urban visual intelligence. Cities **158**, Article 105661 (2024) (Elsevier)
11. Wen, H., Jia, S., Guo, X.: Hedonic price analysis of urban housing: an empirical research on Hangzhou, China. J. Zhejiang Univ. Sci.. **6A**(8), 907–914 (2005) (Springer)
12. Saphores, J.D., Li, W.: Estimating the value of urban green spaces: a hedonic approach. Ecol. Econ. **79**, 92–102 (2012) (Elsevier)
13. Ramírez-Juidías, E., Sánchez-García, A., García-Pérez, J.: Urban green spaces and real estate market: empirical evidence from seville. J. Housing Econ. **51**, 101–116 (2022) (Elsevier)
14. Brander, L.M., Koetse, M.J.: The value of urban green space: a meta-analysis of the economic valuation literature. Environ. Resource Econ. **50**(3), 365–393 (2011) (Springer)
15. Liebelt, V., Bartke, S., Schwarz, N.: Urban green spaces and housing prices: an alternative perspective. J. Environ. Econ. Manage. **85**, 110–129 (2019) (Elsevier)
16. Setiowati, R., Koestoer, R.H., Andajani, R.D.: Valuation of urban green open space using the hedonic price model. Global J. Environ. Sci. Manage. **10**(2), 451–472 (2024) (GIAP Journals)
17. Georgiou M., Morison, G., Smith, N., Tieges, Z., Chastin, S.: Mechanisms of impact of blue spaces on human health: a systematic literature review and meta-analysis. Int. J. Environ. Res. Public Health **18**(5), Article 2486 (2021) (MDPI)
18. Piaggio, L.: Green space and housing prices: evidence from san josé, costa rica. Land Econ. **98**(2), 278–295 (2022) (University of Wisconsin Press)
19. Panduro, T.E., Veie, K.L.: The amenity value of green urban spaces: evidence from a hedonic pricing model. Landscape Urban Plan. **113**, 62–69 (2013) (Elsevier)

20. Baró, F., Calderón-Argelich, A., Langemeyer, J., Connolly, J.J.: Under one canopy? Assessing the distributional environmental justice implications of street tree benefits in barcelona. Environ. Sci. Policy **47**, 10–21 (2015) (Elsevier)
21. Zhang, B., Xie, G., Xia, B., Zhang, C.: The effects of public green spaces on residential property value in Beijing. J.. Resources Ecol. **3**(3), 243–252 (2012) (Institute of Geographic Sciences and Natural Resources Research, CAS)
22. Szczepańska, A., Krzywnicka, I., Lemański, G.: Urban greenery as a component of real estate value. Real Estate Manage. Valuat. **24**(4), 79–87 (2016) (De Gruyter)
23. Troy, A., Grove, J.M.: Property values, parks, and crime: a hedonic analysis in baltimore, MD. Landscape Urban Plan. **87**(3), 233–245 (2008) (Elsevier)
24. Sim, J.: Seeing impacts of park design strategies on local economy through big data: a case study of gyeongui line forest park in seoul. Sustainability **12**(17), Article 6722 (2020) (MDPI)
25. Lee, C.-C., Liang, C.-M., Yeh, W.-C., Hu, Z.: The impact of urban renewal on neighboring housing prices: an application of hierarchical linear modeling. Int. J. Strat. Property Manage. **26**(1) (2022) (Taylor & Francis)
26. Li, H., Zhou, Y., Li, X., Meng, L., Wang, X., Wu, S., Sodoudi, S.: A new method to quantify surface urban heat island intensity. Sci. Total Environ. **624**, 262–272 (2018) (Elsevier)
27. Morano, P., Tajani, F., Anelli, D.: Urban planning variants: a model for the division of the activated "plusvalue" between public and private subjects. Valori e Valutazioni **28**, 31–47 (2021)
28. Locurcio, M., Tajani, F., Anelli, D.: Sustainable urban planning models for new smart cities and effective management of land take dynamics. Land **12**(3), 621 (2023)
29. Di Liddo, F., Morano, P., Tajani, F., Torre, C.M.: An innovative methodological approach for the analysis of the effects of urban interventions on property prices. Valori e Valutazioni, No. 26. Società Italiana di Estimo e Valutazione (2020)
30. Morano, P., Guarnaccia, C., Tajani, F., Di Liddo, F., Anelli, D.: An analysis of the noise pollution influence on the housing prices in the central area of the city of Bari. J. Phys. Conf. Ser. **1603**(1), 012027 (2020) (IOP Publishing)
31. Morano, P., Guarini, M.R., Tajani, F., Di Liddo, F., Anelli, D.: Incidence of different types of urban green spaces on property prices: a case study in the Flaminio District of Rome (Italy). In: Gervasi, O., et al. (eds.) Computational Science and Its Applications – ICCSA 2019, LNCS, vol. 11622, pp. 23–34. Springer, Cham (2019)
32. Morano, P., Guarini, M.R., Tajani, F., Anelli, D.: Sustainable redevelopment: the cost-revenue analysis to support the urban planning decisions. In: Gervasi, O., et al. (eds.) Computational Science and Its Applications – ICCSA 2020, LNCS, vol. 12253, pp. 968–980. Springer, Cham (2020)
33. Locurcio, M., Tajani, F., Anelli, D., Ranieri, R.: A multi-criteria composite indicator to support sustainable investment choices in the built environment. Valori e Valutazioni **30**, 85–100 (2022)