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A zoning of the Metropolitan City of Naples and analysis of land values

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Abstract. This paper presents the results of a zoning study involving the metropolitan city of Naples, for the purpose of identifying the areas within which to perform a comparable search by applying the synthetic-comparative market value procedure of appraisal. Moreover, an analysis was carried out of the values of agricultural land reported by two official sources, i.e. average land values (VFM) and average agricultural values (VAM), and by an unofficial source, i.e. the values of the Observatory of Agricultural Values (VAO). The results show that for some area/crop quality combinations, the values recorded can provide a significant indication of the agricultural value to be estimated. Vice versa, for estimating the agricultural value of land cultivated with the most profitable crops, the official values showed to be unreliable, meaning that the appraisal requires an accurate field survey. As for the differences between the different homogeneous areas, VAO prove to be more reliable, while VAM are the least significant values.

Keywords: zoning, comparable, agricultural value, market value.

JEL codes: C18, Q15, R32.

1. INTRODUCTION

The appraisal judgment is based on the comparative method for which the value is assigned to the assets to be evaluated by comparing them with similar assets of known price. To this end, there are various 'technical' methodologies applied in the estimation procedures which translate the appraised value into monetary terms. The choice of the most appropriate procedure to apply in each case strictly depends on the availability of elementary data. In particular, the synthetic-comparative procedure consists in the evaluation of an agricultural land (subject) by comparing it with similar properties (comparables) for intrinsic conditions, i.e., specific to the subject, and extrinsic, i.e. not inherent to it but influencing the values of all lands located in the same area. This approach is based on Jevons' law of indifference (1871), according to which if the comparison between identical assets is made in

the same market and at the same time, they must have the same value. For these similar assets, it is necessary to ascertain the market prices resulting from the appreciation assigned to the similar features of the subject by economic operators during the exchange. The comparison is made between 'similar' rather than 'identical' properties, in consideration of the probable uniqueness of agricultural land characteristics based on which, for at least one common attribute (technical parameter), the properties differ from each other. In this regard, the spatial context in which the subject is inserted cannot allow differences in the extrinsic characteristics influencing either the subject or comparables. Practically speaking, there are two crucial variables that enable the value of the subject to be estimated on the basis of the prices of the comparables; these are space and time. With regard to the spatial variable, *"the comparative principle would be correctly applicable only on condition that the sample of observed assets for comparison is made up of observations that have the characteristic of being homogeneous from a spatial point of view. This is in the belief, verifiable in real situations, that a different space generates an equally different appreciation by economic operators"* (Grillenzoni and Grittani, 1994, pp. 40-41). Despite its relevance, *"for the purpose of identifying the space within which to conduct the investigations ... it is not possible to provide precise indications That of spatial homogeneity is one of the appraisal problems that remains unsolved: the space can be defined thanks to the experience and sensitivity of the appraiser"* (Grillenzoni and Grittani, 1994, p. 41). On this same point, Medici stresses that *"the prices collected should refer to a fairly uniform area so as to make comparison easier and less arbitrary; in any case, the size of the market is a matter of such uncertainty that it cannot be usefully discussed: it generally covers the appraiser's normal field of activity"* (Medici, 1955, pp. 120-121). On the other hand, the character of 'immobility' of an agricultural land gives the space absolute importance, to the point that location is often considered the most important determinant of the market value in the real estate sector (Hoesli and Morri, 2010), such that two lands with the same intrinsic features may be valued differently. The localization zones, in fact, may differ according to the different land productivity and/or the different intensity of the demand for land, also due to operator expectations concerning land use changes.

The area within which to search for comparables represents, therefore, one of the operative choices that are not easy to resolve. From this point of view, especially in complex and far from homogeneous territorial contexts such as the Metropolitan City of Naples, there is an unavoidable trade-off between the number and quality

of the available observations for a reliable appraisal judgment. In fact, while the goal of assigning the maximum possible credibility to an appraisal value is guaranteed, among other things, by the reliability of the elementary data¹, the restriction of the geographical perimeter inevitably implies the reduction, even to zero, of the comparables, in consideration of the well-known low activity of the agricultural land market.

Therefore, if, on one hand, the importance of the spatial variable is emphasised, on the other hand, in literature this problem constitutes one of the aspects of the appraisal procedures that are substantially unresolved, leaving the choice to the assessor's skill and experience, with few exceptions, such as the municipal borders (Romano, 2007) or *"each province within the same agrarian region"* (Gallerani, 2011, p. 31). And this applies to other 'market-oriented' procedures, such as the market comparison approach (MCA) which, based on professional experience, seeks to overcome empirical appreciation by adjusting the average price of comparables, in order to *"take into account the residual dissimilarity of the property to be estimated with the comparable properties"* (Simonotti, 2006, p. 178). Residual dissimilarity, however, can only concern subject features that are different from the parameter considered in the comparison, leaving it to the sensitivity of the appraiser to choose the space within which to search for comparables.

In short, while, on the one hand, Italian literature underlines the importance of the spatial variable, on the other hand it provides general suggestions about where to find the comparables. These suggestions basically fall within two categories: a) by using existing zonings as the agrarian regions or the municipal boundaries; b) by leaving the choice to appraiser. This could be the reason why, to our knowledge, there is no research on the zoning of metropolitan areas – including that of Naples – aimed at the first purpose of this study. Given their heterogeneity, in fact, for the purposes of appraisal the zoning of such areas would be necessary. In international literature some examples of zoning can be found, but they focus on very extensive territories such as the State of Maranhao in Brazil for the determination and forecast of agricultural land prices (Reyton et al. 2014). On the other hand, the literature is rich in research demonstrating the significant influence of territorial and urbanization features on agricultural land prices and the crucial importance of location also in terms of distance from the city (Borchers et al., 2014; Buurman, 2001; Cavailhès and Wavresky, 2003; Delbecq et al., 2014; De

¹ The elementary data include the market prices of lands similar to the subject, since it involves factual data that can be used *"without resulting from the application of calculation procedures"* (Di Cocco, 1960, p. 17).

Noni et al., 2019; Guiling et al., 2009; Kuethe et al., 2011; Sklenicka et al., 2013; Vyn & Shang, 2021).

Therefore, one of the objectives of this study is to adapt the spatial variable for appraising the market value of agricultural land to a highly heterogeneous context such as the Metropolitan City of Naples. It follows that the first research question is: where to look for comparables in the Neapolitan metropolitan area?

Secondly, the research also aims to analyse the currently available values of agricultural lands recorded at municipal and zonal level by secondary sources – one unofficial, which provides minimum and maximum values for the same crop quality, and two official, as will be more fully illustrated in the following pages². Some of these values are frequently (and sometimes uncritically) adopted in a professional context to accompany the appraisal of the market value of agricultural land, although they are not calculated to this end³, independently of the territorial context and/or crop quality. While there are studies that analyse various aspects of the land market by using some of these values (Casini et al. 2015; Di Fazio, 1990), to our knowledge there are no comparative analyses of these three values that refer precisely to crop quality within homogeneous zones in a specific metropolitan area. For this reason, it may be useful to study closely the characteristics of these values by comparing them within the different territorial and cultivation contexts of the Neapolitan metropolitan area. The aim of this second research, therefore, is to attempt to answer the following questions: *a*) What characteristics do the agricultural values of the three sources have with reference to the identified zones and crop qualities?; *b*) For which zone/crop quality combinations are the agricultural values of the three sources most convergent? *c*) Which source is most reliable in supporting the market value appraisal of agricultural lands? *d*) Is the importance of field expertise, and hence the necessity of gathering data from primary sources on the availability of which the choice of appraisal procedure depends, the same or not in the correspondence between the different agricultural values of land?

This study, therefore, which focuses on the sales comparison approach, aims to give insights about two operative choices of rural appraisal: 1) *where* to search for truly market comparable or sales data, which must be near enough in spatial (as well as in temporal) terms to reflect the same market conditions of the subject,

and 2) *which* useful information can be drawn from the secondary sources in providing data for defining the mercantile framework of the agricultural lands to be appraised.

To answer the four research questions the study is organised as follows. The second section describes the fundamental aspects of the Neapolitan Metropolitan City territory. The third section illustrates the zoning and the relative applied methodology, and the fourth section details the data, the methodological approach and the results of the land values analysis. Section 5 shows the main remarks and discussions, and Section 6 draws the conclusions.

2. THE STUDY AREA

The territory of the Metropolitan City of Naples comprises the entire province of the regional capital, including 92 municipalities. This area, despite being of limited extension (1,171.16 km², corresponding to 9% of the territorial surface of the Campania region), presents striking characteristics of internal differentiation, so much so that it is defined among the Italian metropolitan areas as “*one of the most complex, dense and problematic*” (DARA, 2017, p. 12). These differences are the result of the joint action between the natural system, with the specific characteristics it assumes in the individual areas, and the anthropic adaptation of the soil for housing and for industrial, artisanal, tertiary, tourism, and infrastructural uses.

The process of urbanization, which at the time of the unification of Italy was centralized in the city of Naples, has over the decades gradually taken on a more widespread aspect, with the consequent fragmentation and pulverization of landed property, giving rise to ‘interstitial’ agricultural forms with an incoherent succession of houses and small plots. These dynamics have thus been translated into quantitative terms: while in 1970 the percentage of land area used by agriculture (UAA) was 56.9%, forty years later, in 2010, this percentage had dropped to 19.6%, corresponding to a consumption of approximately 44,000 hectares of soil (-65.6%). It should also be emphasized that the pace of this process has taken on increasingly pressing connotations, so much so that the average annual rate of reduction of UAA has risen from 2.2% in the three decades 1970-2000 to 4.2% in the last intercensal decade 2000-2010. These dynamics resulted in the metropolitan area of Naples holding a UAA percentage of the territorial surface of around 20% compared, for example, to 46% and 41% in Bologna and Milan respectively (Branduini et

² A source is ‘official’ when it presents values prescribed by legislation, while it is ‘unofficial’ when the real estate values are the result of investigations carried out by public or private institutions (Tempesta, 2018).

³ It is not uncommon that, for land allocated exclusively for agricultural purposes, ‘agricultural’ value and ‘market’ value are used interchangeably.

al., 2016), with inevitable repercussions on land values. It should be pointed out, moreover, that this impressive soil consumption is partly the consequence of an interpretation of agricultural areas as land that is perpetually waiting to be used for construction, rather than as areas suitable for agricultural use, which should be the purpose for which their status as non-development land is established in the first place. This interpretation has also been favoured by certain jurisprudential rulings⁴ which have denied the causal link between agricultural green and agricultural activity (Cupo, 1992).

This process has had an even greater impact on agricultural performance, especially considering that from an agronomic point of view a large part of the territory benefits from high land fertility, due to the significant presence of organic substances and to the pedogenetic processes of volcanic soils with their rich chemical, physical and biological properties. This favourable natural condition allows the lands to achieve high levels of productivity and, consequently, high levels of income per unit of UAA. Consider, in fact, that the standard production per hectare of UAA in this territory is € 14,252.35, the highest of all the provinces in the region. In the other provinces of Campania to achieve this level it takes an average of 5.45 hectares in Avellino, 4.07 in Benevento, 3.71 in Salerno and 2.35 in Caserta (ISTAT, 2013).

At present, the total agricultural area (TAA) of the Metropolitan City of Naples is 26,091.9 ha, representing 22.1% of the total, while UAA is 23,088.8 ha, corresponding, as already mentioned, to 19.6% of the total. 37.2% of UAA is used for arable land, with a clear prevalence of vegetables, flowers and ornamental plants (45.7%); 62.8% for woody crops, mainly fruit-bearing (70.8%), especially hazelnut, peach, apricot, walnut and plum trees, followed by olive trees (12.3%), vineyards (11.4%) and citrus fruits (4.8%); 0.008% for family gardens and 0.02% for permanent meadows and pastures. The 9,973 farms represent 3.5% of the total metropolitan area and are essentially based on the workforce provided by the farmers and their family members (Unioncamere Campania, 2016). Overall, agriculture accounts for 5.1% of total employment in the area, while its contribution to total economic wealth stands at 1% (C.C.I.A.A. Napoli, 2018).

The orography of the territory, together with the progressive urbanization, has determined the appearance of a variety of agricultural landscapes, which include the terraced landscapes of the Sorrento penin-

sula, the anthropic ridges of the Phlegraean Fields, the orchards of the Vesuvius area which are replaced by forest crops at higher altitudes, plots cultivated intensively with horticultural crops in the open field and in protected environments in the eastern suburban fringe of Naples.

This plurality of territorial conditions demands the delimitation of relatively narrow areas within which to search for comparables, in contrast with the possibility of expanding the space – due to the presence of road infrastructures and adequate means of transport that minimise the importance of the distance between the agricultural areas (Grillenzoni and Grittani, 1994) – with localization being still a main factor in determining the prices of agricultural lands in this territory.

3. THE ZONING

3.1 *The methodological approach*

The land market is local and must therefore be broken down into a series of sub-markets in order to account for spatial heterogeneity, since locational factors and price levels even for the adjacent lands vary depending on their surrounding conditions and the physical conditions of the individual lands. Therefore, given that both agricultural and non-agricultural factors are influential determinants of agricultural land prices (Mela et al., 2016), the goal of zoning in applying the sales comparison procedures should be to identify areas with similar extrinsic features which, together with similar intrinsic characteristics of the land, form similar values for similar lands. In this perspective, the approach followed, taking the municipality as minimum unit, has imposed the contiguity constraint based on the most probable existence of similar territorial features between contiguous municipalities. This choice is feasible if we consider the possible spatial dependence of agricultural land prices on neighbouring prices for similar lands (De Noni et al., 2019; Feichtinger and Salhofer, 2013; Maddison, 2009; Marques and Telles, 2023; Patton and McErlean, 2003), as well as the existence of a higher number of alternative uses other than agricultural for lands in areas with a greater density of economic activity in the surrounding territory (Cavailhès and Wavresky, 2003). Theoretically, this would be possible by resorting to cluster procedures, imposing the constraint of the territorial contiguity of the component units in each cluster, but this would require the availability of a series of variables and indicators capable of measuring individual phenomena at municipal level. Instead, a different path was chosen, which indirectly uses this information, as

⁴ Regard this, the ruling of the Council of State, Section IV, 11-6-1990 no. 464 establishes that “*the use of agricultural green areas does not presuppose the agricultural allocation of the area, as it may well be designated for achieving a better balance between built-up and non-built-up areas*”.

it is based on six zonings of the study area which can translate into territorial terms the influences of non-agricultural factors on the market values of land, including land intended exclusively for agricultural purposes.

Therefore, in order to use the existing zonings of the study area most relevant to this purpose, a cross-set operation was necessary. In particular, a generic homogeneous area A_i of the final territorialization is the set formed by the intersection – denoted by symbol \cap – of the six original zonings, such that it includes the municipalities c which are in zone i of the first zoning ($A_i^{Z_1}$), zone i of the second zoning ($A_i^{Z_2}$), zone i of the third zoning ($A_i^{Z_3}$), and so on. Therefore, by indicating with symbol \wedge the ‘conjunction’ as logical connective, formally we have:

$$A_i: Z_1 \cap Z_2 \cap Z_3 \cap Z_4 \cap Z_5 \cap Z_6 = \{c | c \in A_i^{Z_1} \wedge c \in A_i^{Z_2} \wedge c \in A_i^{Z_3} \wedge c \in A_i^{Z_4} \wedge c \in A_i^{Z_5} \wedge c \in A_i^{Z_6}\} \quad [1]$$

3.2 The zonings of the Metropolitan City of Naples

3.2.1 The agrarian regions

The agrarian regions represent territorial areas that derive from the subdivision into smaller districts of the altimetric areas previously delimited by ISTAT. Their territory is made up of contiguous municipalities that present similar natural conditions, in terms of geology, climate, position, relief, etc., and agrarian conditions, i.e., from the point of view of existing or potential crops. The analogy of these conditions has likely led some authors to consider them for the purposes of comparison, albeit as a general rule, in order to identify similar lands within the agrarian region (Gallerani, 2011). However, as appropriately specified by ISTAT, “the analogy of the conditions must be understood in a broad sense, bear-

ing in mind that the Italian municipalities (...) present, within their own constituency, a variety of positions and other characteristics” (ISTAT, 1958, p. 10).

The division made by ISTAT resulted in a delimitation of the national territory into 770 agrarian regions, seven of which concern the metropolitan area of Naples (Figure 1). Of these, three fall within the altimetric area of the plain (south-western Campania plain, south-eastern Campania plain, plain of Nola and Pompeii) and four in the hill area (the coastal hills of Naples, the Roccarainola and Visciano hills, the coastal hills of the Sorrento peninsula, and the islands of Ischia, Capri and Procida).

3.2.2 The homogeneous areas according to Law no. 590/1965

Law no. 590/1965, “Provisions for the development of agricultural property”, established the granting of mortgages with a duration of 40 years to direct farmers and other manual workers of the land at an annual rate of 1%, to purchase land “suitable for establishing farms with suitable characteristics or predisposition for building efficient family businesses, from a technical and economic point of view” (art. 1). The loan is granted up to the full amount “of the purchase price of the land deemed appropriate by the provincial agricultural inspectorate” (art. 3). To this end, art. 4 specifies that a “provincial commission periodically indicates, with reference to areas with homogeneous or similar agronomic characteristics, the average land values referring to units of surfaces and types of crop”. The principle of equity, provided for in art. 3, must be based on the above values and “in relation to the specific structural and production elements that make up the individual land”. It is clear, therefore, that this zoning has an explicit estimative purpose, although the land market segmentation that it implies is dictated by the analogy of agronomic or similar characteristics, leaving out other aspects which, having a greater impact on market values than on ‘agricultural’ values, make the purchase price of the land suitable as long as it is in line with an estimated average land value based exclusively on the agricultural allocation aimed directly at establishing efficient family businesses⁵.

Specifically, in the territory of the Metropolitan City of Naples, the provincial commission has identified 12 homogeneous zones, as illustrated in Figure 2.

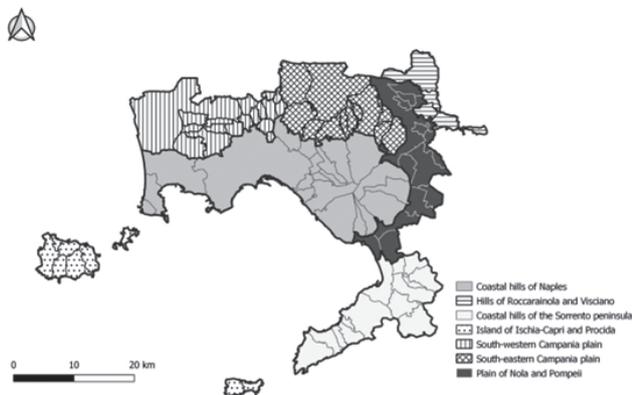


Figure 1. The agrarian regions.

⁵ Every year the official bulletin of Regione Campania publishes the updated VFM, as requested by the management operating unit “Competitiveness and agri-food chains”, to the management operating units of the General Directorate for Agricultural, Food and Forestry Policies competent for the territory.

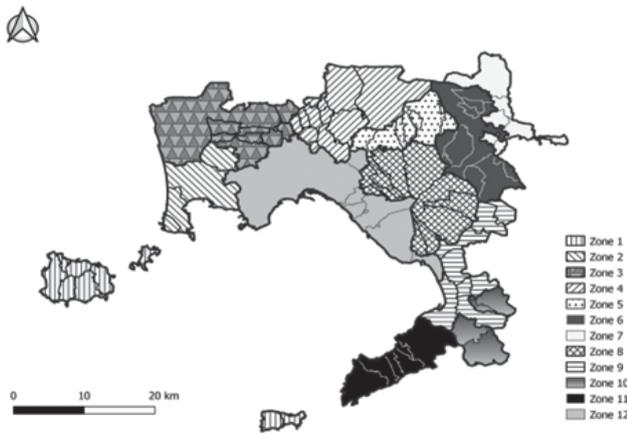


Figure 2. The homogeneous areas according to Law n. 590/1965.

3.2.3 The territorial systems of development

The Regional Territorial Plan (RTP) is a planning tool in which the regional legislator, allowing for the needs of the individual territories, directs, coordinates and guides the planning activity of the local authorities (Michieli and Cipollotti, 2018).

Campania's RTP was approved by Regional Law no. 13/2008 for guaranteeing the uniformity of the provincial territorial planning tools, in the implementation of Regional Law no. 16/2004, entitled "Regulations on the management of the territory". Through the RTP, the Regional Council, following sections 2 a and c of article 13 of Regional Law no.16/2004 and "in compliance with the general objectives of promoting sustainable development and to protect the physical integrity and cultural identity of the territory" identifies "the basic objectives and the main lines of organization of the regional territory, the strategies and the actions aimed at their realization", as well as "the guidelines and criteria for the development of provincial territorial planning tools and for institutional cooperation" (Regione Campania 2008).

In consideration of this, RTP identified 45 Territorial Development Systems (TDS), i.e. areas considered homogeneous based on the geographical characteristics declared by the local social entities themselves and for self-organized local development strategies. These systems are classified according to territorial dominants and constitute zones with respect to which territorial planning assumes homogeneous territorial references, limiting the excessive proliferation of areas.

The TDS that apply to the territory of the Metropolitan City of Naples and, on an urban level, to the municipality of Naples, are characterized by the dominants "rural-manufacturing", "urban-industrial" and "environ-

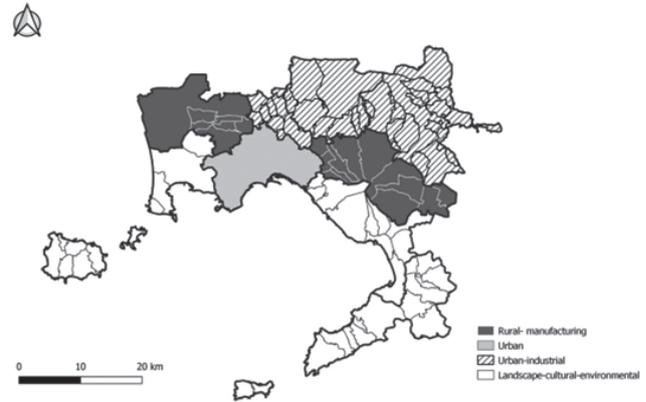


Figure 3. The territorial systems of development.

mental-cultural-landscaped" (Figure 3). The dominants are represented by the characteristics and vocations of the territories for which the identified areas are homogeneous for social and geographical characteristics and for pursuing the local development strategy. Practically speaking, this zoning is based on demographic characteristics and the existing socio-economic and geographical assets.

In consideration of the criteria used, this zoning can certainly affect the segmentation of the land market and as such contribute to the purpose of the study.

3.2.4 The rural territorial systems

Another territorialization involving the metropolitan area of Naples is made by Regione Campania which, to describe the various regional "agricultures", has identified 28 Rural Territorial Systems (RTSs), 7 of which exclusively or partially involve the study area (Figure 4).

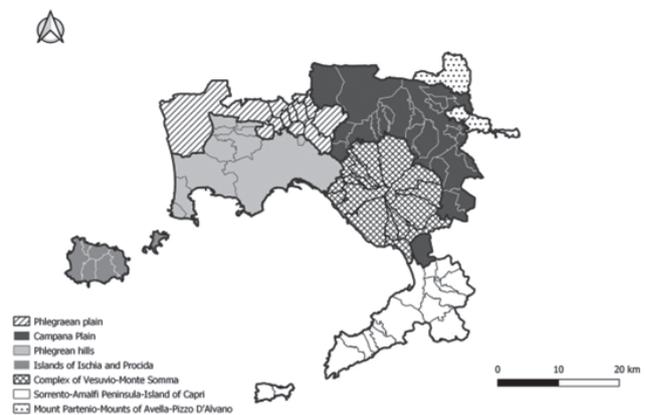


Figure 4. The rural territorial systems.

The RTSs were delimited by aggregating the municipalities considered to be reasonably homogeneous (Regione Campania, 2013), in terms of:

- physiographic and pedological characteristics conditioning the production potential;
- main agricultural and forestry uses;
- forms and structures of the agricultural landscape;
- relations with the urban and infrastructural system.

Given the characteristics based on which the territory has been divided, it is quite clear how the various spatial contexts identified in turn define the different land markets, especially taking into account the value deriving from the exclusively agricultural merit of the land. This zoning, therefore, makes a significant contribution to the goal of delimiting homogeneous territorial areas in which to look for comparables for appraising agricultural lands.

3.2.5 The zones of the Campania Rural Development Plan 2014-2020

The territorial analysis units of the Campania RDP 2014-2020 are represented by aggregates of homogeneous municipalities by altitude range, considering the relationship between the total agroforestry area and the territorial area, as well as the population density (Regione Campania 2015). In the territory of the Metropolitan City of Naples, in consideration of the high resident population density, there are three of the four identified macro areas (Figure 5). These are the “*urban and peri-urban*” macro-area, including the municipality of Naples; the “*rural area with intensive agriculture*”, which aggregates the municipalities located in the plains in which the rural area exceeds 2/3 of the total, and the “*intermediate rural*” macro-area, which includes the

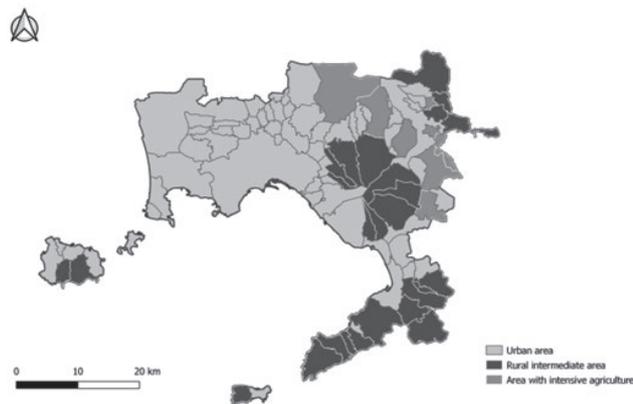


Figure 5. The zones of the Campania Rural Development Plan 2014-2020.

rural hill towns with the highest population density and characterized by an intermediate development.

Although this zoning is the result of using indicators identified for rural development policy purposes, it can undoubtedly represent a basis for delimiting the various land market segments, also because of the importance given to the anthropic pressure and corresponding growing demand for land. As it has been observed, in fact, “*the market segmentation depends on the demand and not on the characteristics of the asset*” (Tempesta, 2018, p. 112), with the intrinsic and extrinsic factors characterizing the agricultural lands and affecting the demand for land, which influence to varying degrees the areas identified by the RDP.

3.2.6 The homogeneous zones according to the charter of Metropolitan City of Naples

To ensure a more balanced and functional territorial structure, the charter of the Metropolitan City of Naples may call for the establishment of homogeneous areas based on the characteristics of identity and historical value; of geomorphological, naturalistic and landscape contexts, and of functional relationships and socio-economic frameworks that justify their common membership. This contingency is included in Law no. 56/2014, in which Article 1,11c reads: “*The statute may provide for (...) the establishing of homogeneous areas and specific functions, taking into account the specific territorial features...*”

The identification of homogeneous areas was carried out in compliance with the “*Guidelines for the Identification of Homogeneous Zones*” (Città Metropolitana di Napoli, 2019) which determine the identification of territorial areas with a population of at least 400 thousand inhabitants, in order to guarantee a minimum critical mass and a delimitation based on following criteria:

- contiguity and homogeneity both internally and in relation to other homogeneous areas;
- balance about geo-morphological and landscape aspects;
- optimization to the structural and socio-economic arrangement.

The study area is therefore broken down into the following five homogeneous zones: *Naples, Flegreo-Giuglianeso, Nord, Interno Vesuvio-Nolano* and *Costa Vesuvio – Sorrentino* (Figure 6). The criteria used to identify these zones, especially as regards the geo-morphological, landscape and socio-economic aspects, contribute to the definition of as many land markets. For these reasons, this territorialization has been taken into consideration in identifying the homogeneous areas, as illustrated in the following section.

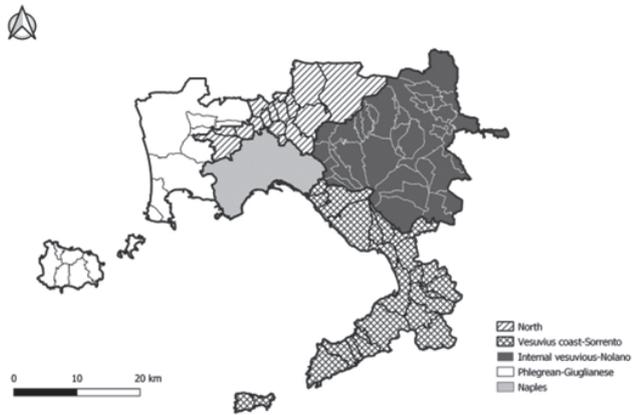


Figure 6. The homogenous zones according to the charter of Metropolitan City of Naples.

3.3 The identified homogeneous zones

As previously mentioned, the six zonings examined were all used for delimiting homogeneous areas in which to look for comparables, although they have not been defined for this study. Their usefulness derives from the consideration that the market values of agricultural lands are the result of the joint action of three factors represented by land productivity (and therefore profitability measured in terms of rental value⁶), demand for land and possible changing use which, depending on the areas and the related urban dynamics in place, are incorporated in the expectations of economic operators. It follows that both the territorializations that take into greater account the characteristics influencing agricultural land profitability and those defined for territorial development needs (with inevitable repercussions on the behaviour of potential buyers of land) contribute to land market segmentation.

By following the methodological approach illustrated above it was possible to identify 12 homogeneous zones, illustrated in Figure 7, while the municipalities falling within them are shown in Table 1. An examination of these reveals that, in such a heterogeneous context, the implication that the comparable lands should be found within the same agrarian region of the subject does not appear to be feasible. For instance, five homogeneous zones were identified in the agrarian region of the coastal hills of Naples, while in that of the plain of Nola, comprising fifteen municipalities, one homogeneous zone was identified (no. 12), whose territory includes only four municipalities. Given that the homogenous zones do not include all the municipalities, it follows



Figure 7. The identified homogeneous zones.

that, if the agricultural land to be appraised falls within a territory not belonging to the areas in question, the space in which comparables may be found will necessarily be limited to the municipal area.

All zonings considered in the study show the same drawbacks as the agrarian regions, being aimed for purposes of rural development and, more generally, territorial policy, with the sole exception of the territorialization used to determine the land values following Law no. 590/65. In fact, the latter appears more in line with

Table 1. The municipalities of the identified homogenous zones.

Zone 1	Massa di Somma, Ottaviano, Pollena Trocchia, San Giuseppe Vesuviano, Sant'Anastasia, Somma Vesuviana, Terzigno
Zone 2	Cercola, San Sebastiano al Vesuvio
Zone 3	Boscotrecase, Trecase
Zone 4	Ercolano, Portici, San Giorgio a Cremano, Torre del Greco
Zone 5	Calvizzano, Marano di Napoli
Zone 6	Bacoli, Monte di Procida, Pozzuoli
Zone 7	Qualiano, Villaricca
Zone 8	Casamicciola Terme, Forio, Ischia, Lacco Ameno, Procida
Zone 9	Barano d'Ischia, Serrara Fontana
Zone 10	Casalnuovo di Napoli, Castello di Cisterna, Pomigliano d'Arco
Zone 11	Visciano, Roccarainola, Casamarciano
Zone 12	Cicciano, Cimitile, Nola, San Gennaro Vesuviano

⁶ Beneficio fondiario.

the achieved zoning, consistently with the typically estimative purpose for which this zoning was established. Despite this, since all the other five zonings represent the result of territorial investigations that include aspects which, to some extent, contribute to segmenting the land market of the study area, they have proved to be useful and functional to the delimitation of the 12 identified homogeneous areas.

4. AN ANALYSIS OF LAND VALUES OF SECONDARY SOURCES

4.1 Data and methodological approach

After the zoning, the second goal was to analyse the land values determined by three secondary sources. The two official sources are the Average Land Values (VFM), as detailed above, established by law no. 590/1965, and the Average Agricultural Values (VAM) introduced by Law no. 865/1971 (so-called “House Law”), as an indemnity criterion in the event of expropriation for public utility. The unofficial source is the database of real estate prices (VAO) of the Agricultural Real Estate Market Observatory (OVA), established following the declaration of unconstitutionality of VAM as a result of Constitutional Court ruling no. 181/2011⁷.

Preliminary to the analysis is the selection of the crop qualities whose relative values are determined by the three abovementioned sources within the homogeneous areas previously identified (Table 2). Since the Observatory provides minimum (VAOmin) and maximum (VAOmax) land quotations for each crop quality in all the municipalities falling within the provincial territory, to make them comparable with VFM and VAM, VAO has been averaged between the two extreme values (VAOm). Moreover, zones 1, 2 and 3, were unified for both VFM and VAM, because the territorial scope of reference included the three areas considered, unlike VAO which is recorded at municipal level. However, in the latter case, the comparative analysis was made possible by the equality of the municipal quotations reported in the Observatory database relating to the three areas.

Given the purposes of the study, the analysis was carried out by comparing the three values in terms of position (average) and variability, measured as coefficient of variation in each zone among crop qualities. The analysis of these values is also preparatory to identifying the zone/crop quality combinations characterized by most convergent values, by calculating the difference between

Table 2. The crop qualities in the homogenous zones.

Crop quality	Zone											
	1	2	3	4	5	6	7	8	9	10	11	12
Arable land					X	X	X	X	X	X	X	X
Irrigated arable land	X	X	X	X	X	X	X			X	X	X
Irrigated garden	X	X	X	X	X	X		X	X	X		X
Orchard	X	X	X	X	X	X	X	X	X	X	X	X
Citrus grove	X	X	X	X		X		X	X			
Vineyard	X	X	X	X	X	X	X	X	X			X
Hazelnut	X	X	X	X								X
Walnut orchard										X	X	X
Olive grove	X	X	X	X		X		X	X			
Chestnut	X	X	X			X					X	X
Coppice	X	X	X		X	X	X	X	X			X
High forest	X	X	X									
Meadow					X		X					
Pasture					X		X					X

the highest and the lowest of the three unit land values, as well as to individuating the source which, for the same crop quality, most discriminates the values between the homogeneous zones (Table 3 and Table 4)⁸. In the first case, the aim is to individuate in which zone and for which crop quality the objectivity of an appraisal does not strictly depend on the data source, given the substantial convergence of the three values. In the second case, the analysis allows the appraiser to identify the source which, by attributing greater consideration to the specific characteristics of the areas, given the greater differences between the three values, reports quotations reflecting a more accurate segmentation of the land market.

Finally, given the availability of an interval between the maximum and the minimum values of VAO, the extent of this range was examined to see whether it was constant or variable by zone and crop quality, in order to check the existence of a correlation between the importance of on-field appraisal – measured as a proxy by calculating the difference between the two extreme values recorded by the OVA – and the land value to be estimated, as represented by VAM and/or VFM.

4.2 Results

In the first stage of the analysis, the average and the coefficient of variation of the three values were cal-

⁷ It should be noted that the data used here refer to 2019 for all three sources, since the most recent VAM currently available for the province of Naples refer to that year.

⁸ Given that for VAO are established two values, VAOmax and VAOmin, and that VAM are average values, the differences between the three values recorded by the three sources have been measured either for VAOmax or for VAOmin.

Table 3. The ranges of variation of unit values (€/mq) in the homogenous zones by crop quality (VAOm).

Crop quality	Zones									
	1, 2, 3	4	5	6	7	8	9	10	11	12
Arable land		0.32	2.36	1.23	2.36	0.77	0.77	2.81	0.86	2.66
Irrigated arable land	3.38	1.31	2.72	1.98	2.72			3.38	0.64	4.75
Irrigated garden	3.82	1.74	3.29	3.48		1.49	1.49	3.89		5.68
Orchard	2.39	1.54	2.79	2.95	2.79	2.25	2.25	3.61	1.87	2.40
Citrus grove	2.72	2.10		3.01		2.97	2.97			
Vineyard	1.50	1.66	0.75	1.05	0.75	1.46	1.63			0.51
Hazel grove	1.34	2.84							1.94	3.65
Walnut orchard								2.88	1.33	1.23
Olive grove	1.17	0.78		1.15		0.09	0.19			
Chestnut	0.52			0.30					0.76	0.78
Coppice	0.54		0.22	0.52	0.22	0.24	0.24			0.25
High forest	0.60									
Meadow			0.76		0.76					
Pasture			0.18		0.18				0.15	

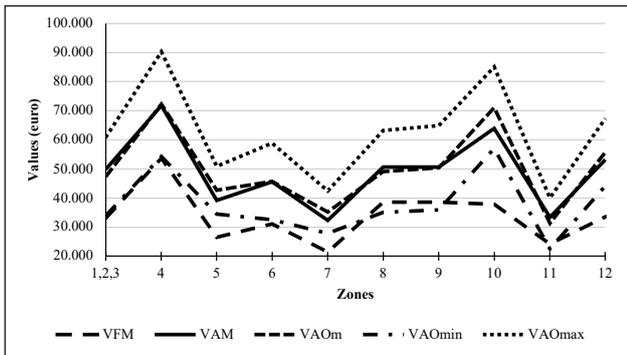
Table 4. The ranges of variation of unit values (€/mq) in the homogenous zones by crop quality (VAOmax).

Crop quality	Zones									
	1, 2, 3	4	5	6	7	8	9	10	11	12
Arable land		1.90	3.11	2.18	3.11	1.70	1.70	3.61	1.71	3.36
Irrigated arable land	5.18	4.50	3.77	4.50	3.77			4.58	2.80	6.15
Irrigated garden	6.68	6.40	4.74	6.40		4.70	4.70	5.44		7.68
Orchard	4.29	3.80	4.69	4.85	4.69	3.85	3.85	5.62	3.27	4.10
Citrus grove	4.80	4.80		4.80		5.90	6.25			
Vineyard	2.50	2.66	1.50	2.05	1.50	2.64	2.85			1.50
Hazel grove	2.54	2.84							2.94	3.80
Walnut orchard								4.33	2.33	2.50
Olive grove	1.72	1.33		1.72		1.20	1.30			
Chestnut	0.82			0.60					1.16	1.18
Coppice	0.77		0.63	0.75	0.63	0.63	0.63			0.63
High forest	0.90									
Meadow			1.01		1.01					
Pasture			0.22		0.22				0.24	

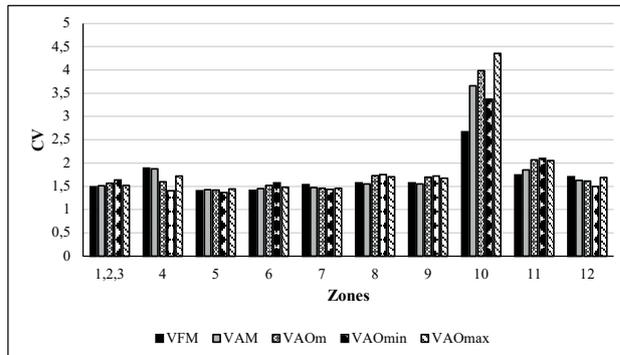
culated. As can be seen in Graph 1, VAOm are basically aligned with VAM, while the minimum values are at the same height as VFM for some areas, lower for zones 8 and 9 and significantly higher in zone 10. Moreover, VAOmax are constantly at the highest level in all zones, reflecting, with a trend very similar to that of VAM, the variations in value among the areas differently from VAOmin. The same analysis carried out for crop quality shows several differences compared to the previous, given that VAOmax is not always the maximum value, as it is exceeded by VAM in the case of hazel groves and

pastures, and that VFM has the lowest values but with four exceptions: citrus groves, hazel groves, coppices and pastures (Graph 2).

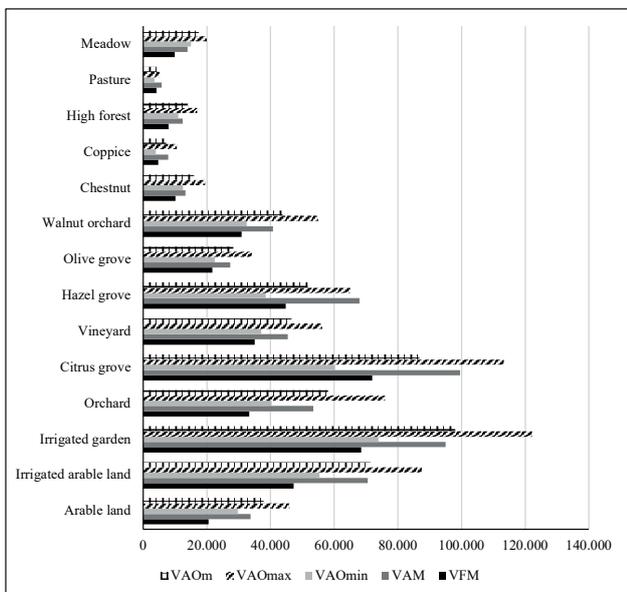
As for variability, the values of the Observatory show a relatively greater differentiation between the crop qualities, and this applies to average values as well as minimum and maximum values (Graph 3). The only relevant exception regards zones 4 and 12, where both VFM and VAM show wider differences. In both areas, however, VAOmax shows a marked variability compared to VAOm and is higher than VFM and VAM in area 12.



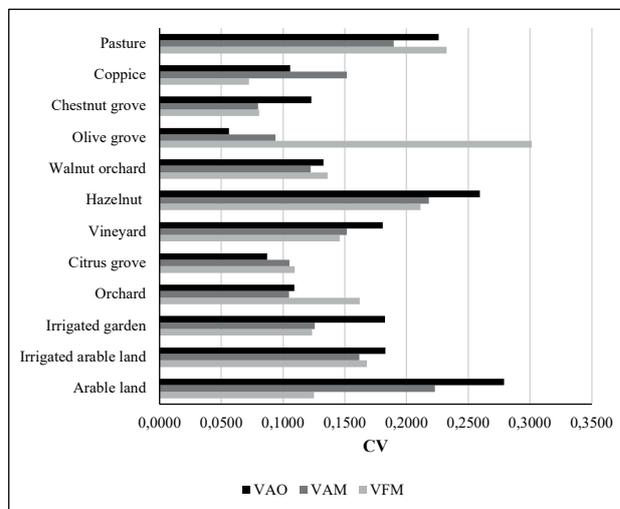
Graph 1. The land values by homogeneous zones.



Graph 3. Land values variability among crop qualities in the single zones.



Graph 2. The land values (€ ha⁻¹) by crop quality.



Graph 4. Variability of land values between homogeneous zones by crop quality.

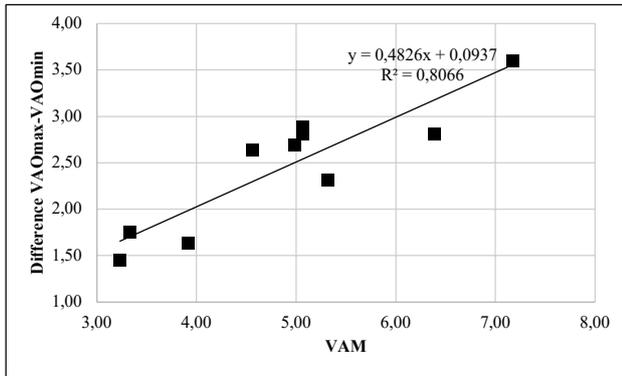
Concerning the identification of combinations of area/crop quality with the highest degree of convergence and therefore a minor range of variation in unit values, Table 3 and Table 4 illustrate how this result can be seen for both VAOm and VAOmax for irrigated arable land in zone 11, irrigated vegetable garden in zones 8 and 9, citrus groves in zone 4, vineyards in zone 12, hazel groves in zone 1-2-3, olive groves in zone 8, coppices in zones 5 and 7 and, lastly, meadows.

In relation to the value differences among the areas for each kind of crop, the results (Graph 4) show that 7 out of 12 crop qualities (pastures, chestnut groves, hazel nut groves, vineyards, citrus groves, irrigated gardens and arable land) presented the greatest variability among the areas, followed by VFM for 4 out of 12 crop qualities, such as olive groves, walnut groves, orchards and

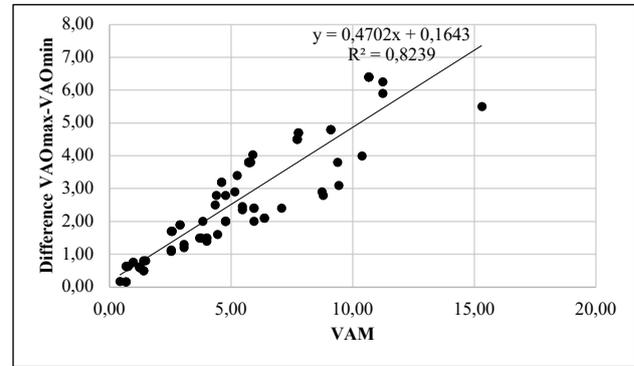
irrigated arable land. The last is VAM, which only in the case of coppices showed the highest differentiations. The high variability of the values recorded by the OVA is most likely due to quotations referring to more limited areas, i.e. those occupied by municipalities, compared to the areas to which VFM and VAM refer⁹.

Lastly, the analysis concerning the range of variation between maximum and minimum values recorded by the Observatory and VAM / VFM, Graph 5 and Graph 6 – which refer to the 12 homogeneous are-

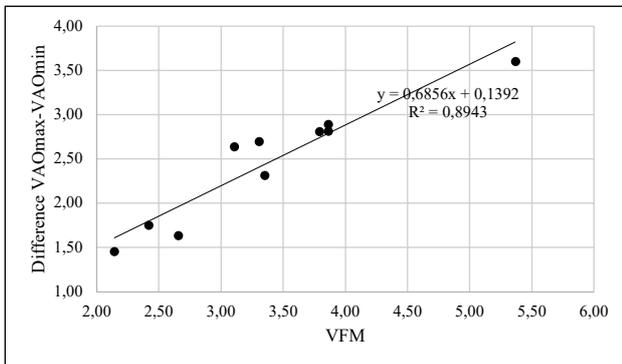
⁹ During the presentation of the OVA it was specified that the decision to establish an Observatory of agricultural values arose from the need to give “substance” to the quotations to be calculated, by referring to more homogeneous territorial areas than the agrarian regions to which VAM refer, due to their alleged unconstitutionality, partly because of their abstractness compared to market values.



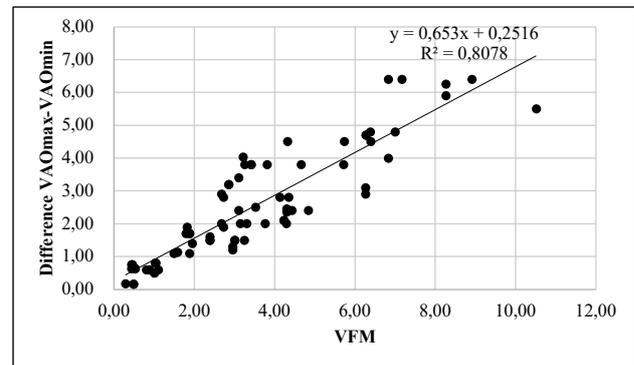
Graph 5. Range of variation of VAO and VAM in the homogeneous zones.



Graph 7. Range of variation of VAO and VAM for all crop qualities in the homogeneous zones.



Graph 6. Range of variation of VAO and VFM in the homogeneous zones.



Graph 8. Range of variation of VAO and VFM for all crop qualities in the homogeneous zones.

as – show that the difference between VAOmax and VAOmin becomes significantly greater as VAM and VFM increase, demonstrating a positive correlation. This means that as the land prices increase, the values from secondary sources become less and less significant and reliable. The same analysis was conducted for the 77 crop qualities recorded in the 12 homogeneous areas (Graph 7 and Graph 8). In this case, with a high level of significance, as the VFM and VAM increased, the interval width between VAOmax and VAOmin also increased, demonstrating here again a positive correlation between the need for expert appraisal and land value. This confirms the vital importance of drawing data from primary sources to which to assign greater weight in estimating the land and, if such data are not available, the necessity of resorting to the income capitalization approach.

5. MAIN REMARKS AND DISCUSSIONS

This paper deals with two different problems which, for those who practice appraisal professionally, may represent two important stages for qualifying a rural appraisal expertise with regard to the metropolitan area of Naples. The first consists in zoning, which can help us to resolve concrete cases of appraisal of the most probable market value of agricultural lands, and also to keep the analytical procedure as a 'last resort', for which the capitalization rate becomes an even more difficult problem to resolve, especially in periods characterized by monetary instability such as that of the present day. On an operative level, it is a question of finding an adequate compromise between widening the space in which to look for comparables (thus increasing the probability of recording enough observations to reduce the probability of using the analytical appraisal) and narrowing the area to increase the likelihood that the observations belong to the same market segment. Furthermore, apart from the number and the quality of observations, the choice of

narrowing the space produces, within the capitalization procedure, opposite effects to the former, because in this case it is necessary to use the indirect method for selecting the rate, thus creating other problems concerning the identification of investments similar to land, so much to arouse “*little hope of sufficiently approaching the rate pertaining to the specific case*” (Famularo, 1963, p. 77). This study offers important indications regarding areas with the same extrinsic characteristics, within which to look for comparables with the same intrinsic characteristics.

The second stage involves the analysis of the data from secondary sources that contribute to defining the mercantile framework for land appraisal in terms of market value. The estimation of this value by the synthetic procedure is usually based on the experience and competence of the appraiser. To ensure objectivity, the appraisal judgment should be demonstrable and verifiable by estimates of the same property performed by other experts who, being rarely consulted, ensure the objectivity of the analytical procedure on the basis of the postulate of ordinariness. Consequently, the “most probable” market value implies the highest probability of being confirmed in real terms, i.e. the value that most experts would attribute to the appraised subject (Simonotti, 2013). To this end, the choice should fall primarily on the sales comparison procedure because is the most reliable way to estimate land value, but only if appropriate data are available. In fact, unlike urban estimates, rural appraisal for estimating agricultural land must address the issue of availability and consistency of data, as there are few sources of information (CONAF, 2021). Obviously, the appropriateness of the data depends on the consulted sources, of which the primary source of information on land sales is the Real Estate Advertising Service of the Land Agency. Lacking this information, or where there is a problem regarding price veracity in supporting the estimated value, the appraiser should determine what additional data would be valuable and from what sources it can be obtained, to estimate a value as objectively as possible¹⁰. For this reason, this study shows some basic descriptive characteristics of “online” data which are usually inserted in the appraisals, especially VAM and, in recent years, VAO, to which VFM have been added here since on them the judgment of adequacy of the purchase price of agricultural lands was based, while retaining the need to take into account “*the specific structural and productive elements that make up the individual lands*” (Law no. 590/1965, art. 4) defined as “rustic”, presumably because, of all the factors influencing the values, only those of agricultural merit

were considered¹¹. The last point is fundamental in discriminating between agricultural and market value of a land for agricultural use, because, independently from the data availability, it suggests the appraisal procedure to be applied. In the first case, in fact, only the discounted stream of future rental values is suitable, while in a territory such as the Neapolitan metropolitan area where changes in land use expectations are high, the market value includes a component of “hope” value – i.e. the existence of other possible, but not yet legal, uses (Drapakovkyi et al., 2020) – which is realistically and objectively appraisable only through procedures based on the market approach¹².

VAM, on the other hand, before the Unconstitutionality Judgement no. 181/2011, constituted an indemnity whose assessment had a substantially different purpose than that of VFM. Despite this judgment, VAM continue to be published exclusively for calculating additional indemnity for both landed and non-landed farmers, based on D.P.R. no. 327/01, art. 40, subparagraph 4 and art. 42 respectively, thus representing a sort of compensation for labour and business income losses, rather than compensation for the propriety damage resulting from a loss of ownership rights. From this point of view, at least in the years after 2011, VFM are theoretically more consistent with the patrimonial content that the estimated value of an agricultural land must assume, which analytically translates into an income capitalization deriving solely from land ownership.

Concerning VAO, these prices are elaborated using empirical methods by qualified professionals operating in the territory, consulting both public deeds of sale and sale offers. The quotations are obtained by verifying the consistency between the various announcements and subsequently proceeding with the ordinary reduction of the asking price during the conclusion of the agreement. The values are the ordinary minimum and maximum quotations that agricultural land located in the various local contexts can reach, while exceptions may be made for land with singular characteristics, and in this case the value may differ from those recorded. Fur-

¹¹ Unlike the other two values, the law establishing VFM is not explicit on this point.

¹² Naturally, the analytical procedure is suitable for appraising the market value in the absence of data on market prices, but not if the latter are available. The discounted stream of future rental values matches the market value if the direct method for calculating the capitalization rate is applied. Otherwise, in the analytical procedure the land-use change expectations can be included in the market value only by reducing the capitalization rate whose entity, which has so great an impact on the value, lacks objective referents. However, the problem of appraising thoroughly (and following a realistically applicable procedure) the market value of agricultural lands having a component of hope and lacking market prices for similar lands is a matter to be studied in greater depth.

¹⁰ This is a problem that in the past induced Grillenzoni to promote a “bank of prices” of the real estate sales in agriculture (Grillenzoni, 1970).

thermore, in determining the values, the Observatory considers only the factors that affect agricultural profitability and none others, such as the land's suitability for future development due to its proximity to built-up areas, its position in particularly high-value landscape contexts and, lastly, whether it is calculated net of any existing rural buildings. In the light of the calculation method, the Observatory specifies that VAO "*cannot be considered a substitute for the 'appraisal', even if aimed at ascertaining pure agricultural merit, but only as an aid to it*" (Osservatorio dei Valori Agricoli, 2020).

By observing the ranking of the zones in terms of value, it is evident that, practically speaking, the three values express land prices only based on the intrinsic characteristics, and not those related to the area in which the land is situated. In fact, in the areas of greater landscape and environmental value, which are, not unexpectedly, characterized by the presence of high-value residential properties, the values of agricultural land are lower than those recorded in less valuable contexts. This finding proves that the three values are reliable in expressing the real value of lands exclusively for agricultural use, net of the value of the properties invested in them, which however, cannot be properly defined as 'market value' since, especially in the more densely populated and highly urbanized areas, the operators' expectations include appreciation that is not limited exclusively to agricultural merit and takes into account factors that influence prices without affecting the rental value. For this reason, it can be argued that the value of a land in the area/crop quality combinations for which the variability of quotations is relatively low, can be interpreted as a 'minimum' threshold of the real market value which exceeds the use value in agricultural production in most of the Neapolitan metropolitan area. This result can be useful in estimating the definitive indemnity in the case of total expropriation for public utility. In fact, while sentence no. 181/2011 of the Constitutional Court, intervening on subparagraphs 2 and 3 of art. 40 of the Consolidated Text 327/2001, declared the unconstitutionality of VAM in determining the provisional indemnity, this did not apply to subparagraph 1 of the same article. This subparagraph, in fact, regulating the formulation of the definitive indemnity, refers to the "*criterion of the agricultural value taking into account the crops actually grown on the land and the value of the buildings legitimately built, also in relation to farm operation, without evaluating any possible or actual use other than agricultural*".

The analysis of these values highlights some useful information in the context of operative rural appraisal. Firstly, VFM are ranked as the minimum values even of VAOMin except for a few zones and crop qualities.

Moreover, at zonal level, VAM is substantially in the middle between VAOMax and VAOMin, while by type of production, the dynamic is less regular, showing in some cases that it exceeds VAOMax and is lower than VAOMin. By matching these findings by zone and crop quality, we see that is not possible to obtain an absolute ranking between these values. Moreover, knowledge of the combinations of area/crop quality with the greatest convergence of values is useful to the appraiser, making it possible to assign a higher degree of objectivity to the appraisal judgment since it is substantially 'independent' from the choice of the secondary sources of data, which usually support the estimate itself.

As regards the differences between homogeneous areas that should reflect in different values for lands with the same crop qualities, the OVA quotations prove to be more reliable, partly as a result of the investigation carried out at municipal level. From this point of view, VAM are confirmed as the least significant values, as they refer to agrarian regions (particularly extensive in the territory of the Metropolitan City of Naples) in which, taking into account the same land productivity, the varying intensity of the factors affecting land demand and the fluctuating competition with agriculture for land use, they reduce the possibility of profitably by inserting these values within the mercantile framework. Therefore, the analysis rebuts the validity of certain statements that consider the agrarian regions to be sufficiently homogeneous, such that the comparables must be found within them. On the other hand, as has been pointed out (Marone, 2008), the territorialization defined by agrarian regions is the result of the breaking down of the national territory into circumscriptions (ISTAT, 1958), not for estimative purposes but for sectorial statistics geared to defining economic policy lines (Povellato, 1997).

Furthermore, the difference between VAOMin and VAOMax increases as land prices rise. While, on one hand, this finding seems to confirm that the non-agricultural factors show to be more relevant in zones with higher agricultural land prices (Lehn and Bahrs, 2018; Nilsson and Johansson, 2013), on the other hand it implies, especially in these cases, that the agricultural values recorded by the three sources cannot play any other role than that of support in carrying out an accurate expert appraisal judgment. Where the purpose of the appraisal, however, is the assessment of the agricultural value of land, the results show that for some area/crop quality combinations the three values can provide a significant indication of the value to be appraised, without prejudice to the need for the estimate to be based on expert "on-field" activity, to adequately justify the value to be attributed to the land being estimated.

6. CONCLUSIONS

The purpose of this study was twofold: *a)* to identify the zoning of the metropolitan city of Naples for estimative purposes, to achieve the relative observations necessary for applying the sales comparison procedure; *b)* to analyse three locally available land values collected from three sources, two official and one unofficial, which provide useful information for those who have the task of drawing up appraisals aimed at estimating the agricultural and market values of lands. This has made it possible to provide useful answers to the questions of those who practice the appraisal professionally, concerning: *a)* the market segmentation in terms of extrinsic characteristics in such a highly heterogeneous territory as the metropolitan city of Naples; *b)* the comparative analysis of three values recorded from secondary sources, producing useful indications concerning the ‘independence’ of the objective appraisal from the choice of source; *c)* the identification of the secondary data that are most reliable in estimating the value of agricultural land; *d)* the growing importance of on-field appraisal in the case of higher land values.

We are convinced that the approach could be usefully applied in other territories where zoning is necessary to solve problems relating to the spatial variable in identifying the comparables, as long as relevant zonings are available. This does not, of course, solve the problem of delimitation based on the municipal boundaries of the homogeneous zones, which does not take into account that in some cases, even within the same municipality, there might be areas characterized by different land values for the same crop quality.

The follow-up of this study might focus on two research lines. The first regards a potential zoning based on VAO, given that these values are recorded at municipality level. The second concerns the conducting of the analysis of the three values in each municipality that is not part of the homogenous zones. This makes it possible to calculate the difference, if market prices are available, between the latter and the agricultural value of lands classified from an urban-planning point of view as ‘non-development’, which can be useful in solving many actual cases of appraisal.

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