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The appraisal rationalisation of real estate *expertise*[1]

Key words: **market value, assessed value, real estate expertise**

Abstract The Italian appraisal practice is characterized by valuations developed in subjective opinions formulated by the valuers, according to the experience and the competence rather than on the survey of the market data of comparable properties. This practice makes up for the lack of information on the real estate market and to the consequent absence of systematic collections of market data. This tradition is in the cadastral appraisal for the rural (1886) and urban properties (1939). The assessed income is appraised for a representative property and wide to all the other properties with arbitrary scores (pure number). The assessed value is derived from the income with fixed multipliers.
The reform of the cadastral appraisals (2013) provides the employment of predetermined statistic functions rather than the automated valuation models applied in the mass appraisal.
There are therefore ample spaces to rationalize the Italian valuations. For the market appraisal the process of rationalization is based on the comparison between the *expertise* and the market comparison approach. For the cadastral appraisal the process of rationalization is based on the statistic application to the fixed functions with the survey of a sample of market prices and the ratios study according to the valuation standards.

INTRODUCTION

In the appraisal of real estate the concept of fairness takes on a fundamental significance in order to establish the appraisal point of view. Appraisal is a forecast that is formulated in a probabilistic manner, consequently to avoid criteria that are merely subjective, the appraisal must define the circumstances and the conditions of the valuation process. An approach that is based on an estimate identifies these requisites in the valuation standard that represents best practice and that consists of methods that are uniform and generally acceptable and gives feedback with regard to standards for which the appraisal of properties is a tool (accounting standards and cadastral standards).
In areas where the real estate market has a deficient level of information, the appraisals tend to rely on the use of empirical estimates that are based on subjective judgements prepared by experts and that serve as true and proper *expertise*. In this way it is possible to make up for the lack of market information by relying on experience and ability (*animus aestimandi*). In our Country traditional *expertise* has a wide range of action in drawing up market estimates that is also extended to estimates

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of properties for the purpose of the cadastral system. It is intrinsically not possible to confirm or to verify an appraisal that is prepared by an expert and neither can it be repeated but can be confirmed by appraisals (equally subjective) drawn up by other experts.
Best practice for appraisal refers to valuation methods and techniques that give better results than those achieved by any other system. This refers typically to the most significant experiences or to the best results achieved in a valuation process. Best practice can be transformed into rules that can be observed, in this way constituting a standard. It is clear that it is not possible for the real estate *expertise* to be turned into rules that need to be observed in connection with best practice.
Valuation standards are written definitions, limits and rules that are approved, inspected and verified by an authority, based on best practice and considered as the minimum acceptable appraisal benchmark. The standards are generally used as examples or models against which to compare or measure quality or performance in the field of appraisal practice *expertise*.
This study addresses the issue of the real estate by establishing on a formal basis the objective aspects and those that can be made objective of this appraisal practice. Market *expertise* and *expertise* in the cadastral system present the same system and can be examined by disaggregating them in their three constituent parts: the unit value, the area of the property and a series of corrective coefficients. With regard to market estimates, several rational coefficient measures are put forward; these are based on a comparison with the corresponding processes based on the collection of market data that apply valuation standards (see the paragraph below). Insofar as cadastral estimates are concerned: a wide-ranging model of expert opinion on the cadastral system is presented that can be treated statistically with data collection (see paragraph captioned Multiplicative Model). The statistic and appraisal analysis covers two sets of sample data for the sale of apartments in the city of Palermo in the three years between 2010 and 2012 (see paragraph captioned Real Estate Data Samples). The first sample calculates on a statistical basis the various correction coefficient of the cadastral model; the second sample performs a verification of the model according to international cadastral standards (see paragraph entitled Cadastral Function).

UNIT VALUE, TRADE AREA AND COEFFICIENTS

In the case of residential property, *expertise* on market value is based on a single value, the trade area of the property and on a series of coefficients that express the effect on the value of the site of characteristics related to property other than surface characteristics (such as the state of maintenance, floor level, position, etc.). In practice a unit value is used that is multiplied by the trade area and by a number of coefficients. In general, the market value of residential immovable property can be summarized as follows:

$$\text{Market value} = \text{Unit value} \bullet \text{Trade area} \bullet \text{Coefficients} \qquad [1]$$

In *expertise* the unit value can be calculated:
- By the prices of comparable properties;
- By the appraiser in a concise mode (pure *expertise*);
- From the repertoires of prices prepared by the government or reported by sector-specific magazines.

The unit value calculated from prices collected in the same market segment is equal to the weighted average of the prices for trade area. The average value is therefore gross of the other characteristics which are different from the surfaces. The average value can be related to a real property or to a hypothetical one which presents an average price and other characteristics at average levels. If the property to be evaluated has measurements of different characteristics which are different from the average, then it is necessary to resort to coefficients which are used to correct the average value based on deviations compared to the average characteristics different from those of the surface. In practice

the comparison is made between the average value of the property (real or fictitious) and the property to be estimated, considering the deviations of the different features not included in the property surfaces. The same applies for the valuation carried out by the expert when it is independent of the prices in the market segment. The expert may directly give a unit value for the property to be valuated, or else set a medium value conceived with reference to a mental archetype and correct this value with the coefficients for which it considers that the subject property is different from the property placed as an archetype.

The trade area of the property is made of the main surface and the secondary surface (balconies, terraces, attics, basements, lodges, etc). The impact of the price of a secondary surface on the price of the principal one can take minor, major and equal values to the unit, according to the market appreciation. The trade ratios are detected directly in the real estate market.

The trade ratio m_i of the secondary generic surface i (with $i=2, 3,..., n$) is equal to the relationship between the average price of the secondary surface p_i and the average price of the main surface p_1 as follows:

$$\mu_i = \frac{p_i}{p_1}. \qquad [2]$$

If there are indicated as s_1 the principal surface of the property to assess and with s_i the generic secondary surface, the trade area of the property to be assessed is equal to:

$$S = s_1 + \sum_{i=2}^{n} s_i \cdot \mu_i. \qquad [3]$$

In the *expertise* the coefficient of an property characteristic is the ratio between the value that the property to valuate should have and the value assigned to it until that time without taking into account other characteristics that are not related, or taking them into account in some way (subjectively). The coefficients of the characteristics not related to the surfaces are expressed with pure numbers of the unit that are larger or smaller depending on whether the characteristic increases or decreases the market value of the property to be estimated. The coefficients of the characteristics different from the surfaces are determined subjectively by the valuer and often with the help of the commercial manuals, where they are reported by single feature generally in the form of an interval between a minimum and a maximum.

In the market detection the coefficient of an property characteristic different from the surface is the ratio between the price of an comparable property P_h that has this characteristic and the price of an comparable property P_0 that does not have this characteristic (or does not possess it at the same level) with all other things being equal. The coefficient of the generic characteristic a_h (with $h=1,2,...,l$) is equal to:

$$\alpha_h = \frac{P_h}{P_0}. \qquad [4]$$

In the traditional form the market value (*V*) of the subject property is calculated multiplying the unit value (*v*) by the trade area of [3] and by the coefficient of [4] in the following way:

$$V = v \cdot S \cdot \prod_{h=1}^{l} \alpha_h . \qquad [5]$$

According to the paired data analysis for the property characteristics measured on a nominal scale (absence, presence) there is only one coefficient for the characteristic calculated with [4]. For the characteristics measured on an ordinary scale there exist as many coefficients as the levels of the characteristic less one. The coefficient $\alpha_{h(\mathrm{f})}$ of the generic characteristic (with *f=1,2,...,g*) is given by the ratio between the price of an comparable $P_{(f)}$ that has the characteristic at level *f* and the price of an comparable $P_{(1)}$ that possesses the characteristic at the first level:

$$\alpha_{h(2)} = \frac{P_{(2)}}{P_{(1)}}; \alpha_{h(3)} = \frac{P_{(3)}}{P_{(1)}}; \ldots; \alpha_{h(f)} = \frac{P_{(f)}}{P_{(1)}}; \ldots; \alpha_{h(g)} = \frac{P_{(g)}}{P_{(1)}}. \qquad [6]$$

For the property characteristics measured on cardinal scale, the coefficient a_h of the generic characteristic can be extracted considering an elementary scheme referred to two comparable (*e* and *j*) and two characteristics represented by the trade area and by a feature other than the trade area. Indicating as S_e the trade area of the first comparable, with S_j the commercial area of the second comparable, the weighted average $\overline{P}$ of the two reported prices is equal to:

$$\overline{P} = \frac{P_e + P_j}{S_e + S_j}. \qquad [7]$$

The value of the subject (*V*) according to the *expertise* is then equal to:

$$V = \overline{P} \cdot S \cdot \alpha_h . \qquad [8]$$

In the proceedings based on observed data and their comparison, such as the market comparison approach, the marginal price of the characteristic that is different from the trade area may be made explicit with the comparison function (Simonotti, 1985). Indicated with x_{he} the characteristic different from the trade area of the comparable *e*, with x_{hj} the different characteristic of the trade area of the comparable *j*, with x_h the different characteristic from the trade area of the subject and with p_x the marginal price of this last characteristic, one can put an equality between the values of the subject referring respectively to the comparable *e* and to the comparable *j* in the following way:

$$\frac{P_e}{S_e} \cdot S - \left(x_{he} - x_h\right) \cdot p_x = \frac{P_j}{S_j} \cdot S - \left(x_{hj} - x_h\right) \cdot p_x . \qquad [9]$$

The marginal price of the characteristic different from the trade area is equal according to [9] to:

$$p_x = \frac{\overline{P}_e - \overline{P}_j}{x_{he} - x_{hj}} \cdot S, \qquad [10]$$

where with $\overline{P}_e$ and $\overline{P}_j$ there are indicated the prices per unit of the trade area of the respective comparable. Putting equality between the estimated value with the *expertise* of [8] and the estimated value rationally by [9] one obtains:

$$\overline{P} \cdot S \cdot \alpha_h = \overline{P}_e \cdot S - \left(x_{he} - x_h\right) \cdot \frac{\overline{P}_e - \overline{P}_j}{x_{he} - x_{hj}} \cdot S; \qquad [11]$$

is obtained by solving the coefficient α_h of the different characteristic from the trade area as follows:

$$\alpha_h = \frac{\overline{P}_e}{\overline{P}} - \frac{x_{he} - x_h}{x_{he} - x_{hj}} \cdot \frac{\overline{P}_e - \overline{P}_j}{\overline{P}}, \qquad [12]$$

where the coefficient of the different characteristic from the trade area is set equal to the ratio between the unit price of an property that possesses this characteristic at a given level and the average price, correct to keep account of the surface of the price variation.

MULTIPLICATIVE MODEL

According to international valuation standards, the assessed value is based on the definitions in the laws relating to the valuations and the real estate imposition. Within the ambit of the proposal to reform the cadastral valuation system (2006), an experiment was carried out the general pattern of which is the 'valuation function' (de Santis, 2006), which expresses the assessed value of an property based on: an average ordinary value; on the cadastral area of the property; on a series of coefficients in zone A_1 of neighbourhood A_2 the technical characteristics of building A_3 and the property unit A_4. Therefore the cadastral value is equal to:

$$Valore\ catastale = Valore\ medio\ ordinario \cdot \mathrm{A}_1 \cdot \mathrm{A}_2 \cdot \mathrm{A}_3 \cdot \mathrm{A}_4 \cdot Superficie\ catastale, \qquad [13]$$

that occurs *mutatis mutandis* with the same formulation of the traditional *expertise* of [1]. In the valuation function the ordinary average unit value refers to a territorial field of the real estate market, which represents a sub-division of urban space and building. The cadastral coefficients are relative to the different characteristics from the cadastral area and report the exponent b_h (with $h=1, 2,..., l$) as follows:

$$A_h = \alpha_h^{b_h}. \qquad [14]$$

The cadastral area is a fictitious measure formed by the main surface of the property and by the secondary surfaces computed with cadastral ratio that set a lower unit (Technical standards for the determination of the cadastral surface of the property unit to ordinary destination. Presidential Decree no. 138 of 23.03.1998). Indicating with γ_i the cadastral ratio area (Annex C), the cadastral area (*C*) of the property to valuate is equal to:

$$C = s_1 + \sum_{i=2}^{n} s_i \cdot \gamma_i . \qquad [15]$$

Indicating with v_c the unit value of the territorial area, the cadastral value *VC* of the property is equal to:

$$VC = v_c \cdot C \cdot \prod_{h=1}^{l} \alpha_h^{b_h} . \qquad [16]$$

The general formula of the cadastral value can therefore be presented as in the market *expertise* of [5].
Statistically, the construction of the cadastral function starts from the detection of a sample of data. Indicating P_k as the market price of the generic comparable *k* (with *k=1,2,...,m*), with x_{hk} the characteristic different from the cadastral area (with *h=1,2,...,l*), with b_h the exponent of variables relative to the different characteristics of the cadastral area (with *h=1, 2,..., l*), the formula of the cadastral value [16] depicts a multiplicative model (exponential in the parameters, *log-log*) in the following form:

$$P_k = \overline{v}_c \cdot C_k \cdot \prod_{h=1}^{l} x_{hk}^{b_h} , \qquad [17]$$

where the unit value $\overline{v}_c$ of the territorial unit shall be the weighted average of the prices for the cadastral areas according to [7]:

$$\overline{v}_c = \frac{\sum_{k=1}^{g} P_k}{\sum_{k=1}^{g} C_k} . \qquad [18]$$

It is a unit value introduced in the statistical model as an exogenous constant.
Given the purpose of forecasting the multiplicative model, the simplest way to calculate the parameters is represented by the interpolation of a function that more than others approximates to the data detected maintaining the multiplicative form assigned.
Once the parameters of the model are calculated, the cadastral value (*VC*) of the immovable to assess of surface *C* is equal to:

$$VC = \overline{v}_c \cdot C \cdot \prod_{h=1}^{l} x_h^{b_h} . \qquad [19]$$

The imposition of the multiplicative model reduces the number of the indices of statistical verification to those compatible with the shape and the termination conditions of the function.
The statistical models to be applied in the real estate appraisal must be validated in order to ensure that they have reached the appraisal standards set for their use. This is done through the ratio study, where the values estimated by the model are compared to observed market prices. In the *mass appraisal* for tax purposes, the test is carried out on a separate sample, represented by a group of properties that were not used in the analysis and that have known market prices.
The ratio study compares the estimated values with the cadastral function and the market prices recorded (International Association of Assessing Officers, 2003). The elementary ratio for generic property *y*, with *y=1,2,..,z*, with estimated value A_y and market price S_y is equal to:

$$A_y / S_y. \quad [20]$$

The *performance* of the mass appraisal is measured through: the estimation level represented by the error of valuation equal to the difference between the value estimated and the market price; to the uniformity of the estimation represented by the variability of the assessment error; and the average absolute percentage difference. The measures of the estimation levels are: the median $\widetilde{A/S}$, the average $\overline{A/S}$ and the weighted average $\overline{A}/\overline{S}$, that expresses the average ratio of the group of properties given for the market prices:

$$\overline{A}/\overline{S} = \frac{\sum_{y=1}^{z} A_y}{\sum_{y=1}^{z} S_y}. \quad [21]$$

The uniformity between the groups can be analysed in terms of horizontal and vertical equity: horizontal equity concerns the comparison of the ratio between property groups; the vertical equity concerns the field of variation in prices of the properties.
The measures of the appraisal uniformity are: the range of variation calculated from the difference between the maximum ratio and the minimum ratio of the immovable group; the **coefficient of disperion (COD)** calculated on deviations from the median of the ratios:

$$COD = \frac{100}{\widetilde{A/S}} \cdot \frac{\sum_{y=1}^{z} \left| A_y / S_y - \widetilde{A/S} \right|}{z}; \quad [22]$$

the **coefficient of variation (COV)** calculated on deviations from the median of the ratios:

$$COV = \frac{100}{\bar{A}/\bar{S}} \cdot \left[\frac{\sum_{y=1}^{z} \left(A_y / S_y - \bar{A}/\bar{S} \right)^2}{z-1} \right]^{\frac{1}{2}}; \quad [23]$$

and the **price-related differential (PRD)** calculated by the ratio between the average ratio and the ratio weighted average:

$$PRD = \frac{\bar{A}/\bar{S}}{\overline{A}/\overline{S}} = \frac{\sum_{y=1}^{z} A_y / S_y}{z} \cdot \frac{\sum_{y=1}^{z} S_y}{\sum_{y=1}^{z} A_y}. \quad [24]$$

PRD measurements are significantly greater than the unit indicate regression of the assessment; minor measures suggest progressivity of the valuation unit. Generally, the estimates of the properties of higher value report lower ratios in respect of the properties of lower value, in this case the estimates are considered regressive, while in the opposite case the estimates are considered progressive if the most valuable properties are overestimated compared to properties of minor value.

SAMPLES OF SALE DATA

The sample survey has involved two distinct samples of data collected from the same market segment:

The survey sample with which the cadastral function is built and the parameters of the different characteristics from the surface are calculated;

The test sample where the ratio study takes place.

The detection of the survey sample has focused on the buying and selling prices and the characteristics of apartments in the Santa Rosalia Montegrappa neighbourhood in the semi-periphery of the city of Palermo, close to the university area. These are residential apartments in multi-story buildings in a condominium. The sample is made of 70 complete data collected over a period of time between 2010 and 2012.

For the detection of property data a collection standards was applied (Simonotti and Ciuna, 2011).

For the purposes of the cadastral value the choice of the property characteristics to be introduced in the function considers technical aspects, relating to tax compliance and to the organisation of the service, and appraisal aspects mainly related to the periodicity of the cadastral estimate in respect of the continuous real estate processes (internal state of maintenance), to characteristics of a difficult or complex nature (qualitative characteristics) and to situations of parity of conditions in the market segment investigated (construction period). In retrospect the statistical analysis may provide insight on the characteristics to be included (or excluded) in the function, discarding, for example, those which have a negligible effect on the market price or are not statistically significant. In these circumstances the statistical analysis must be repeated with the characteristics saved.

For the purposes of the construction of the cadastral function the following property characteristics

were considered:
- Date of contract (DAT) measured in years;
- Cadastral area (CAT), which includes the main surface and the secondary surfaces of the apartment due to the superficial cadastral links (Annex C), measured in square metres;
- Services (SER) counted numerically;
- Level Plan (LIV) measured as the number of floors above street level;
- State of external maintenance (MAE) measured as physical deterioration on the building in four levels of the ordinal scale (1 poor, 2 sufficient, 3 good, 4 excellent);
- Views (AFF) defined according to the number of façades with openings.

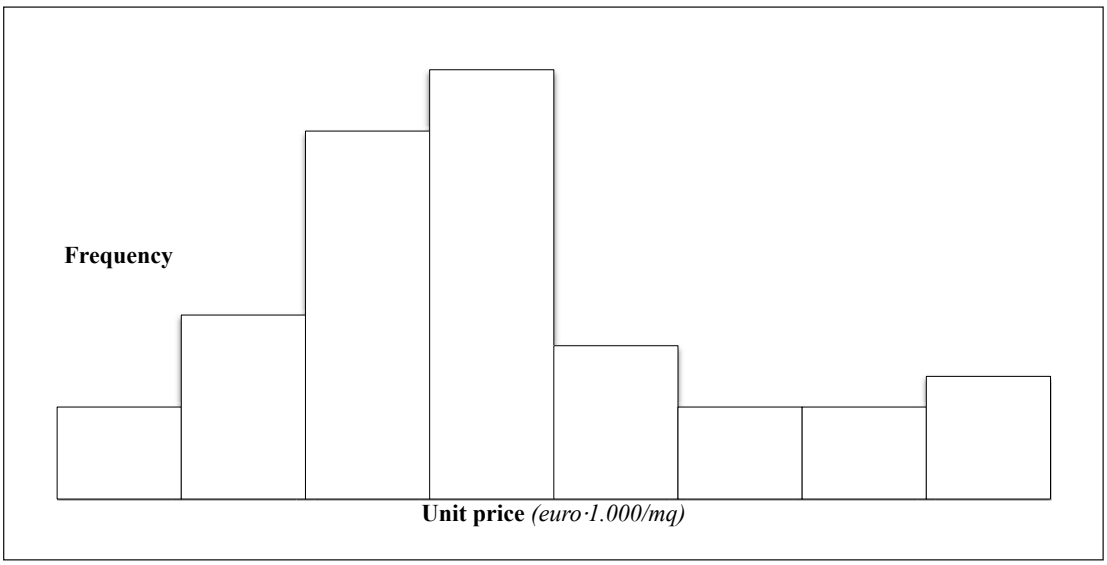
The market price (PRZ) of the apartments of the survey sample is expressed in Euro.
The sample statistics consider the property characteristics detected and the market price.
For the DAT characteristic: in 2010 there were 40 apartments detected, in 2011 there were 7 apartments detected and in 2012 there were 23 apartments detected.
For the CAT characteristic the range of variation of the sample ranges from a minimum of 52.20 square metres and a maximum of 150.80 square metres, the average being equal to 112.08 square metres and the standard deviation is equal to 20.79 square metres. For the SER, LIV, MAE and AFF the absolute frequencies are shown (Table 1).

Table 1 Survey sample. Frequency of the characteristics on an ordinal scale and dichotomous scale

Immovable	**Absolute frequency**							
characteristic	***1***	***2***	***3***	***4***	***5***	***6***	***7***	***8***
SER (*1,2*)	*45*	*25*						
LIV (*1,2,3,4,5,6,7,8*)	*11*	*8*	*16*	*15*	*12*	*5*	*1*	*2*
MAI (*1,2,3,4*)	*2*	*13*	*42*	*13*				
MAE (*1,2,3,4*)	*2*	*5*	*60*	*3*				
AFF (*1,2,3*)	*3*	*53*	*14*					

The total market price of the apartments in the survey sample varies from a minimum of € 67,000.00 to a maximum of € 272,000.00. The average is equal to € 207,265.27, the standard deviation is equal to € 46,022.47. The unit price of the apartments varies from a minimum of 1,133.73 euro/square metre to a maximum of 2,607.47 euro/square metre. The average is equal to 1,827.59 euro/square metre and the standard deviation is equal to 357.42 euro/square metre.

Figure 1 Survey sample. Frequency distribution of the unit price



The testing sample is formed of 20 full data on the sale of apartments in a multi-storey condominium found in the same Santa Rosalia Montegrappa neighbourhood of the survey sample and in the same period. For verification purposes the same characteristics considered in the statistical-estimative analysis were considered.

The sample statistics consider the property characteristics detected and the market price. For the DAT characteristic: 10 apartments were found in 2010, 3 apartments were found in 2011 and 7 were found in 2012.

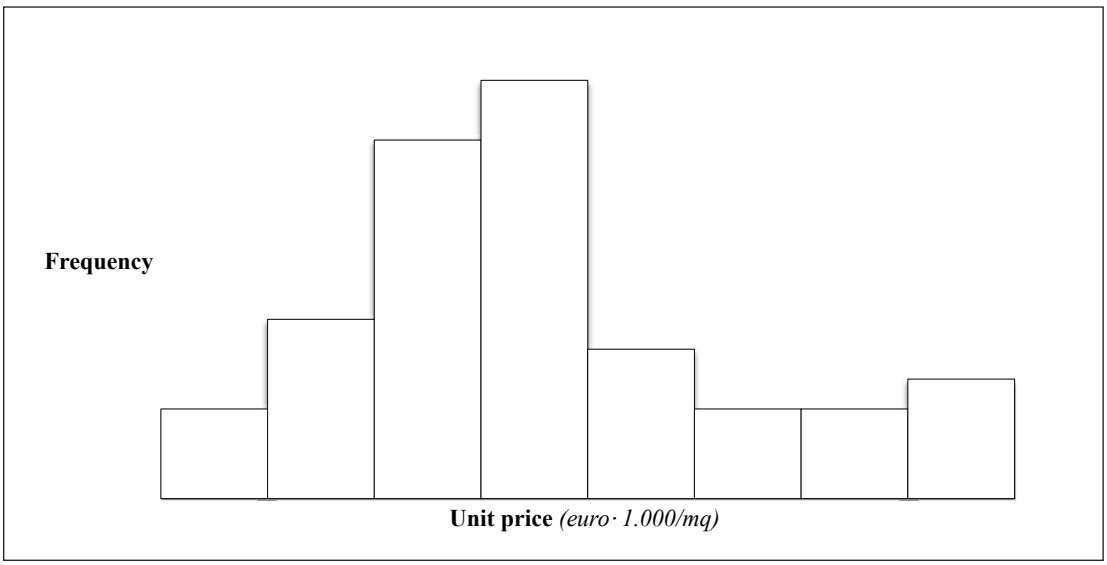
For the CAT characteristic the range of variation of the sample varies between a minimum of 71.02 square metres and a maximum of 141.44 square metres, the average being equal to 116.37 square metres and the standard deviation being equal to 15.86 square metres. The absolute frequencies for SER, LIV, MAE and AFF are shown in Table 2.

Table 2 Testing sample. Frequency of the characteristics on an ordinal dichotomous scale.

Immovable characteristic	Absolute frequency					
	1	***2***	***3***	***4***	***5***	***6***
SER *(1,2)*	*10*	*10*				
LIV *(1,2,3,4,5,6)*	*4*	*1*	*5*	*4*	*3*	*3*
MAE *(1,2,3,4)*	*0*	*0*	*20*	*0*		
AFF *(1,2,3)*	*0*	*14*	*6*			

The total market price of the apartments in the survey sample varies from a minimum of € 160,000.00 to a maximum of € 270,531.80. The average is equal to € 216,269.54, the standard deviation is equal to € 32,125.79. The unit price of the apartments varies from a minimum of 1,300.69 euro/square metre to a maximum of 2,529.28 euro/square metre. The average is equal to 1,884.16 euro/square metre and the standard deviation is equal to 337.39 euro/square metre (Figure 2).

Figure 2 Testing sample. Frequency distribution of the unit price



CADASTRAL FUNCTION

The experimental level of the cadastral function requires an assumption on the estimative procedure of rationalisation of the appraisal. The assumption relates to the construction of a function which concerns the first statistical analysis and does not consider other interventions meant to improve the statistical-estimative indexes, working on the sample and the model. In this way the predictive purposes to favour the definition of a procedure which is uniform and demonstrable is overshadowed. The estimation procedure is designed to enable the analyst to describe the process of carrying out and of verifying that the estimation results faithfully reflect the behaviour of the market for the property to be evaluated (The Appraisal Foundation, 2013).
For the calculation of the parameters, the cadastral function is presented as a report obliged to be resolved with the interpolation, keeping in mind the constant exogenous term and isolating the property characteristics other than the cadastral area. Consequently, the variable explained by the model in [17] becomes the following:

$$\frac{P_k}{\bar{v}_c \cdot C_k} = \prod_{h=1}^{l} x_{hk}^{b_h} \cdot \qquad [25]$$

It is possible to explain the cadastral function, obtained through the statistical-estimative rationalisation, operating on the survey sample. The cadastral function, given the different property characteristics other than the cadastral area, is presented according to [25] in the following form:

$$\frac{P_k}{1.779{,}02 \cdot C_k} = DAT_k^{-0{,}112} \cdot SER_k^{0{,}118} \cdot LIV_k^{-0{,}113} \cdot MAE_k^{-0{,}006} \cdot AFF_k^{0{,}211}; \qquad [26]$$

Where the constant term is calculated by [18]. The standard error of the model is equal to € 28,987.33, the percentage error being equal to 13.99%. The value of F is equal to 4.7322 with a probability equal to 3.601E-06.

The cadastral value (VC) of the property to estimate of surface C [15] is therefore equal by extension to:

$$VC = 1.779{,}02 \cdot C \cdot DAT^{-0{,}112} \cdot SER^{0{,}118} \cdot LIV^{-0{,}113} \cdot MAE^{-0{,}006} \cdot AFF^{0{,}211}. \quad [27]$$

From the analysis carried out it is possible to derive the marginal prices of the property characteristics with a partial derivation of the cadastral function, which considers the property characteristics to their average value (Table 3).

Table 3 Parameters and marginal prices of the property characteristics other than the cadastral area

	Property characteristic				
	DAT	**SER**	**LIV**	**MAE**	**AFF**
	(euro/year)	(euro/n)	(euro/liv)	(euro/n)	(euro/n)
Parameter	-0,112	0,118	-0,113	-0,006	0,211
Marginal price	-13.541,06	18.827,63	-6.551,26	-439,16	20.784,18

The characteristic sign of the MAE contradicts the indications of the housing market, which include an increase in price to improve the status of external maintenance; however the MAE characteristic affects the 0.21% on the average price: for the purposes of the cadastral estimate this characteristic may be later excluded from the function for the purposes of simplification.
According to the international cadastral standards (International Association Of Assessing Officers,2003) (International Association Of Assessing Officers, 2013) the appraisal tests were carried out on the testing sample (Table 4).

Table 4 Results of the ratio study of the cadastral function

Reports						
$\widetilde{A} / S$ (1)	$\bar{A} / S$ (2)	$\overline{A} / \overline{S}$ (3)	**Range of variation**	***COD*** %	***COV*** %	***PRD***
1,0003	*1,0012*	*1,0072*	*0,6944*	*14,8130*	*18,4709*	*1,0085*

For the test sample the average absolute percentage difference calculated in respect to the average is equal to 13.97%: for the residential properties it must be less than 10÷15%.
For the level of estimate measurements (Table 4, columns 1, 2 and 3) the test gives an indication of the overall level of assessments. The dispersion coefficient (COD), calculated based on average deviation reports, for residential properties should be less than 15% in older areas and less than 10% in newer and fairly similar residential areas. The variation coefficient (COV) is calculated based on the average deviations ratios.
The price differential (PRD), calculated on the relationship between the average ratio and average weighted ratio, should be close to 1, in particular between 0.98 and 1.03. The PRD standards are not absolute when the samples are small or when there are wide variations in the prices. The standard suggests that the level of relationship of a group of properties must be within 5% of the overall ratio of all the groups considered. The level of the overall ratio must be within 10% of the 100% level (0.90÷1.10).

CONCLUSIONS

From the appraisal point of view the concept of fairness is not abstract because it takes form with the application of valuation standards, which aim to guarantee the result of the estimate through a set of uniform and generally applicable conditions. Oppositely the real estate *expertise* is based on values and coefficients estimated subjectively and often derived from generic list of interval values and from general guidelines of the industry publications. The *expertise* does not allow the translation rules to be observed, which are necessary for the best practices and valuation standards.

The cadastral *expertise* estimates the income of the properties with the method of classes and tariffs (rents), based on the estimation procedure for merit points. The merit points are pure numbers with the task of extending the estimate rent for an typical property to all properties of the same county. The operation is carried out by assigning an arbitrary base point to the rent of the typical property and calculating the other tariffs in direct proportion with merit points referred to the base point subjectively assigned. The set of merit points forms the scale of merits between the classes and the staircase of connection unites the municipalities of the county. Faced with the ladder system experiments have been carried out using a cadastral function based on the same scheme of the market *expertise*, reporting the unit value, the cadastral area and the coefficients. It is the function of a pre-defined form (multiplicative) to apply to the system of the properties for fiscal aims.

To render concrete the concept of equity valuation (and tax) an appraisal rationalisation of market *expertise* and a statistical rationalisation of the cadastral function (where possible) is proposed.

For the market *expertise* unitary value and coefficient measures are offered based on the collection of market data according to the valuation standards. The difference in estimation logic between the *expertise* and the procedures which are based on the detection of market data is in the nature of the comparison: the *expertise* is based on deviations of the subject from that of the average value (true or fictitious), correcting it with the coefficients; the standard procedures are based on the comparison between the subject and each comparable property.

The cadastral function has the same multiplicative form of the market *expertise* except that it is applied in the appraisal of the properties for tax purposes. Once note has been taken of this choice, the statistical rationalisation can be carried out with the application to a sample of data taken from the real estate market, more precisely to a survey sample for the calculation of function parameters and a testing sample according to the cadastral valuation standards.

The main differences with the proper statistical applications are: the prearranged -multiplicative form opposite the forecasting purposes of the model; the imposition of a constant exogenous formed by the unitary value; the choice of the characteristics to be included in the model; the fixed contribution of the secondary surfaces; the calibration of the model to determine the contribution of the single property characteristic; the means of verification of the model.

The rationalisation processes presented are intended to define an appraisal procedure based on the collection and the processing of market data and present the appraisal results. These processes are proposed as the minimum acceptable benchmark which is preparatory to a valuation standard. The *expertise* carried out by the professionals to estimate the market value is considered superfluous when it is based on the detection of market data, which leads directly to the value sought, without the intermediation of the average value and the coefficients. In this case this *expertise* is relegated to unique or contingent situations that justify its use with special or extraordinary assumptions. The cadastral functions applied in the fiscal assessment of the properties impose conditions of equity and transparency which the valuation standard proposed with the rationalisation process seeks to ensure to taxpayers.

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