Market Prices and Property Taxation in Italian Real Estate: A Turin Case Study

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Abstract The aim of the paper is to address the issue of social inequity in Italy due to property taxation. The European Union has declared the fact that cadastral values used to define property taxation in Italy do not reflect market prices. In this paper, we analyze the discrepancies between cadastral values and listing prices. Furthermore, we find empirical coefficients to apply to current cadastral values to reduce the spread between current cadastral values and market prices. The procedure used is very simple and could easily be applied by local public administrations in order to correct the inequity produced by the current property taxation system within the same city and among various cities.

Keywords Property taxation · Property cadastral value · Property cadastral rent · Listing prices · Hedonic models

1 Introduction

In Italy, property taxation is based on property cadastral values, which are computed using cadastral rents defined by the Italian land registry, dating back to the 1950s and 1960s. The land registry defined the cadastral rents still used today, across large geographical areas. These cadastral rents were defined empirically using a property classification that was based on physical features of properties,

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which no longer reflect the real estate market. Cadastral rents rely on the number of cadastral rooms. Cadastral room sizes belong to a predefined range rather than having a fixed number of square meters. The first cause of inequity of taxation is that they represent location using a geographical segmentation into large census zones, which no longer reflect real estate submarkets. For this reason, property location has a negligible impact on cadastral rents, although the impact of location on prices is well known (Bourassa et al. 2003, 2007; Goodman and Thibodeau 1998). The second cause of inequity of taxation is the use of cadastral rooms rather than actual sizes in square meters. Because of this, properties with different numbers of square meters can have the same number of cadastral rooms. Consequently, the householder of the smaller property pays the same taxes as the householder of the bigger property.

The aim of this paper is twofold: on one hand, we empirically measure the discrepancy between current cadastral values and market values, which is a measure of social inequity. Using a traditional hedonic approach (Rosen 1974), we identify the main factors that explain the spread between market and cadastral values, based on a case study. On the other hand, we propose a methodology to update current rents to match them more closely to market prices, while awaiting the next phases of the land registry reform, which will be a long process. The case study is Turin's real estate market.

The paper is organized as follows. Section 2 introduces the empirical methodology used. Section 3 presents the case study and the databases used for the analysis. We discuss the empirical results in Sect. 4, and conclusions are presented in Sect. 5.

2 Empirical Analysis Design

The land registry defined cadastral values (CV) using the income approach (*Regio Decreto Legge* n. 652 of 1939 and Law no. 1142 of 1949). The benefits of property ownership were measured to define the cadastral rent (CR) of assets, which were divided into different categories (from category A to category F) according to their use. The biggest category was A, which includes ordinary assets and residences. Accordingly, cadastral rents were defined for assets in category A, while, for assets in other categories, the appraisal was performed case by case. In this study, we consider residences, which are assets belonging to category A. For assets in category A, cadastral rents (CR) are defined across census zones. Assets in the same category and census zone are divided into classes, according to their physical features. Then, for each class the cadastral rent by cadastral room, which we call unit cadastral rent (UCR), is defined. Finally, a property CR is the product of UCR and the number of the property cadastral rooms. Cadastral values (CV) are obtained using some coefficients defined by law, which are not connected with the interest rate. Formally, CV can be deduced by CR by the following:

$$CV = CR * 126 \quad (1)$$

Notice that CV is a linear transformation of CR. Indeed, we work directly on CR whenever this is possible. As discussed above, the low contribution of location to CR and the use of cadastral rooms as a proxy for size are the main factors that contribute to increasing the difference between cadastral values and market prices. Accordingly, we focus on these two aspects. With respect to location, there are some studies (Goodman and Thibodeau 1998; Bourassa et al. 2007) that conclude that geographical housing submarkets are more important in predicting house prices than the spatial statistics approach (Bourassa et al. 2003, 2010). Coherently and in accordance with the presidential decree 138/1998, we use Microzones to model location. Their importance for Turin real estate is also empirically supported in Fregonara and Semeraro (2013). Since, in Italy, information on market prices is not public and is difficult to retrieve, consequently we use listing pricing (LP) to proxy market prices (Taltavull and McGreal 2009; Curto et al. 2015), where listing prices are used to analyze the real estate market. Listing prices can be used to proxy market prices for the analysis of the two aspects considered in this paper: location and size. In fact, the explanatory power of location on listing price could be considered as a proxy for the explanatory power of location on market price, as empirically shown in Fregonara and Semeraro (2013).

The analysis performed in this work is developed in two steps. The first step aims to show that location and cadastral rooms are the main factors influencing the discrepancies between cadastral values and market values. The second step proposes an empirical procedure to update cadastral values to reduce the discrepancies with market prices.

2.1 Factors Influencing Spread in Cadastral Rents and Asset Prices

The first step of analysis is performed using a traditional hedonic approach. We specify hedonic models to explain the two dependent variables: listing price (LP) and cadastral rent (CR). We focus on the explanatory power of Microzones, number of rooms and size measured in square meters. The variable Microzone is a nominal variable with disordered modalities: the attractiveness of each Microzone depends on the subjective perceptions of sellers and buyers. Therefore, Microzones are specified by dummy variables. We empirically computed the coefficient of determination corresponding to linear regressions to explain listing prices, cadastral rents, and the differences between listing prices and cadastral values (DP):

$$DP = LP - CV. \quad (2)$$

We considered two hedonic models, corresponding to two sets of explanatory variables. Formally, the first model is:

$$Y_j = \alpha_{j0} + \sum_{i=1}^{n} \alpha_{ij} X_{ij}^{CR} + \varepsilon_j, \quad j = 1, \ldots, k = 1, 2 \tag{2.1}$$

where Y_j, j = 1, …, 4 are LP, CR, and DP, respectively, and the explanatory variables $X^{CR}{}_{ij}$ are the variables defining cadastral rents: category, class, and number of cadastral rooms. The hedonic weight α_{ijk}, j = 1, ... n_i, i = 1, ..., n assigned to each variable is equivalent to the contribution level of these characteristics to the price values (Rosen 1974); α_{j0} is the model intercept; and ε_j the error term. The second model is:

$$Y_j = \alpha_{j0} + \sum_{i=1}^{n} \alpha_{ij} X_{ij}^{LP} + \varepsilon_j, \quad j = 1, \ldots, k = 1, 2 \tag{2.2}$$

where Y_j j = 1, …, 4 are LP, CR, and DP, respectively, and the explanatory variables $X^{LP}{}_{ij}$ are the main factor influencing market prices: Microzone, quality of the building, and size (Curto et al. 2015). The hedonic weight α_{ijk}, j = 1, ... n_i, i = 1, ..., n assigned to each variable is equivalent to the contribution level of these characteristics to the price values (Rosen 1974); α_{j0} is the model intercept; and ε_j the error term. The hedonic weights in Eqs. (2.1) and (2.2) are estimated using traditional least-squares estimates. The coefficient of determinations (R^2) of the two regression models measures the proportion of variation of the dependent variables (LP, CR, DP) explained by the model.

2.2 Operational Proposal

The second step of analysis proposes a methodology to adjust CR across Microzones to introduce cadastral rents per square meter. We introduce a *location-adjustment coefficient* for each Microzone to apply to CR—and CV—as follows. If P_i is the sample mean of assets prices in the Microzone, i = *1*, …, N, where N is the number Microzones into which the area under appraisal is divided, the coefficients c_i are defined by:

$$c_i = \frac{P_i}{\frac{\sum_{i=0}^{40} P_i}{N}} = \frac{NP_i}{\sum_{i=0}^{40} P_i} \tag{2.3}$$

Hence, each coefficient is the ratio between the mean listing price observed in the Microzone i, i = 1, …, 40 (P_i), and the arithmetical mean of P_i, i = 1, …, N, *i.e.*,

$\overline{P} = \frac{\sum_{i=0}^{40} P_i}{N}$. Then, the adjusted rent ACR_j (I) of a property I located in Microzone j, j = 1, …, N is given by:

$$ACR_j(I) = c_j CR_j(I) \tag{2.5}$$

where $CR_j(I)$ is the cadastral rent of property I. The relationship between the adjusted rent ACR_i (I_i) and ACR_j (I_j) of two properties I_i and I_j, belonging respectively to submarkets i and j, depends only on the mean prices in the two submarkets (Curto et al. 2014).

The second proposal to update CR consists of defining a rent per square meter (square meter cadastral rent, *SMCR* for short), according to actual rents per cadastral room (UCR). In that, we assume the value as unit rent of asset I to be:

$$SMCR(I) = \frac{UCR(I)}{s_{middle}(I)} \tag{2.7}$$

where $UCR(I)$ is the rent per cadastral room of asset I and s_{middle} (I) is the arithmetical mean between the minimum size and the maximum size per cadastral room of asset I (the range of the number of square meters per cadastral rooms are provided in Table 4). Then we can find recalculated cadastral rents (*RCR*) of asset I by multiplying $SMCR(I)$ and property size, and we obtain:

$$RCR(I) = SMCR(I) * s(I) \tag{2.8}$$

where $s(I)$ is the size of asset I measured in square meters. Recalculated cadastral rents (*RCR*) are compared with current rents. Finally, we apply the location coefficients c_j, j = 1, …, n also to *RCR*, to analyze the distribution of rents across Microzones after the introduction of SMCR and the application of location adjustment coefficients.

3 The Case Study

We perform the empirical analysis on a case study of the city of Turin. Turin is divided into four census zones and forty Microzones. Microzones were defined by Politecnico di Torino in 1999, using a territorial information system and performing a factorial analysis and a cluster analysis. The factors considered include price level, building characteristics, accessibility, presence of services, and green areas, as provided by the law 138/1998. Microzones are numbered from 1 to 40, fanning out from the center of the city to the suburbs. Figure 1 compares Microzones with the four census zones in which Turin is divided.

As one can see in Fig. 1, the census zones are big areas that do not reflect local amenities. In the same census zone, there are heterogeneous assets. In particular, in

Fig. 1 The four census zones and the 40 census Microzones of the city of Turin

census zone 1, one can find prestigious assets as well as low-quality assets. Coherently, people living there belong to various social status. Instead, Microzones are a geographical segmentation, and they are able to explain almost 40% of market prices, as empirically measured in Fregonara and Semeraro (2013), and of listing prices, as shown in Curto et al. (2015).

3.1 Data

The analyses use two separate property databases of the Turin Real Estate Market Observatory (TREMO). TREMO was founded under an agreement between Politecnico di Torino, Turin's Municipality, and Turin's Chamber of Commerce, with the institutional aim to collect and analyze data from the real estate market. We consider the TREMO sample of assets on sale in 2013, which consists of 566 properties, and we call it the TREMO sample. For each asset, we consider the characteristics: Microzone, size (measured in square meters), and building quality. We defined five building quality levels, which consider several building characteristics, such as building materials, age of the building, and also cadastral category and class. The highest level corresponds to attractive properties while the lowest corresponds to council houses. We used dummy variables to model the quality-of-building levels. Descriptive statistics for each Microzone are provided in Curto et al. (2014). The second database is the property of Turin Municipality, and we call it CDB (cadastral database). The CDB contains information on each asset in the Land Registry. Information collected for residential assets are cadastral rent, category, class, number of cadastral rooms, and location, which is provided through map sheets, the number, and the subdivision. Unfortunately, the identification code used by TREMO does not allow for a one–to-one association between the TREMO and CDB databases, since address codes identifies buildings and not apartments.

Nevertheless, the CDB sample consists of 49,305 data and includes the assets with the address codes sampled in TREMO sample. Descriptive statistics for the CDB sample are provided in Curto et al. (2014).

To analyze discrepancies between CR and LP, we link the two databases using address code and floor. We found one-to-one correspondence for 129 data, which we collect in a new sample named BDM. The sample of 129 properties provides information from the two databases TREMO and BDC. Despite the small sample size, the statistics in Table 1 highlight the need to update current rents and include the marginal contribution of location on property value. Table 3 includes Microzones with at least three observations; Microzones with at least seven observations are in bold.

Table 2 provides the mean and the range of size across properties with different numbers of cadastral rooms and exhibits a large variability of size in correspondence to the same number of cadastral rooms. From this, cadastral room number seems not suited to be a proxy for size. In this sense, descriptive statistics seem to justify our approach.

4 Empirical Results

This section presents the results of the empirical analysis performed. Firstly, we analyze the main factors explaining CR, LP, and the difference between LP and CV, i.e., DP. Secondly, we update the current cadastral rents and discuss the results.

4.1 Factors Influencing Cadastral Rents and Market Prices

This section analyzes the main factors explaining LP and CR. Results of hedonic analysis are provided in Table 3a, b. Table 6a explains CR, LP, and DP using factor defining cadastral rents, i.e., category, class, and cadastral rooms. It shows that the factors defining rents are not able to fully explain LP, while they contribute 37% to explain the difference between CV and LP.

Table 3b explains CR, LP, and DP using the main factor influencing LP, i.e., size, Microzone, and building quality, which explain 87% of LP. These factors are able to explain only 37% of CR, and they are responsible for the difference between CR and LP ($R^2_{adj} = 0.85$). These results highlight the fact that location and size are able to explain the current spread between CR and LP. We also split the above regression into two separate regressions to measure the impact of location and building quality on LP and CR separately. The first regression has Microzones as an explanatory variable, and we found $R^2_{adj} = 0.49$ for LP and $R^2_{adj} = 0.22$ for cadastral rents. The second regression has building quality as explanatory variable and we found $R^2_{adj} = 0.45$ for LP and $R^2_{adj} = 0.23$ for cadastral rents. These results

Table 1 Sample JOIN: listing prices and cadastral values—under the assumption of residence—mean values for Microzones

Microzone	Sample size	RC mean	LP mean	ULP mean	UCV mean	M	Sample size	RC mean	LP mean	ULP mean	UCV mean
1	1	5	180,000	3829	14,641	23	3	881	753,333	178	111,113
2	3	62	503,333	3400	186,381	**24**	**9**	**46**	**651,556**	**3400**	**139,582**
3	2	1597	719,500	4831	201,320	25	3	58	374,667	129	173,909
5	3	28	426,333	166	83,186	26	2	781	220,000	2004	98,504
6	1	1224	900,000	4205	154,224	27	3	1322	194,333	88	166,696
7	5	29	319,600	119	87,491	28	4	774	285,750	82	97,610
8	3	70	678,333	178	210,675	**29**	**10**	**28**	**184,000**	**94**	**83,326**
9	3	48	451,666	3207	146,198	30	1	17	168,000	2584	52,709
10	4	15	252,250	119	45,632	31	4	18	143,250	83	54,743
11	5	37	345,800	134	113,032	32	1	28	159,000	95	84,595
15	**7**	**39**	**410,428**	**3206**	**116,621**	**33**	**12**	**22**	**211,083**	**90**	**65,819**
16	2	559	1,025,000	248	70,523	34	2	11	121,000	1360	32,455
18	3	950	651,333	151	119,789	**35**	**8**	**31**	**139,125**	**84**	**92,282**
19	4	1077	265,750	93	135,800	36	4	21	113,750	1425	62,308
20	3	30	204,666	77	92,024	37	1	27	125,000	80	80,854
21	**10**	**25**	**129,690**	**1407**	**76,754**	40	1	322	200,000	2000	40,671
22	3	1428.87	433,666	3230	180,037						

Table 2 Sample JOIN: size for given number of rooms statistics

Number of cadastral rooms	Minimum size	Mean size	Maximum size	Size st. dev.
1.5	47.00	98.50	150.00	72.83
2.5	50.00	96.43	140.00	34.24
3	45.00	105.45	270.00	62.63
3.5	50.00	82.55	130.00	24.17
4	30.00	103.29	260.00	61.68
4.5	50.00	98.33	230.00	52.90
5	40.00	88.25	130.00	25.13
5.5	60.00	122.22	250.00	58.69
6	65.00	166.29	300.00	77.56
6.5	83.00	145.75	175.00	30.69
7.5	75.00	130.83	170.00	43.75
9	180.00	200.00	220.00	28.28
9.5	125.00	140.00	155.00	21.21

Table 3 Hedonic regression analysis

Variables	Rents		Listing Prices		DPrices	
	Estimate	Pr(>|t|)	Estimate	Pr(>|t|)	Estimate	Pr(>|t|)
(a)						
(Intercept)	1353.07	3.77E−12	611,669	0.00258	441,182	0.02821
A01	Omitted		Omitted		Omitted	
A02	−1143.18	5.65E−12	−219,193	0.19,823	−75,153	0.65,814
A03	−1714.33	<2e−16	−470,500	0.00641	−254,495	0.13581
A04	−1812.51	<2e−16	−444,841	0.01378	−216,465	0.22603
A05	−1783.31	1.23E−10	−483,268	0.0948	−258,571	0.36938
A06	−692.81	0.000455	435,224	0.04907	522,518	0.0186
A07	−47.8	0.849328	870,867	0.00293	876,890	0.00275
A10	412.87	0.0436	−58,183	0.80138	−110,205	0.63393
C02	-1317.42	8.77E−07	23,488	0.9353	189,483	0.513
CLASS01	Omitted		Omitted		Omitted	
CLASS02	37.06	0.532505	−55,157	0.41571	−59,828	0.37756
CLASS03	163.52	0.004,449	−75,411	0.243	−96,014	0.13795
CLASS04	305.34	2.96E−06	−77,124	0.27821	−115598	0.10529
CLASS05	230.33	0.002342	−72,719	0.39061	−101,740	0.23051
CLASS06	19.17	0.893226	−90,889	0.57718	−93,305	0.5672
Rooms	196.56	<2e−16	39,805	0.00717	15039	0.3031
Adjusted R-squared:	0.9267		0.5403		0.3638	
p-value:	<2.2e−15		3.45E−16		5.43E−09	
F-statistic on 14 and 113 DF	115.7		11.6		6.187	

(continued)

Table 3 (continued)

Variables	Rents		Listing Prices		DPrices	
	Estimate	Pr(>|t|)	Estimate	Pr(>|t|)	Estimate	Pr(>|t|)
(b)						
(Intercept)	−820.343	0.22015	−370,830.8	0.008212	−267,467.5	0.03352
size (square meters)	4.685	0.00057	3118.2	<2e−16	2527.8	<2e−16
Microzone 1	Omitted		Omitted		Omitted	
Microzone 2	1678.053	0.01883	274,364	0.06128	62,929.3	0.63144
Microzone 3	2935.267	0.00126	640,902.7	0.000671	271,059.1	0.10227
Microzone 4	2213.997	0.00556	296,948.1	0.068101	17,984.4	0.90172
Microzone 5	696.896	0.34115	421,178.6	0.00624	333,369.7	0.01603
Microzone 6	325.348	0.6913	199,264.2	0.240337	158,270.3	0.30142
Microzone 7	820.649	0.23667	258,130.4	0.072828	154,728.7	0.23147
Microzone 8	1637.114	0.03182	462,995.1	0.00363	256,718.7	0.06993
Microzone 9	1203.476	0.10984	288,298	0.064164	136,660	0.32792
Microzone 10	681.417	0.35344	308,501.6	0.04373	222,643	0.10566
Microzone 11	1095.636	0.12861	297,671.9	0.046514	159,621.7	0.23386
Microzone 15	1193.283	0.0915	311,055.1	0.033915	160,701.5	0.22107
Microzone 16	1208.137	0.09524	872,938.4	6.53E −08	720,713.2	5.68E −07
Microzone 18	651.676	0.36579	288,660	0.054257	206,548.8	0.12583
Microzone 19	1232.164	0.09208	186,938.9	0.213956	31,686.3	0.81482
Microzone 20	851.237	0.28019	222,164.4	0.172965	114,908.6	0.43356
Microzone 21	906.166	0.20282	180,626.2	0.218603	66,449.4	0.61505
Microzone 22	1588.928	0.03667	360,780.3	0.021872	160,575.3	0.25322
Microzone 23	879.486	0.2514	572,350.1	0.000459	461,534.8	0.00164
Microzone 24	1117.491	0.1264	430,140.9	0.005029	289,337	0.03488
Microzone 25	1627.614	0.03361	380,987.8	0.016359	175,908.4	0.21416
Microzone 26	1035.523	0.18974	238,952.4	0.143131	108,476.6	0.45974
Microzone 27	1405.582	0.11252	312,740	0.087507	135,636.7	0.40896
Microzone 28	812.92	0.27653	139,159.8	0.366319	36731.8	0.79135
Microzone 29	1027.019	0.14053	266,092.2	0.065259	136,687.9	0.29129
Microzone 30	859.481	0.3246	311,679.6	0.085294	203,384.9	0.21197
Microzone 31	891.86	0.22228	285,132.6	0.060198	172,758.3	0.20494
Microzone 32	1089.115	0.21322	287,088.7	0.112908	149,860.2	0.3573
Microzone 33	853.678	0.22325	271,153.4	0.062391	163,590	0.21075
Microzone 34	644.529	0.41862	203,399.2	0.217378	122,188.6	0.41086
Microzone 35	1181.046	0.09368	278,338.6	0.05622	129,526.8	0.32158
Microzone 36	908.045	0.22467	250,153.2	0.106253	135,739.5	0.32957
Microzone 37	1157.496	0.19082	293,149.1	0.109344	147,304.7	0.37066
Microzone 40	599.954	0.49495	234,543.3	0.197701	158,949.1	0.33282

(continued)

Table 3 (continued)

Variables	Rents		Listing Prices		DPrices	
	Estimate	Pr(>|t|)	Estimate	Pr(>|t|)	Estimate	Pr(>|t|)
Building Quality 3	74.644	0.59,882	24,469.6	0.40398	15,064.4	0.56908
Building Quality 2	Omitted		Omitted		Omitted	
Building Quality 1	−606.11	0.44328	−46,772.7	0.774085	29,597.2	0.84061
Building Quality5	716.332	0.06314	404,276.4	1.60E −06	314,018.5	2.75E −05
Building Quality 4	167.938	0.44848	149,837.6	0.001438	128,677.5	0.00238
Adjusted R-squared:	0.3765		0.8712		0.8536	
p-value:	1.16E−05		<2.2e−16		1.16E−05	
F-statistic on 38 and 88 DF	3.002		23.43		20.33	

Dependent variables CR, LP, and DP, i.e., listing prices-cadastral values

Table 4 Adjusted rents by Microzone

Microzone	CR mean	c_2013	AR mean	Microzone	CR mean	c_2013	AR mean
2	1479.22	1.38	2041.32	21	609.16	0.52	316.76
5	660.21	1.13	746.03	22	1428.87	1.02	1457.44
7	694.38	0.92	638.83	23	881.85	1.13	996.49
8	1672.03	1.44	2407.72	24	1107.8	1.15	1273.97
9	1160.3	1.17	1357.55	25	1380.23	0.82	1131.79
10	362.17	0.86	311.46	27	1322.99	0.69	912.86
11	897.08	0.85	762.52	28	774.69	0.67	519.04
15	925.57	0.94	870.03	29	661.32	0.68	449.7
18	950.71	0.87	827.12	31	434.47	0.66	286.75
19	1077.78	0.7	754.45	33	522.38	0.7	365.66
20	730.36	0.82	598.89	35	732.4	0.57	417.47
				36	494.51	0.49	242.31

underline that factors which influence current market prices do not influence cadastral rents.

The next section proposes a simple methodology that could be applied by local administrations to update CRs; it relies on a redistribution of CRs across Microzones and on the introduction of unit CR per square meter to overcome the drawbacks of cadastral rooms as a proxy for size. We notice that also building-quality classifications should be updated to redefine cadastral categories and classes; nevertheless this action requires a long process, which is part of the Land Registry reform and is beyond the scope of the present paper.

4.2 Rents Adjustment

Following the procedure outlined in Sect. 2.2, we compute the *location-adjustment coefficient* c_i, $i = 1, \ldots, 40$ in Eq. (2.3), where P_i, $i = 1, \ldots, 40$ are the mean *LP* for the 40 Microzones. The *location-adjustment coefficients* are provided in Table 4. Then, for each asset in the CDB sample, we obtain the adjusted cadastral rents (AR) by applying Eq. (2.5).

In Table 4, we provide the mean values of CR and of AR for each Microzone.

Notice that, in the Microzones with the *location-adjustment coefficients* greater than one, the adjusted rents would increase as opposed to those with the *location-adjustment coefficients* smaller than one. Following the procedure in Sect. 2.2, we computed SMCR for each asset in the BDM sample using Eq. (2.7), and then we computed the recalculated cadastral rents RCR for each asset in the sample using Eq. (2.8). Table 5 provides statistics of RCR across Microzones. Recalculations yield result higher than current rents, suggesting that everybody declares the minimum admissible number of cadastral rooms per property.

Finally, we apply the *location-adjustment coefficient* to RCR of each Microzone to re-distribute RCR across them. Table 6 exhibits, for each Microzone, sample statistics for final cadastral rents (FCR), obtained applying location coefficients to RCR.

Notice that the application of the *location-adjustment coefficient* to RCR leads to FCR, which are higher than current rents in the most desirable Microzones and lower that current rents in the less attractive Microzones.

5 Conclusions

This paper analyzes discrepancies between current cadastral values, which are defined by Land Registry and are used as a base for property taxes, and market prices, which are represented by listing prices. We focus on two main aspects: location and size. These two aspects are proven to be the main factors influencing the discrepancy between cadastral values and listing prices. In fact, using hedonic approach, we show that location has a negligible impact on current cadastral rents and explains the differences between cadastral rents and listing prices. We then propose a simple methodology to update rents, which makes it possible to incorporate the value of location and to overcome the current use of cadastral rooms as a proxy for size. The methodology proposed could be applied by local administrations while waiting for Land Registry reform, in accordance with the recent regulation provided by Legislative Decree no. 23 of 11 March 2014. We show that

Table 5 CR recalculated using UCR per m^2

Microzone	Min	Mean	Max	St. dev.	Microzone	Min	Mean	Max	St. dev.
2	757.71	1906.22	2629.5	1005.74	22	748.13	1909.47	3434.44	1379.58
3	664	2218.46	3772.92	2198.34	23	405.79	1843.26	2619.18	1246.2
5	796.83	1053	1434.28	336.63	24	379.6	2305.79	5417.06	1441.56
7	611.14	1068.37	1373.77	336.63	25	392.51	1641.96	3668.31	1770.71
8	980.41	2145.72	2986.61	1041.7	26	472.19	1030.58	1588.96	789.68
9	1571.75	1875.06	2071.72	266.51	27	442.67	1080.13	2167.64	946.46
10	276.67	665.68	1012.26	335.51	28	735.09	1351.39	2143.29	628.67
11	542.28	1058.59	1668.16	475.92	29	568.1	981.17	1285.98	233.19
15	686.89	1367.83	3346.64	918.74	31	447.6	532.77	664.02	93.77
16	981.27	1209.98	1438.68	323.44	33	433.82	844.68	1845.47	456.71
18	1275.65	1724.73	1958.4	389.02	34	547.8	557.95	568.1	14.35
19	590.49	1453.52	3426.33	1328.09	35	433.28	747.68	1071.65	277.19
20	686.89	1154.29	1832.68	601.33	36	149.41	649.39	1344.51	522.62
21	299.72	898.97	1717.59	448.27	Torino	73.8	1141.48	6210.64	1101.29

Table 6 Final rents: descriptive statistics

Microzone	Min	Mean	St. dev.	Max		Microzone	Min	Mean	St. dev.	Max	
2	1048.22	2637.06	3637.65	1391.33	1	22	766.25	1955.72	3517.63	1412.99	1
3	822.43	2747.80	4673.17	2722.88	1	23	457.91	2080.04	2955.64	1406.29	1
5	901.23	1190.96	1622.19	380.74	1	24	435.21	2643.58	6210.64	1652.74	1
7	563.73	985.49	1267.20	310.51	0	25	320.36	1340.16	2994.06	1445.24	0
8	1408.30	3082.19	4290.08	1496.34	1	26	302.46	660.12	1017.79	505.82	0
9	1838.33	2193.09	2423.11	311.71	1	27	305.44	745.29	1495.66	653.05	0
10	236.99	570.20	867.07	287.38	0	28	491.06	902.76	1431.76	419.96	0
11	458.74	895.52	1411.19	402.61	0	29	386.31	667.20	874.47	158.57	0
15	644.49	1283.39	3140.04	862.03	0	31	296.49	352.90	439.84	62.11	0
16	1792.05	2209.72	2627.39	590.68	1	33	304.03	591.97	1293.34	320.07	0
18	1115.96	1508.83	1713.24	340.32	0	34	384.30	391.42	398.54	10.07	0
19	414.43	1020.15	2404.77	932.12	0	35	245.75	424.08	607.83	157.22	0
20	565.18	949.76	1507.95	494.78	0	36	73.80	320.78	664.16	258.16	0
21	154.63	463.79	886.13	231.27	0	Torino	36.46	1175.60	7234.28	1484.01	

The right-hand columns indicate the Microzones where final rents are higher than CR (1) and the Microzones where final rents are lower than CR (0) updated rents could be better as proxy listing prices and that they can reproduce the variation of prices across spatial real estate submarkets.

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