The Paradox of Fiscal Inequality in Italy: Exploratory Analyses on Property Tax Rates

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Abstract. The Organization for Economic Co-operation and Development (OECD) in the last Going for Growth report (2021) urged the Italian government to redefine the tax on the first home ownership and to review the cadastral rates. This could represent an opportunity to re-discuss the objectives of the property taxation, as a part of the general tax reform announced by the Italian government. The aim of this paper is to perform some preliminary analyses on the fiscal inequality related to luxury properties in six different Italian cities at municipal level. The proposed methodological approach is based on three steps and can be also applied to other urban contexts. A stratified sampling of data from real estate advertisements provide the basis for the calculation of the cadastral values and a set of innovative fiscal inequality indicators. Descriptive statistics and regression analyses are performed to study the relations between property prices, cadastral values and the inequality level expressed by the proposed indicators. Findings show that cadastral values are not related to property prices and that the fiscal inequality level is significant in the analysed cities, even if with some differences that highlight a chaotic fiscal situation. The regression results also highlight the random relationship between tax rates and property prices and thus suggest that redistributive policies are necessary in the Italian context. The outputs of these first exploratory analyses represent a good starting point that deserves to be carried on and developed to test the proposed methodological approach. In particular, further researches could be focused on other housing segments, such as economic properties and tenements, and the analyses could be improved by considering the different urban areas and the related sub-markets.

Keywords: Fiscal inequality · Real estate market · Property taxation · Cadastral values · Property prices · Italy

1 Introduction

In the last decade, the economic crisis has affected the real estate market and has also produced several structural changes. In particular, the process of income polarization, determined by globalization, has amplified social inequalities and has determined the

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contraction of demand in the urban areas where the population with the lowest creditworthiness lives. Socio-economic characteristics often determine a real territorial polarization between weak urban areas, degraded and with limited services, and prestigious areas of high building and territorial quality. These phenomena, that the Covid-19 pandemic is accentuating, are widely studied in the literature. In this perspective different aspects deserve to be take into account, such as for example social inequality (Atkinson 1970; Bechini 2017), quality of life (Schneider 1976; Diener 1995; Diener and Suh 1997), welfare and well-being (Segre et al. 2011; Andrews and Withey 2012), social vulnerability (Cutter et al. 2000; Schmidtlein et al. 2008; Tate 2013; Lee 2014) and urban vibrancy (Jacobs 1961; Jacobs 1969; Montgomery 1995; Montgomery 1998; Yue et al. 2017).

Recent studies, which analysed social and housing vulnerability and urban vibrancy, identified clear spatial clusters, strictly related to the real estate market dynamics (Barreca et al. 2017; Barreca et al. 2018, Barreca et al. 2020a, Barreca et al. 2020b). The phenomenon highlighted a relation between set of vulnerability and vibrancy indicators and property prices in the city of Turin, but it has an even greater significance if its potentialities are extended to other cities at national level.

In order to reduce territorial and socio-economic inequalities across the urban areas and thus foster territorial welfare, the fiscal inequality and the related property taxation constitute urgent issues to be faced and deeply studied. Coherently with the objectives of the 2030 Agenda for sustainable development, the reform of the property taxation should support local finance and foster processes of territorial redevelopment and urban regeneration.

In particular, in the Italian context the fiscal inequality has currently reached paradoxical levels: often the taxes on luxury properties are lower than taxes on economic buildings or tenements, due to the inaccurate assignment of the cadastral category and relating appraisal rates defined by the Agenzia delle Entrate (a branch of the Italian Ministry of Economy and Finance). The reform of property taxation has been discussed for many years and numerous studies were carried out on different urban contexts at national and international level (Bourassa 1990; Dillinger 1992; Pellegrino et al. 2011; Rosengard 2012; Curto et al. 2014; Yinger et al. 2016; Bordignon et al. 2017; Curto et al. 2017; Elinder and Persson 2017). Nevertheless, in Italy it never started for several reasons. Recently, the Organization for Economic Co-operation and Development (OECD) in the last Going for Growth report (2021) urged the Italian government to institute a tax on the first home ownership and to review the cadastral rates. This could represent an opportunity to re-discuss the objectives of the property taxation, as a part of the general tax reform announced by the Italian government.

To support the reform of property taxation it is fundamental to understand the property tax rates determination process and, in particular, to study the relation between cadastral values (that constitute the tax bases) and property prices. The discrepancy between these values is well-known, but a real quantification of it across different cities is not deeply studied, at least at our knowledge.

The aim of this paper is to perform some preliminary analyses on the fiscal inequality related to luxury properties in six different Italian cities at municipal level (Turin, Milan, Bologna, Florence, Naples and Palermo). In particular, this research aims to create a

set of fiscal inequality indicators able to explicit the gap between cadastral values and property prices, as well as to quantify the discrepancy in terms of property taxation.

Findings confirm that redistributive policies are necessary in the Italian context, which is currently characterized by a chaotic fiscal situation. In particular, the results highlight that the reform of property taxation cannot be defined, as requested by the OECD and EU, until the cadastral values are firstly corrected, by taking into account property prices and the real estate market context.

The paper proceeds as follows: the methodological approach is introduced in Sect. 2, while Sect. 3 presents the selected case studies. Results are discussed in Sect. 4 and some concluding remarks are presented in the final section.

2 Methodological Approach

A methodological approach was developed to study the fiscal inequality related to luxury properties. It was based on three main steps that could be applied to analyse and compare different Italian cities: stratified sampling (step 1), Cadastral values and fiscal inequality indicators calculation (step 2) and Regression analyses (step 3).

Step 1 - Stratified Sampling

The first step of the proposed methodological approach is fundamental to a priori establish a series of stratification rules and build comparable data samples across different cities and related databases. Since the aim of this research is to study the housing properties listed on the market with the highest listing prices, the data sampling is not casual and needs to be stratified. As previous studies demonstrated, listing prices can be considered a good proxy of transaction prices (Curto et al. 2012). Thus, even if it represents a key limitation, listing prices can be used, eventually reduced by a certain percentage. It is generally known the absence of transparent information of real estate market in the Italian context; the Ministry of Economy and Finance collects and manages data on transaction prices and cadastral incomes, but unfortunately this important knowledge base is not publically available and accessible. Therefore, stratified samples of luxury houses can be identified by monitoring real estate advertisements published on real estate web platforms and by sorting them by decreasing price. It is worth mentioning that this paper is aimed to present some first exploratory analyses, but further researches may include also housing properties with the lowest prices, in order to perform other analyses to eventually support redistributive policies.

According to the aim of the present research, a set of characteristics has to be preliminary defined to select the listings to be included into the data samples. In the structuring of the data sample and the related database some variables of housing properties listed on the market are defined as mandatory while other as optional. The data related to the price, the apartment size, the cadastral income and the cadastral category are necessary to select the housing properties listed on the market. Other characteristics, such as the apartment floor, the building typology, the building construction period and other intrinsic and extrinsic characteristics, can be observed, even if they do not represent priority features in this first phase of the research. Also, the property address is not a priority feature at this stage: in fact, the selected properties georeferencing are considered at

municipal level, due to the fact that the aim is to globally analyse the phenomena in comparison with other cities at national level. Further researches will be addressed to analyse the fiscal inequality by considering also the urban territorial segments and the related real estate sub-markets.

Step 2 - Cadastral Values and Fiscal Inequality Indicators Calculation
To analyze fiscal inequality, the cadastral values of each observation and a set of indicators relating to both the cadastral coefficients and the real estate market values are calculated. The Cadastral Value (CV) of a property does not refer to the market value of an asset, but it is calculated to determine the taxes for the ownership and/or the acquisition of a property. CV is obtained by multiplying the cadastral income revalued by 5% by a certain coefficient established by law based on the cadastral category of the property (in Italy art. 52 of the decree 131/1986 and subsequent amendments and addictions). The cadastral income is calculated on the basis of the size of the property (expressed in cadastral rooms, square meters or cubic meters) and the appraisal rates defined by the Agenzia delle Entrate (a branch of the Italian Ministry of Economy and Finance) which may vary according to the property location and use. The cadastral income is reported in the cadastral certificate, but often it is also indicated in the property listings.

In this research, the calculation of CV is a necessary fundamental step to allow the calculation of the following innovative fiscal inequality indicators.

The first indicator (ΔATP_CV) represents the difference between the property Adjusted Total Price (ATP) and its CV and it is calculated as follows (1):

$$\Delta\text{ATP\_CV} = ATP - CV \tag{1}$$

where ATP is the total listing price reduced by a certain percentage in order to be assimilated to the transaction price and CV is the Cadastral Value. This percentage reduction may vary according to the city and to the specific economic trend of the real estate market.

The second indicator (ATP/CV) represents the ratio between the property Adjusted Total Price (ATP) and its CV, it is calculated as follows (2):

$$ATP/CV = \frac{ATP}{CV} \tag{2}$$

where ATP is the Adjusted Total Price and CV is the Cadastral Value.

The third indicator (ΔIMU) represents the difference between the IMU tax calculated (C_IMU) and the IMU tax effectively paid (P_IMU) as follows (3):

$$\Delta\text{IMU} = C\_IMU - P\_IMU \tag{3}$$

where C_IMU is the property tax calculated on the basis of the property value and the Municipal Rate and P_IMU is the property tax calculated on the basis of the CV and the Municipal Rate.

The fourth indicator (CTR) represents the Calculated Tax Rate, and it is computed as follows (4):

$$\mathrm{CTR} = \frac{P\_IMU}{ATP} 1000 \tag{4}$$

where P_IMU is the property tax paid and ATP is the Adjusted Total Price.

Step 3 - Regression Analyses
In this research a traditional hedonic approach (Rosen 1974) is used to perform preliminary and explorative analyses aimed at investigating whether, how and in what measure there is a relationship between fiscal inequality and the real estate market.

In particular, two Ordinary Least Squares (OLS) models are performed to measure the impact of property prices, assumed as explanatory variable, on cadastral values (first model) and on property tax rates (second model). Both models are tested by means of Jarque-Bera Test (normality of errors) to verify the pertinence of used variables and Breusch-Pagan and Koenker-Bassett tests to verify the absence of heteroskedasticity (Breusch and Pagan 1979). Moreover, a logarithmic transformation of all the considered variables is applied to weaken the collinearity, eliminate heteroscedasticity and reduce the absolute values of the data. Therefore, in the first OLS model the dependent variable is LogCV (Cadastral Value), while in the second model the dependent variable is LogCTR (Calculated Tax Rate). The logarithmic transformation of the ATP (Adjusted Total Price) variable is assumed as explanatory variable in both models.

3 Study Areas and Data Samples

The methodological approach was defined to be applied to different urban contexts. In this phase of the research the following six Italian cities were selected to test some first preliminary results: Milan, Turin, Bologna, Florence, Naples and Palermo.

The selected case studies represent some of the main Italian cities - excluding Rome - characterized by different socio-economic contexts and well distributed throughout the country; for these reasons they can be considered a good starting point for this research in order to compare the results archived after the application of the proposed methodological approach.

The trend of the real estate market in the last 5 years highlights some first principal differences among these six Italian cities. Figure 1 highlights the highest property mean values (>3.600 Euro/m^2) and the highest standardized numbers of property transactions in Milan, which is the only city that presents a clear positive trend for both values. Bologna and Florence present similar property mean values (around 2.800 Euro/m^2) and a slightly decreasing trend; the dynamism of their real estate market is the lowest among the considered cities, aligned with Palermo. The data related to Turin and Naples show a constant trend of the property mean values (in range from 2.100 and 2.200 Euro/m^2), but a considerable difference by analysing the standardized numbers of property transactions, which is higher than 10.000 for Turin and half the size for Naples. Palermo, with the lowest property mean values (around 1.200 Euro/m^2) and a low number of property transactions, presents the weakest real estate market among the considered cities.

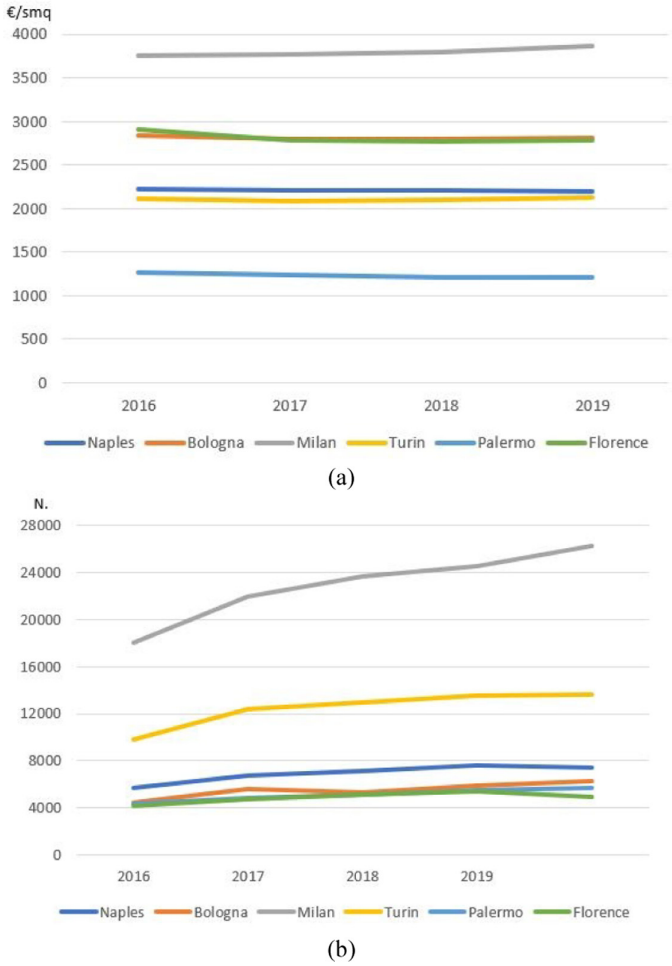

Fig. 1. The real estate market trend in the selected case studies: (a) property values (mean); (b) standardized number of property transactions (Source: Authors' elaboration on OMI - Agenzia delle Entrate data)

For each selected city, the data sampling was carried on according to the abovementioned stratification rules (step 1 of the proposed methodological approach) to obtain six different luxury properties data samples. One of the most relevant Italian real estate web platform (www.immobiliare.it) was assumed as data source to observe property listings published from January to March 2021.

Table 1 shows the summary statistics of the property Adjusted Total Prices (ATP), Adjusted Unitary Prices (AUP) and the Cadastral Incomes (CI) calculated on the data samples consisting of 100 property listings for each considered city. It is worth mentioning that the ATP are calculated by reducing the observed total listing price by 15% in order to be assimilated to transaction prices in 2021. Furthermore, it is important to

Table 1. Summary statistics of the property prices and the cadastral incomes (Source: Authors' elaboration on Immobiliare.it data)

	Freq	ATP (mean)	ATP (st.dev.)	AUP (mean)	AUP (st.dev.)	CI (mean)	CI (st.dev.)	IMU Tax - Municipal Rate 2020
Milan	100	1.758.280	1.212.815	8.571	2.691	2.347	1.665	10,6‰
Florence	100	1.401.850	711.417	4.534	1.515	2.081	1.253	10,6‰
Naples	100	1.200.950	490.116	4.722	1.677	1.901	929	10,6‰
Turin	100	983.760	300.218	3.303	1.001	2.495	1.313	10,6‰
Bologna	100	902.790	333.653	3.386	891	2.169	1.144	10,6‰
Palermo	100	501.390	358.307	1.694	739	784	581	10,6‰

notice that both the mean Adjusted Total Prices and the mean Adjusted Unitary Prices are very high if compared with those showed in Fig. 1, due to the abovementioned stratified sampling aimed at selecting listings of luxury properties. By comparing the summary statistics of the six cities, the high variability of both property prices and cadastral incomes, is evident. In fact, very high values emerge in Milan (with ATP higher than 1.700.000 Euro, AUP around 8.500 Euro/m^2 and CI higher than 2.300), while in Palermo the mean values (ATP around 500.000 Euro, AUP around 1.700 Euro/m^2 and CI lower than 800) are considerably lower. This framework is remarkable, above all considering that this variability among mean values in different Italian cities drastically grows when the range of the minimum and maximum values is analysed.

According to the aim of this research and to the calculation of the above mentioned fiscal inequality indicators, Table 1 also shows the rates that the selected Italian Municipality established in 2020 to determine the taxes for the ownership and/or the acquisition of a property (called IMU tax). It is worth mentioning that currently the IMU tax cannot be applied for first homes ownership, but it is applied for all properties classified in A/1, A/8 and A/9 cadastral categories (stately properties, villas, castles/historical buildings).

Despite the fact that the data samples consist of the property listings with the highest prices, thus representing the luxury housing segment, the descriptive statistics of the "cadastral category" variable in Fig. 2 highlight that most of the properties are classified as "civil properties" (cadastral category A/2), which is probably too generic and so easily associated to several properties. Instead, the rather low number of "stately properties" (cadastral category A/1) highlights the very well-known problem related to the correctness of the cadastral category attribution. For example, by comparing Bologna and Florence, which have similar mean property values, it is surprising that on the one hand in Bologna there are no "stately properties" and on the other in Florence the percentage of the same cadastral category amounts to 20%. These data denote that the fiscal inequality level may be even higher.

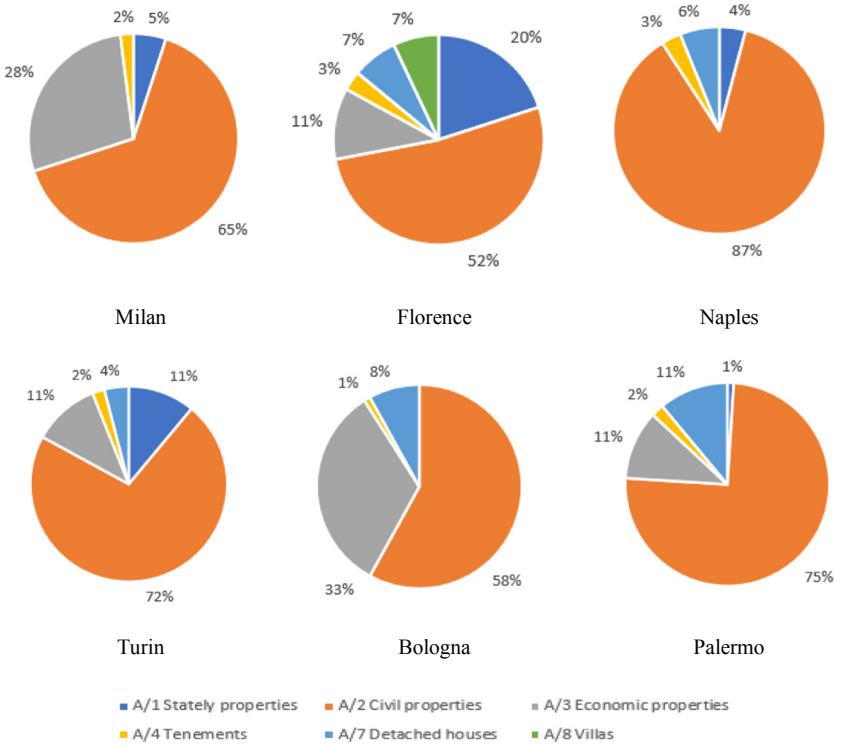

Fig. 2. Cadastral categories of the listed properties (Source: Authors' elaboration on Immobiliare.it data)

4 Results

In accordance with the aim of studying the fiscal inequality related to luxury properties, the proposed methodological approach was applied to analyze the six Italian cities assumed as case studies. Therefore, six different data samples were built following the above mentioned stratification rules and the cadastral values of the selected properties were calculated, as well as a series of fiscal inequality indicators. Finally, regression analyses were performed in order to highlight fiscal inequality issues.

4.1 Cadastral Values and Fiscal Inequality Indicators

The step 2 of the proposed methodological approach was applied to each of the six data samples related to the cities of Milan, Turin, Bologna, Florence, Naples and Palermo.

Figure 3 shows the mean Cadastral Values (CV) calculated from the listed cadastral incomes. The distributions of the CV are not normal in any data sample considered, due to the stratified data sampling that was carried out to select luxury properties. Moreover, each data sample has maximum outliers, which identify properties of exceptional value.

Furthermore, Table 2 shows the minimum and maximum values of the four indicators calculated in order to highlight different ranges in the considered cities.

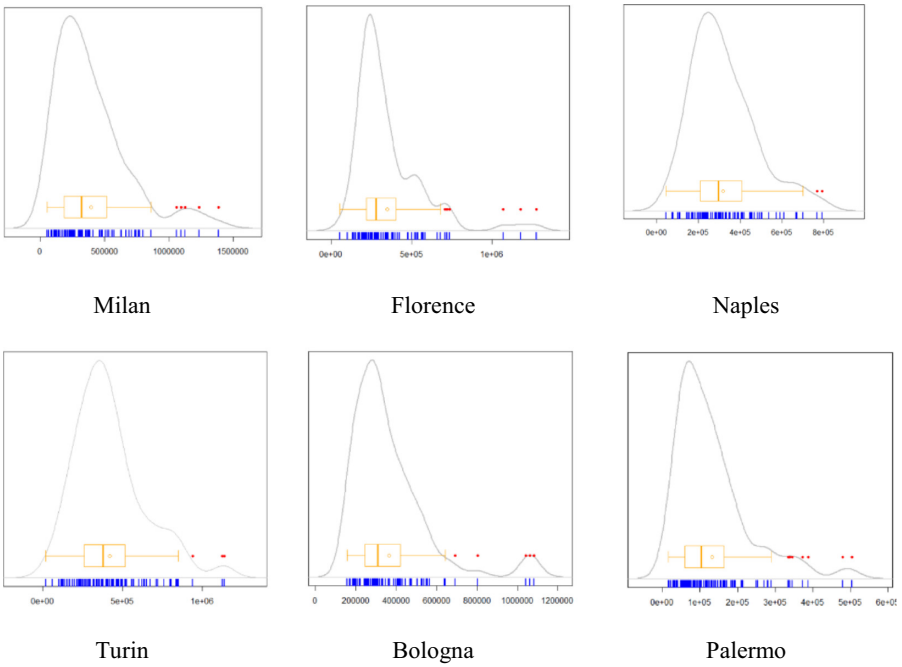

Fig. 3. Cadastral value distribution of the listed properties (Source: Authors' elaboration on Immobiliare.it data)

Table 2. Fiscal inequality indicators: minimum and maximum values (Source: Authors' elaboration on Immobiliare.it data)

	ΔATP_CV (€)		ATP/CV (%)		ΔIMU (€)		CTR (%)	
	min	max	min	max	min	max	min	max
Milan	7984	5888472	1,02	16,44	84,6304	62417,8	0,64	10,42834
Florence	−333924	1595008	0,70	80,78	−3539,59	16907,08	0,13	15,07767
Naples	−339428	1527260	0,68	6,32	−3597,94	16188,96	1,68	15,57984
Turin	−344972	4204456	0,68	23,35	−3656,7	44567,23	0,45	15,66118
Bologna	−86956	2611440	0,89	14,43	−921,734	27681,26	0,73	11,9065
Palermo	−54304	1854520	0,89	15,36	−575,622	19657,91	0,69	11,95441

The mean values of the four indicators are illustrated in Fig. 4 to compare the fiscal inequality in the six considered cities.

The highest differences between CV and ATP (ΔATP_CV) are in Florence and Milan, both higher than 800.000,00 €. The ratio between ATP and CV (ATP/CV) presents a rather low variability among the six cities, ranging from about 2,3 in Bologna to more

than 4 in Milan. The difference between the property tax calculated (C_IMU) on the basis of the property value and the property tax effectively paid (P_IMU) calculated on the basis of the CV and the Municipal Rate (ΔIMU) presents high variability: the highest score is again in Milan, followed by Florence and Naples. Finally, the Calculated Tax Rate (CTR) highlights the lowest values in Milan and Florence and the highest values in Turin and Bologna. In general, it is evident a great variability of the fiscal inequality level, even if Milan seems to be the city with the most critical situation.

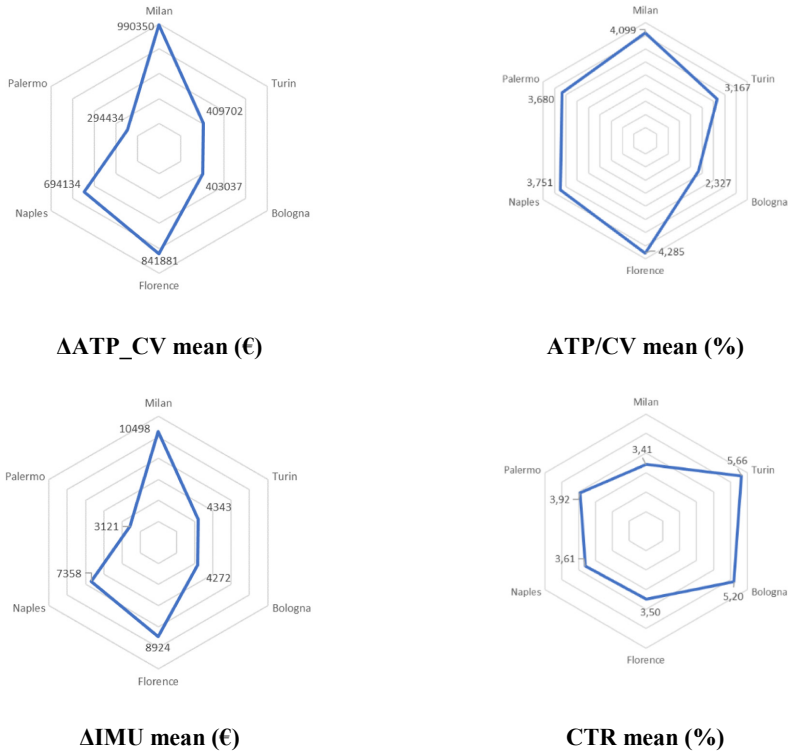

Fig. 4. Fiscal inequality indicators: mean values across the 6 case studies (Source: Authors' elaboration on Immobiliare.it data)

Figure 5 shows the difference between the IMU tax calculated (C_IMU) and the IMU tax effectively paid (P_IMU) related to the properties selected by means of the stratified sampling. Milan presents maximum values higher than 60.000,00 Euro, followed by Florence and Naples with maximum values respectively higher than 40.000 Euro and 25.000,00 Euro: on the contrary, the maximum values in the other cities are significantly lower (on average around 15.000,00 Euro). The fact that in Naples ΔIMU is higher than in Bologna and in Turin deserves to be further investigated, considering that in Naples the number of economic and popular housing properties is certainly higher. These results suggest that in Naples the gap between weak and wealthy urban areas is very high, and it is highlighted by the polarization of property prices, the income distribution and the unemployment level of population.

Therefore, in all the considered cities numerous property owners currently pay lower IMU taxes than they should and this aspect represents one of the key issues that evidently make the reform of property taxation urgent.

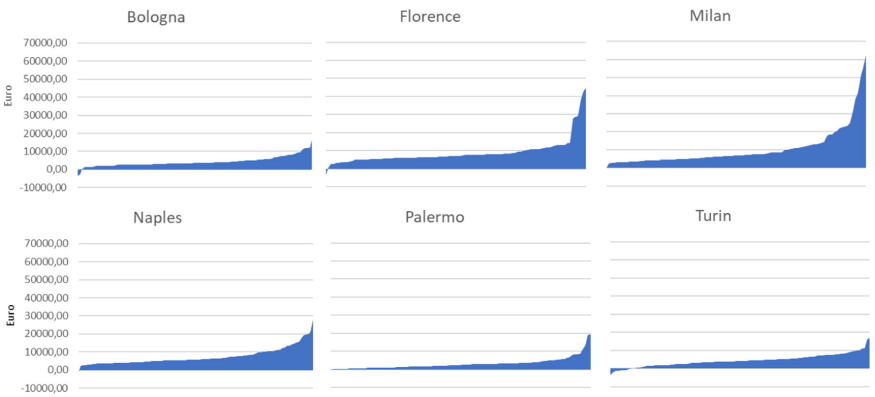

Fig. 5. ΔIMU distribution in the 6 data samples (Source: Authors' elaboration on Immobiliare.it data)

The specific situation in Milan deserves to be further explored by comparing the ATP and the CV of each property: Fig. 6 shows on the right the decreasing ordered ATPs and on the left the related CVs. The graph highlights a random relation between these values. In particular, there are not only several properties with CV higher than ATP, but also properties with CV lower than ATP; it is worth mentioning that in some cases the CV are strongly underestimated, even 300% lower than ATP.

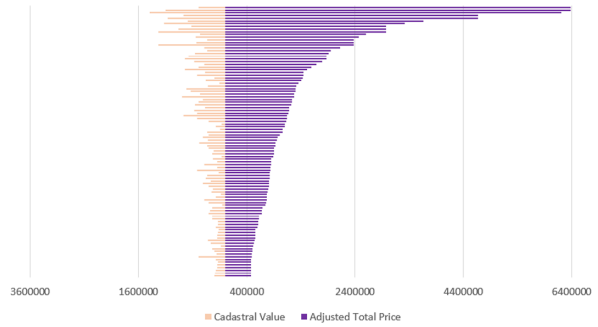

Fig. 6. CVs and ATPs distribution in Milan data sample (Source: Authors' elaboration on Immobiliare.it data)

Finally, it is interesting to analyse the relation between the ATP and the CTR variables. The scatterplot in Fig. 7 highlights a negative relation that means that high property values are generally related to low Calculated Tax Rates.

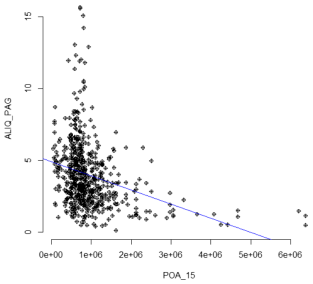

Fig. 7. Calculated Tax Rate (CTR) and Adjusted Total Price (ATP): scatterplot (Source: Authors' elaboration on Immobiliare.it data)

4.2 Regression Analyses Results

A traditional logarithmic hedonic model was applied on the data samples related to the six analysed cities. Two regression analyses were performed in order to study the relation between Adjusted Total property Prices (ATP) and Cadastral Values (CV) - in the first OLS model - and between ATP and Calculated Tax Rates (CTR) - in the second OLS model. On the basis of the normality test of both CV and CTR variables, the logarithmic transformation was preferred: thus, the dependent variable of the first model was LogCV, while the dependent variable of the second model was LogCTR. The ATP variable was also preferred in its logarithmic transformation and assumed as explanatory variable. The results of the first OLS model (Table 3) showed that cadastral values are very weakly related to property prices: in some cities the relation between the dependent and explanatory variables is null (Turin and Florence) or very low (Naples),while in the others is rather weak (R^2 around 30%). Therefore, it is evident that the tax bases, that the cadastral values represent, are independent from the property prices.

Table 3. First OLS model to assess the relationship between Cadastral values (LogCV) and Adjusted Total Prices (LogATP) (Source: Authors' elaboration).

		Dependent variable: Cadastral Value (LogCV)			
Independent variable: Adjusted Total Price (LogATP)		Ordinary Least Squares Model (OLS)			
		Coefficients	Probability		Adjusted R^2
Milan	Intercept	1.125 e^1	$< 2e^{-16}$	***	0.373
	LogATP	3.601 e^{-7}	$8.9e^{-12}$	***	
Turin	Intercept	1.250 e^1	$< 2e^{-16}$	***	0.019
	LogATP	3.487 e^{-7}	0.088		
Bologna	Intercept	$1.213e^1$	$< 2e^{-16}$	***	0.319
	LogATP	$7.499e^{-7}$	$5.25e^{-10}$	***	
Florence	Intercept	1.248 e^1	$< 2e^{-16}$	***	0.016
	LogATP	$1.186e^{-7}$	0.104		

(*continued*)

Table 3. (*continued*)

		Dependent variable: Cadastral Value (LogCV)			
Independent variable: Adjusted Total Price (LogATP)		Ordinary Least Squares Model (OLS)			
		Coefficients	Probability		Adjusted R^2
Naples	Intercept	1.211 e^1	$< 2e^{-16}$	***	0.160
	LogATP	$4.381e^{-7}$	$2.13e^{-05}$	***	
Palermo	Intercept	1.104 e^1	$< 2e^{-16}$	***	0.333
	LogATP	$1.175e^{-6}$	$1.96e^{-10}$	***	

Signif. codes: $p \leq 0.001$ '***'; $p \leq 0.01$ '**'; $p \leq 0.05$ '*'; $p \leq 0.1$ '.'; $p \leq 1$ ' '.

The results of the second OLS model (Table 4) showed that Calculated Tax Rates are unrelated to property prices since the explanatory power of all the models is very low. Moreover, these results shows the negative sign of the marginal coefficients of LogATP in all the cities, this means that the ratio between the variables, even if low, is in any case inverse, contrary to what it might be expected from a fair tax system.

Table 4. Second OLS model to assess the relationship between Calculated Tax Rates (LogCTR) and Adjusted Total Prices (LogATP) (Source: Authors' elaboration).

		Dependent variable: Calculated Tax Rate (LogCTR)			
Independent variable: Adjusted Total Price (LogATP)		Ordinary Least Squares Model (OLS)			
		Coefficients	Probability		Adjusted R^2
Milan	Intercept	1.278e + 00	$< 2e^{-16}$	***	0.073
	LogATP	$-1.237e^{-07}$	0.003	**	
Turin	Intercept	2.187	$< 2e^{-16}$	***	0.115
	LogATP	$-7.28e^{-7}$	$3.23e^{-04}$	***	
Bologna	Intercept	1.804	$< 2e^{-16}$	***	0.060
	LogATP	$-2.89e^{-7}$	0.007	***	
Florence	Intercept	1.606	$< 2e^{-16}$	***	0.266
	LogATP	$-4.29e^{-7}$	2.35e-08	***	
Naples	Intercept	1.541	$< 2e^{-16}$	***	0.120
	LogATP	$-3.64e^{-7}$	$2.32e^{-04}$	***	
Palermo	Intercept	1.512	$< 2e^{-16}$	***	0.180
	LogATP	$-6.77e^{-7}$	$6.33e^{-06}$	***	

Signif. codes: $p \leq 0.001$ '***'; $p \leq 0.01$ '**'; $p \leq 0.05$ '*'; $p \leq 0.1$ '.'; $p \leq 1$ ''.

5 Conclusion

The proposed methodological approach based on three main steps was applied to analyse and compare the fiscal inequality related to luxury properties in six different Italian cities at municipal level. On the basis of the stratified data samples, exploratory analyses were performed and highlighted interesting preliminary results. The analyses were focused on cadastral categories, cadastral values and on the calculation of four innovative fiscal inequality indicators, proposed to quantify the well-known gap between cadastral values and property prices, as well as to explicit the discrepancy in terms of property taxation.

The descriptive statistics of the "cadastral category" variable highlighted that most of the properties are classified as "civil properties" (cadastral category A/2), although the data samples consist of the property listings with the highest prices of each city and thus represent the luxury housing segment. This results, that suggests that the fiscal inequality level may be very high, is strengthened by the fact that the number of "stately properties" (cadastral category A/1) is rather low. Furthermore, the four fiscal inequality indicators showed that cadastral values are randomly related to property prices and that the fiscal inequality level is significant in the analysed cities, even if with a great variability that denotes a general chaotic fiscal situation. In particular, the ΔIMU indicator explicated the great difference between the IMU tax calculated (C_IMU) and the IMU tax effectively paid (P_IMU), which is particularly evident in the city of Milan. Finally, the regression analyses results also confirmed that redistributive policies are necessary in the Italian context, by highlighting that the cadastral values have to be urgently corrected on the basis of the property prices. Therefore, in order to support the property taxation reform, the first urgent step is to revise the current cadastral rates and consequently the cadastral incomes. However, this chaotic system seems to respond to a single general "rule", according to which the taxes paid are negatively rather than positively correlated to property prices. Therefore the analyses effectively brought out that the cadastral values in Italy are anachronistic and are determined by stochastic components that made that taxes to be randomly paid, regardless of the values and characteristics of the properties. The revision of the cadastral rates can no longer be postponed for two reasons. Firstly, because it represents a crucial point to reduce the territorial and socio-economic inequalities originated by the real economy across the urban areas. Secondly, because it represents the fundamental step to revise the cadastral values, that constitute the tax bases for the IMU tax calculation. In particular, the re-introduction of the tax on the first home ownership, suggested by the OECD and identified as part of the general property taxation reform, could have positive consequences on a social, economic and territorial level, only if, for example, the generated incomes were invested for the redevelopment of the most vulnerable urban areas.

For these purposes, further researches will be addressed in order to analyse the fiscal inequality level by considering the phenomenon not only at municipal level, but also in the urban areas characterized by different real estate submarkets and socio-economic contexts (Whitehead 1999; Watkins 2001; Bourassa 2007). Those analyses will by particularly finalized to support policies to foster the territorial welfare, limit the social injustices caused by the fiscal inequality and tackle tax evasion. Furthermore, these analyses should be also developed by considering all the 8000 Italian municipalities,

in order to verify how the property taxation system could really and effectively support redistributive mechanisms across the entire national context between more and less vulnerable areas and people. Moreover, the current analyses, limited to the luxury property segments, are not able to highlight the real impact that the property taxation could produce in social and territorial terms. A further development of this research will be addressed to extend the data sampling and consider also properties with lowest prices and thus representing the economic housing segment. In this way, it could be identified not only the fiscal inequality related to property owners that currently pay lower IMU taxes than they should, but also to those property owners than should pay drastically less.

In conclusion, the property taxation reform should be supported by analyses on both luxury and economic properties, in order to foster fiscal redistributive processes able to balance the current fiscal inequality and social injustice.

References

1. Andrews, F.M., Withey, S.B.: Social Indicators of Well-being: Americans' Perceptions of Life Quality. Springer, Berlin, (2012). https://doi.org/10.1007/978-1-4684-2253-5
2. Atkinson, A.B.: On the measurement of inequality. J. Econ. Theory **2**, 244–263 (1970)
3. Barreca, A., Curto, R., Rolando, D.: Assessing social and territorial vulnerability on real estate submarkets. Buildings **7**(4), 94 (2017). https://doi.org/10.3390/buildings7040094
4. Barreca, A., Curto, R., Rolando, D.: Housing vulnerability and property prices: spatial analyses in the Turin real estate market. Sustainability **10**(9), 3068 (2018). https://doi.org/10.3390/su10093068
5. Barreca, A., Curto, R., Rolando, D.: Urban vibrancy: an emerging factor that spatially influences the real estate market. Sustainability **12**(1), 346 (2020). https://doi.org/10.3390/su12010346
6. Barreca, A., Curto, R., Rolando, D.: Is the real estate market of new housing stock influenced by urban vibrancy? Complexity (2020).https://doi.org/10.1155/2020/1908698
7. Bechini, T.: La disuguaglianza in Italia: Un'analisi multidimensionale per circoscrizioni. EyesReg-Giornale di Scienze Regionali **7**, 64–69 (2017)
8. Breusch, T.S., Pagan, A.R.: A simple test for heteroscedasticity and random coefficient variation. Econom. J. Economy. Soc. 1287–1294 (1979)
9. Bourassa, S.C.: Land value taxation and housing development: effects of the property tax reform in three types of cities. Am. J. Econ. Sociol. **49**(1), 101–111 (1990)
10. Bourassa, S.C., Cantoni, E., Hoesli, M.: Spatial dependence, housing submarkets, and house prices. J. Real Estate Financ. Econ. **35**, 143–160 (2007)
11. Bordignon, M., Grembi, V., Piazza, S.: Who do you blame in local finance? An analysis of municipal financing in Italy. Eur. J. Polit. Econ. **49**, 146–163 (2017)
12. Curto, R., Fregonara, E., Semeraro, P.: Asking prices vs market prices: an empirical analysis. Territorio Italia **1**, 53–72 (2012)
13. Curto, R., Fregonara, E., Semeraro, P.: How can land registry values be made fairer pending a review of valuations? Territorio Italia **1**, 59–82 (2014)
14. Curto, R., Fregonara, E., Semeraro, P.: Market prices and property taxation in Italian real estate: a Turin case study. In: Stanghellini S., Morano P., Bottero M., Oppio A. (eds) Appraisal: From Theory to Practice. Green Energy and Technology. Springer, Cham (2017). https://doi.org/10.1007/978-3-319-49676-4_11

15. Cutter, S.L., Mitchell, J.T., Scott, M.S.: Revealing the vulnerability of people and places: a case study of Georgetown County, South Carolina. Ann. Assoc. Am. Geogr. **90**, 713–737 (2000)
16. Diener, E.A.: A value based index for measuring national quality of life. Soc. Indic. Res. **36**, 107–127 (1995)
17. Diener, E., Suh, E.: Measuring quality of life: economic, social, and subjective indicators. Soc. Ind. Res. **40**, 189–216 (1997)
18. Dillinger, W.: Urban Property Tax Reform Guidelines and Recommendations. The World Bank, Washington, D.C. (1992)
19. Elinder, M., Persson, L.: House price responses to a national property tax reform. J. Econ. Behav. Organ. **144**, 18–39 (2017)
20. Jacobs, J.: The Death and Life of Great American Cities. The Failure of Town Planning. Random House, New York (1961)
21. Jacobs, J.: The Life of Cities. Random House, New York, NY, USA (1969)
22. Lee, Y.J.: Social vulnerability indicators as a sustainable planning tool. Environ. Impact Assess. Rev. **44**, 31–42 (2014)
23. Montgomery, J.: Urban vitality and the culture of cities. Plan. Pract. Res. **10**, 101–110 (1995)
24. Montgomery, J.: Making a city: urbanity, vitality and urban design. J. Urban Des. **3**, 93–116 (1998)
25. OECD: Economic Policy Reforms 2021: going for growth In: OECD Better policies for better lives (2021). https://www.oecd.org/economy/italy-economic-snapshot/. Accessed 07 May 2021
26. Pellegrino, S., Piacenza, M., Turati, G.: Developing a static microsimulation model for the analysis of housing taxation in Italy. Int. J. Microsimul. **4**(2), 73–85 (2011)
27. Rosengard, J.K.: Property Tax Reform in Developing Countries. Springer, New York (2012). https://doi.org/10.1007/978-1-4615-5667-1
28. Rosen, S.: Hedonic prices and explicit markets: production differentiation in pure competition. J. Polit. Econ. **82**(1), 34–55 (1974)
29. Schmidtlein, M.C., Deutsch, R.C., Piegorsch, W.W., Cutter, S.L.: A sensitivity analysis of the social vulnerability index. Risk Anal. **28**, 1099–1114 (2008)
30. Schneider, M.: The "quality of life" and social indicators research. Public Adm. Rev. **36**, 297–305 (1976)
31. Segre, E., Rondinella, T., Mascherini, M.: Well-being in Italian regions. Measures, civil society consultation and evidence. Soc. Ind. Res. **102**, 47–69 (2011)
32. Tate, E.: Uncertainty analysis for a social vulnerability index. Ann. Assoc. Am. Geogr. **103**, 526–543 (2013)
33. Yinger, J., Bloom, H.S., Boersch-Supan, A.: Property taxes and house values: the theory and estimation of intrajurisdictional property tax capitalization. Elsevier (2016)
34. Yue, Y., Zhuang, Y., Yeh, A.G.O., Xie, J.Y., Ma, C.L., Li, Q.Q.: Measurements of POI-based mixed use and their relationships with neighbourhood vibrancy. Int. J. Geogr. Inf. Sci. **31**, 658–675 (2017)
35. Watkins, C.A.: The definition and identification of housing submarkets. Environ. Plan. **33**, 2235–2253 (2001)
36. Whitehead, C.M.E.: Chapter 40 Urban housing markets: theory and policy. In: Handbook of Regional and Urban Economics, vol. 3, pp. 1559–1594. Elsevier, Amsterdam (1999)