Property tax and property values: Evidence from the 2012 Italian Tax Reform *

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Abstract

This paper assesses the extent to which property taxes are capitalized into property values, exploiting the 2012 Italian tax reform. Municipal-level variation in the level of the property tax rates is instrumented using the exogenous staggered timing of local elections. We show that the incumbent local governments with upcoming elections in 2013 shifted the composition of fiscal revenues towards lower property tax. Our 2SLS estimate shows that a one standard deviation increase in municipal-level property tax intensity leads to a 2.7% reduction of municipal property values in the year of the reform, consistently with full capitalization of the tax. We elicit information on the characteristics of the compliers and show that these municipalities feature inefficient public spending and low social capital.

Keywords: Real estate values, Property tax capitalization, Political budget cycle

JEL Classification Numbers: D72, H22, R21

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1 Introduction

The property tax capitalization hypothesis predicts that differences in property values between jurisdictions reflect differences in expected property tax liabilities, holding constant other housing market characteristics. This hypothesis was seminally developed and tested by Oates (1969, 1973). The volume of empirical studies that followed Oates's work largely documents that changes in property tax liabilities are capitalized into property values at different degrees (either partial, full or over capitalization).[1] While the seminal literature focused primarily on estimating the degree of property tax capitalization, little is known about its determinants. The extent to which property taxes are capitalized into property values depends not only upon the level of local public expenditure, but also upon its effectiveness in providing public services. This argument, although theoretically grounded, lacks of empirical validation.

Whether the quality of local governments, as measured by the efficiency of public spending, affects the degree of property tax capitalization is important, not only to validate a theoretical prediction, but also from a policy perspective. Indeed fiscal revenues from immovable property taxes are typically levied by local jurisdictions and significantly contribute to their financing in both high and middle income countries (Norregaard, 2013).

This paper tests the property tax capitalization hypothesis by exploiting the effect of the Italian 2012 property tax reform, and shows that full capitalization arises in contexts that feature inefficient management of public resources. From mid-2011 Italy faced a sovereign debt crisis that led to the resignation of the incumbent government in November 2011.[2] A new technocratic government took office on November 16th, 2011 and by the 22nd of December of the same year the Italian parliament approved a comprehensive fiscal austerity plan.[3] One of the main novelties of the austerity plan was a new fiscal regime on real estate property with the introduction of a municipal property tax ("Imposta Municipale Unica", IMU hereafter). This policy shift offers an ideal setting to study the impact of tax changes on property values for four reasons. First, the policy change was unexpected, being associated with the sudden occurrence

[1] The reader may refer to Yinger *et al.* (1988) for a comprehensive review of the literature up to 1988 and to Hilber (2017) for a more recent review of the literature.

[2] The government was elected in 2008 and was chaired by the prime minister Silvio Berlusconi.

[3] The new government was in charge from November 2011 to April 2013 and was chaired by Mario Monti.

of the 2011 sovereign debt crisis. Second, each municipality was allowed to choose its own tax rate (within some bounds that will be described in details in the next section). Third, in light of the sovereign debt crisis, the municipal fiscal revenues from increased local property tax rates have been, by law, partially transferred to the central government and partially compensating for the reduction in fiscal transfers from the central government; overall the law generated a municipal-level expenditure- and deficit-balanced increase in property tax revenues. Fourth, the property tax base in Italy was fixed in the years of the reform because it does not change with market valuations; as a consequence, changes in property tax rates directly affect the level of local fiscal revenues, while changes in real estate market values do not directly affect revenues.

We exploit the reform-induced variation in tax rates across municipalities in a difference-in-differences setting and estimate the relationship between municipal property taxes and changes of property values. To address threats to identification arising from the potential endogeneity of the tax rates chosen by each municipality, we exploit the staggered timing of municipal elections to build an instrumental variable. Variation in the timing of municipal elections in Italy is due to historical reasons and, unless cases of early-terminated mandates of the municipal council, it can be considered exogenous with respect to local economic conditions (Coviello and Gagliarducci, 2017; Repetto, 2017).

Following Alesina and Paradisi (2017), we show that, after the 2012 reform, municipalities with elections in 2013 set significantly lower property tax rates than other municipalities. To corroborate the exclusion restriction assumption in our setting we provide the following evidence. First, using data on electoral cycles prior to 2013, we show that property values do not change in the year before municipal elections occur. Second, we show that municipalities with and without elections in 2013 do not differ in terms of property values and local housing market characteristics, nor they show different dynamics in property values before the introduction of the IMU.

Using 2SLS we find that a one standard deviation increase in property tax rates induced a 2.7% drop in municipal property values in the year of the reform. This estimate is consistent with full capitalization at a discount rate of about 2.4%, which is line with the average real

interest rate in the period 2006-2016.

Our estimate represents the local average causal response of property values to property taxes for the compliers -i.e. municipalities whose choice of the tax rate depends upon the electoral cycle. Although local, we argue that our estimate is particularly relevant because it provides evidence of full property tax capitalization in a context that features inefficient management of public resources. Indeed we show that compliers are characterized by lower quality of government, measured by the inefficiency of local public expenditure and tax collection, and low levels of tax culture, as they are located in regions where there is relatively higher tax evasion tolerance. Finally, compliers also feature a significantly lower level of social capital which has been linked by Nannicini *et al.* (2013) to lower political accountability and, possibly, to worse selection of local politicians.

While contributing to the microeconomic literature on the property tax capitalization hypothesis, our result also adds to the recent debate about the macroeconomic effects of property taxes. Arnold *et al.* (2011) empirically show that an increasing role of property taxation relative to other taxes is welfare enhancing in a macroeconomic perspective. Based on this empirical result, recurrent taxes on land, dwellings and non-residential buildings are considered by policy makers less distortionary for investment and labour choices than other taxes.[4] Although in our setting we cannot assess the macroeconomic effect of the 2012 Italian tax reform, we show that property taxes, under certain circumstances such as inefficiency of local public expenditure or low levels of social capital, may significantly reduce property values. The consequent negative impact on household's wealth could potentially trigger a negative effect on households' consumption (Campbell and Cocco, 2007; Mian *et al.*, 2013) that could reinforce the negative income effect of the property tax on households' durable spending found by Surico and Trezzi (2018). We conclude that the distortionary effects of property taxes may depend upon the quality of institutions, and need be evaluated by taking into account the specific context where the policy is implemented.

The rest of the paper is organized as follows. Section 2 describes the institutional setting. In

[4]As the Eurostat (2014) reports in "Taxation trends in the European Union": *recurrent taxes on real estate property have attracted increasing attention from policy makers because in many countries where they are low they offer a potential source for increasing revenue, while at the same time they are considered to be the least detrimental to economic growth given the immobility of the tax base (p. 44).*

Section 3 we describe our data. Section 4 describes preliminary evidence based on a difference-in-differences estimation strategy. Section 5 presents our instrumental variable strategy and discusses the validity of the identifying assumptions, while Section 6 reports the 2SLS results. Section 7 contains a number of robustness checks. Section 8 concludes.

2 Institutional setting

On March 14, 2011, the Italian government approved the law decree no.23 regarding fiscal federalism. The law stated that, starting in 2011, all Italian municipalities, except for those in regions with special legislative authority,[5] would be subject to a new fiscal autonomy regime. Specifically, the law prescribed: i) a substantial reduction of fiscal transfers from the central government to each municipality, counterbalanced by ii) an increase in local fiscal autonomy. In particular, after this reform, each municipality was entitled to the tax revenues from immovable properties located within its boundaries and was granted a higher degree of autonomy in setting local income and consumption taxes to households and firms.

The law decree no.23 also scheduled the introduction of a new fiscal regime on real estate property (IMU), which would have replaced the previous fiscal regime ("Imposta comunale sugli immobili", ICI hereafter) starting in 2014. Under ICI residential property was subject to a dual tax regime: 1) the main dwelling (the house where the household has its fiscal residence) was tax exempt, except for luxury residences; 2) other residential properties were subject to a local tax rate. The main innovation of the IMU as prescribed by the law decree no.23 was an increase in the property tax rate on residential properties other than primary residences and a larger discretion in its determination given to municipalities.

Starting in mid-2011, Italy was hit by a severe sovereign debt crisis, which led to the resignation of the prime minister in November 2011 and the birth of a technocratic government in the same month. The first initiative of the new government was the adoption of a fiscal consolidation plan with the objective of lowering financial markets' pressure on government bond yields. On December 6, 2011 the new Italian government approved a fiscal consolidation plan

[5]The five regions that are granted special status by the Italian Constitution are Valle d'Aosta, Trentino-Alto Adige, Friuli-Venezia Giulia, Sardegna and Sicilia.

(law decree no. 201) which introduced a major change in the fiscal treatment of real estate property. The introduction of the IMU system, planned to take place in 2014 by the law decree no. 23, was anticipated to 2012, and extended to primary residences.

The new property tax regime introduced three main innovations with respect to the previous one: 1) inclusion of the main dwelling, irrespective of the category, in the tax base; 2) redefinition of the tax base as the land registry value multiplied by a factor of 160;[6] 3) provision of a 0.4% tax rate on the main residence (*Imu Prin* hereafter) and a tax rate of 0.76% on secondary houses (*Imu Sec* hereafter). Each municipality was free to modify the *Imu Prin* rate within a +/-0.2 percentage points band and the *Imu Sec* rate within a +/-0.3 percentage points band, by the end of October 2012. Furthermore, the law established a 200 euro deduction on the tax paid on the main dwelling, plus an additional 50 euro per household member below 26 (up to a maximum of 400 euro).[7]

The law confirmed the significant reduction in fiscal transfers from the central government to the municipalities contained in the law decree no.23; it also established that municipalities had to transfer a fraction of the revenues from taxation of primary residences to the central government. As a result of the reform, total revenues from property taxes on the main dwelling increased from about 1 billion euro between 2010 and 2011 to about 4.2 billion euro in 2012. Total revenues from property taxes on other residential properties rose from about 8.2 billion euro between 2010 and 2011 to about 10.5 billion euro in 2012.

As we will show below, only a very small fraction of municipalities set the property tax rates below the statutory levels: the fraction of municipalities setting *Imu Prin* (*Imu Sec*) below the statutory level is only 7% (1%) in our sample. This evidence suggests that the drop in fiscal transfers by the central government after 2012 was expected to be quantitatively relevant.

Although at the time of the reform the government labeled the new tax system as an "experiment", the Italian legal system does not allow a national law to apply experimentally. The

[6]This factor was equal to 100 under the previous fiscal regime. The land registry value is an estimate of what the rental value of the property was in 1988-1989.

[7]Municipalities are allowed to modify the level of deductions. In our sample only 0.7% of the municipalities opt for a deduction different from the national level. Within this group, 20 municipalities set the deduction at a level that covers the full payment of the tax bill on the main dwelling. In these cases we set *Imu Prin* equal to zero. In a robustness check we exclude municipalities which set a different deduction relative to the national level of 200 euro and the results (not shown for brevity) are unaffected.

labeling was chosen possibly to assuage the unpopularity of the property tax, which in fact was significantly reduced for the main dwellings in 2013 by the new elected government. In 2014 the *Imu Prin* was abolished and replaced by a new local tax on services ("Tributo per i Servizi Indivisibili", TASI). Despite the change in name, however, the new tax resembled the IMU both in terms of tax base and rates;[8] in fact, as documented by Messina and Savegnago (2014), total fiscal revenues on primary residences remained substantially unchanged in 2012 and in 2014. Therefore, to all practical effects, the tax change was not transitory. Indeed so it was perceived by Italian households in 2012, when they were asked about their expectations of the duration of the IMU by the Survey of Household Income and Wealth (SHIW):[9] only 7% of the households said to be certain that the IMU would be abolished within the subsequent 5 years while 33% of the households assessed the probability of the removal of IMU to be zero. Hence, in 2012, the vast majority of the households assigned a positive probability that the increase in property taxes would last for at least five years.

3 Data

Our primary source of data is the Italian Real Estate Market Observatory (OMI hereafter), an agency that belongs to the Italian Fiscal Authority (Agenzie delle Entrate) within the Ministry of Finance. The OMI divides each Italian municipality into homogeneous real estate markets. For each area it provides semestral estimates of property and rental values for different categories of real estates (residential buildings, offices etc.), and, within each category, for various maintenance states (excellent, normal and bad). These estimates rely on transaction data complemented by surveys of local housing market conditions conducted among real estate agents.[10]

In our analysis we select data for residential buildings in the time window spanning four semesters before and two semesters after the introduction of the tax reform (from 2010 to 2012). To avoid issues stemming from differences in the quality composition of residential buildings,

[8] The rates of TASI in 2014 were set between 0.1% and 2.5% with no deductions.

[9] The survey question was: "In your opinion, which is the probability that the Municipal Property Tax (IMU) will be abolished within the next 5 years and not replaced by another similar tax?"

[10] If transaction volumes are not large enough to produce precise estimates of market values, the OMI imputes the data.

we focus on residential properties whose maintenance state is classified as normal.[11] Finally, we average semestral values for each Italian municipality, so as to obtain a panel dataset of average municipal quality-homogenous residential real estate values and rents for each semester from 2010 to 2012. The OMI dataset also provides data on the number of transacted houses in a given municipality over the total housing stock in that municipality at yearly frequency. We merge this panel with data on property tax rates and deductions chosen by each municipality in 2011 (under ICI system) and 2012 (under the IMU system) as reported by the Institute for Local Finance and Economy. We add information on municipal characteristics drawn from the 2011 Population and Housing Census conducted by the the national institute for statistics (ISTAT); data on the timing of elections at municipal level, provided by the Ministry of the Interior; and municipal balance sheet data drawn from the database AIDA PA provided by Bureau Van Dijk.

We drop observations referring to municipalities belonging to regions with special legal status and those for which we miss relevant information.[12] The resulting sample consists of 6213 municipalities.

Table 1 reports summary statistics for our working dataset.

Insert Table 1 here

The average municipal residential property value is 1055 euros per square meter with standard deviation of about 568. The average property tax rate on the main residence (*Imu Prin*) is about 4.26 permil (0.426%) and the average property tax rate on secondary properties (*Imu Sec*) is 8.59 permil (0.859%). About 61% of the municipalities set *Imu Prin* equal to 0.4% (the statutory tax rate), whereas 36% of them set *Imu Sec* equal to the statutory level of 0.76%. 32% of the municipalities chose to increase *Imu Prin* above the statutory level (in this group of municipalities the average *Imu Prin* was about 0.51%) against a fraction of 63% of municipalities that increased *Imu Sec* above the statutory level (the average *Imu Sec* for this group was about 0.91%).

[11] Residential buildings with maintenance state classified as normal represent the largest share of total residential buildings in Italy; accordingly, in the OMI database, real estates with normal maintenance state are about 90% of total observations.

[12] Municipalities that belong to the autonomous regions of Trentino-Alto Adige, Friuli-Venezia Giulia, Valle dÁosta, Sicily and Sardinia are excluded because they were originally considered into a separate fiscal regime by the law decree no. 23 on March 14, 2011.

The distribution of population of Italian municipalities is very skewed towards left and has a large standard deviation; the average level of resident population is about 8200. On average there are 1.68 houses per household. This is due to the large presence of secondary houses (empty houses plus rented houses). Secondary houses represent, in fact, about 26% of total houses on average. Municipal public expenditure per capita is about 1317 euros per year; municipal fiscal deficit, measured as the difference between public expenditure and fiscal revenues, is positive on average (about 7 euros per capita).

Looking at the time-series of property values in Italy, we observe a significant drop in the years following the introduction of the new property tax system. Figure 1 plots the logarithm of property values averaged across municipalities in our sample from 2010 to 2012. Between 2011 and 2012 average property values decreased by about 3%.

Insert Figure 1 here

Figure 2 plots the histogram of the difference between the average of the logarithm of property values in the two semesters that follow the introduction of the IMU (2012H1-2012H2) and the average of the logarithm of property values in the two semesters that precedes it (2011H1-2011H2):

$$\frac{1}{2}\sum_{t=2012H1}^{2012H2} log(P_{it}) - \frac{1}{2}\sum_{t=2011H1}^{2011H2} log(P_{it}),$$

where P_{it} indicates property values per square meter in municipality i at time t.

Insert Figure 2 here

This figure shows that there is considerable variability across municipalities (standard deviation is about 4%) in the change in property values and that the distribution is skewed towards left. The first objective of our empirical analysis is to establish a causal link between the drop in property values and the increase in property taxes.

As outlined in the previous paragraph, all Italian municipalities were affected by the new property tax regime. In order to establish the differential impact of the change in property tax rates on property values we need to construct a measure of the intensity of the new tax regime at municipal level. As explained in the previous section, the IMU system envisaged two tax

rates: the *Imu Prin*, that applied on primary residences only and the *Imu Sec*, that applied on other residences. Furthermore, while in 2011 primary residences were exempt from property taxation, secondary residences were not. However, under the previous regime (ICI), the tax base for each secondary house was calculated by multiplying the cadastral value of the house by 100; under the IMU regime, instead, the tax base for the application of the *Imu Sec* tax rate was calculated by multiplying the cadastral value of the house by 160.

The change in property tax rates on primary residences between 2011 and 2012 is thus equal to the *Imu Prin*, while a correct estimate of the change of the tax rate applied to secondary residences between 2011 and 2012 must take into account the change in both the rate and in the multiplicative factor of the tax-base formula. Furthermore, the tax pressure on residential real estate depends on the marginal buyer at municipal level, that can be either a first-home buyer or not. In light of these considerations, we define a unified measure of the increase in property tax pressure for each municipality i as it follows:

$$T_i = (1 - \delta_i) \times \textit{Imu Prin}_i + \delta_i \times \textit{Change in Sec}_i \tag{1}$$

where *Change in Sec*$_i$ is equal to *Imu Sec*$_i$ $- \frac{\textit{Ici Sec}_i}{1.6}$ and δ_i is the share of secondary houses measured as described in Table 1. The measure suggested in equation (1) implies that increases of fiscal pressure on residential properties induced by higher levels of *Imu Prin* (*Change in Sec*) are larger (smaller) the smaller (larger) the share of secondary houses. The rationale behind this formulation is that in municipalities characterized by a smaller share of secondary houses, the marginal buyer is more likely to be a resident first-home buyer, and the relevant tax rate in the marginal transaction to be the one on primary houses. Although this assumption nests on the empirical evidence that homeownership tends to be highly persistent at municipal level, [13] in the robustness section of the paper we show that our main empirical results are robust to the use of extreme values (0 or 1) of δ in equation (1).

The average level of T is 4.37 permil (0.437%) with a standard deviation of 0.66. Using data on municipal fiscal revenues we estimate that a 0.1 percentage points difference in T is

[13] A bivariate regression of ratio of the share of owner occupied houses measured in 2001 ISTAT Census on the share of owner occupied houses measured in 2011 ISTAT Census shows a coefficient equal to 0.85 about.

associated, in 2012, to a difference in property tax revenues per house of about 74 euro (the mean of property tax revenues in our sample is about 788 euro per house). This evidence corroborates the hypothesis that the measure in equation (1) captures variation in the intensity of property taxation at municipal level. We will use the variable T as main independent variable in the subsequent analysis.

4 Difference-in-differences estimates

In this section we investigate the relationship between changes in property tax rates chosen by each Italian municipality and changes in property values. The aim of this section is to provide *prima facie* evidence based on difference-in-differences estimates and discuss their limitations. We estimate the following equation:

$$y_{it} = \alpha_i + \lambda_t + \beta T_i \times Post_t + \epsilon_{it}, \tag{2}$$

where y_{it} is either the logarithm of property values per square meter or the logarithm of rental values per square meter in municipality i at time t, or the transaction volumes over total stock of housing in municipality i at time t;[14] T_i is our measure of intensity of treatment defined in the previous section; $Post_t$ is a dummy that takes value equal to one after the introduction of the IMU system (2012) and zero in the previous two years (2010 and 2011). The model in equation (2) includes a full set of municipality fixed effects, α_i, to control for any unobserved time-invariant difference across municipalities, and a full set of time fixed effects, λ_t, to control for any shock common to all municipalities.

Insert Table 2 here

The main coefficient of interest in equation (2) is β, which captures the relationship between the change in the outcome y and the variation in property taxes across municipalities after the introduction of the IMU system. Table 2 reports the estimated β coefficients from equation (2). The estimates in Table 2 show evidence of a negative and significant relation between house

[14] Notice that transaction volumes are observed at yearly frequency.

prices and property taxes. A 0.1 percentage points increase in T is associated with a 0.2% drop in property values and a 0.5 percentage points reduction in transaction volumes; whereas there is no significant relationship between our measure of tax pressure and rental values.

Although the evidence reported in Table 2 seems to suggest that the increase in property tax rates after 2012 was associated with a drop in property values, it does not necessarily provide a reliable estimate of the causal impact of property taxes on property and rental values. Property tax rates were the result of municipalities' choices, which may be correlated with observable or unobservable differences across municipalities that directly affected the dynamics of property and rental values.

A causal interpretation of those estimates is possible under the assumption that the evolution of property values in municipalities with average tax rates provides a valid counterfactual for what would have been the evolution of property and rental values in other municipalities if they had set the same tax rate. In other words, municipalities need to be on parallel trends absent the treatment, and heterogeneity in the effect of property taxes needs be orthogonal to the variation in tax rates. Although this assumption cannot be tested directly, the evolution of property and rental values before the introduction of IMU can be of some guidance. If, for instance, the variation in tax rates across municipalities is related to differences in local economic conditions, this will be reflected in different dynamics of the real estate market already before the introduction of IMU. To test this hypothesis we estimate the following equation:

$$y_{it} = \alpha_i + \lambda_t + \sum_{\tau=2010H1}^{2012H2} \gamma_\tau T_i \times \mathbf{1}(t = \tau) + \epsilon_{it}, \tag{3}$$

where, differently from equation (2), γ_τ are time-varying coefficients for the relationship between property values and T_i. Figure 3 shows the estimates of γ_τ in equation (3), normalized with respect to the second semester of 2011.

Insert Figure 3 here

The Figure 3 shows the estimated γ coefficients (together with 95% confidence intervals) from equation (3) when the dependent variable is the log of property values per square meter; it indicates that a decreasing trend in property values is correlated with the intensity of the property

tax rate T_i; as a consequence a causal interpretation of the estimates in Table 2 is unwarranted. The existence of different dynamics of property values across municipalities before the introduction of IMU is likely driven by differences in pre-existing economic conditions at municipal level that are jointly correlated with the choice of high property tax rates and decreasing trends in property values.

Even absent pre-trends, given the nature of the fiscal reform on March 2011 and the subsequent modification on December 2011, it is likely that municipalities that chose higher property tax rates were the ones that were running in already large fiscal deficits or were expecting larger reductions in fiscal transfers from the central government. Furthermore, municipalities that chose higher property tax rates may be characterized by low resilience of local housing demand to property tax, making the estimated coefficient downward biased.

Identifying the determinants of the choice of specific property tax rates and its relationship with the trends in local housing markets is beyond the objective of this paper. To solve the endogeneity problem that emerged in this preliminary analysis, in the following sections, we adopt an instrumental variable approach.

5 Identification

In this section we address the endogeneity problem highlighted above using an instrumental variable approach. We instrument variation in T_i across municipalities exploiting the staggered timing of municipal elections. The timing of municipal elections in Italy is staggered for historical reasons that are outlined in details by Coviello and Gagliarducci (2017).

Some municipalities had elections in 2012, before the deadline for the choice of the tax rate prescribed by the law (October 2012); therefore the local government in charge of setting the tax rate had no incentive to choose it strategically so as to please voters. In contrast, municipalities whose elections were planned for 2013 had such an incentive – in fact a stronger incentive than local governments whose elections were held at later dates. Indeed, Alesina and Paradisi (2017) show that these municipalities chose a significantly lower tax rate on primary residences (*Imu Prin*) than other municipalities. Accordingly, we find a significant negative relationship

between property tax rates set by each municipality and the occurrence of elections in 2013 estimating the following model:

$$y_i = \alpha + \beta Election2013_i + \epsilon_i, \tag{4}$$

where y_i is either our measure of treatment intensity T_i or the *Imu Prin* or the *Imu Sec* or *Change in Sec*; and $Election2013_i$ is a dummy variable that equals one if elections in municipality i were held in 2013, and zero otherwise. Among municipalities with elections in 2013, we identify municipalities where elections had already been held between 2009 and 2012; these are the municipalities where the city council terminated its electoral mandate before the natural end. We treat such municipalities as if they had no elections in 2013.[15]

Panel A in Table 3 shows that municipalities with elections in 2013 set *Imu Prin* about 16 basis points lower than other municipalities, whereas *Imu Sec* was not significantly different from other municipalities; the coefficient estimated on *Change in Sec* is instead negative but weakly significant. The estimated coefficient in column (4) shows that the intensity of property tax pressure was about 13 basis points lower in municipalities with elections in 2013. Panel B in Table 3 provides the results obtained by estimating a version of equation (4) augmented with population deciles fixed effects, included to control for the effect of municipality size on property tax rates.[16]

Insert Table 3 here

This evidence can be rationalized by a political economy argument and is in line with previous literature (Drazen and Eslava, 2010): in order not to lose political support before an election, incumbent local governments have an incentive not to increase the property tax rates above the statutory level dictated by the central government.

The results shown in Tables 2 and 3 indicate that $Election2013_i$ is a relevant instrument

[15]Municipalities are required to determine the IMU tax rates by October 2012. If having municipal elections in 2013 is not expected by the electorate in October 2012, because previous elections were held in the same year or within four years prior to 2013, there is no political economy reason to believe that property tax rates should have been lower in these municipalities relative to the ones that did not have elections in 2013.

[16]The rationale for this robustness check is that, as we will discuss in the following subsection, municipalities with and without elections in 2013 show a significant difference in population, which we account for in the subsequent analysis.

for our variable of interest T_i. The validity of the instrument rests on the assumptions that the timing of municipal elections was independent of the dynamics in property values, and that municipal elections affected the dynamics of property values only through their impact on T. The rest of this section provides evidence in support of these assumptions, namely we show that: (i) covariates are balanced between municipalities with and without elections in 2013; (ii) municipalities with elections in 2013 did not have different dynamics of property values before 2012; (iii) before the introduction of IMU, having elections in year t did not significantly affect the growth rate of house values over the previous two years.

5.1 Covariate balance

To provide evidence in support of our identification strategy, we first show that municipalities with and without elections in 2013 were comparable in terms of observable characteristics in the pre-reform period.

Insert Table 4 here

Table 4 reproduces the summary statistics of Table 1 separately for municipalities with and without elections in 2013 in the year immediately before the property tax reform (in 2011). The two groups of municipalities are comparable in terms of demographics, housing market characteristics and fiscal budget variables. The absence of systematic differences in the levels of property and rental values across the two groups suggests that the tax base, which we cannot measure directly, is likely not to differ on average across the two groups. However, there is a significant difference in average resident population across the two groups of municipalities; given that the distribution of resident population is highly skewed towards left the presence of few big cities in one of the two groups can have a significant impact on the average. To account for such heterogeneity, in all the subsequent regressions, we will include population deciles dummies interacted with time dummies in order to control for different time trends for municipalities of different size.

Finally there is no significant difference in the share of secondary houses; this ensures that our measure of treatment intensity T, defined in equation (1), only exploits cross-sectional

variation induced by different property tax rates set in 2012. In the robustness section 7 we provide evidence that differences across municipalities in the level of transaction volumes of residential properties do not drive our results.

5.2 Event-study analysis of the impact of elections in 2013

We analyze the reduced-form impact of elections in 2013 on property values. First, we show that before the introduction of the IMU the dynamics of property values did not differ between municipalities with and without elections in 2013. Second, we show that elections in 2013 had a significant impact on property values in 2012. We do so by estimating the following event-study model:

$$y_{it} = \alpha_i + \lambda_{s,t} + \sum_{\tau=2010H1}^{2012H2} \gamma_\tau Election2013_i \times \mathbf{1}(t = \tau) + \epsilon_{it}, \tag{5}$$

where γ_τ are time-varying coefficients for the relationship between the log of property values per square meter and the dummy $Election2013$; the estimates are normalized relative to the second semester of 2011. Notice that, differently from equation (3), equation (5) includes population deciles dummies interacted with time dummies ($\lambda_{s,t}$).

Figure 4 plots the estimated sequence of γ_τ from equation (5), together with 95% confidence intervals, and shows that the dynamics of property values before 2012 did not differ significantly between municipalities with and without elections in 2013. Furthermore, the figure shows that having elections in 2013 had a significant reduced-form impact on property values.

Insert Figure 4 here

5.3 Exclusion restriction

In the previous subsection we showed that elections held in 2013 affected property values in 2012, the year of the introduction of the IMU. The validity of our instrumental variable strategy rests on the exclusion restriction assumption that the 2013 municipal elections impacted the dynamics of property values only through their effect on property taxes. To provide evidence

in support of this assumption in this subsection we show that, before the property tax reform, there were no significant changes in house prices over the years preceding municipal elections.

We use data on the full electoral cycle spanning from 2007 to 2011 (a full electoral cycle naturally involves all Italian municipalities) and data on property values in the period 2006-2010. We test whether having elections in year $t+1$ has a significant effect on property values in year t relative to the previous two years, $t-1$ and $t-2$, and relative to municipalities without elections in year $t+1$, by estimating the following equation:

$$y_{it} = \alpha_i + \lambda_{s,t} + \beta Election_{i,t}^{t+1} + \epsilon_{it}, \tag{6}$$

where y_{it} is the logarithm of property values per square meter for municipality i at time t, and $Election_{i,t}^{t+1}$ is a dummy variable equal to one if municipality i has elections in year $t+1$. The coefficient β should be interpreted as the average deviation in the trend of property values at time t for municipalities that have elections in $t+1$. A significant estimate of β would imply that, in the period under analysis, municipal elections were systematically related to fluctuations in house prices in the years preceding them. Results reported in Table 5 are based on models that include time fixed effects (λ_t in column 1) and population deciles by time fixed effects ($\lambda_{s,t}$ in column 2); the estimates of β across specifications are not significantly different from zero: hence, we conclude that before the introduction of IMU (2007-2011), there is no evidence of a direct impact of municipal elections on the dynamics of house prices in the year prior to the elections.

Insert Table 5 here

Another potential concern is that the 2013 municipal elections may have induced increases in local public expenditure relative to fiscal revenues (the so-called political budget cycle) in the years preceding the elections. To study the dynamic of local public expenditure and fiscal deficit in our setting we estimate the following equation:

$$y_{it} = \alpha_i + \lambda_t + \sum_{\tau=2010}^{2012} \beta_\tau Election2013_i \times \mathbf{1}(t=\tau) + \epsilon_{it}, \tag{7}$$

where y_{it} is either the total municipal public expenditure or the fiscal deficit per capita at municipal level and β_τ are time-varying coefficients for the relationship between the outcome and elections in 2013. The estimates of equation (5), reported in Figure 5, reveal that there is no correlation between elections in 2013 and changes in municipal expenditure and fiscal revenues per capita between 2011 and 2012. In 2012, the year immediately before the elections, we observe an increase in public expenditure that, not being matched by a similar increase in fiscal revenues, implied a similar increase in the level of fiscal deficit per capita. This effect is however small and weakly significant, in line with recent evidence by Repetto (2017) who finds that the political budget cycle for Italian municipalities became significantly weaker after a reform occurred in 2008 that required disclosure of balance sheets before elections, thus making voters more informed about spending manipulation.

Insert Figure 5 here

We argue that this evidence hardly affects our estimates. In fact, to the extent that increases in public spending are expected to be temporary, they should not affect property values. Furthermore, if temporary changes in public expenditure over fiscal revenues in the years preceding municipal elections would have been capitalized in property values, the estimate of the coefficient in equation (5) should have been positive and significant.

6 IV estimates

In this section we show the results obtained from the empirical strategy described above. Panel A in Table 6 reports the reduced form estimate of the impact of elections in 2013 on the logarithm of property and rental values per square meter (columns (1) and (2) respectively), and on the transaction volumes over total housing stock (column (3)). Panel B in Table 6 reports the 2SLS results.

We find a strongly significant effect of property taxes on property values, and no statistically significant effect on rents and transaction volumes. The average causal response is -4.1%, that is, a 0.1 percentage points difference in T translated into a relative drop in property values of 4.1% for municipalities whose property tax rates were affected by elections in 2013.

Insert Table 6 here

This result supports the property tax capitalization hypothesis: a 0.1 percentage points increase in T induces a drop in value consistent with full capitalization of the tax liability at a discount rate of 2.4%.[17]

The estimated impact of T on rental values in Table 6 in column (2) is instead not statistically significant. This indicates that the income flow from rents was unaffected by the tax reform, so that the entire estimated impact of T on property values is exclusively due to the capitalization of future tax liabilities. In line with the hypothesis that the negative impact of the introduction of the IMU reflects a drop in local demand, column (3) shows that property taxes had a negative, though imprecisely estimated, effect on transaction volumes.

It is important to notice that the 2SLS estimate reported in Table 6 captures the impact of T on property values only for municipalities that modify their property tax rate according to whether or not they have elections in 2013 (compliers): municipalities where the incumbent local governments are affected by electoral concerns in their choice of the level of property taxes.

To shed light on the context for which our result provides a reliable estimate of the property tax capitalization effect, we characterize the compliers along several dimensions, and in particular in terms of quality of public resources management. Indeed municipalities where the choice of the property tax in 2012 was more sensitive to the electoral cycle are likely to be those where public resources are managed less efficiently: if voters expect increases in property taxes not to be compensated by the provision of local public goods they are more resilient to them and politicians have stronger incentives to manipulate their choice based on the electoral cycle.

To characterize the compliers in our setting, we first dichotomize our measure of the treatment intensity T, while capturing the relevant variation in T induced by the instrument. Following Angrist and Imbens (1995), we construct the cumulative density functions of the endogenous variable for municipalities with and without elections in 2013 and, then, we compute

[17] Relying on the assumption that the change in property values reflects the present discounted value of the change in tax liabilities, as in Yinger *et al.* (1988), we obtain: $\frac{\Delta P_1}{P_0} = -\frac{T}{r} \times \frac{B}{P_0}$, where B is the tax base, r is the discount rate and P_0 is the price at time 0. Assuming $B = P_0$, the value of r that satisfies this condition for $\frac{\Delta P_1}{P_0} \approx 4.1\%$ when $T = 0.1\%$ is 2.4%. Notice that the average real interest rate in the period 2006-2016 (calculated as the difference between the 10-year government bond yield and the consumer price inflation) is about 2.4% (source: Federal Reserve Economic Data).

the difference between them for each level of T.

Insert Figure 6 here

Figure 6 shows that municipalities with elections in 2013 had a significantly lower probability of having a property tax rate between 4 and 5 permil relative to other municipalities. In other words, we show that our instrument captures variation in T mostly between 4 and 5 permil. In light of this finding, we construct a dummy variable (*T-dummy*) that takes value equal to one if T is at or above 4 permil (71% about of the population) and zero otherwise.

To characterize the compliers in terms of each observable characteristic of interest, we compute the ratio between the first stage for the subsample of municipalities with that characteristic and the overall first stage. We consider the characteristics that are likely to be correlated with voters' preferences for lower property tax rates and that are theoretically predicted to be related to high degrees of property tax capitalization.

The theoretical literature (Brueckner, 1979) predicts that the degree of property tax capitalization depends upon the efficiency of local public spending. Following Gagliarducci and Nannicini (2013) and Grembi *et al.* (2016) we use as indicator of local government inefficiency the ratio between total spending (or tax revenues) committed in the provisional budget at the beginning of the year and the effective spending (or revenues collection) at the end of the year. The higher the ratio of committed to realized spending (revenues), the lower the extent to which the local government's commitments are met, and the higher their inefficiency. Furthermore, we consider a variable that measures the attitude of voters toward tax evasion. This variable, measured at regional level, is drawn from the World Values Survey and has been recently used by Casaburi and Troiano (2015) as a measure of tax culture. In our context, we hypothesize that lower levels of tax culture correspond to lower effectiveness in tax collection and higher resilience of voters to property tax rate increases.

Finally, we consider two variables that measure the level of social capital at provincial level: the number of non-sport daily newspapers sold per a thousand inhabitants in 2001 (Cartocci, 2007) and the number of blood bags donated per one hundred inhabitants in 1995 (Guiso *et al.*, 2004). These variables have been shown to be related to political accountability and in our setting may proxy for the level of trust between voters and local institutions.

Insert Table 7 here

Table 7 summarizes the results obtained in characterizing compliers. Following Angrist and Pischke (2008), for each of the variables listed in column (1) of Table 7 we estimate the relative likelihood that compliers have that characteristic as the ratio between the first stage for municipalities with that characteristic and the overall first stage. The effect of $Election_{2013}$ onto the variable *T-dummy* is estimated to be -0.096. Hence all estimates in column (2) of Table 7 are divided by -0.096 to obtain the estimates in column (3), namely the relative likelihood that compliers have the characteristic indicated in the corresponding row in column (1). The table shows that complying municipalities are characterized by inefficient public expenditure, ineffective tax collection and lower levels of political accountability, as proxied by social capital. This result is in line with the idea that municipalities where the choice of the tax rate is affected by the electoral cycle are those where voters are relatively more adverse to property tax increases. Indeed if voters expect that an increase in property taxes would not be accompanied by an adequate provision of local public goods due to the inefficient management of the jurisdiction, they would strongly oppose it. As a result, politicians would have a strong incentive to manipulate their choice of the tax rate for electoral motives. On the other hand in these municipalities the negative effect of property taxes on property values should be larger, since it is not counterbalanced by increases in the provision of public goods. The analysis of the compliers' characteristics allows us to conclude that our estimate of the capitalization effect is likely to apply to contexts that feature highly inefficient management of public resources.

7 Robustness

7.1 Spillovers across municipalities

In the analysis conducted so far we assume that there are no spillovers across neighboring municipalities: potential homebuyers do not switch out of municipalities with higher property tax rates to nearby municipalities with low tax rates. In presence of such spillovers, the estimates based on the comparison between municipalities with and without elections in 2013 may be

biased. Suppose there are two neighboring municipalities, one with elections and one without elections in 2013. The incumbent local government in the municipality with elections sets lower property tax rates, while the incumbent government of the other municipality does not. If households move from the municipality without elections to the one with elections to exploit the lower tax rates, property values in the municipality without elections decrease. In such a case, our estimate could be partially driven by the difference between the increase in property values in municipalities with elections and the decrease in municipalities without elections, due to spillovers. This would lead to an overestimate of the true positive effect of having elections in 2013 on property prices and transaction volumes; in other words, municipalities without elections would not provide a valid counterfactual for what would be the evolution of property values in municipalities with elections, absent the treatment.

To shed light on this issue, we repeat the analysis described in the previous section excluding all municipalities that are adjacent to those with elections in 2013 and have no elections themselves. Table 8 reports the reduced form (RF) in Panel A and the 2SLS estimates in Panel B obtained using this sub-sample of municipalities for property and rental values and housing market transaction volumes.

Insert Table 8 here

The results do not differ from those obtained on the full sample, indicating that our baseline estimates are not affected by spillovers across neighboring municipalities.

7.2 Differences between municipalities with and without elections in 2013

As highlighted in Section 3, Italian municipalities are heterogeneous in terms of population size and average transaction volumes over total housing stock in 2011, the year that preceded the fiscal reform. While we provided all the above estimates by allowing for population specific time effects, in this subsection we also provide evidence that possible heterogeneous time effects related to transaction volumes do not affect our baseline estimates. To account for potential heterogeneous dynamics of property values along this dimension, we augment our baseline specification with the interactions between dummy variables indicating the deciles of the distribution of transaction volumes across municipalities in 2010 and time dummies.

Insert Table 9 here

The results, reported in Table 9, confirm our baseline results. Furthermore, in this specification, the negative estimated impact of T on transaction volumes is slightly more precise than in the baseline analysis.

7.3 Alternative measures of property tax intensity

In this subsection we provide evidence that our results are robust to different definitions of property tax intensity T. In particular we consider two extreme values of δ in equation (1): 1) $\delta = 0$, a case in which T corresponds to the property tax on primary residences *Imu Prin*; 2) $\delta = 1$, where T corresponds to the change in the tax pressure on residences other than primary houses *Change in Sec*. Finally we use as a measure of the treatment intensity the dummy variable used above to characterize compliers: *T-dummy*.

Insert Table 10 here

The results in Table 10 show a significant negative impact of IMU on property values, in line with our baseline results. In particular, the results in column (1) and column (2) show that the estimated 2SLS coefficients of *Imu Prin* and *Change in Sec* do not differ one from the other. This signals that the two variables are strongly correlated and that omitting one or the other is unwarranted.

The second stage relationship between property values and the variable *T-dummy* is reported in column (3): again the coefficient of interest is negative and significant, in line with our baseline results.

8 Conclusions

In this paper we provide an empirical assessment of the property tax capitalization hypothesis by analyzing the impact of a national property tax reform that occurred in Italy in 2012 on property and rental values and transaction volumes. The cross-sectional variation in municipal property tax rates allows to study the presence of capitalization.

To account for issues related to the endogenous choice of property tax rates by Italian municipalities, we propose an instrumental variable approach. Following Alesina and Paradisi (2017), we show that municipalities with elections in 2013 chose lower property tax rates relative to other municipalities and provide compelling evidence in favor of the exclusion restriction assumption.

The 2SLS results show that a 0.1 percentage point increase in the tax rate on primary residences induced a 4.1% reduction of property values among compliers (i.e. municipalities that modify their choice of property tax rates according to whether or not they have elections in 2013). We characterize such municipalities and show that they feature relatively worse management practices in local public expenditure and/or tax collection and lower levels of social trust. We thus conclude that, in line with the theoretical predictions in the literature, the property tax is fully capitalized into house prices when public spending is highly inefficient.

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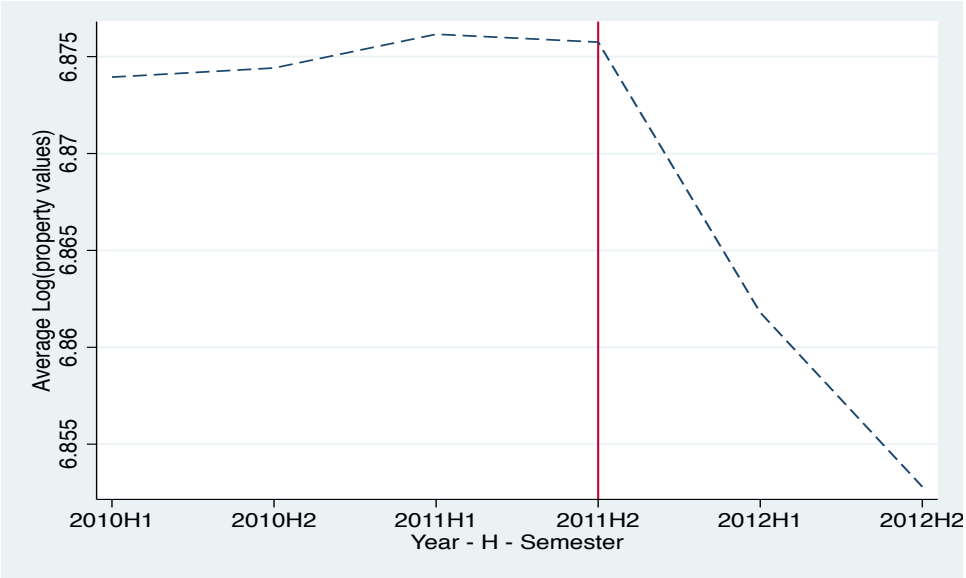
Figure 1
Average property values 2010-2012

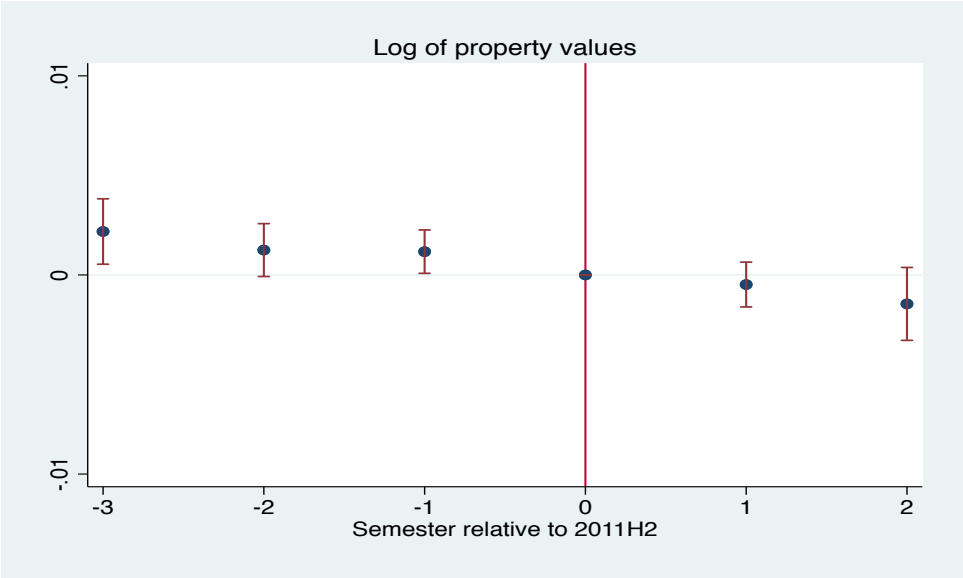


Note. This figure plots the logarithm of property values averaged across municipalities in each semester from 2010 to 2012.

Figure 2
Changes of property values after the reform

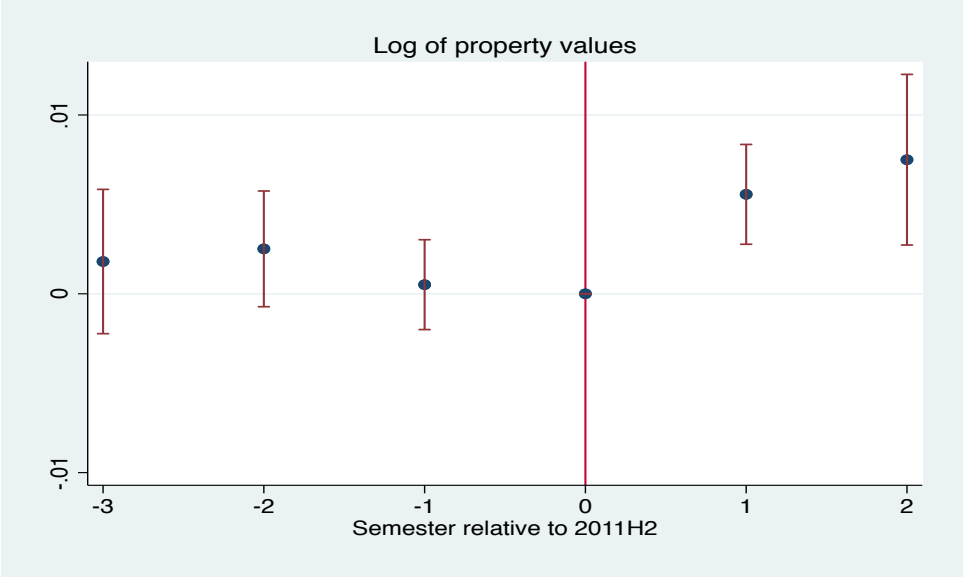
Note. This figure plots the histogram of the change between the average logarithm of property values in the two quarters that followed the introduction of the IMU and the average in the two quarters that preceded it.

Figure 3
Dynamics of property values and property taxes



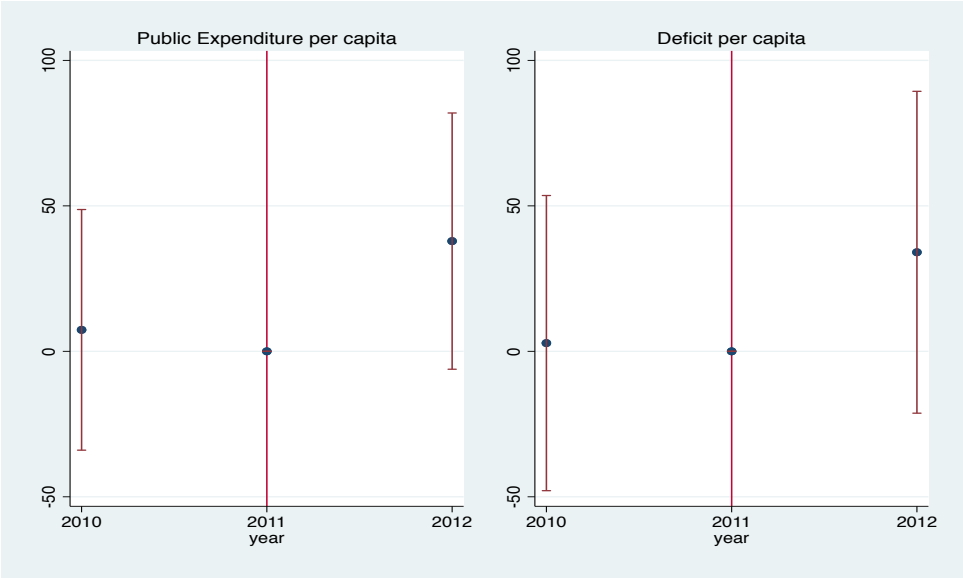
Note. This figure plots the pattern of the γ_τ coefficients from estimating (2) for the log of property values. The capped lines show the 95 percent confidence interval on each coefficient relative to the reference semester (second semester of 2011).

Figure 4
Dynamics of property values and municipal elections in 2013



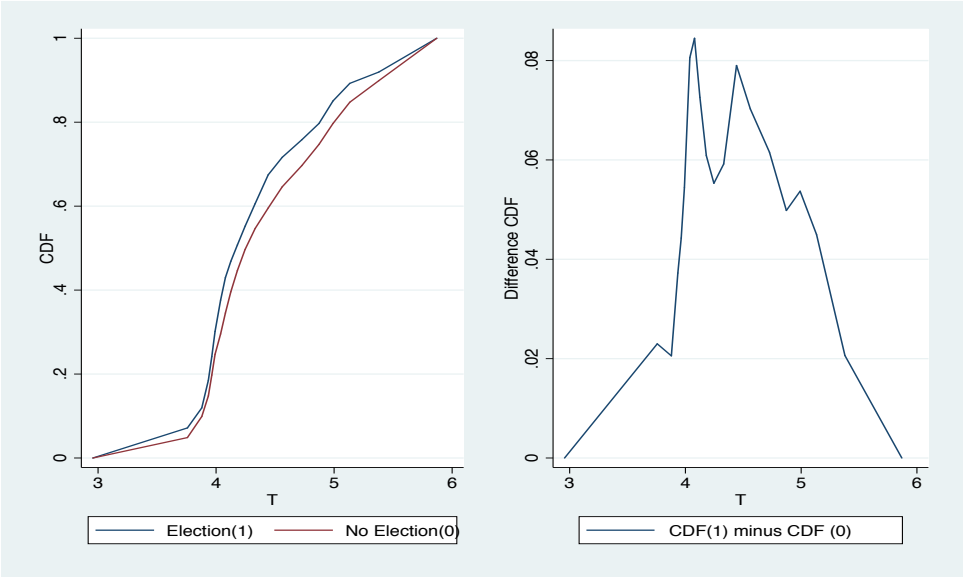
Note. This figure plots the pattern of the γ_τ coefficients from estimating (4) for the log of property values. The capped lines show the 95 percent confidence interval on each coefficient relative to the reference semester (second semester of 2011).

Figure 5
Dynamics of local public spending and 2013 municipal elections



Note. This figure plots the time-varying reduced-form estimate of the impact of elections in 2013 on public expenditure per capita and fiscal deficit per capita (i.e. the β_τ coefficients from estimating equation 5). The capped lines show the 95 percent confidence interval on each coefficient relative to the reference year (2011).

Figure 6
Cumulative Density Functions



Note. The left figure plots the CDF of the variable T for the two groups of municipalities with and without elections in 2013; the right figure plots the difference of the two CDF.

Table 1
Summary Statistics

	Mean	Standard Deviation	Observations
Property and rental values and transaction volumes 2010-2012 (OMI)			
Property value per square meter	1055.83	568.62	36822
Rental value per square meter	3.72	1.87	35140
Log of property value per square meter	6.87	0.40	36822
Log of rental value per square meter	1.22	0.43	35140
Transaction volumes over housing stock (%)	1.42	0.99	17061
Property tax rates in 2012 and 2011 (IFEL)			
Imu Prin 2012	4.26	0.75	6213
Imu Sec 2012	8.59	1.02	6213
Ici Sec 2011	6.28	0.71	6213
Demographic and Housing Characteristics 2011 (Census)			
Resident population	8231.70	48072.23	6213
Houses per household	1.68	1.22	6213
Secondary houses over total houses	0.26	0.16	6213
Municipal Fiscal Budget Data 2010-2012 (AIDA PA)			
Municipal total expenditure per capita	1317.51	1264.52	18396
Municipal fiscal deficit per capita	7.22	361.04	18396

Values of property and rental values per square meter are at semestral frequency, averaged over the period 2010-2012 and are expressed in euros. *Imu Prin*, *Imu Sec* and *Ici Sec* are in permil. Demographic and Housing characteristics are measured in 2011: resident population is the number of residents living in the municipality; houses per household is the share of residential houses relative to the number of the resident households; secondary houses over total houses is the share of rented houses plus empty houses over total. Municipal Fiscal Budget Data are at annual frequency, averaged over the period 2010-2012 and expressed in euros.

Table 2
Prima facie evidence

	(1) Log of property value	(2) Log of rental value	(3) Transaction volumes
T × Post	-0.002**	-0.002	-0.051**
	(0.001)	(0.001)	(0.023)
Observations	36822	35140	16916
Municipality and Time fixed effects	Y	Y	Y

Difference-in-differences estimates using T as the intensity of the treatment. T is measured in permil. Post is a dummy variable which takes value equal to 1 in 2012. Log or property and rental value per square meter are measured at semestral frequency. Transaction volumes are measured at yearly frequency.
Standard errors clustered at municipality level in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 3
First stage regression

	(1) *Imu Prin*	(2) *Imu Sec*	(3) *Change in Sec*	(4) T
		Panel A		
Elections in 2013	-0.156***	-0.097	-0.110*	-0.131***
	(0.045)	(0.062)	(0.057)	(0.041)
Constant	4.273***	8.600***	4.677***	4.380***
	(0.010)	(0.013)	(0.012)	(0.009)
		Panel B: population deciles fixed effects		
Elections in 2013	-0.175***	-0.183***	-0.170***	-0.154***
	(0.045)	(0.058)	(0.055)	(0.041)
Constant	4.120***	8.228***	4.423***	4.258***
	(0.030)	(0.033)	(0.034)	(0.026)
Observations	6213	6213	6213	6213

The table shows OLS estimate for the cross-section of municipalities in our sample. In column (1) the dependent variable is the *Imu Prin* (measured in permil). In column (2) the dependent variable is the *Imu Sec* (measured in permil).In column (3) the dependent variable is *Imu Sec*$_i - \frac{Ici\ Sec_i}{1.6}$ (measured in permil). In column (4) the dependent variable is the treatment defined in equation 1. Election in 2013 is a dummy variable which takes value equal to 1 if the municipality has municipal elections in 2013 and zero otherwise. Regression results in Panel B include population deciles fixed effects.
Standard errors are robust.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 4
Covariate balance

	Election in 2013		No Election in 2013		
	Mean	Observations	Mean	Observations	Difference
Property and rental values and transaction volumes - Average 2011(OMI)					
Property value per square meter	1102.34	335	1060.99	5878	-41.36
Rental value per square meter	3.88	322	3.75	5612	-0.13
Log of property value per square meter	6.88	335	6.88	5878	-0.00
Log of rental value per square meter	1.24	322	1.23	5612	-0.01
Transaction volumes over housing stock (%)	1.44	305	1.53	5429	0.09*
Property tax rates in 2012 (IFEL)					
T	4.25	335	4.38	5878	0.13***
Imu Prin	4.12	335	4.27	5878	0.16***
Change in Sec	4.57	335	4.68	5878	0.11**
Demographic and Housing Characteristics 2011 (Census)					
Resident population	16972.39	335	7733.55	5878	-9238.84***
Houses per household	1.69	335	1.68	5878	-0.01
Secondary houses over total houses	0.26	335	0.26	5878	-0.01
Municipal Fiscal Budget Data - Average 2011 (AIDA PA)					
Municipal total revenues per capita	1305.42	335	1295.13	5845	-10.29
Municipal fiscal deficit per capita	15.36	335	32.89	5845	17.53

Values of property and rental values per square meter are at semestral frequency, averaged in 2011 and are expressed in euros. T, *Imu Prin* and *Change Sec* are in permil. Demographic and Housing characteristics are measured in 2011: resident population is the number of residents living in the municipality; houses per household is the share of residential houses relative to the number of the resident households; secondary houses over total houses is the share of rented houses plus empty houses over total. Municipal Fiscal Budget Data are measured in 2011 and expressed in euros.

Table 5
Exclusion restriction test: electoral cycles in the years 2007-2011

	(1)	(2)
	Log of property value per square meter	
$Election_t^{t+1}$	0.001	0.001
	(0.001)	(0.001)
Observations	68742	68742
Municipality and Time fixed effects	Y	N
Municipality and Population deciles · Time fixed effects	N	Y

Sample period 2006-2010. $Election_t^{t+1}$ is a dummy variable that indicates if a municipality in the period 2007-2011 at year t has municipal elections in year t+1.
Standard errors clustered at municipality level in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 6
Instrumental variable results

	(1)	(2)	(3)
		Panel A	
	Log of property value	Log of rental value	Transaction volumes
Election 2013 × Post	0.006***	-0.002	0.032
	(0.002)	(0.004)	(0.030)
		Panel B	
	Log of property value	Log of rental value	Transaction volumes
T × Post	-0.041**	0.014	-0.209
	(0.017)	(0.024)	(0.198)
Observations	36822	35140	16916
Municipality and Pop. deciles · Time fixed effects	Y	Y	Y

Panel A reports the reduced form impact of having elections in 2013 respectively on the log of property value per square meter, the log of rental value per square meter and transaction volumes over total housing stock. Panel B reports the two stage least square (2SLS) estimates. Election2013 is a dummy variable which takes value equal to 1 if the municipality has municipal elections in 2013 and zero otherwise. T is measured in permil. Post is a dummy variable which takes value equal to 1 in 2012 and 0 otherwise.
Standard errors clustered at municipality level in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 7
Charactererizing compliers

(1)	(2)	(3)
Municipal Characteristic (X)	First Stage conditional on (X) above median	Relative likelihood
Inefficient Public Spending above median	-0.123	1.28
Inefficient Tax Collection above median	-0.121	1.26
Justify Tax Cheating above median	-0.124	1.29
Blood Donation in 1995 below median	-0.104	1.08
Number of newspapers in 2001 below median	-0.121	1.26

Column (1) lists the municipal level characteristics (X) used to characterize the compliers. Column (2) reports the result of a regression of *T-dummy* on the dummy indicating if the municipality has Elections in 2013 on the subgroup of municipalities with characteristic X. Column (3) presents the relative likelihood that compliers have the characteristic indicated in the corresponding row in column (1).

Table 8
Robustness I: excluding municipalities adjacent to municipalities with elections in 2013

	(1)	(2)	(3)
		Panel A	
	Log of property value	Log of rental value	Transaction volumes
Election 2013 × Post	0.007***	-0.003	0.046
	(0.002)	(0.004)	(0.030)
		Panel B	
	Log of property value	Log of rental value	Transaction volumes
T × Post	-0.046***	0.015	-0.308
	(0.018)	(0.024)	(0.213)
Observations	25542	24251	11553
Municipality and Pop. deciles · Time fixed effects	Y	Y	Y

Panel A reports the reduced form impact of having elections in 2013 respectively on the log of property value per square meter, the log of rental value per square meter and transaction volumes over total housing stock. Panel B reports the two stage least square (2SLS) estimates. Election2013 is a dummy variable which takes value equal to 1 if the municipality has municipal elections in 2013 and zero otherwise. T is measured in permil. Post is a dummy variable which takes value equal to 1 in 2012 and 0 otherwise.
Standard errors clustered at municipality level in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 9
Robustness II: including transaction volumes per time fixed effects in 2010

	(1)	(2)	(3)
		Panel A	
	Log of property value	Log of rental value	Transaction volumes
Election 2013 × Post	0.006***	0.002	0.027
	(0.002)	(0.003)	(0.027)
		Panel B	
	Log of property value	Log of rental value	Transaction volumes
T × Post	-0.061**	-0.022	-0.267
	(0.028)	(0.026)	(0.281)
Observations	22353	21378	11182
Municipality and Pop. deciles · Time fixed effects	Y	Y	Y
Vol. deciles in 2010 · Time fixed effects	Y	Y	Y

Panel A reports the reduced form impact of having elections in 2013 respectively on the log of property value per square meter, the log of rental value per square meter and transaction volumes over total housing stock. Panel B reports the two stage least square (2SLS) estimates. Election 2013 is a dummy variable which takes value equal to 1 if the municipality has municipal elections in 2013 and zero otherwise. T is measured in permil. Post is a dummy variable which takes value equal to 1 in 2012 and 0 otherwise.
Standard errors clustered at municipality level in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table 10
Robustness III: alternative measures of the property tax rate

	(1)	(2)	(3)
	Log of property value		
Imu Prin × Post	-0.036**		
	(0.015)		
Change in Sec × Post		-0.036**	
		(0.016)	
T-Dummy			-0.074**
			(0.036)
Observations	36822	36822	36822
Municipality and Pop. deciles · Time fixed effects	Y	Y	Y

Panel A reports the reduced form impact of having elections in 2013 respectively on the log of property value per square meter, the log of rental value per square meter and transaction volumes over total housing stock. Panel B reports the two stage least square (2SLS) estimates. Election2013 is a dummy variable which takes value equal to 1 if the municipality has municipal elections in 2013 and zero otherwise. *Imu Prin*, *Change in Sec* are measured in permil. *T-Dummy* is a dummy variable which takes value equal to 1 if T is equal or greater than 4 and 0 otherwise. Post is a dummy variable which takes value equal to 1 in 2012 and 0 otherwise.
Standard errors clustered at municipality level in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.