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Property Tax and Property Values: Evidence from the 2012 Italian Tax Reform

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Tommaso Oliviero* and Annalisa Scognamiglio**

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. 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: D72, G12, H20, R32.

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Table of contents

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 local 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 occur-

[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.

rence 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 used to compensate 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, 2018).

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 municipal elections that take place before 2013, we show that property values dynamics are not related to the electoral cycle. 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 in 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 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.

We also analyze the effect of IMU on rental values so as to evaluate whether the overall effect of property taxes on property values reflects the capitalization of future tax liabilities or also the indirect effect potentially arising from changes in rental values. If homeowners are able to transfer the burden of property taxes at least in part onto renters, the negative direct effect of higher tax liabilities on property values is partially offset by higher rental values, thus resulting in a lower overall effect of property taxes on property values. If rental values do not react to property tax increases, the overall change in property values is fully driven by the capitalization of tax liabilities.[4] We find no impact of the introduction of IMU on rental values. This indicates that the income flow from rents was unaffected by the tax reform, so that the entire estimated impact of IMU on property values is due to the capitalization of future tax liabilities. Finally, we find that property taxes had a negative, though imprecisely estimated, effect on the share of transacted houses over the total stock of houses. These results suggest that the effect of IMU on property values is driven by a drop in the local demand in presence of a relatively inelastic supply.

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

[4]The theoretical literature on the effect of property taxes on rental values does not provide a definitive answer, as its predictions hinge fundamentally on assumptions about the elasticities of rental housing supply and demand and on the time horizon under analysis. Furthermore there is no clear-cut empirical evidence on this issue (see England (2016) for a review).

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.[5] 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 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 robustness tests and additional insights related to the political economy of the property tax. Section 8 concludes.

2 Institutional setting

On March 14, 2011, the Italian government approved the decree law n. 23 regarding fiscal federalism. The law stated that, starting in 2011, all Italian municipalities, except for those in regions with special legislative authority,[6] would be subject to a new fiscal autonomy regime. Specifically, the law prescribed a substantial reduction of fiscal transfers from the central gov-

[5] 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).*

[6] 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.

ernment to each municipality, counterbalanced by 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 decree law n. 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 decree law n. 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 (decree law n. 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 decree law n. 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;[7] 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 (see Figure 1 for a timeline of events). Furthermore, the law established a 200 euro deduction on the tax paid on the main dwelling, plus an additional 50 euro

[7]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.

per household member below 26 (up to a maximum of 400 euro).[8]

The law confirmed the significant reduction in fiscal transfers from the central government to the municipalities contained in the decree law n. 23; it also established that municipalities had to transfer to the central government 50% of the amount computed by applying the statutory tax rate of 0.76% to the total tax base, with the exception of primary residences and irrespective of the chosen property tax rates. Based on this law provision, the increase in tax pressure did not fully translate into increased revenues accruing to the municipalities. 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. 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 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;[9] 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):[10] only 7% of the households

[8]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.

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

[10]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?"

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.[11]

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, we focus on residential properties whose maintenance state is classified as normal.[12] 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 (IFEL). We add data on: municipal characteristics drawn from the 2011 Population and Housing Census conducted by the Italian national institute for statistics (ISTAT); municipal elections provided by the Ministry of the Interior; and municipal balance

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

[12] 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.

sheet 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.[13] 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 1,055 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%).

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 8,200. 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. We also report the share of residential buildings that have been built after 1990 as a proxy for buildings' age; notice that buildings built before 1990 have cadastral values based on property market rental values as of 1988-1989 (Eyraud, 2014) and, as a consequence, their cadastral values are the least up-to-date.

Municipal public expenditure per capita is about 1,317 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 2 plots the logarithm

[13] Municipalities that belong to the autonomous regions of Trentino-Alto Adige, Friuli-Venezia Giulia, Valle d'Aosta, Sicily and Sardinia are excluded because they were originally considered into a separate fiscal regime by the decree law n. 23.

of property values averaged across municipalities in our sample from 2010 to 2012. Between 2011 and 2012 average property values decreased by about 3%. Figure A.1 shows that the time-series of average log rental values and transaction volumes over the same time window follow a similar pattern.

Insert Figure 2 here

Figure 3 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 3 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 histograms of changes in rental values and transaction volumes, reported respectively in the left panel and the right panel of Figure A.2, also show considerable variation. 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 section, 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 on 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 $(\textit{Imu Sec}_i - \frac{\textit{Ici Sec}_i}{1.6})$ and δ_i is the share of secondary houses measured as described in Table 1. The measure 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 larger share of primary 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,[14] 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 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.

[14] A bivariate regression 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.

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;[15] T_i is our measure of intensity of treatment defined in equation (1); $Post_t$ 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 municipality fixed effects, α_i, to control for any unobserved time-invariant difference across municipalities, and 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 property values 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 suggests 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. Indeed property tax rates were the result of

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

municipalities' choices, which might 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 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 4 shows the estimated γ_τ coefficients (together with 95% confidence intervals) from equation (3) normalized with respect to the second semester of 2011; 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. Figure A.3 shows similar trends for rental values and transaction volumes.

Insert Figure 4 here

Even absent pre-trends 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, the choice of the tax rates by

each municipality may depend upon the elasticity of local housing demand to property tax. For example, if municipalities with low elasticity systematically chose higher tax rates while those with high elasticity chose low tax rates, the correlation between property tax rates and changes in property values would not provide a valid estimate of the property tax capitalization effect. 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:

$$t_i = \alpha + \theta Election2013_i + \epsilon_i, \tag{4}$$

where t_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.[16]

Panel A in Table 3 shows that municipalities with elections in 2013 set *Imu Prin* about 1.6 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 1.3 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.[17]

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 Table 3 indicate that $Election2013_i$ is a relevant instrument 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, there is no evidence of a relationship between the

[16]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. In the Appendix, Table A.1, we show that the analysis that follows is robust to the exclusion of municipalities that experience early terminations that led to anticipated elections in 2013 from the sample.

[17]The rationale for this test is that, as we will discuss in the following subsection, municipalities with and without elections in 2013 show a significant difference in population and we will account for such difference in the subsequent analysis by including population deciles per time fixed effects in all specifications.

dynamics of property values and the electoral cycle; (iv) having or not municipal elections in 2013 is unrelated to differences in trends of local public expenditure and fiscal deficit.

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. 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.[18]

We find 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 Section 7 we provide evidence that differences across municipalities in the level of transaction volumes of residential properties do not drive our results. Municipalities with elections in 2013 do not differ from other municipalities in terms of buildings' age and the share of non-residential buildings. Finally, we find that municipalities with elections in 2013 show larger population density as measured by the ratio

[18] As an alternative strategy, in order to account for differences in municipality size, we replicated our analysis by excluding the 84 provincial capitals from the sample; estimation results, reported in the Appendix, Table A.2, are in line with the baseline results.

of total resident population over the municipality area (in square kilometres); although this statistical difference vanishes after controlling for resident population we check the robustness of our subsequent empirical results by including population density deciles dummies interacted with time dummies. The corresponding estimates are reported in the Appendix, Table A.3.

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 5 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.[19] Figure A.5 shows that the dynamics of rental values (upper panel) and transaction volumes (bottom panel) are unrelated to the occurrence of municipal elections in 2013.

Insert Figure 5 here

[19] We perform a random permutation test to verify whether randomly generated instruments produce reduced form and first stage estimates that are close to our baseline estimates. As we show in Figure A.4, our reduced form estimate lies above the 99th percentile of the distribution generated by the 'placebo' reduced form estimates and our first stage estimate lies below the 1st percentile of the distribution generated by the 'placebo' first stage estimates. This indicates that our estimated impact of having elections in 2013 on property values and property tax pressure is not confounded by chance variation across Italian municipalities.

5.3 Electoral cycle

To test whether municipal elections have a systematic impact on the dynamics of property values, we estimate the following model:

$$y_{it} = \alpha_i + \lambda_{s,t} + \Theta Z_{i,t} + \epsilon_{it}, \tag{6}$$

where y_{it} is the logarithm of property values per square meter for municipality i at time t, and $Z_{i,t}$ is a set of four dummies defined as follows:

$$Z_{i,t}= \begin{cases} z_{i,t}^{\tau-3} = 1 & \text{three years before election} \\ z_{i,t}^{\tau-2} = 1 & \text{two years before election} \\ z_{i,t}^{\tau-1} = 1 & \text{one year before election} \\ z_{i,t}^{\tau+1} = 1 & \text{one year after election} \end{cases}$$

and zero otherwise; the indicator for the year of the election is not included in the specification and, as a consequence, the regression coefficients attached to the dummies must be interpreted as the change in the property values relative to the election year. We estimate the model in equation (6) using property values in the period 2008-2011 and limiting the sample to municipalities that have elections in 2010-2012.[20] We focus on this sub-sample because Repetto (2018) shows that in Italian municipalities the correlation between local public expenditure and the electoral cycle drastically reduced following a reform that occurred in 2008 that required disclosure of balance sheets before elections, thus making voters more informed about spending manipulation. Given that our analysis is based on municipal elections in 2013, in building our test of the relationship between property values and the electoral cycle, we focus only on the post-reform period and on municipalities whose property values are not influenced by public expenditure levels which relate to pre-reform choices (i.e. we focus on municipalities that have elections at least two years after the reform). Estimation 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 Θ across specifications are not significantly different from zero:

[20] We exclude from the analyzed sample municipalities with early terminations.

hence, we conclude that before the introduction of IMU, there is no evidence of a direct impact of municipal elections on the dynamics of property values.

Insert Table 5 here

5.4 Local public expenditure

A potential concern is that the 2013 municipal elections may have induced increases in local public expenditure relative to fiscal revenues 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:

$$d_{it} = \alpha_i + \lambda_{s,t} + \sum_{\tau=2010}^{2012} \gamma_\tau Election2013_i \times \mathbf{1}(t = \tau) + \epsilon_{it}, \tag{7}$$

where d_{it} is either the total municipal public expenditure or the fiscal deficit per capita at municipal level and γ_τ are time-varying coefficients for the relationship between the outcome and elections in 2013. We include population deciles per time fixed effects ($\lambda_{s,t}$) in the specification in order to be consistent with the baseline specification. The estimates of equation (7), reported in Figure 6, reveal that there is no correlation between elections in 2013 and changes in municipal expenditure and fiscal deficit 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. These estimates are however not statistically different from zero and small.[21] This result is in line with the evidence by Repetto (2018) who finds that the political budget cycle for Italian municipalities became significantly weaker after the reform that occurred in 2008.

Insert Figure 6 here

We argue that this evidence hardly affects our estimates: if temporary changes in public expenditure over fiscal revenues in the years preceding municipal elections would have been

[21] Public expenditure and fiscal deficit per capita increase in 2012 by about 31 and 21 euros respectively in municipalities with elections in 2013. These amounts are about 2% and 6% of the standard deviations of public expenditure and fiscal deficit per capita in Table 1.

capitalized in property values, the estimated coefficient that refers to the year before election in equation (6) should have been positive and significant.

6 IV estimates

In this section we show the estimates of the effect of property taxes on property values obtained by implementing a 2SLS procedure, where the first stage equation is:

$$t_{it} = \alpha_i + \lambda_{s,t} + \theta Election2013_i \times Post_t + \eta_{it}, \tag{8}$$

where t_{it} is $T_i \times Post_t$. Consistently with the estimates in Table 3, the point estimate of θ is -0.158. The F-statistic for the excluded instrument is equal to 15.25. In the second stage, the fitted values from equation (8) are then used as main regressor in the following equation:

$$y_{it} = \alpha_i + \lambda_{s,t} + \beta \hat{t}_{it} + \epsilon_{it}, \tag{9}$$

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.

Insert Table 6 here

We find a negative and 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.[22]

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

[22]In the Appendix, Table A.4, we replicate our analysis by including time fixed effects instead of population deciles per time fixed effects and show that the results are very similar to the baseline specification.

discount rate of 2.4%.[23] However, determining the degree of capitalization requires assumptions regarding the discount rate, the ratio of market to taxable property value and households' expectations on the persistence of property tax rates. Indeed if the variation in property tax rates induced by municipal elections was not expected to be permanent, or if the households' discount rate was expected to decrease, or if the tax base was lower than the market value of residential properties, our evidence would be consistent with over-capitalization of the IMU.[24]

As for rental values, the estimated impact of T, shown in Table 6 column (2), is 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 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. In the next section, in order to shed light on the determinants of property tax capitalization in our context, we provide a characterization of the compliers along several dimensions, with a focus on variables that measure the quality of public resources management.

6.1 Characterizing compliers

In this section we verify whether municipalities for which the choice of the property tax rates in 2012 was more sensitive to the electoral cycle are those where public resources are managed less efficiently. Our hypothesis is that if voters expect increases in property taxes not to be compensated by the provision of local public goods, they are more averse to them and politicians

[23] 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).

[24] Eyraud (2014) points out that in Italy the national average ratio of market to taxable value is 2.2 for primary residences and 2.4 for other dwellings.

have stronger incentives to manipulate their choice based on electoral concerns.

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 compute the difference between them for each level of T.

Insert Figure 7 here

Figure 7 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 provide a characterization of 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 unconditional first stage (equation 4). 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 also use data on the inefficiency of specific components of local public spending that are more directly related to the degree of capitalization of property taxes: education and environment. Notice that all inefficiency measures used in the current analysis refer to municipal budget variables measured in 2010-2011.

To test whether the level of public services provided by the compliant municipalities is lower than the one provided by the others, we collect data on the recycling rate of municipal waste, the use of public transportation and the percentage of public green areas.[25]

We further 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 aversion of voters to property tax as it is hard to evade.

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 proxy for the level of trust between voters and local institutions.

Table 7 summarizes the results of the compliers' characterization. Following Angrist and Pischke (2008), for each of the variables listed in Table 7, we compute the relative likelihood that compliers have that characteristic as the ratio between the first stage for municipalities with that characteristic and the unconditional first stage. The effect of $Election2013$ onto the variable *T-dummy* is estimated to be -0.096. Hence all estimates in column (1) of Table 7 are divided by -0.096 to obtain the estimates in column (2), namely the relative likelihood that compliers have the indicated characteristic. The table shows that compliant municipalities are characterized by inefficient total public expenditure, inefficient public expenditure in education and environment, low levels of public services (recycling rate of municipal waste, use of public transportation and percentage of public green areas), ineffective tax collection and lower levels of political accountability, proxied by social capital.

Insert Table 7 here

[25]The recycling rate of municipal waste is measured in 2011 for each Italian municipality (source: ISPRA); the use of public transportation, available only for provincial capitals, is measured as the average of the per capita number of passengers that use public transports in a given year over the period 2000-2011 (source: ISTAT); the percentage of public green areas, available only for provincial capitals, is measured in 2011 (source: ISTAT). Given that the last two variables are available only for provincial capitals, we impute the value of the capital city to all municipalities belonging to that province.

These results are 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 effective 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.

6.2 Heterogeneous capitalization of the property tax

The literature on property tax capitalization emphasizes that the degree of capitalization is larger in presence of inelastic supply of houses (Hilber, 2017; Sirmans *et al.*, 2008), which ultimately depends on the availability of developable land. The level of developable land in a given municipality can be proxied by geographical and regulatory constraints or municipal demographic characteristics, such as population density. In this section we provide an assessment of this hypothesis in our setting by testing for the differential impact of the introduction of IMU depending on the level of population density of Italian municipalities measured by the population per square kilometer in 2011.

We divide our sample into two sub-samples: municipalities with a level of population density in 2011 below the overall sample median (relatively larger share of developable land) and municipalities with a level of population density in 2011 above the sample median (relatively smaller share of developable land). For each subsample, we replicate our baseline 2SLS strategy; in Table 8, columns (1) and (2), we report the reduced form impact of having elections in 2013 on the change in log of property values per square meter (Panel A), the first stage coefficients obtained by estimating equation (8) (Panel B), and the 2SLS estimates (Panel C).

Insert Table 8 here

In line with the existing results in the literature, we find that the reduced form and 2SLS estimates are significantly larger for the sub-sample of municipalities with larger levels of population density; the first stage estimate is also slightly smaller than the baseline estimate, showing that the political economy incentive of local politicians to set lower property taxes is stronger in municipalities where the capitalization effect is supposed to be larger.

Furthermore, we also expect the capitalization effect of statutory tax rates to be larger in municipalities where the cadastral values are closer to the market values; unfortunately, we do not observe the cadastral values or the average ratio between cadastral and market values for each Italian municipality. However, as highlighted by Eyraud (2014), cadastral values are based on property market rental values as of 1988-1989; therefore, residential buildings built after 1990 could have cadastral values that are closer to market values.

We hypothesise that municipalities with a relatively larger share of newly built houses, as measured in 2011, show a larger degree of capitalization of property tax rates. In line with the above strategy, we divide our initial sample in two sub-samples: municipalities with a share of residential buildings built after 1990 below the overall sample median (about 12%), and municipalities with a share of residential buildings built after 1990 above the overall sample median. In Table 8, columns (3) and (4), we report, for each sub-sample, the reduced form impact of having elections in 2013 on the change in log of property values per square meter (Panel A), the first stage coefficients (Panel B), and the 2SLS estimates (Panel C). We only detect a significant 2SLS estimate for the sub-sample of municipalities that are characterised by a larger share of residential buildings built after 1990, whose cadastral assessments are presumably closer to market values.

7 Robustness and additional results

7.1 Excluding adjacent municipalities

The analysis conducted so far does not account for the possibility that potential homebuyers move to municipalities with elections in 2013 from neighbouring municipalities because of relatively lower IMU tax rates. In presence of such spillovers, the estimates based on the

comparison between municipalities with and without elections in 2013 may be biased: consider two neighbouring municipalities, one with elections and one without elections in 2013; suppose that the incumbent local government in the municipality with elections sets property tax rates lower than the neighbouring municipality; 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. This would lead to a violation of the stable unit treatment variable assumption (SUTVA) and an overestimate of the true positive effect of having elections in 2013 on property prices; 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 9 reports the reduced form in Panel A and the 2SLS estimates in Panel B obtained using this sub-sample of municipalities.

Insert Table 9 here

The results do not differ from those obtained on the full sample, indicating that our baseline estimates are not affected by the mobility of homebuyers across neighbouring municipalities. Another potential source of violation of the SUTVA in our setting is the strategic adjustment of tax rates across neighbouring municipalities (Brueckner and Saavedra, 2001; Bocci *et al.*, 2019). If tax rates are strategic complements across neighbouring municipalities, municipalities that are adjacent to those with elections in 2013 may adjust downward their own choice of the tax rate in response to the low tax rates set by municipalities with elections in 2013. Such strategic interaction may also contribute to the result shown in Table 9, as it may offset the negative effect of mobility across neighboring municipalities. To test whether such strategic interaction occurs in our setting, using a bivariate regression, we estimate the average difference in T between municipalities adjacent to municipalities with elections in 2013 and the other municipalities in our sample. We do not detect any significant difference, confirming the reliability

of our baseline estimate.[26]

7.2 Differences between municipalities with and without elections in 2013

As highlighted in Section 3, Italian municipalities with elections in 2013 differ from other municipalities in terms of population size and average transaction volumes over total housing stock in 2011. 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 10 here

The results, reported in Table 10, confirm our baseline results.

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 11 here

Columns (1), (3) and (5) in Table 11 report results from specifications that include municipality and population deciles per time fixed effects and columns (2), (4) and (6) also include transaction volume deciles per time fixed effects. They show a significant negative impact of IMU on property values, in line with our baseline results. In particular, the results in columns (1) and

[26]The estimated coefficient is -0.010 with standard error 0.021.

(2) and columns (3) and (4) show that the estimated 2SLS coefficients of *Imu Prin* and *Change in Sec* are significantly different from zero; the estimated 2SLS coefficients of *Imu Prin* and *Change in Sec* are extremely similar in line with the evidence that both variables show a similar first stage (Panel B, Table 3). The second stage relationship between property values and the variable *T-dummy* is reported in columns (5) and (6): again the coefficient of interest is negative and significant, in line with our baseline results.

7.4 Insights from the political economy of the property tax

Our instrumental variable approach is based on the idea that incumbent local governments with elections in 2013 had political economy incentives not to increase the property tax rates above the statutory level dictated by the central government. This argument is possibly stronger in municipalities where the incumbent mayor (elected in 2008) re-ran for municipal elections in 2013. By using the data provided by the Italian Ministry of the Interior we identify the 153 municipalities (out of 335 with elections in 2013) where the incumbent mayor re-run for office in 2013. We construct a dummy variable that identifies the municipalities with elections in 2013 where the mayor re-ran for office ($Re-run\,election\,2013$), interact it with the $Post$ dummy, and use this interacted variable as a second instrument in our baseline specification. The results from the reduced form, first stage and 2SLS are in column (1) of Table A.5, respectively in Panel A, B and C. As the estimates show, the two instruments have a positive reduced form impact on the log of property values; the first stage coefficients are negative for both instruments, but larger and more significant for the newly added instrument, in line with the political economy argument. The 2SLS is similar in magnitude and more precisely estimated in this specification.

Along a similar line of thoughts, the political economy argument is possibly stronger in municipalities where the election is predicted to be close. Absent a direct measure of the prediction of close-race in 2013 elections, following the strategy used by Bordignon *et al.* (2003), we define a proxy for close electoral competition as a dummy that equals one if the mayor got more than 1/3 of the total votes at the first election round in 2008 ($Close\,election\,2008$). We then estimate augmented specifications for both the first stage and the reduced form that include

the main effect of having elections in 2013 and the interaction between elections in 2013 and the indicator for close elections. The estimates are reported in Table A.5, column (2): Panel A reports the reduced form estimates and shows that the coefficient of the interaction term is positive and significant; Panel B reports the first stage estimates and shows that the coefficient of the interaction term is negative but imprecisely estimated. Finally, the 2SLS estimate (Panel C) is in line with our baseline result.

Additionally, we test whether yardstick competition among municipalities affects the relationship between property tax pressure and $Election2013$, by making it stronger when neighbours' prior secondary rates are higher (Besley and Case, 1995; Bordignon *et al.*, 2003; Padovano and Petrarca, 2014). To this purpose we construct for each municipality a variable that is equal to the average property tax rates on secondary houses in 2011 ($Ici\,Sec$) in neighbouring municipalities and label it $Yardstick\,Competition$. We add to our baseline specification the interaction term between $Election2013 \times Post$ and this new variable. We also augment the model with an additional regressor that is equal to $Yardstick\,Competition \times Post$. The results in column (3) of Table A.5 show that neither the reduced form (Panel A) nor the first stage (Panel B) significantly depend on the neighbours' prior secondary property tax rates.

Finally, in line with the argument by Füss and Lerbs (2017), we test for the possibility of stronger reduced form and first stage impact of having municipal elections in 2013 depending on the local homeownership rate. We construct a dummy variable that is equal to 1 if the municipality has, in 2011, a share of primary residences (defined as the complement of the variable $Secondary\,houses\,over\,total\,houses$ in Table 1) above the median value and zero otherwise. We introduce a new instrumental variable to our baseline specification that is equal to the interaction term between $Election2013 \times Post$ and the newly constructed dummy variable. We also augment the model with an additional regressor that is equal to $Above - Median\,Primary\,houses \times Post$. The results in column (4) of Table A.5 show that the reduced form (Panel A) and the first stage (Panel B) do not significantly depend on the level of the local homeownership rate proxied by the share of primary houses.

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 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 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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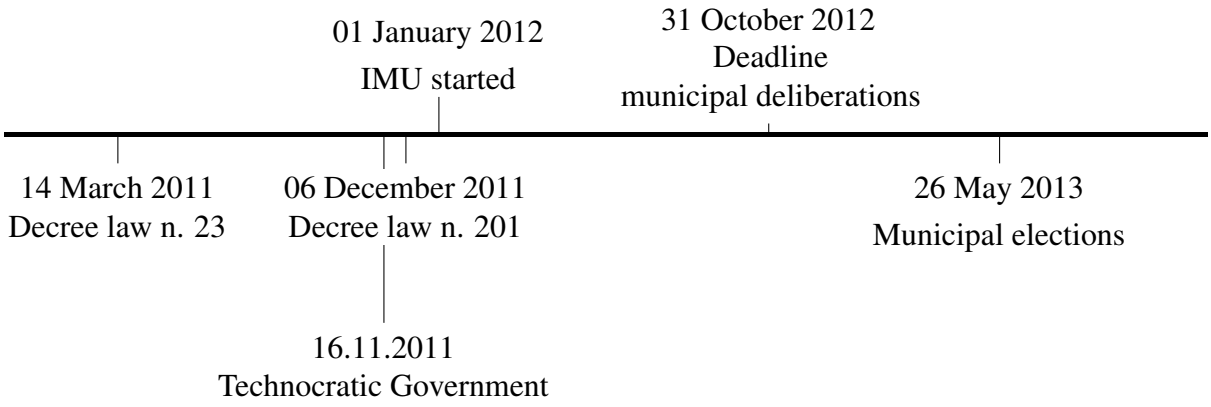
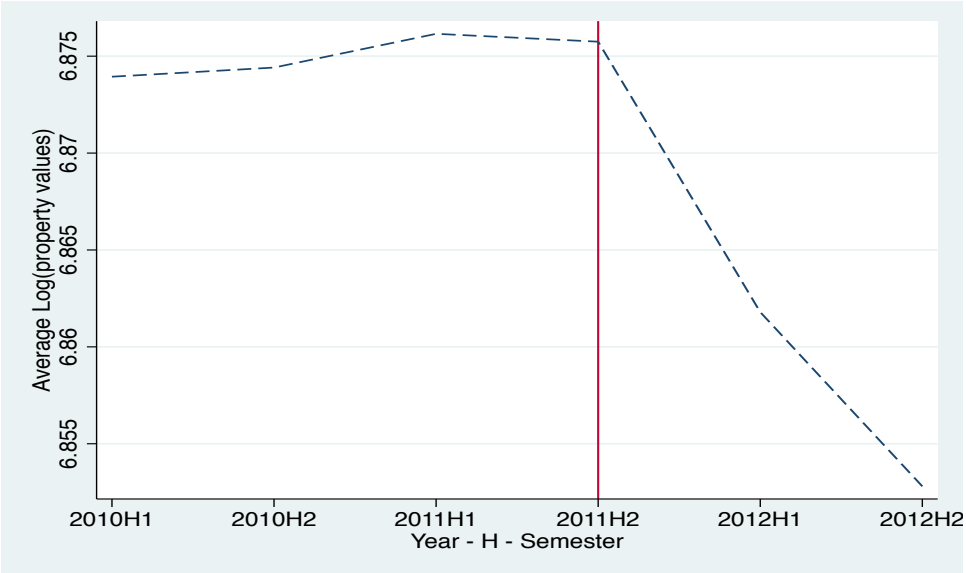
Figure 1
Timeline of events



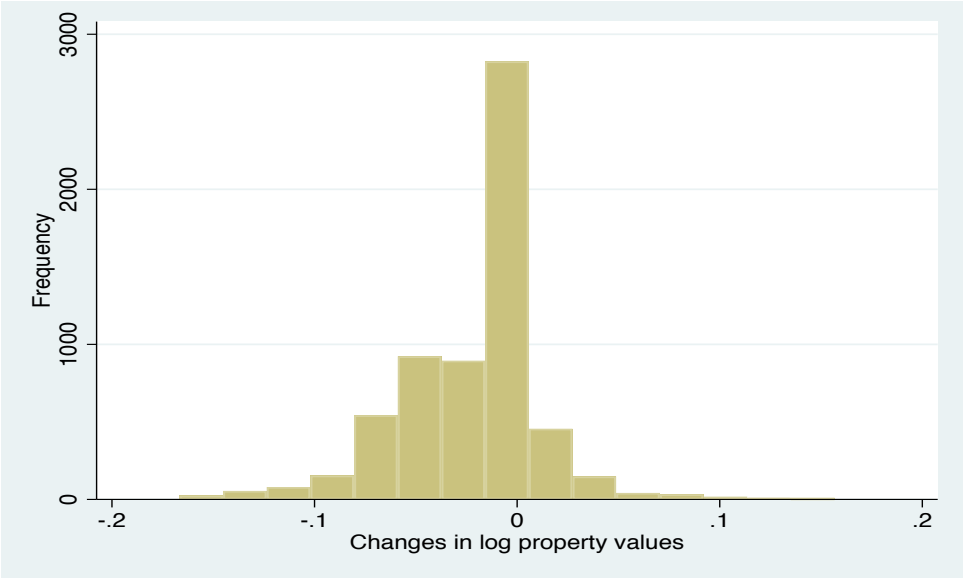
Note. In March 2011 the decree law n. 23 established that a new property tax regime on secondary houses would apply starting from 2014. The sovereign debt crisis hit Italy in mid-2011 and in November 2011 a technocratic government took office. In December 2011 the decree law n. 201 introduced the IMU for primary and secondary houses starting from 2012. Municipal deliberations on property tax rates had to take place by October 2012. 2013 municipal elections took place in May.

Figure 2
Average property values 2010-2012



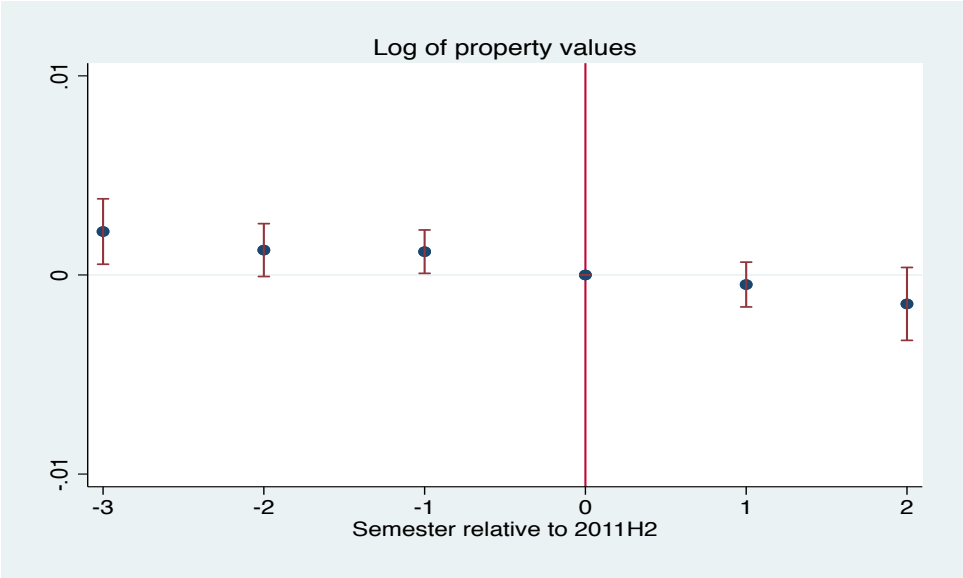
Note. This figure plots the logarithm of property values averaged across municipalities in each semester from 2010 to 2012.

Figure 3
Changes of property values after the reform



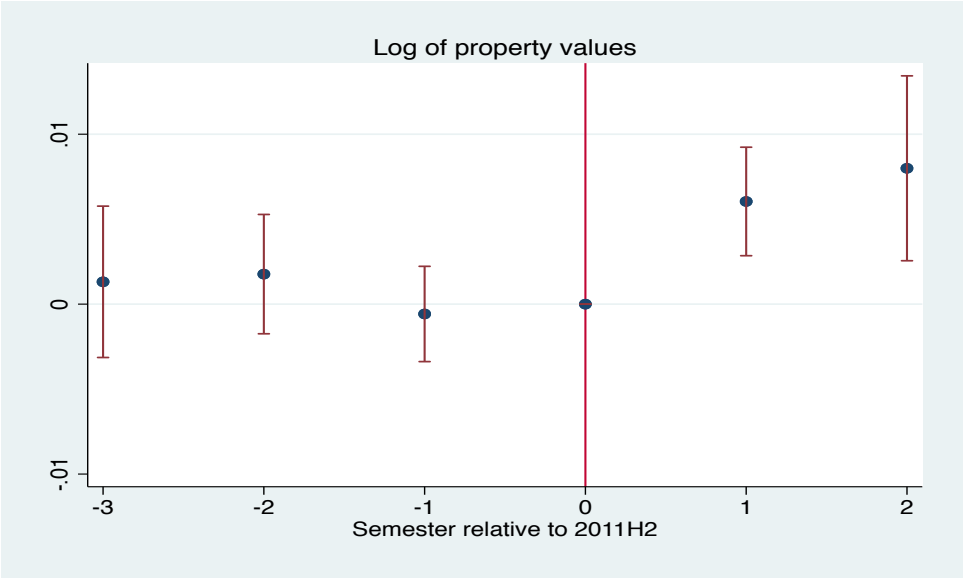
Note. This figure plots the histogram of the difference between the average logarithm of property values in 2012 and the average logarithm of property values in 2011.

Figure 4
Dynamics of property values and property taxes



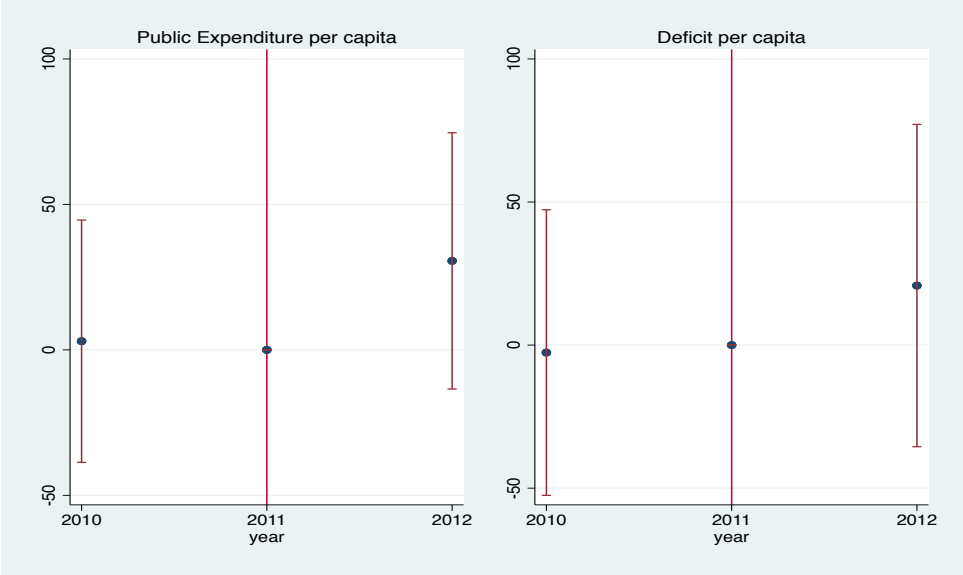
Note. This figure plots the pattern of the γ_τ coefficients from estimating equation (3) for the log of property values. The capped lines show the 95 percent confidence interval on each coefficient relative to the reference semester (second semester of 2011).

Figure 5
Dynamics of property values and municipal elections in 2013



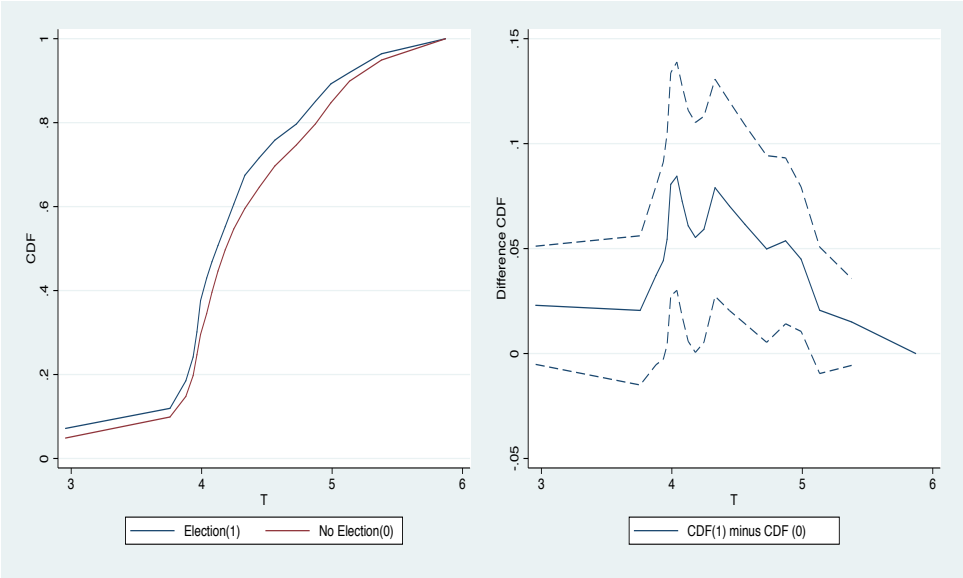
Note. The figure plots the pattern of the γ_τ coefficients from estimating equation (5) for the log of property values. The capped lines show the 95 percent confidence interval on each coefficient relative to the reference semester (second semester of 2011).

Figure 6
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 γ_τ coefficients from estimating equation 7). The capped lines show the 95 percent confidence interval on each coefficient relative to the reference year (2011).

Figure 7
Cumulative Density Functions



Note. The left panel plots the CDF of the variable T for the two groups of municipalities with and without elections in 2013. The right panel plots the difference of the two CDFs; dashed lines are 95 percent point-wise confidence bands calculated using the conventional formula for a difference in proportions.

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
Share of residential buildings built after 1990	0.13	0.09	6213
Share of non residential buildings	0.09	0.06	6213
Population per Km2	313.73	658.86	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; share of residential buildings built after 1990 is the ratio between the number of residential building built after 1990 and the total number of residential buildings; share of non residential buildings is the ratio of the number of non-residential buildings and the total number of buildings; population per Km2 is the ratio of total resident population over the municipality area measured in square kilometres. Municipal Fiscal Budget Data are at annual frequency, averaged over the period 2010-2012 and expressed in euros.

Table 2
Prima facie evidence

	(1)	(2)	(3)
	Log of property value	Log of rental value	Transaction volumes
T × Post	-0.0021**	-0.0016	-0.0507**
	(0.0009)	(0.0014)	(0.0226)
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 of 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
The impact of Election 2013 on property tax rates in 2012

	(1)	(2)	(3)	(4)
		Panel A: without controls		
	Imu Prin	*Imu Sec*	*Change in Sec*	T
Election 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: with population deciles fixed effects		
	Imu Prin	*Imu Sec*	*Change in Sec*	T
Election 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 variable 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.
Robust standard errors in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

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
Share of residential buildings built after 1990	0.13	335	0.13	5878	-0.00
Share of non-residential buildings	0.10	335	0.09	5878	-0.01
Population per Km2	418.19	335	307.78	5878	-110.41***
Municipal Fiscal Budget Data - Average 2011 (AIDA PA)					
Municipal total expenditure per capita	1320.78	335	1328.02	5845	7.24
Municipal fiscal deficit per capita	15.36	335	32.89	5845	17.53

Property and rental values per square meter are at semestral frequency, averaged in 2011 and 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; share of residential buildings built after 1990 is the ratio between the number of residential buildings built after 1990 and the total number of residential buildings; share of non-residential buildings is the ratio of the number of non-residential buildings and the total number of buildings; population per Km2 is the ratio of total resident population over the municipality area measured in square kilometres. Municipal Fiscal Budget Data are measured in 2011 and expressed in euros.

Table 5
Electoral cycle on property values in the years 2008-2011

	(1)	(2)
	Log of property value per square meter	
Three years before election	0.000	0.001
	(0.003)	(0.003)
Two years before election	0.001	0.002
	(0.002)	(0.002)
One year before election	0.001	0.001
	(0.001)	(0.001)
One year after election	-0.001	-0.002
	(0.003)	(0.002)
Observations	15383	15383
Municipality and Time fixed effects	Y	N
Municipality and Population deciles · Time fixed effects	N	Y

The analysed sample period is 2008-2011 and considers municipalities that have elections in 2010 or in 2011 or in 2012.
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: Reduced Form		
	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: 2SLS		
	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
Characterizing compliers

	(1)	(2)
Municipal Characteristic (X)	First Stage conditional on (X)	Relative likelihood
Inefficient public spending above median	-0.123	1.28
Inefficient public spending on education above median	-0.136	1.42
Inefficient public spending on environment above median	-0.105	1.09
Recycling rate of municipal waste below median	-0.103	1.07
Use of public transportation below median	-0.111	1.16
Percentage of public green areas below median	-0.108	1.12
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) 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 (2) presents the relative likelihood that compliers have the indicated characteristic; it is computed as the ratio between the coefficient of the First Stage conditional on (X) in column (1) and the unconditional First Stage coefficient that is equal to -0.096.

Table 8
Heterogeneous effects

	(1)	(2)	(3)	(4)
	Population Density		Buildings built after 1990	
	Below median	Above median	Below median	Above median
		Panel A: Reduced Form		
		Log of property value		
Election 2013 × Post	0.002	0.010***	0.004	0.008***
	(0.004)	(0.003)	(0.003)	(0.003)
		Panel B: First Stage		
		T × Post		
Election 2013 × Post	-0.137**	-0.173***	-0.098	-0.209***
	(0.064)	(0.052)	(0.065)	(0.050)
		Panel C: 2SLS		
		Log of property value		
T × Post	-0.015	-0.057**	-0.045	-0.040**
	(0.026)	(0.023)	(0.042)	(0.017)
Observations	18416	18406	18389	18433
Municipality and Pop. deciles · Time fixed effects	Y	Y	Y	Y

The reported results are from different subsamples: column (1) refers to the subsample of municipalities with Population per km2 below or equal to the sample median; column (2) refers to the subsample of municipalities with Population per km2 above the sample median; column (3) refers to the subsample of municipalities with the Share of residential buildings built after 1990 below or equal to the sample; column (4) refers to the subsample of municipalities with the Share of residential buildings built after 1990 above the sample median. Panel A reports the reduced form impact of having elections in 2013 on the log of property value per square meter; Panel B reports the first stage estimates. Panel C reports the 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 9
Robustness I: excluding municipalities adjacent to municipalities with elections in 2013

	(1)	(2)	(3)
	Panel A: Reduced Form		
	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: 2SLS		
	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. 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 II: including transaction volumes per time fixed effects in 2010

	(1)	(2)	(3)
	Panel A: Reduced Form		
	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: 2SLS		
	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.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

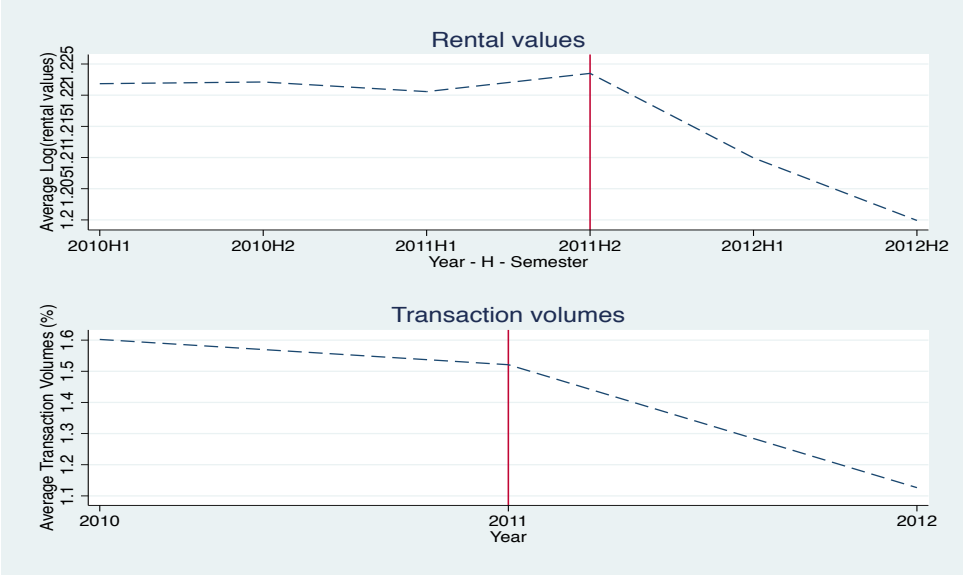
Table 11
Robustness III: alternative measures of the property tax rate

	(1)	(2)	(3)	(4)	(5)	(6)
	Log of property value					
Imu Prin × Post	-0.036**	-0.045***				
	(0.015)	(0.016)				
Change in Sec × Post			-0.036**	-0.044**		
			(0.016)	(0.018)		
T-Dummy					-0.065**	-0.079***
					(0.026)	(0.029)
Observations	36822	22353	36822	22353	36822	22353
Municipality and Pop. deciles · Time fixed effects	Y	Y	Y	Y	Y	Y
Vol. deciles in 2010 · Time fixed effects	N	Y	N	Y	N	Y

The table reports the two stage least square (2SLS) estimates when using alternative measures of property tax intensity in 2012. *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.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

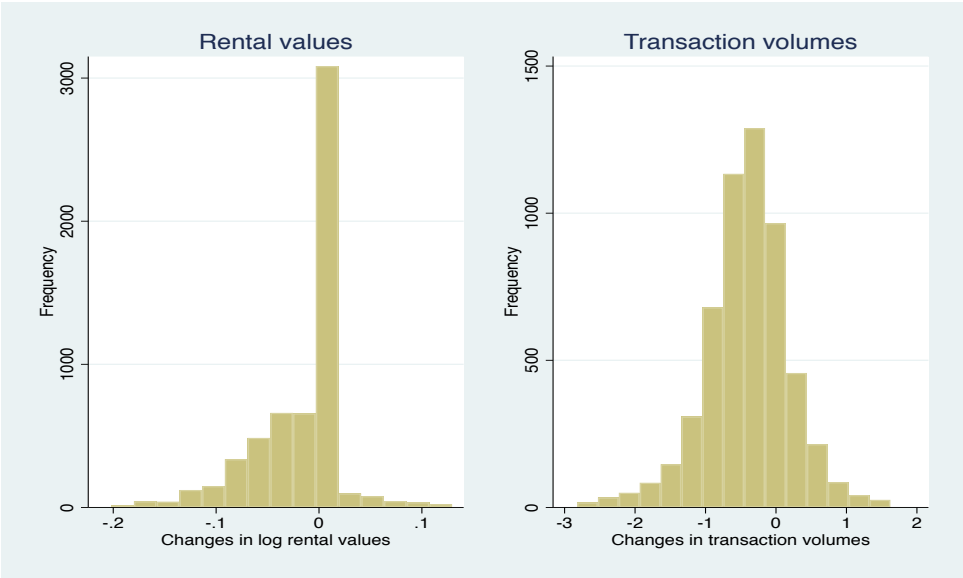
A Appendix

Figure A.1
Average rental values and transaction volumes 2010-2012



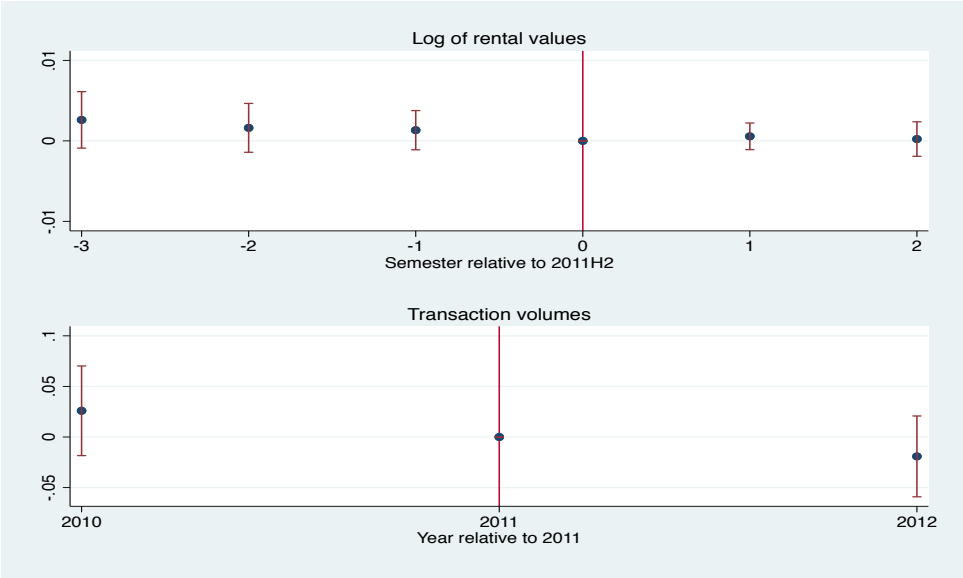
Note. The upper panel plots the logarithm of rental values averaged across municipalities in each semester from 2010 to 2012. The bottom panel plots the transaction volumes averaged across municipalities in years from 2010 to 2012.

Figure A.2
Changes of rental values and transaction volumes 2011-2012



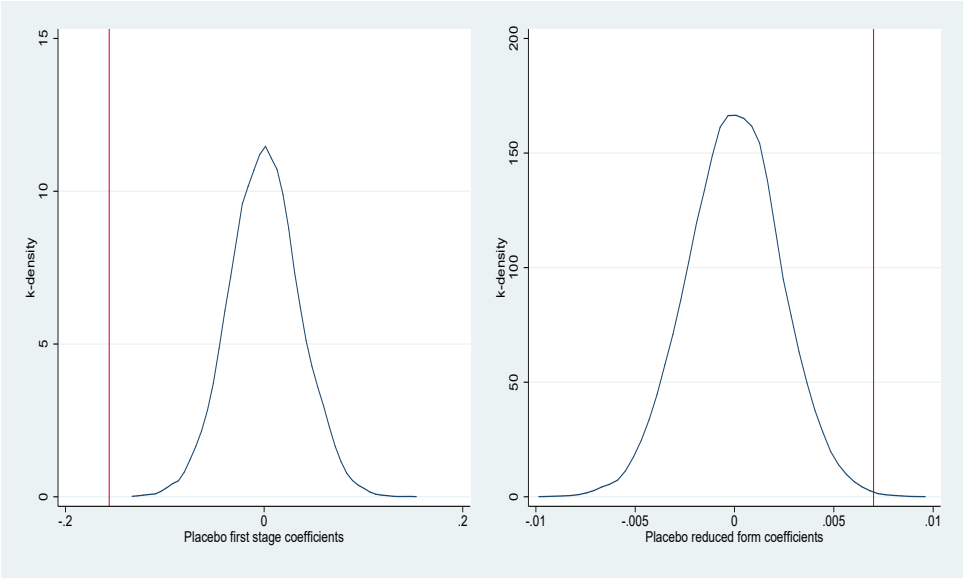
Note. The left figure plots the histogram of the change between the average logarithm of rental values in the two semesters that followed the introduction of the IMU and the average in the two semesters that preceded it. The right figure plots the histogram of the change between the transaction volumes in 2012 and in 2011.

Figure A.3
Dynamics of rental values and transaction volumes and property taxes



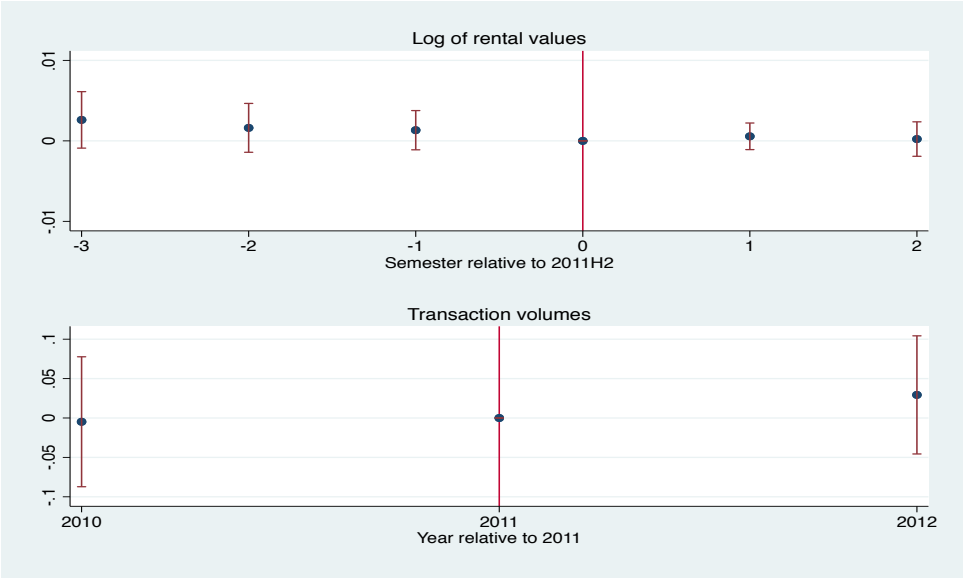
Note. The upper figure plots the pattern of the γ_τ coefficients from estimating (3) for the log of rental values. The capped lines show the 95 percent confidence interval on each coefficient relative to the reference semester (second semester of 2011). The bottom figure plots the pattern of the γ_τ coefficients from estimating (3) for the transaction volumes; notice that transaction volumes are available at yearly frequency and the reference year is 2011. The capped lines show the 95 percent confidence interval on each coefficient relative to the 2011.

Figure A.4
Random permutation test



Note. We assign a random draw from a uniform distribution with support [0,1] to each Italian municipality in our sample, then we sort municipalities based on this random variable and generate a dummy variable equal to 1 for the first 335 municipalities (the number of municipalities with elections in 2013). We estimate both the reduced form and first stage regressions using the randomly generated 'placebo' instrument. We repeat this procedure 10,000 times and plot the distribution of the reduced form (right panel) and first stage (left panel) coefficients. The vertical lines indicate our point-estimates of the reduced form regression (column 1, Panel A of Table 6) and of the first stage regression (column 4, Panel B of Table 3).

Figure A.5
Dynamics of rental values and transaction volumes and elections in 2013



Note. The upper figure plots the pattern of the γ_τ coefficients from estimating (5) for the log of rental values. The capped lines show the 95 percent confidence interval on each coefficient relative to the reference semester (second semester of 2011). The bottom figure plots the pattern of the γ_τ coefficients from estimating (5) for the transaction volumes; notice that transaction volumes are available at yearly frequency and the reference year is 2011. The capped lines show the 95 percent confidence interval on each coefficient relative to the 2011.

Table A.1
Robustness IV: Excluding municipalities with early terminations

	(1)	(2)	(3)
	Panel A: Reduced Form		
	Log of property value	Log of rental value	Transaction volumes
Election 2013 × Post	0.006***	-0.002	0.035
	(0.002)	(0.004)	(0.030)
	Panel B: 2SLS		
	Log of property value	Log of rental value	Transaction volumes
T × Post	-0.042**	0.014	-0.233
	(0.017)	(0.025)	(0.203)
Observations	35955	34289	16362
Municipality and Pop. deciles · Time fixed effects	Y	Y	Y

Panel A reports the reduced form impact of having elections in 2013. 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. The table reports estimates on the subsample of municipalities that excludes those that experience early terminations that led to anticipated elections in 2013.
Standard errors clustered at municipality level in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.2
Robustness V: Excluding provincial capitals

	(1)	(2)	(3)
	Panel A: Reduced Form		
	Log of property value	Log of rental value	Transaction volumes
Election 2013 × Post	0.006***	-0.003	0.019
	(0.002)	(0.004)	(0.031)
	Panel B: 2SLS		
	Log of property value	Log of rental value	Transaction volumes
T × Post	-0.046**	0.019	-0.131
	(0.021)	(0.029)	(0.242)
Observations	36318	34637	16530
Municipality and Time fixed effects	Y	Y	Y

Panel A reports the reduced form impact of having elections in 2013. 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. The table reports estimates on the subsample of municipalities that excludes provincial capitals.
Standard errors clustered at municipality level in parentheses.
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.3
Robustness VI: including population density deciles per time fixed effects

	(1)	(2)	(3)
	Panel A: Reduced Form		
	Log of property value	Log of rental value	Transaction volumes
Election 2013 × Post	0.007***	-0.002	0.031
	(0.002)	(0.004)	(0.029)
	Panel B: 2SLS		
	Log of property value	Log of rental value	Transaction volumes
T × Post	-0.046**	0.016	-0.225
	(0.019)	(0.027)	(0.215)
Observations	36822	35138	16773
Municipality and Dens. deciles · Time fixed effects	Y	Y	Y

Panel A reports the reduced form impact of having elections in 2013. 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 A.4
Instrumental variable results with time fixed effects

	(1)	(2)	(3)
	Panel A: Reduced Form		
	Log of property value	Log of rental value	Transaction volumes
Election 2013 × Post	0.007***	-0.003	0.013
	(0.002)	(0.004)	(0.030)
	Panel B: 2SLS		
	Log of property value	Log of rental value	Transaction volumes
T × Post	-0.050**	0.020	-0.106
	(0.021)	(0.029)	(0.235)
Observations	36822	35138	16773
Municipality and Time fixed effects	Y	Y	Y

Panel A reports the reduced form impact of having elections in 2013. 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 A.5
Exploiting further variation in Election 2013

	(1)	(2)	(3)	(4)
		Panel A: Reduced Form		
		Log of property value		
Election 2013 × Post	0.003	0.003	0.007**	0.005
	(0.003)	(0.003)	(0.003)	(0.003)
Re-run election 2013 × Post	0.007			
	(0.005)			
Close election 2008 × Election 2013 × Post		0.014**		
		(0.006)		
Yardstick competition × Election 2013 × Post			-0.001	
			(0.005)	
Above-Median Primary houses × Election 2013 × Post				0.002
				(0.005)
		Panel B: First Stage		
		T × Post		
Election 2013 × Post	-0.076	-0.142***	-0.145***	-0.160***
	(0.049)	(0.048)	(0.055)	(0.054)
Re-run election 2013 × Post	-0.180**			
	(0.080)			
Close election 2008 × Election 2013 × Post		-0.064		
		(0.083)		
Yardstick competition × Election 2013 × Post			-0.027	
			(0.080)	
Above-Median Primary houses × Election 2013 × Post				0.009
				(0.081)
		Panel C: 2SLS		
		Log of property value		
T × Post	-0.041***	-0.046***	-0.039**	-0.037**
	(0.014)	(0.017)	(0.016)	(0.016)
Observations	36822	36822	36822	36822
Municipality and Pop. deciles · Time fixed effects	Y	Y	Y	Y

Panel A reports the reduced form impact on the log of property value per square meter. Panel B reports the first stage estimates. The F-statistics of the excluded instruments is 8.99 in specification in column (1), 8.65 in column (2), 7.90 in column (3) and 7.51 in column (4). Panel C reports the 2SLS estimates. The specification in column (3) includes $Yardstick\ competition \times Post$ as additional control. The specification in column (4) includes $Above-Median\ Primary\ houses \times Post$ as additional control.

Standard errors clustered at municipality level in parentheses.

$^{*}\ p < 0.10$, $^{**}\ p < 0.05$, $^{***}\ p < 0.01$.