All for one, one for all: Inter-municipal cooperation and public good provision

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Abstract

Do agglomeration or congestion effects dominate when municipalities merge government functions? I exploit an Italian policy reform, which forced municipalities below 5,000 residents to join inter-municipal communities (IMC), to estimate the effects on local real estate prices and public services. Affected areas see an increase in house prices reflecting an improvement in public goods provision. Cooperating municipalities provide better services without increasing investments, suggesting that small municipalities were operating below an efficient scale before the reform. **JEL**: H70, H71, H72, R23, R31

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1. Introduction

There has been a longstanding debate about the optimal size of jurisdictions (Epple and Romer 1989; Ostrom et al. 1961; Ostrom 2010). Public choice and fiscal federalism theories propose that public goods and services should be provided at the lowest level of government that can effectively achieve specific objectives (Oates 1972, 1999; Ostrom et al. 1961). However, excessive fragmentation may hinder economies of scale and scope, leading to increased transaction costs and reduced competition (Oates 1999), as suggested by Tiebout (1956); Alesina and Spolaore (1997); Bolton and Roland (1997).

Governments worldwide have been moving toward the integration of small areas through cooperation and mergers to achieve savings and exploit economies of scale, especially in response to the debt crisis following the 2008 global financial crisis (Bel and Warner 2015; Warner 2006). However, the efficiency of larger entities in providing public services remains an ambiguous question, with the literature yet to provide a definitive answer. Some studies suggest that aggregating small municipalities reduces per capita expenditure levels without compromising the quantity and quality of services provided (Bel and Costas 2006; Bel and Mur 2009; Bel et al. 2013; Dijkgraaf and Gradus 2013; Zafra-Gomez et al. 2013). Conversely, other studies have reached the opposite conclusion (Sorensen 2007; Garrone et al. 2013).

This paper investigates the impact of a reform that mandated Italian municipalities with populations below 5,000 inhabitants to collaborate with neighboring municipalities through the creation of an inter-municipal community on local house prices. To do so, I utilize multiple sets of administrative data, including local residential and commercial building sales and rent prices, municipal balance sheets, and measures of public good quality.

To estimate the effect of inter-municipal cooperation, I employ a fuzzy difference-in-

discontinuity design, which accounts for the low compliance rate and the compound treatment problem at the policy cutoff (Galindo-Silva et al. 2021). I find that municipalities participating in inter-municipal cooperation experience an increase in both residential and commercial building prices ranging between 28% and 57%. This change in house prices can be attributed to an increase in efficiency, allowing the cooperating municipalities to produce better quality public goods: the number of childcare seats increases by 15.6%, and the kilometers of roads served by public lighting increase by 75%. This finding is supported by the inflow of residents to these municipalities after the formation of the inter-municipal community, as predicted by Tiebout's theory (Tiebout 1956).

This study contributes to the vast literature on the optimal size of jurisdictions. Empirical research presents mixed results due to the tradeoff between Oates' agglomeration argument and congestion (Oates 1969; Brueckner 1981; Bel and Sebő 2021). Evidence of savings has been found in Israel and Germany (only for compulsory mergers) (Blesse and Baskaran 2016; Reingewertz 2012), while no significant effect has been observed in France, the Netherlands, and Italy, likely due to the compensation between savings and deterioration across different areas within the same country (Allers and de Greef 2018; Blom-Hansen et al. 2016; Luca and Modrego 2021). My work complements these previous findings by demonstrating that the creation of larger government units improves efficiency through economies of scale, leading to the production of better local public goods, which, in turn, impact house prices positively.

Secondly, I contribute to the literature on the production of local public goods. While the theory of local public goods has been extensively explored in the literature (Stiglitz 1977; Besley and Coate 2003), there is limited evidence on the effects of jurisdiction size on public good production. Prior research on inter-municipal cooperation has focused on specific aspects such as sewage and waste disposal (Bel et al. 2013; Bel

and Warner 2015), daycare and libraries (Tricaud 2021), and garbage collection (Allers and de Greef 2018; Dijkgraaf and Gradus 2013). Due to data limitations, other authors have used house prices as a proxy for public goods, indicating amenity capitalization. For example, Schoenholzer (2018) found an increase in house prices due to municipal annexation in California. My findings demonstrate that the size of jurisdictions does impact public good production, with larger jurisdictions experiencing an improvement in public good quality. Furthermore, I provide evidence that house prices are indeed an accurate proxy for public good quality, considering the capitalization effect they have on both residential and commercial properties.

The rest of the paper is organized as follows: Section 2 describes the institutional background, how the inter-municipal communities work, and how they evolved; Section 3 illustrates the data sources; Section 4 details the empirical strategy; Sections 5 and 6 describe the main results and the underlying mechanism and Section 7 concludes.

2. Institutional Background

Italy provides an ideal setting to study the phenomenon of inter-municipal cooperation due to its recent historical evolution, which aligns well with the analysis of the size of the jurisdiction's impact on the housing market.

2.1. *Unioni di Comuni*

Municipalities form the lowest level of the Italian administrative hierarchy. They are the closest administrative level to citizens and oversee various public functions in areas such as social welfare services, waste disposal, and infrastructural spending. However, they are sparsely populated, with the median and mean population sizes of municipalities being 2,498 and 7,514 inhabitants, respectively. Given this fragmentation and inspired

by theories of functional federalism (Ermini and Fiorillo 2009), Italian lawmakers have increasingly encouraged measures of municipal cooperation to enhance the efficiency of local governments.

Inter-municipal communities (IMC), known as *Unioni di Comuni*, were introduced in Italy three decades ago. By joining an IMC, municipalities transfer some of their decision-making powers and financial resources in specific pre-agreed policy areas to the newly established administrative entity, which, in return, provides the corresponding services. IMC are legal entities with their budget, president, chosen among the mayors of the participating municipalities, and council composed of the council members of cooperating municipalities. IMC are commonly formed by bordering municipalities that belong to the same commuting zone and are present throughout the entire country, with higher prevalence in the Northern regions, such as Lombardy and Piedmont, and in remote areas like the mountainous regions of the Alps and the Apennines[1,2].

In financial terms, the share of the municipal unions' budget on the total expenditure of local governments has increased over time. In 2007, the total expenditures of municipal unions accounted for about 0.10% (403 million euros) of the total local expenditures in Italy (350 billion euros). By 2013, the total expenditures of municipal unions had more than doubled, accounting for approximately 0.30% (970 million euros) of the total local expenditures in Italy (334 billion euros) (Ferraresi et al. 2018)[3].

[1] In 2009, Mountainous Communities (*Comunita' Montane*), another form of inter-municipal cooperation, were dismissed and transformed into Unions of Municipalities, which explains why they are particularly common among mountainous municipalities.

[2] The map of how the inter-municipal communities are distributed on the Italian territory can be found in Figure A2.

[3] However, these percentages underestimate the real expenditure quota of the unions, as municipalities often do not write off their quota of the delegated function and continue to register it as their expenditure.

2.2. The evolution of the phenomenon

The evolution of inter-municipal communities (IMCs) in Italy is of particular interest for the research strategy later described in Section 4, especially the last phases of its development.

Initially, the tool was developed as a temporary measure for small municipalities with a population below 5,000 inhabitants (one local government with up to 10,000 inhabitants was also allowed to join) to prepare for a full merger into a single municipality within 10 years. However, the temporary nature of the coordination tool, combined with limited economic incentives, did not attract much interest among local administrators, resulting in only 16 communities in 1999. In 1999, the temporary nature and population size limits were abolished, but the reform did not have much more success.

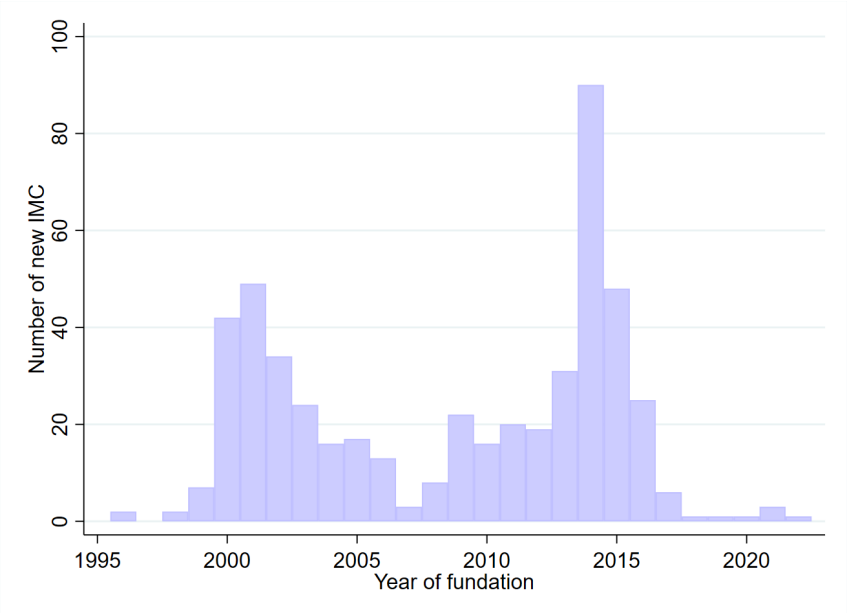
Finally, in 2010, local governments with populations below 5,000 (3,000 if in mountainous areas) inhabitants were required to start delivering public services through IMCs, in which they had to engage in compulsory joint management of basic public services. The law established that municipalities below a certain population threshold had to start jointly managing at least three "fundamental functions" by January 1, 2013. The "fundamental functions" commonly transferred to the newly created communities are administration and management, municipal police, education, roads, and transport services, planning and environment, and social welfare. This last step was followed by a legislative move that facilitated the creation of IMCs and generated economic incentives for municipalities to join one[4].

Figure 1 illustrates the number of newly created IMCs in Italy in each year over the past 25 years. Before 2000, IMCs were extremely rare because they were a stepping stone toward a merger. Once the merger requirement was removed in 1999, there is a

[4]The steps of evolution of inter-municipal communities in Italy is summarized in Figure A1.

clear jump in the bar graph that lasts four to five years, after which there is a slowdown. The slowdown ended with the 2010 mandate, even though it is not until 2014 that one can see a big spike in the number of new IMC, thanks to the incentives for the members introduced that year. As of 2018, there are 525 active municipal unions, accounting for 40% of all municipalities in Italy[5].

FIGURE 1. Inter-municipal communities over time



Note: The figure shows the number of new inter-municipal communities (IMC) created every year in Italy over the last 25 years.

3. Data

The data used for this project is sourced from various administrative sources. First, I collected data on all the inter-municipal communities that ever existed in Italy between 1990 and 2018. These data are provided by the Italian Ministry of Internal Affairs and have been supplemented with information from regional registries of inter-municipal communities, local newspaper articles, and other local government resources (e.g.,

[5]Table A1 details information on IMC by region.

IFEL). The complete dataset contains information for 525 IMCs, their members, and the year of creation (and termination if applicable).

I complemented these data with complete administrative data on real estate prices and rents collected and harmonized by the Italian Treasury. This dataset spans the period between 2002 and 2018 and includes information on both residential and non-residential units, including commercial real estate[6]. Following Cannari and Faiella (2008) and Fenizia and Saggio (2020), the house price measure is computed as the average real estate selling price/rents in municipality m in year t[7].

To explore the mechanism, I collected measures of public goods for the number of childcare seats per capita and road lights per kilometer of road for the years 2000-2015. I also obtained property tax rates set at the municipal level for the years 2000-2019 from IFEL. The data contains information on the two main property tax rates: the one for the main dwelling buildings and the one for all other buildings. Next, I collected population counts from the 2001 and 2011 Censuses to use as a running variable in the analysis and intercensal population for the mechanism analysis. Finally, I include expenditure figures from the municipal balance sheets; I have information on current and capital expenditures, computed per capita and in real terms.

Finally, I collected municipal-level data, including the share of the population between 0 and 14 years old and over 65 years old, the share of the foreign population, population density, altitude, and the share of employed individuals in the primary and secondary sectors, as well as election years, to use as controls.

Once I merged all the data sources, I restricted the analysis to municipalities in Ordinary Status regions[8]. I excluded municipalities that merged with others to create new

[6]Commercial real estate includes factories, industrial buildings, and craft workshops.

[7]I exclude outlier transactions from the sample and only include buildings whose status is reported as "normal" (excluding poor and excellent status buildings).

[8]Municipalities in Special Status regions follow different rules regarding expenditure management, face different fiscal constraints, etc.

municipalities, suppressed municipalities due to incorporation, and new municipalities formed during the period of analysis. The final sample consists of 6,410 municipalities over the years 2002-2018, totaling 108,625 observations.

4. Methodology

The inter-municipal cooperation mandate, in effect since 2010, employs a population cutoff of 5,000 inhabitants. Interestingly, there are at least two other municipal policies in Italy that share the same cutoff point: a mayoral and executive committee wage policy, as well as a set of financial constraints (Gagliarducci and Nannicini 2013; Grembi et al. 2016). Both policies were established before 2010. Consequently, utilizing the cross-sectional regression discontinuity (RD) estimator to estimate the average treatment effect of interest in a neighborhood of the threshold could lead to a biased estimate, as the effects of the three confounded treatments cannot be disentangled from one another.

To address this issue, I adopt a difference-in-discontinuity identification strategy, following the approach of Grembi et al. (2016). In this approach, the pre-period is used to identify the impacts of the other policies at the discontinuity, while the difference between the pre- and post-period discontinuity identifies the impact of the treatment of interest. I use a regression discontinuity design on the first-differenced outcomes, as suggested by Butts (2021). This approach is appropriate under two key assumptions: (1) outcomes are continuous in the counterfactual absence of the policies, and (2) no other policy is implemented between periods that causes a discontinuity in the absence of the treatment. As the effects of previous policies were already fully developed in the pre-period, a regression discontinuity estimated on a first-differenced outcome will identify the treatment effect.

Figure 2 shows the first stage results and illustrates how the identification strategy works. In all plots, the two red lines indicate 2010, the year the IMC policy was implemented, and 2013, the year the sharing of municipal functions became effectively mandatory. Subfigures (a) and (b) display two regression discontinuity plots in 2006 and 2016, respectively, representing one year before the reform and one-year after[9]. One can observe that before the policy was implemented, having less than 5,000 inhabitants did not significantly affect the probability of being part of an inter-municipal community (subfigure (a)). However, after the policy was implemented (subfigure (b)), the probability of joining a community increased, although the increase was small in magnitude (about 15 percentage points). Subfigure (c) displays the evolution of the yearly RD estimates over time, along with their 95% confidence intervals. Three conclusions can be drawn from this figure. First, before 2010, the RD estimates were not significant and close to zero, indicating that municipalities cooperated independently of their population size before the mandate. Second, even after the mandate was implemented in 2010, not all municipalities that were required to join an inter-municipal community did so. As of 2018, only 20% of municipalities with less than 5,000 inhabitants belonged to an inter-municipal community[10]. To account for non-compliance, I perform a fuzzy Difference-in-Discontinuity estimation, following the approach proposed by Galindo-Silva et al. (2021) and Millán-Quijano (2020).

Thus, I define a post-period starting in 2013, when the municipal function sharing was officially established (as in Bellodi et al. (2022)), and compare municipalities with above and below 5,000 inhabitants, both before and after that date. In formal terms, I estimate the following model:

[9] These years were chosen randomly for explanatory purposes; the conclusions would not change if any other year pairs were chosen.

[10] Anecdotal evidence shows that strong parochialism, especially in smaller towns, and local politicians' fear of losing support in the municipalities where they were elected are among the reasons for avoiding the mandate.

$$\Delta IMC_{r(m),i-j} = \alpha_1 Treated_{r(m)} + \beta_1 \tilde{Pop}_{r(m)} + \gamma[\tilde{Pop}_{r(m)} \times Treated_{r(m),i-j}] +$$

$$+ \theta_{r(m)} + u_{r(m),i-j} \tag{1}$$

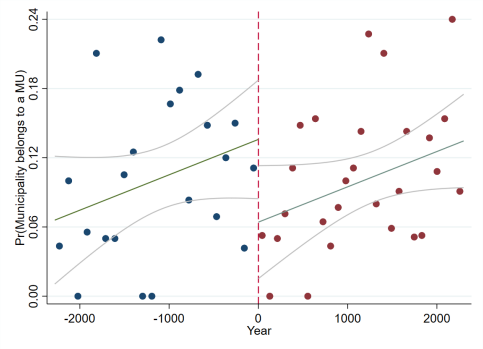
$$\Delta Y_{r(m),i-j} = \alpha_2 \Delta \hat{IMC}_{r(m),i-j} + \beta_2 \tilde{Pop}_{r(m)} + \gamma_{r(m)} + \varepsilon_{r(m),i-j} \tag{2}$$

Here, $\Delta IMC_{r(m),i-j}$ denotes the first difference between all post-reform years i (2013-2018) and all pre-reform years j (2002-2012), stacked together, of a dummy variable that takes a value of one if a municipality m in the region r belongs to an inter-municipal community. $Treated_{r(m)}$ is a dummy variable that takes a value of one for municipalities m in region r with a population of less than 5,000 after 2010[11]. $\tilde{Pop}_{r(m)}$ represents the re-centered running variable. The term $\theta_r(m)$ refers to region fixed effects that control for the potential presence of confounders due to varying regional features, such as different regional incentives to join inter-municipal communities (Ferraresi et al. 2018). Finally, $Y_{r(m),i-j}$ represents the first-differenced outcome for municipality m in region r.

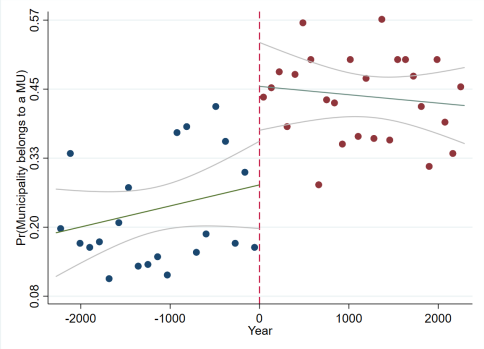
[11]The relevant population measure is from the 2001 Census.

FIGURE 2. First stage estimates

A. 2006



B. 2016



C. Yearly RD estimates

Note: This figure shows the first stage results. Subfigures a) and b) show RD plots for the years 2006 and 2016, before and after the IMC reform, respectively. The running variable is centered around 5000 and the dots above the cutoff represent municipalities with less than 5000 inhabitants and vice versa. Subfigure c) shows yearly RD coefficients; each dot is the RD estimate from a regression of a dummy variable equal to one if a municipality is part of a municipal union in a certain year. The dotted line represents 95% confidence intervals, and the two red vertical lines indicate the years 2010 and 2013.

The estimation follows Two-Stage Least Squares in first differences: Equation (1) estimates the first stage, where the treatment, $IMC_{r(m),i-j}$, is instrumented using the policy cutoff. Equation (2) then estimates the second stage. The coefficient of interest is denoted as α_2. Both equations are estimated nonparametrically using the algorithm proposed by Calonico et al. (2019). The main estimates are bias-corrected RD estimates with a robust variance estimator, employing a first-order polynomial in the running variable.

Selecting bandwidths in a difference-in-discontinuity setting does not have a single

optimal procedure, so for the main results, I choose a bandwidth of 700 inhabitants. I also provide robustness checks in the Appendix, where I show the sensitivity of the results to a wide selection of bandwidths (Galindo-Silva et al. 2021) and robust estimation procedures. Additionally, in the Appendix, I estimate the same model using higher-order polynomials (second and third) and present estimates from different estimation procedures.

5. Main results

5.1. The effect of IMC on house prices

House prices serve as the main outcome of interest as they provide an indicator of changes in the quality of public services. Previous research has demonstrated that amenities such as schools, parks, and shopping centers (as well as negative factors like noise and pollution) can affect house prices (Fishel 2001). Homebuyers and tenants are willing to pay more for properties in areas that offer more desirable features.

The creation of a larger jurisdiction might influence the production of public goods and thus house prices in two opposite ways: agglomeration effects make local governments more efficient and allow the production of higher quality public goods thanks to the generation of economies of scale and scope; congestion effects have the opposite consequence due to the increase in production costs. Therefore, it is an interesting research question to explore how cooperation among municipalities affects the housing market.

Figure 3 plots the yearly reduced-form regression discontinuity estimates for house sale and rent prices. Panels a) and b) show the yearly estimates for residential properties. Each estimate is obtained from a regression discontinuity model of the logarithmic transformation of sale and rent prices on the instrument, the 5000 inhabitants' cutoff.

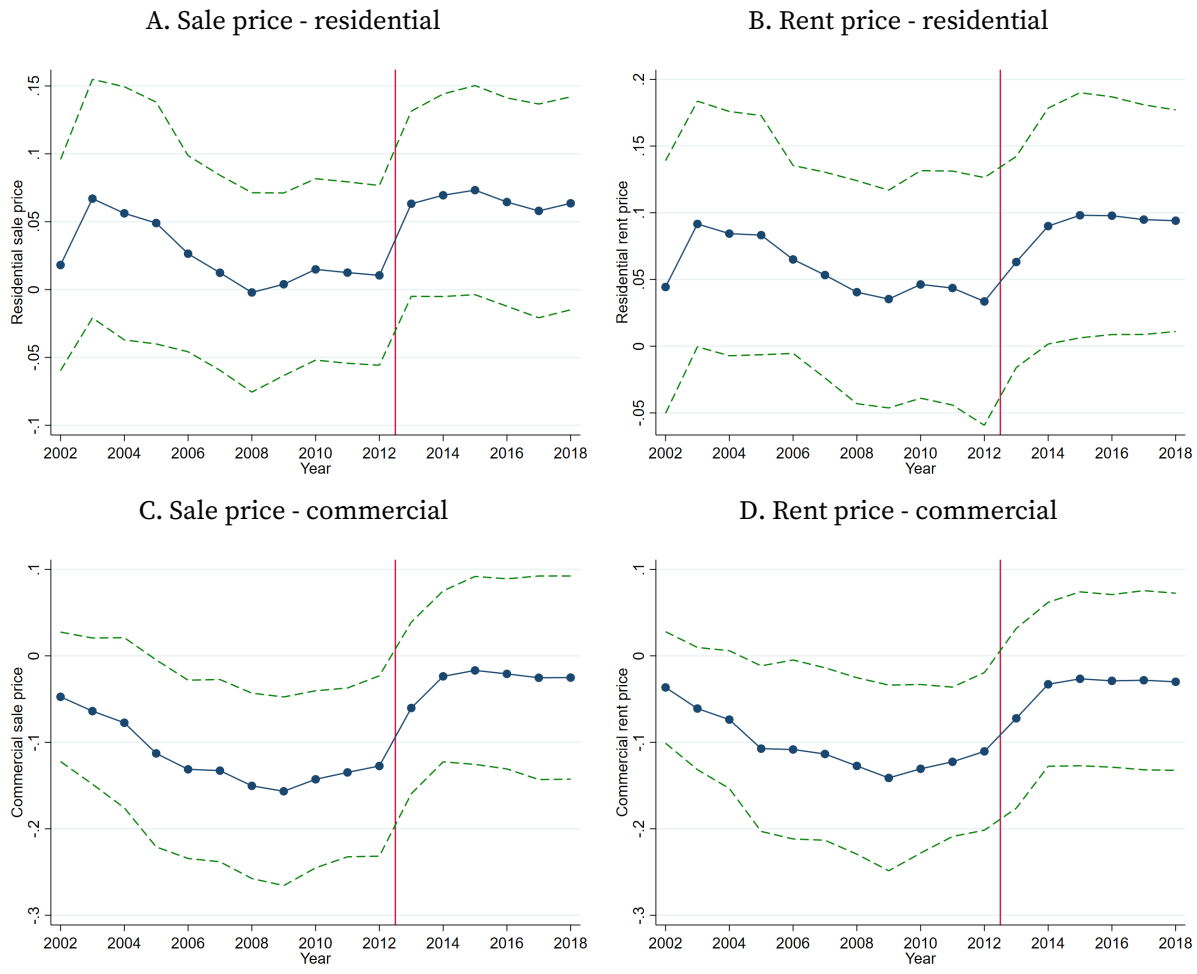
Notably, there is a stable pre-trend for both sale and rent prices up until 2013, indicating the absence of significant pre-trends for these outcomes. From 2013, there is a sharp increase in both prices, which remains constant thereafter. Panels c) and d) show that commercial building prices exhibit a similar pattern.

These figures yield two takeaways: first, there is evidence of the absence of pre-trends in the outcomes, which is one of the assumptions of the difference-in-discontinuity estimation; second, there is evidence of a clear jump in house prices in 2013 when the sharing of function among cooperating municipalities became official.

The visual findings are supported by the fuzzy difference-in-discontinuity estimates presented in Table 1. The F statistics indicate that the first stage regression is strong across the board (Stock and Yogo 2005). Columns (1) and (2) of Table 1 show that residential sale prices increase by 28-29.5% in municipalities that joined an IMC after the mandate was implemented. Rents have increased by approximately 26%. These estimates are consistent across different estimation procedures and are robust to changes in the polynomial form of the running variable and bandwidths, as presented in Table A4 and Figure A5. Columns (3) and (4) show that commercial building prices also increased by a larger amount, 57-58% (rents by 41%).

A municipality that joins an inter-municipal community experiences an increase in house prices in both the residential and commercial categories. These findings differ from Tricaud (2021), which does not find any change in house prices due to positive and negative effects compensating each other across municipalities with stronger and weaker shocks to housing supply. Unfortunately, Italy lacks available data on housing permits at the municipal level, preventing an investigation of how the housing stock changes after cooperation begins. However, other avenues can be explored, and in the next section, I delve into two potential mechanisms behind the change in house prices: tax rates and the quality of public goods.

FIGURE 3. Reduced form estimates for house prices



Notes: These plots show the yearly reduced form estimates of house price measures on the instrument, having less than 5,000 inhabitants. Subfigures a) and b) report sale and rent prices for residential buildings, respectively. Subfigures c) and d) show the same plots for house prices of commercial buildings.

TABLE 1. House prices - Difference-in-Discontinuity Estimates

	Residential		**Commercial**	
	(1)	(2)	(3)	(4)
	ln(sale)	ln(rent)	ln(sale)	ln(rent)
Conventional	0.282**	0.266**	0.571***	0.441**
	(0.110)	(0.120)	(0.195)	(0.198)
First-stage F	37.78	38.38	21.24	20.85
Bias-corrected	0.295***	0.263**	0.584***	0.413**
	(0.110)	(0.120)	(0.195)	(0.198)
First-stage F	42.09	42.75	23.71	23.28
Robust	0.295**	0.263*	0.584***	0.413*
	(0.124)	(0.135)	(0.218)	(0.221)
First-stage F	34.53	34.64	19.17	18.92
Mean	1236.243	4.385	890.597	4.289
Observations	7,463	7,463	7,554	7,554

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors clustered at the municipality level are reported in parentheses. All dependent variables are in logs, while the means are reported as non-transformed . The F statistics are for the first stage regressions of the probability to belong to an IMC on an indicator for having less than 5,000 inhabitants. Controls include the fraction of workers in the first and second sector, the fraction of population between 0-4 and above 65, the share of foreign population, altitude of the municipality, population density, dummies for the municipality being in the North and Center of the country, a dummy for rural municipalities, a dummy equal to one if the year is an election year, and region fixed-effects.

5.2. Mechanism

In this section, I explore two potential drivers of the change in house prices caused by the creation of an inter-municipal community: a change in property tax rates and a change in public good quality.

First, I consider the possibility that municipalities entering an inter-municipal

community might change their property tax rate differently from municipalities that do not cooperate. This idea is backed up by findings in the empirical and theoretical literature. Breuillé et al. (2018) investigates this possibility in France and finds that inter-municipal cooperation leads to an increase in taxation, following the argument that reduced competition frees municipalities from the need to undercut each other as before cooperation. However, there are other forces in play when thinking about inter-municipal cooperation: one of the main reasons to support IMC is that they help the creation of economies of scale which are expected to reduce not only public expenditure but also taxation (Duncombe and Yinger 1993); spillovers also play a role, and in the presence of positive (negative) spillovers, IMC should increase (decrease) taxation because of their internalization (Wilson 1986). Thus, the direction of this effect is unclear a priori.

The property tax rate is the main source of own revenues for local governments in Italy[12] and mayors have freedom in setting its rate. There are two main rates, a lower one for the residential buildings identified as main dwellings[13] and a higher one for the rest of the buildings[14][15].

The first two columns of Table 2 show the estimates of the effect of inter-municipal cooperation on property tax rates. Both estimates are negative, but there is no statistically significant effect on either of the tax rates. These results are also robust to different estimation techniques, higher-order polynomials in the running variable, and

[12] In 2015, property tax revenues were 18% of the total revenue and 42% of the tax revenue for the average municipality (Ministry of Finance, 2015)

[13] A house is identified as the main dwelling if an individual and the members of her family officially and habitually reside there.

[14] The rest of the buildings are defined as base building and they include residential properties that are not main dwellings, commercial and productive buildings, offices, parking spaces, etc.

[15] The property tax structure has been reformed in 2012. The main change consists of an increase in the range of adjustment of the tax rate, which gave mayors larger discretion in how to set the tax rate. The reform affected the whole country at the same time and in the same way and the mayors endogenously decided if and how to adjust the tax rates.

different bandwidths. Thus, the house price increase is not reflecting the capitalization of property tax as it is found to be common in OECD countries and Italy in particular (Cebula 2009; Oliviero et al. 2019).

All of this reconnects to the findings of the seminal Oates (1969) paper, which finds a negative relationship between property tax rates and house prices. Moreover, it finds that "for an increase in property taxes unaccompanied by an increase in the output of local public services, the bulk of the rise in taxes will be capitalized in the form of reduced property values". Thus, as a next step, I investigate the effect of cooperation on measures of public good quality.

I focus on two services, childcare, and street lighting. Both measures have been used in the literature on decentralization and public good provision (Bianchi et al. 2022). I take the measures in per capita terms and logarithms given the highly left-skewed distribution. Columns (3) and (4) of Table 2 present the estimates. There is a 15.6% increase in per capita spots at public childcare in municipalities that join an IMC and 75% more illuminated kilometers of municipal road per capita. Both estimates are consistent across estimation methods, polynomials of the running variable, and bandwidth sizes. These findings are consistent with other work on a smaller set of municipalities in Italy (Ferraresi et al. 2018) and France (Tricaud 2021). The idea behind this finding is that municipalities that join an inter-municipal community gain efficiency by exploiting economies of scale and scope that allow them to cut redundant functions and focus the resources on fewer better-quality services.

To gain insight into the efficiency story, I study how the municipalities that start cooperating change their spending patterns. I focus on general spending and split it between current and investment expenditures. Both are taken per capita and in real terms and taken in logarithms. Column (5) shows that joining an IMC increases current expenditure by 46%, which is expected given that the IMC is a new entity that needs

an organization to function and thus requires the hiring of bureaucrats, whose wages weigh on the current expenditures of the member municipalities (Ivaldi et al. 2016). Column (6), instead, shows that there is no change detected in investment expenditure for municipalities that start cooperating. The estimate is nonsignificant and thus means that these municipalities are not working on additional investments. This is suggestive evidence that the improvement in public service provision is coming from an increase in efficiency coming from cutting duplicate functions and duplicate investments.

Finally, to corroborate the public goods findings, I evaluate Tiebout's "voting with their feet" hypothesis (Tiebout 1956). This hypothesis posits that if local public good quality changes, then people will move across jurisdictions searching for the best combination of taxes and amenities. Results are shown in columns (7) and (8) of Table 2: population increases by 6.5% after a municipality joins an inter-municipal community and starts cooperating in producing local public goods. This amounts to an average of 88.74 more immigrants per municipality. If nothing else changes, this shows that the higher house prices are due to an increased inflow of people into the cooperating municipalities thanks to an improved supply of local public goods. This is a strong finding considering that Italy is a typical low-mobility country where people have strong family ties (Manacorda and Moretti 2006).

Altogether, these findings help shed light on the mechanism behind the increase in house prices that affects municipalities that join an inter-municipal community. The price increase is the result of the capitalization of improved amenities that are now available in the cooperating municipalities thanks to improved efficiency.

TABLE 2. Mechanism

	Tax rates		Public goods	
	(1)	(2)	(3)	(4)
	Main dwelling	Base	Childcare	Street lights
Conventional	-0.049	-0.064	0.156***	0.750**
	(0.032)	(0.042)	(0.045)	(0.372)
First-stage F	31.04	25.17	54.74	57.57
Observations	7,851	7,856	5,563	7,850
Mean	0.485	0.769	0.055	16.946
	Population		Expenditure	
	(5)	(6)	(7)	(8)
	Log(Population)	Net Immigration	Current	Investment
Conventional	0.065***	88.737***	0.461**	-1.89
	(0.020)	(26.177)	(0.222)	(1.500)
First-stage F	59.12	59.64	12.46	12.88
Observations	7,895	7,895	6,488	6,330
Mean	20,782.13	93.502	474.942	42.659

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors clustered at the municipality level are reported in parentheses. The dependent variables are property tax rate for main dwelling and other buildings (in %), public good measures (log childcares per 1000 inhabitants and log kilometers of street lights per 1000 inhabitants), current and investment expenditures (in per capita and real terms), and population growth and net immigration. Means are reported non-transformed. The F statistics are for the first stage regressions of the probability to belong to an IMC on an indicator for having less than 5,000 inhabitants. Controls include the fraction of workers in the first and second sector, the fraction of population between 0-4 and above 65, the share of foreign population, altitude of the municipality, population density, dummies for the municipality being in the North and Center of the country, a dummy for rural municipalities, a dummy equal to one if the year is an election year and region fixed-effects.

6. Conclusions

This article provides new evidence on the effects of inter-municipal cooperation on member municipalities. By exploiting an Italian mandate that forced municipalities with

populations below 5,000 to join an inter-municipal community, I find that municipalities that begin cooperating experience a substantial increase in the sale and rent prices of both residential and commercial buildings. The size of this increase ranges from 28 to 57%.

This change is generated by the capitalization of better amenities into house prices. When municipalities cooperate, they gain efficiency and can produce better public goods. In this study, they improve the supply of childcare by increasing seats by 15.6% and enhancing municipal street lighting by covering an additional 75% of roads. Importantly, I exclude the possibility that the change in house prices might be related to property tax, as I do not find any change in rates after the creation of an inter-municipal community.

These results suggest that inter-municipal cooperation can have positive consequences on the member municipalities, as it achieves its objective of expenditure rationalization, which translates into better public good provision. The resulting increase in house prices implies that, on average, it is unclear whether the overall welfare ends up increasing or not. Although this aspect is outside the scope of the paper, it would be interesting to provide a more general equilibrium perspective on the theme.

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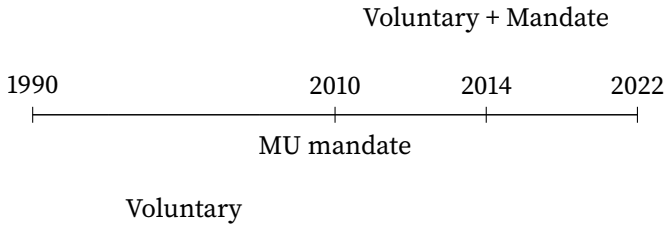
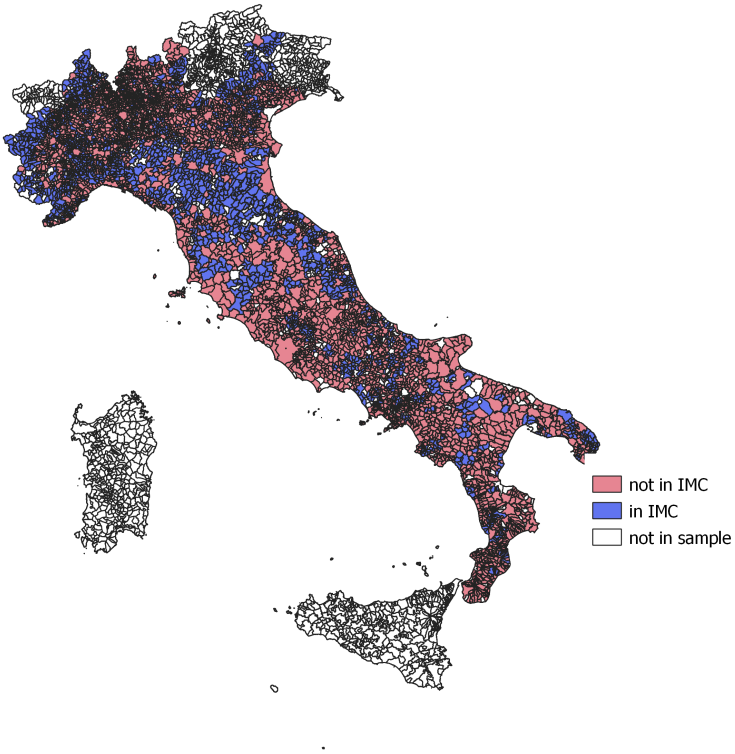
Appendix A. Additional Tables and Figures

FIGURE A1. Timeline of the inter-municipal cooperation reforms



- In 1990, municipal unions were introduced in Italian public law. Municipalities were free to join but they had to merge after 10 years of union.
- In 2000, the mandatory fusion requirement has been removed.
- In 2010, Italy passed a law that **mandate** municipalities with less than 5,000 inhabitants to join a MU.
- In 2014, the discipline of municipal unions has been simplified, reducing the types of unions existing, facilitating the internal organization

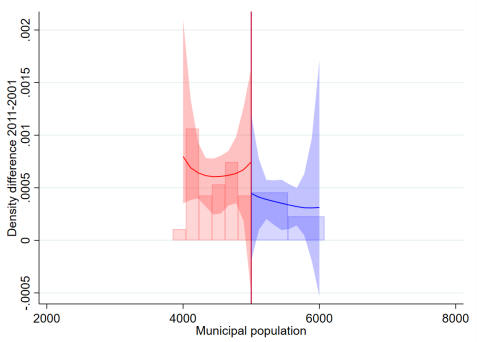
FIGURE A2. Inter-municipal communities in Italy in 2018



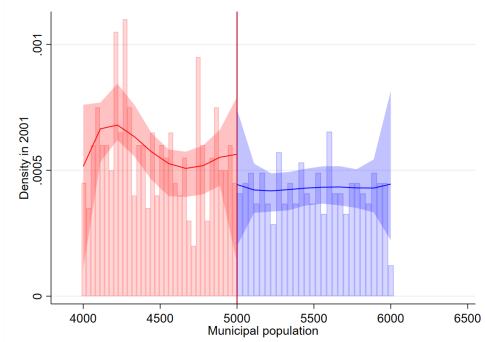
Note: The map shows the municipalities that are part of an inter-municipal community (purple) and those that were not (pink) in 2018. Blank municipalities are not included in the sample because they are either part of a Special Status region (e.g., Sicily) or they have missing values for the main outcomes of interest

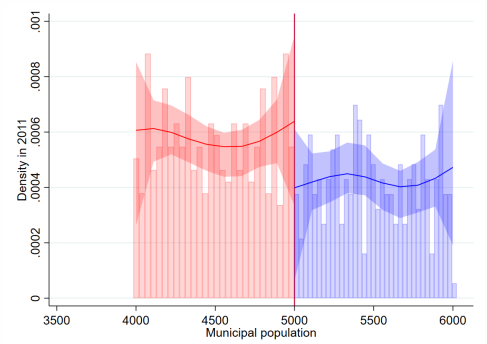
FIGURE A3. McCrary test

A. Population 2011-2001



B. Population 2001



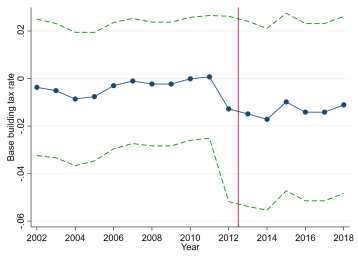


C. Population 2011

Note: The figures show the test of continuity at the 5,000 inhabitant threshold. The top figure shows the continuity of the difference between the 2011 and 2001 populations (data from the Census), while the two bottom figures who the continuity of the 2001 and 2011 populations separately. The lines are local polynomials, the histograms show the population distribution and the shaded areas are 95% confidence intervals.

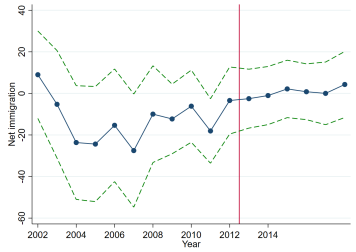
FIGURE A4. Yearly reduced form estimates - Other outcomes

A. Main dwelling tax rate

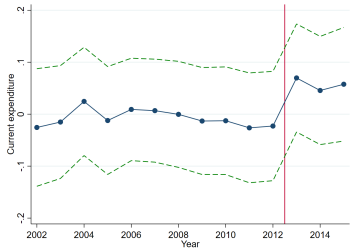


B. Commercial building tax rate

C. Population

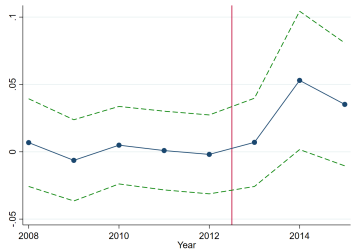


D. Net immigration

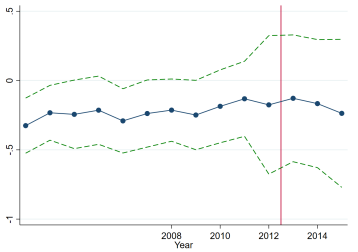


E. Current expenditure

F. Capital expenditure



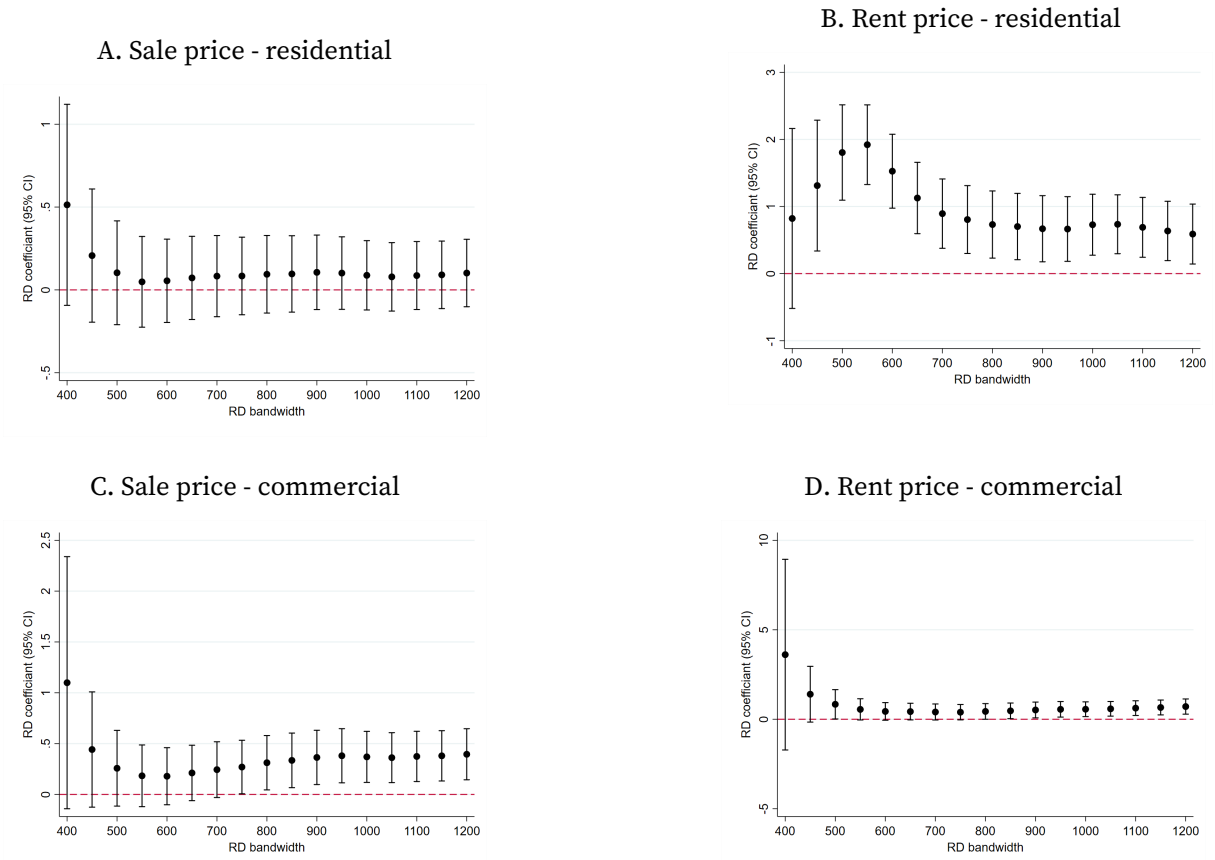
G. Childcare



H. Street lights

Note: These plots show the yearly reduced form estimates of house price measures on the instrument, having less than 5,000 inhabitants.

FIGURE A5. Different bandwidths



Note: The figures show difference-in-discontinuity estimates for house price measures (sale and rent prices) for residential and commercial buildings and a set of bandwidth sizes ranging from 400 to 1200.

TABLE A1. Unions by region

Region	IMC	Municipalities	Avg. # municipalities	Avg. mun population
Abruzzo	12	75	6.25	3851.67
Basilicata	4	27	6.75	1712.75
Calabria	14	64	4.57	3364.86
Campania	19	90	4.74	6266.53
Emilia-Romagna	41	266	6.49	7914.02
Lazio	21	102	4.86	2451.48
Liguria	20	91	4.55	2490.5
Lombardia	75	258	3.44	2238.45
Marche	20	121	6.05	4098
Molise	11	61	5.55	2850.27
Piemonte	116	753	6.49	1749.96
Puglia	23	111	4.83	11966.7
Toscana	23	136	5.91	6809.30
Umbria	2	16	8	10348
Veneto	43	198	4.60	7125.98
Total	525	2369	5.54	5015.9

Notes: The table shows the number of inter-municipal communities (IMC), the number of municipalities that are part of an IMC, the average number of municipalities, and the average population per IMC.

TABLE A2. Summary statistics

	(1) pop $\leq$ 5000		(2) pop $>$ 5000	
	Mean	SD	Mean	SD
Panel A: House prices				
Residential sale price	892.98	355.17	1236.24	478.17
Residential rent price	3.22	1.34	4.38	1.70
Commercial sale price	648.29	260.30	890.60	332.59
Commercial rent price	3.16	1.26	4.29	1.55
Panel B: Property tax rates				
Main dwelling tax rate	0.25	0.27	0.23	0.26
Base building tax rate	0.71	0.16	0.77	0.17
Panel C: Population and public goods				
Population	1829.40	1291.72	20782.13	76827.51
Net immigration (%)	0.34	2.03	0.57	1.27
Δ% Population	-0.17	2.21	0.40	1.19
Childcare providers	0.04	0.21	0.06	0.12
Street lights	37.45	390.39	16.06	146.06
Panel D: Controls				
Primary sector workers	0.10	0.09	0.06	0.07
Secondary sector workers	0.33	0.11	0.32	0.10
Young share of population	0.13	0.03	0.15	0.02
Old share of population	0.23	0.07	0.19	0.04
Foreign share of population	0.06	0.04	0.07	0.04
Altitude (m)	406.60	285.44	178.71	174.09
Population density	145.77	237.84	710.01	1063.25
North	0.60	0.49	0.53	0.50
Rural	0.82	0.38	0.15	0.36
Observations	75,829		32,931	

Notes: This table shows the summary statistics (mean and standard deviation) of the outcomes and control variables used in the main analysis. All prices in Panel A are computed in logs. In Panel B, property tax rates are in percentage points and the tax deduction is in euros. In Panel C, net immigration is defined as inflow minus outflow of people in the municipality, Δ%Population is the yearly percentage change in population. Childcare and street lights are computed per 1,000 inhabitants.

TABLE A3. House prices - Absolute values

	Residential		**Commercial**	
	(1)	(2)	(3)	(4)
	Sale	Rent	Sale	Rent
Conventional	360.340***	0.659	321.613**	0.858
	(119.791)	(0.413)	(135.033)	(0.638)
First-stage F (Conv.)	39.39	37.78	20.64	21.60
Bias-corrected	384.513***	0.676	340.590**	0.704
	(119.791)	(0.413)	(135.033)	(0.638)
First-stage F (Bias-corr.)	43.88	42.09	23.04	24.11
Robust	384.513***	0.676	340.590**	0.704
	(135.028)	(0.461)	(150.807)	(0.713)
First-stage F (Robust)	35.81	34.44	18.75	19.46
Observations	7,463	7,463	7,554	7,554
Mean	1236.243	4.385	890.597	4.289
Bandwidth	993	1141	1540	1087

Notes: The table reports difference-in-discontinuity estimates for house price outcomes, separated by building category (residential and commercial). The F statistics are for the first stage regressions of the probability to belong to an IMC on the treatment status, i.e., having less than 5,000 inhabitants in 2010. Controls include the fraction of workers in the first and second sector, the fraction of population between 0-4 and above 65, the share of foreign population, altitude of the municipality, population density, dummies for the municipality being in the North and Center of the country, a dummy for rural municipalities, a dummy equal to one if the year is an election year and region fixed-effects.

TABLE A4. House prices - Other polynomials

	Residential		Industrial	
	(1)	(2)	(3)	(4)
	ln(sale)	ln(rent)	ln(sale)	ln(rent)
Panel A: 2nd degree polynomial				
Estimate	0.578**	0.456**	1.904	2.021
	(0.229)	(0.228)	(1.235)	(1.377)
First-stage F	14.44	14.74	2.777	2.804
Panel B: 3rd degree polynomial				
Estimate	2.272*	1.553	-6.574	-6.036
	(1.380)	(1.027)	(11.038)	(9.604)
First-stage F	2.712	2.730	0.451	0.474
Observations	7,463	7,463	7,554	7,554
Mean	6.827	1.462	6.517	1.456
Bandwidth	1618	1493	1618	1493

Notes: The table reports difference-in-discontinuity estimates for house price outcomes, separated by building category (residential and commercial). The polynomial form of the running variable is second-degree (Panel A) and third-degree (Panel B). The F statistics are for the first stage regressions of the probability to belong to an IMC on the treatment status, i.e., having less than 5,000 inhabitants in 2010. Controls include the fraction of workers in the first and second sector, the fraction of population between 0-4 and above 65, the share of foreign population, altitude of the municipality, population density, dummies for the municipality being in the North and Center of the country, a dummy for rural municipalities, a dummy equal to one if the year is an election year and region fixed-effects.