When Cooperation Backfires: Examining the Effects of Inter-Municipal Cooperation on Local Housing Markets

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Abstract

Do agglomeration or congestion effects dominate when municipalities consolidate government functions? This study examines an Italian policy reform that mandated municipalities with fewer than 5,000 residents to join inter-municipal communities (IMCs) and share service provision, allowing for an assessment of the effects on local real estate prices. The findings reveal that affected municipalities experience a decrease in house prices, reflecting a decline in the quality of public goods provision. Ultimately, the results suggest that the joint management of municipal functions can be detrimental to local governments and their residents. **JEL**: H70, H71, H72, R23, R31

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1. Introduction

The optimal size of jurisdictions remains a critical and contentious issue within academic discourse, with significant implications for public administration and policy outcomes (Epple and Romer 1989; Ostrom et al. 1961; Ostrom 2010). Central to this debate is the pivotal question: do agglomeration or congestion effects dominate when municipalities consolidate government functions? Theories of public choice and fiscal federalism, which advocate for the provision of public goods and services to be managed at the lowest level of government capable of achieving desired outcomes (Oates 1972, 1999; Ostrom et al. 1961). However, excessive fragmentation of jurisdictions can lead to inefficiencies—including diminished economies of scale, increased transaction costs, and reduced competition—ultimately undermining effective governance (Oates 1999; Tiebout 1956; Alesina and Spolaore 1997; Bolton and Roland 1997). This paradox necessitates that policymakers critically evaluate jurisdictional configurations, aiming to strike a balance that enhances public service delivery while safeguarding economic vitality.

In the last two decades, numerous governments around the world have pursued the integration of smaller jurisdictions through inter-municipal cooperation (IMC) and mergers, largely motivated by the need to achieve cost savings and improve operational effectiveness following the 2008 global financial crisis (Bel and Warner 2015; Warner 2006). Despite widespread reform efforts, the fundamental question of whether larger governmental entities are more efficient in delivering public services remains unresolved in the literature. Some studies suggest that the consolidation of small municipalities can lead to reduced per capita expenditures without compromising the quantity or quality of services offered (Bel and Costas 2006; Bel and Mur 2009; Dijkgraaf and Gradus 2013; Zafra-Gomez et al. 2013; Bel et al. 2013), while others present opposing findings, indicating that size alone does not guarantee efficiency gains (Sorensen 2007; Garrone et al. 2013).

This paper delves into the Italian context, specifically examining a policy that mandates municipalities with populations below 5,000 to form inter-municipal communities, which facilitate the sharing of municipal functions among members. By utilizing administrative datasets alongside a fuzzy difference-in-discontinuity design (Grembi et al. 2016; Galindo-Silva et al. 2021), this study investigates the policy's effects on house prices, which serve as a proxy for the quality of public goods. Preliminary findings indicate that house prices in both the residential and commercial markets decrease by roughly 5% and 13%, respectively. Notably, this decline is not driven by changes in property taxes, but rather by a deterioration in the supply quality of local public goods. This quality is measured both directly, using measures of local puiblic goods as childcare supply, supply of street lights and number of libraries, and indirectly, through the analysis of migration patterns. Contrary to expectations of increased efficiency, the results suggest that the consolidation of municipal functions may produce congestion effects, complicating the decision-making process and prolonging administrative procedures.

This research contributes to three primary strands of literature. First, it enhances the discourse surrounding the optimal size of jurisdictions, exploring the balance between Oates' agglomeration argument (Oates 1969) and the potential congestion effects on local governance efficiency (Brueckner 1981). Mixed findings emerge in the literature, as summarized in the meta-analysis by Bel and Sebő (2021): evidence of savings due to economies of scale can be observed in Israel and Germany (specifically for compulsory mergers) (Reingewertz 2012; Blesse and Baskaran 2016), contrasted with findings from France, the Netherlands, Italy, and Finland, where limited effects are noted due to compensatory dynamics across various domains within the same country[1]. Other inves-

[1] In contrast, Ferraresi et al. (2018) demonstrate that inter-municipal communities lead to decreased

tigations have indicated that inter-municipal cooperation has successfully reduced local unemployment in Poland (Banaszewska et al. 2022). The advantages of agglomeration hinge on the cost structure of public services, the configuration of local governance, and the overarching governance framework (Bel and Warner 2015). Additionally, literature has explored the determinants influencing inter-municipal cooperation, with Bergholz and Bischoff (2018) finding that larger populations of German municipalities are more inclined to cooperate, while Di Porto and Paty (2018) emphasizes the significance of neighboring municipalities in decisions to join inter-municipal forms. My findings add to this body of research by demonstrating that the creation of larger governmental units can lead to reductions in property tax rates and improved tax collection, contrasting with the results of Breuillé et al. (2018) and Charlot et al. (2015), who documented diminished tax competition in France.

Second, this research contributes to the literature on the production function of local public goods. The concept of local public goods has been extensively examined in scholarly work (Stiglitz 1977; Besley and Coate 2003). However, empirical evidence regarding specific public goods, such as sewage and waste disposal (Bel and Warner 2008; Bel et al. 2013), as well as daycare and library services (Tricaud 2025), remains notably scarce. As a result, several authors have focused on house prices as an indicator of public goods quality, yielding mixed results. For example, Tricaud (2025) found no significant price effect of inter-municipal cooperation (IMC) in France, whereas Schoenholzer (2018) reported an increase in house prices linked to municipal annexation in California.

My contribution lies in elucidating the effects of inter-municipal cooperation on house prices and examining the varying impacts and mechanisms associated with different categories of buildings. The research most closely related to mine is by Tricaud (2025), which investigates the impact of inter-municipal cooperation in France on the

public expenditures in Italy's Emilia Romagna region.

supply of building permits and house prices, alongside a range of additional outcomes. A key distinction between the two studies is the mechanisms driving the effects on house prices: Tricaud (2025) concludes that house prices remain unaffected by cooperation due to compensatory dynamics between the direct and indirect effects of increased housing supply. In contrast, I find that residential house prices show no significant change because the quality of public goods remains stable, while industrial property prices rise due to reductions in property taxes. The divergence in findings can be attributed to contextual differences between Italy and France, particularly regarding the higher demand for construction in the former.

Lastly, and closely related to the previous discussion, this paper contributes to the literature on fiscal federalism and local taxation. Building upon the seminal work of Oates (1969), which links local tax and service packages to property values, numerous subsequent studies have explored the effects of property taxes on house prices (Palmon and Smith 1998; Lutz 2015), fiscal behavior (Dye and McGuire 1997), yardstick competition (Bordignon et al. 2003), and urban sprawl (Brueckner and Kim 2003; Song and Zenou 2006), along with its incidence (Aaron 1974; Sullivan 1985). My contribution lies in investigating the relationship between tax rate setting and house prices in the context of cooperation among local governments, an area that the existing literature has yet to adequately explore.

The remainder of the paper is organized as follows: Section 2 outlines the Italian framework and the evolution of IMC legislation; Section 3 discusses the data sources and sample characteristics; Section 4 details the identification strategy and examines preliminary checks of its assumptions; Section 5 presents the main results by outcome category; Section 6 assesses the mechanisms underlying the findings; and Section 7 concludes.

2. Background

Italy's administrative structure consists of four layers: Regions, Provinces, Metropolitan Municipalities, and Municipalities, the latter being the lowest level of governance. The country has inherited a fragmented administrative framework from its pre-unitary past, with a total of 7,954 municipalities as of 2018. Many municipalities are small, with median and mean populations of 2,522 and 7,694 inhabitants, respectively, in 2017. Municipalities serve as the closest authority to citizens, responsible for various public functions, including social welfare services, territorial development, local transport, education, cultural facilities, police services, water delivery, waste disposal, and infrastructure spending. This fragmentation has led Italian lawmakers to increasingly promote municipal cooperation, drawing on theories of functional federalism to enhance the efficiency of local governance (Ermini and Fiorillo 2009).

Intermunicipal communities, known in Italy as Unioni di Comuni, were established three decades ago through Law 142/1990. This framework allows municipalities to transfer specific decision-making powers and financial resources to a newly created administrative entity that provides agreed-upon services. Each municipal union acts as a legal entity with its own balance sheet, president (elected from among the mayors), and council (comprising council members from participating municipalities). Notably, Italian law stipulates that each municipality can belong to only one union, although they can change unions based on their statutes.

Composed primarily of neighboring municipalities within the same commuting zone, intermunicipal communities are widespread across the country, with a higher concentration in Northern regions, particularly Lombardy and Piedmont, and in smaller or more remote localities, such as the mountainous areas of the Alps and Apennines. The demographic characteristics show an average municipality size of roughly 4,000 inhabitants, indicating that intermunicipal cooperation mainly attracts smaller municipalities.

The development of intermunicipal communities has occurred in three phases. Initially, they were designed for small municipalities with populations below 5,000, with a temporary goal of encouraging full merging within a decade. However, limited economic incentives led to minimal interest from local administrators, with only 16 communities formed by 1999 (Ivaldi et al. 2016). Law 265/1999 eliminated the temporary nature and population size limits of these bodies, but enthusiasm for unions remained low. In 2010, the Italian government mandated municipalities with populations below 5,000 (or 3,000 in mountainous areas) to deliver public services through intermunicipal communities. This mandate established shared management of at least six essential functions, aiming to improve public service delivery and efficiency, particularly in the post-2008 recession context (Crescenzi et al. 2016). Municipalities below specified population thresholds were required to jointly manage a minimum of three “fundamental functions” by January 1, 2013; additional functions by September 30, 2014; and all remaining functions by December 31, 2014. Commonly transferred "fundamental functions" include financial management, public transport services, land registry, urban planning, civil protection, waste collection, social services, school infrastructure, and local police functions. Other functions, such as economic development and tourism, can also be transferred to improve municipal management, exemplified by coordinated municipal policing through the IMC.

Intermunicipal communities have three key political bodies: the President, the Council, and the Executive Board. Their terms coincide with those of the member municipalities. The IMC Council consists of the mayors of member municipalities and counselors elected based on population, ensuring representation for minority municipalities. The President is elected from the Council and serves a one-year term, rotating among mayors. The Executive Board includes the President and additional members based on the number of municipalities, reflecting the bargaining power associated with population size.

Despite the initial mandatory management mandate, deadlines for implementation have been extended multiple times, most recently to December 31, 2022, through decree law 228/2021. The Italian Constitutional Court intervened in 2019, asserting that the obligation to join unions cannot be absolute and must allow exemptions in cases where financial and efficiency benefits are unproven.

Financially, the role of intermunicipal communities within local government budgets has grown. For instance, in 2007, municipal unions accounted for approximately 0.10% of total local expenditures in Italy, increasing to around 0.30% by 2013 (Ferraresi et al. 2018). This percentage likely underestimates actual expenditures, as municipalities often do not aggregate allocated functions in expenditure reports. Intermunicipal communities receive financial support through transfers from member municipalities and other governmental levels, facilitating cooperative local service organization. They also benefit from exemptions to fiscal regulations impacting larger municipalities. Cooperation offers advantages such as economies of scale, reduced service duplication, and improved efficiency (Welling Hansen 2014).

The regulatory power exercised by intermunicipal communities (IMCs) regarding tax matters has been subject to diverse interpretations, especially when a local authority manages all or part of the tax service. Some scholars argue that the regulatory power related to taxation remains with the municipal council, as the Unions are entitled only to revenues from taxes and fees specific to services they manage (Article 32, Paragraph 5, of the Tuel). According to this view, IMCs can only handle the administrative aspects of tax services, similar to associations of municipalities. However, a detailed analysis reveals that many IMCs have acquired regulatory authority in tax matters. Legislative

Decree 446/1997, in Article 5, letter a), allows local authorities to conduct tax assessments in associated forms. Therefore, if the Union is permitted to assess, it follows that it can manage collections and regulatory authority as a recognized local entity. Consequently, IMCs are funded through a share of the taxes they facilitate collecting, as well as transfers from member municipalities, regions, and the State.

Following the 2001 Constitutional reform, which strengthened the role of Regions in local governance, regional governments have gained significant regulatory powers to implement national legislation concerning IMCs, alongside a role in monitoring and evaluating municipal cooperation processes. From 2011 to 2016, various regions enacted regulations that were not always homogeneous, leading to regional policy heterogeneity in the regulation and specific types of incentives offered to foster cooperation (Manestra et al. 2018). For instance, some regions—such as Veneto, Toscana, and Emilia Romagna—supported the creation of municipal unions through diverse financial incentives, while others did not provide any particular support. Lombardia stands out by maintaining a special registry of municipal unions (Unioni di Comuni Lombardi), with access to regional funds restricted to registered municipalities. Nonetheless, the overall trend shows that almost all Ordinary Statute Regions have legislated to conform to national government requirements, even as the net number of municipal unions has increased steadily over the years, accompanied by notable membership churn (Manestra et al. 2018).

Figure 2 illustrates the establishment of inter-municipal communities (IMCs) across Italian Ordinary Status regions by year of foundation. As previously noted, there were very few municipal unions prior to the year 2000. A significant change in legislation at that time led to increased popularity and formation of these unions. Despite the introduction of policies in 2010 intended to promote municipal union formation, the anticipated surge did not materialize until 2014, when the rules governing their establishment were simplified. By 2018, the final year of analysis, there were 445 active municipal unions encompassing a total of 2,369 municipalities, representing approximately 35% of all municipalities in Ordinary Status regions.

Figure 3 depicts the geographical distribution of IMCs in Italy, highlighting their characteristics and locations. Notably, many municipal unions are situated in mountainous and hilly areas, primarily due to the smaller size of towns in these regions. Additionally, the dissolution of the so-called Comunita' Montane (Mountain Communities) into municipal unions further contributed to this geographic pattern. It is also evident that these unions typically consist of neighboring municipalities that share a common territory and historical background, fostering collaborative objectives and initiatives.

Lastly, Table 1 provides a geographic breakdown of IMCs by region, along with several key characteristics. When paired with Table 2, it reveals that the average population of an IMC is less than 5,000 inhabitants, with most unions being established around 2009 and typically comprising five municipalities. The data indicates that IMCs are predominantly located in northern Italy, with the top four regions in terms of the number of IMCs accounting for roughly 50% of the total.

3. Data

This section outlines the datasets utilized for analysis, covering expenditures, revenues from Italian municipalities, information on inter-municipal communities (IMCs), population demographics, measures of public goods quality, house prices, and various municipal characteristics. The data, collected from reputable sources such as the Italian Ministry of Internal Affairs and the Italian National Statistical Institute, spans multiple years and provides an extensive view of the financial, demographic, and service provision landscape across Italian municipalities. Through careful integration and filtering, the final dataset comprises 6,188 municipalities observed from 2002 to 2018, enabling a robust examination of the effects of inter-municipal cooperation on service delivery and fiscal outcomes.

Expenditure and Revenues. Detailed balance sheet data for all Italian municipalities (over 8,000) for the years 1998-2018 were obtained from the Italian Ministry of Internal Affairs. These data include detailed categorizations of municipal expenditures and revenues. Expenditures are divided into current and capital categories and further classified into twelve functions: administration, management and control, justice, local police, education, culture, sport, tourism, transportation, environment, welfare, and trade. Revenues encompass various sources, including taxes, transfers, loans, sales, and third-party revenues, focusing primarily on current and capital expenditures. Monetary values are expressed in real terms (2015 euros) and on a per capita basis.

Unioni di Comuni. Data on all inter-municipal communities (IMCs) that have existed in Italy from 1990 to the present were collected. The dataset comprises information on 559 IMCs, detailing their member municipalities and respective years of creation and termination, compiled from the Italian Ministry of Internal Affairs and supplemented by regional registries, local newspaper articles, and other local government resources (e.g., IFEL). This allows for a comprehensive analysis of historical municipal unions.

Population. Population counts were gathered from the 2001 and 2011 Censuses, alongside intercensal population data from 2000 to 2020. This data assists in identifying municipalities subject to the 2010 mandate. Very few municipalities switched between being below and above 5,000 inhabitants during the 2001-2011 period; hence, the 2001 Census was used for years 2000 to 2009 and the 2011 Census for 2010 onwards. Additionally, net immigration data (inflows minus outflows) and birth counts were collected from the Italian National Statistical Institute.

Public Goods. Measures of public goods quality were obtained from various sources:

- ***Car Accidents:*** Data on car accidents occurring on municipal roads, sourced from Istat (Italian Statistical Institute), serves as a proxy for municipal infrastructure quality, including details on accidents resulting in injuries or fatalities and their locations.
- ***Public Libraries:*** Information on public libraries in Italy (approximately 15,000) was acquired from the Italian Registry of Libraries, detailing their dates of opening/closure, locations, and additional characteristics.
- ***Other Public Goods:*** Data regarding childcare supply, waste collection, public lighting, local police services, and school cafeteria service provision were extracted from municipal balance sheets provided by the Italian Ministry of Internal Affairs.

House Prices. For house prices, comprehensive administrative data on real estate prices and rents were collected and harmonized by the Italian Treasury. This dataset, gathered by the *Agenzia delle Entrate* - *Territorio* - *Osservatorio del Mercato Immobiliare*, covers the period from 2002 to 2018, featuring both residential and non-residential units. It includes information on sale prices and rents, collected separately for residential housing, industrial real estate (factories, industrial buildings, and craft workshops), and offices. Following Fenizia and Saggio (2020), real estate prices/rents are computed at the municipality level as the average selling price/rent in municipality m in year t, excluding outlier transactions and retaining only properties reported as having a "normal" condition.

Municipal Characteristics. Data concerning various municipal characteristics were sourced from the Italian Statistical Institute and include information on the age distribution of the population (ages 0-14 and over 65), population density, election years, altitude, employment shares in the primary and secondary sectors, and the share of the foreign population.

After merging all data sources and filtering out municipalities in Special Status regions (due to different expenditure management rules and fiscal constraints) and those that did not exist for the entire analysis period (including those that merged into new municipalities or were otherwise suppressed), the final sample consists of 6,742 municipalities spanning the years 2002 to 2018, yielding a total of 121,326 observations.

Table 2 shows summary statistics for the two groups of municipalities of interest, those with less than 5000 inhabitants and mandated to join a municipal union, and those with more than 5000 inhabitants. Columns (3) estimates the difference between the means and computes the t statistic of the difference. Panel A of the table reports the sumamry statistics for our measures of expenditure, current and capital expenditure (per capita and in real terms). Smaller municipalities have a higher per capita value of both current and capital expenditures, which is in line with the idea of smaller local governments not being able to benefit from economies of scale and scope. However, Panel B shows that these municipalities also have a higher revenues in real and per capita terms. Finally, Panel C reports the same statistics for some characteristics of the municipalities and indicates that smaller municipalities have a higher share of people employed in the primary sector (agriculture, ...), they have a higher share of older population, they are located in hilly and mountaineous areas, and they have a much lower population density.

4. Methodology

The IMC mandate, which has been in effect since 2010, introduces a sharp cutoff at a population size of 5,000 inhabitants. However, this cutoff is not the only policy that varies based on population size; it coincides with a significant increase in the wages of mayors and other members of the executive committee, as defined by a remuneration policy established in the early 1960s. Research by Gagliarducci and Nannicini (2013) indicates that this wage increase at the 5,000-inhabitant threshold attracts more educated individuals to political roles and leads to improved performance among elected officials. Furthermore, after 2001, municipalities with populations below 5,000 were exempted from the Domestic Stability Pact—a set of fiscal rules imposed by the central government aimed at regulating local financial management. As noted by Grembi et al. (2016), these constraints alter the spending behavior of affected municipalities, making it a relevant confounder in assessing the effects of the IMC mandate.

Given the institutional framework outlined above, three key treatments change at the 5,000-inhabitant threshold: the salary of the mayor and executive officers, fiscal rules, and the mandate for municipal unions. Municipalities below this threshold not only have lower mayoral salaries throughout the sample period, but they also enjoy greater spending flexibility. In contrast, the municipal union mandate was introduced in 2010 for those municipalities. Consequently, using a cross-sectional regression discontinuity (RD) estimator would yield a biased estimate of the average treatment effect (ATE) of the mandate, as the effects of these three confounding treatments become entangled.

To address this multiple policy issue, I employ a fuzzy Difference-in-Discontinuity identification strategy, following the approaches of Galindo-Silva et al. (2021) and Millán-Quijano (2020). This method intuitively leverages pre-period data to control for any existing differences in outcomes at the cutoff, allowing for the identification of the treatment effect of interest by isolating the impacts of concurrent policies at the same threshold. The identification of the ATE assumes that: 1) the conditional expectation of all potential outcomes is continuous at the cutoff; 2) the determination of whether an individual is subject to the treatment is independent of potential outcomes near the cutoff, meaning individuals cannot self-select into the treatment; 3) the confounding policy maintains the same effect before and after the treatment; and 4) the probability of selection into each policy and the joint probability of selection remain constant. If these five assumptions hold, the fuzzy Difference-in-Discontinuities estimator can accurately identify the local causal effect of the treatment of interest. For a comprehensive discussion of these assumptions and their econometric treatment, see Galindo-Silva et al. (2021).

Estimation can be performed non-parametrically by selecting a smoothing parameter. I adopt the bandwidth selection method proposed by Picchetti et al. (2024), which minimizes the Mean Square Error of the estimator, similar to the recommendations of Calonico et al. (2014) for simple regression discontinuity designs. Additionally, I calculate robust confidence intervals that demonstrate superior properties compared to the bias-corrected intervals suggested by Calonico et al. (2014).

Figure 4 presents the yearly RD estimates for the likelihood of being part of an inter-municipal community surrounding the 5,000-inhabitant cutoff. The two red lines mark 2010—the year the policy was implemented—and 2014—when a set of incentives was introduced to encourage municipal participation. Subfigures a) and b) display the RD estimates for the year before the reform (2008) and a year after (2015). Notably, there is no significant effect of being a municipality with fewer than 5,000 inhabitants on the likelihood of joining an IMC prior to the reform. However, the estimate becomes positive and statistically significant after the policy was enacted, although the increase in probability is modest. Subfigure c) illustrates the evolution of yearly RD estimates over time alongside their 95% confidence intervals. The main takeaways from this analysis are: first, prior to 2010, RD estimates are insignificant and close to zero, indicating that municipalities formed unions irrespective of their population size. Second, even after the policy's implementation in 2010, not all municipalities that were expected to join did so, with only a 30% increase observed by 2018 in the likelihood of municipalities with fewer than 5,000 inhabitants belonging to an IMC. This can be attributed to the gradual enforcement of the mandate and the persistent parochialism among municipalities, as well as local politicians' concerns about potential electoral repercussions from supporting municipal unions, especially in smaller towns.

Lastly, the policy's effect became statistically significant in 2014, coinciding with the introduction of additional incentives and simplifications aimed at facilitating the creation of unions. It is important to note that 2010 should not be considered the definitive start of the post-reform period, as municipalities were granted a three-year window to delegate their functions to the newly established entities. Therefore, since this study focuses on the impact of cooperation on public good quality, it is more appropriate to define the post-period as commencing in 2013, when shared functions began to be officially implemented (Bellodi et al. 2022).

Thus, I define the post-period starting in 2013 and compare municipalities both above and below the 5,000-inhabitant threshold, before and after this year. The primary specification utilizes a first-order polynomial with a robust estimation procedure. As a robustness check, I will estimate the same model using higher-order polynomials (second and third), different bandwidths, and various estimation techniques in the Appendix. Formally, I estimate the following model, in line with the methodologies outlined by Galindo-Silva et al. (2021) and Miller et al. (2023):

$$Y = \alpha_1 + \alpha_2 Treat + \alpha_3 Post + \tau Treat * Post + f(X, Post) + \varepsilon$$

and $Treat = \tau_0 + \tau_1 I(Pop < 0) + \tau_2 Post + \tau_3 I(Pop < 0) * Post + f(X, Post) + u$, where (Pop) is the population of municipality (m) in year (t) recentered around zero, (I(Pop < 0)) is an indicator function that equals one if the population is below zero in year (t) (less than 3,000 for mountainous municipalities and less than 5,000 for other municipalities), (Post) is a binary variable that equals one for the years 2013 and onward, and (f(X, Post)) is a polynomial function of the running variable that includes interactions with (I()). Since the design is fuzzy rather than sharp, the participation in inter-municipal communities (IMCs) is only partially determined by crossing the population cutoff. Some municipalities opted to form IMCs prior to the mandate's implementation, while others resisted compliance even after the mandate was enforced. The estimator (τ^{FRD}) is the fuzzy difference-in-discontinuities estimator, obtained through a two-stage least squares estimation. The variable ($Treated_{r(m)}$) indicates municipalities (m) in region (r) with a population of less than 5,000 (or 3,000 for mountainous areas) after 2010.[2]

Finally, ($M_{r(m),i-j}$) includes a set of municipal controls, such as the proportion of workers in the primary and secondary sectors, the share of the population aged 0-4 and over 65, the percentage of the foreign population, the municipality's altitude, population density, and an indicator for election years. The term ($\theta_{r(m)}$) captures region fixed effects to control for potential confounders stemming from differing regional characteristics, including varying incentives to join inter-municipal communities (Ferraresi et al. 2018). The primary outcomes of interest are the log of residential and commercial house sale and rent prices, with additional variables described in Section 6.

5. Results

The principal findings are summarized in Table 4, which analyzes the impact of joining an inter-municipal community (IMC) on sale and rent prices for two categories of properties: residential and industrial. In economic literature, variations in house prices are frequently interpreted as indicators of changes in the quality of public services; amenities such as educational institutions, parks, and shopping centers typically enhance

[2]Following Grembi et al. (2016), I utilize both census populations: the 2001 Census for the years 2002 to 2009 and the 2011 Census for the year 2010 onward. However, results are robust to using the 2010 population, the population from the reform year, or the yearly intercensal population.

property values, whereas disamenities such as noise and pollution detract from them (Fishel 2001). Accordingly, homebuyers and tenants are often inclined to incur higher costs for properties located in areas that provide superior public services and overall living conditions.

A limitation of the house price data lies in the absence of detailed property characteristics, such as the number of rooms and square footage. However, the dataset categorizes buildings into three distinct conservation states (poor, average, optimal), which facilitates the aggregation of properties with similar attributes. This approach to measuring house prices has been employed and substantiated by prior literature, thus providing a reliable framework for assessing the effects in question (Fenizia and Saggio 2020; Accetturo et al. 2021; Zurla 2023).

To illustrate the observed impacts, I commence with plots of the yearly reduced-form estimates for sale and rent prices across both property categories. Figures 5a) and 5b) depict the estimates for residential sale and rent prices. Notably, there is a significant downward shift in the trend for residential prices following the implementation of the IMC policy in 2010. Prior to this intervention, a relatively stable pre-trend persisted until 2009, indicating consistent price levels; however, a pronounced negative change is evident after the policy took effect. This trend is similarly reflected in plots 5c) and 5d), which illustrate industrial prices, where a comparable flat pre-trend transitions into a significant decline subsequent to 2010. Collectively, these initial findings suggest that municipalities integrating into an IMC experience adverse effects on both residential and commercial property prices.

These results are further corroborated by the estimates presented in Table 5. Derived from the two-stage least squares (2SLS) difference-in-discontinuity analysis outlined in Section 4, Columns (1) and (2) reveal a statistically significant effect on sale and rent prices for residential properties across all specifications. The coefficients are negative and robustly significant, with a decrease in sale prices ranging from 4% to 4.3%, and a decline in rent prices between 6% and 6.2%. In Columns (3) and (4), a more pronounced reduction in commercial property sale prices is evident, exhibiting a decrease of 11.5% to 13.1% relative to the mean, accompanied by a notable 15% to 18% reduction in rent prices. The estimates closely align when employing the robust and bias-corrected estimation procedure developed by Calonico et al. (2017). Importantly, all specifications demonstrate a strong first stage, as indicated by a high F-statistic value. The findings are consistent across various bandwidth specifications, as demonstrated in Figure A1 and across polynomial specifications (Table A2)[3].

These findings have significant implications regarding the effects of municipal cooperation facilitated through IMCs. The observed decline in property values suggests that the anticipated benefits associated with improved public services and amenities may not be realized for residents and businesses following the formation of an IMC. This raises critical questions about the effectiveness of such cooperative arrangements in enhancing local governance and service quality. Notably, these results align with existing literature, which indicates that inter-municipal cooperation does not always translate into expected improvements in public service delivery.

5.1. Validity tests

The identification strategy employed in this analysis utilizes a fuzzy regression discontinuity design applied to first differences. This approach necessitates adherence to specific assumptions related to both instrumental variable methodology and the difference-in-discontinuity framework. The validity of the first stage is evaluated by calculating the F-statistic across all specifications, ensuring the instruments used are sufficiently strong. Additionally, the parallel trends assumption is assessed by plotting

[3] The same results stand when using non-tranformed prices as in Table A2

the reduced-form estimates over time for each specification.

To verify the assumptions for the difference-in-discontinuity design, I first examine the continuity of the running variable—specifically, the population count—following the guidance of McCrary (2008). Figure 5 illustrates that the Census-derived population figures from 2001 and 2011 exhibit a smooth distribution at the cutoff, supporting the continuity assumption. The census is conducted independently by the National Statistical Office, ruling out the possibility of false reporting.

Subsequently, I conduct balance tests on the characteristics of municipalities around the cutoff to ensure a smooth distribution across this threshold. Table 3 provides descriptive statistics for key demographic and economic variables, confirming the absence of discontinuities or manipulations that could bias the results. Furthermore, Table xx demonstrates that the point estimates remain consistent with the inclusion of municipal controls, emphasizing that covariates do not influence the estimates. Following Grembi et al. (2016), I focus on geographical characteristics of the municipalities, acknowledging that Italian geography correlates with economic development, crime rates, and factors related to opportunistic manipulation.

Next, I examine the sensitivity of the estimates to bandwidth choices, as illustrated in online Appendix Figure xx. I select bandwidths in increments of 50 inhabitants surrounding the optimal bandwidth calculated using Calonico et al. (2019). The estimates display robustness, remaining consistent within a range close to the value obtained from the optimal bandwidth.

Inspired by Della Vigna and La Ferrara (2010), I perform difference-in-discontinuity estimations for house price outcomes using false population thresholds around the true cutoff of 5,000. These false thresholds extend from 3,900 to 4,900 and 5,100 to 6,100, ensuring sufficient distance from the actual policy threshold. For mountainous municipalities, thresholds from 1,900 to 2,900 and 3,100 to 4,100 are employed. At these fabricated points, we do not expect to observe systematic treatment effects similar to our baseline findings.

Figure A7 displays the cumulative density functions for residential and commercial building prices based on 2,000 placebo estimates. This analysis employs a third-order spline polynomial specification. The premise is that we should not see many coefficients outside the actual threshold's range. Indeed, all placebo coefficients fall below the estimated values for both residential and commercial properties, with the cumulative density functions steeply clustered around zero. Notably, only 3 percent of the placebo coefficients for residential prices and 5.5 percent for commercial prices exceed the absolute value of the true coefficient and show opposite (negative) signs compared to the true baseline estimate. Overall, these placebo tests strongly reinforce the robustness of our main findings related to fiscal discipline.

In conclusion, this rigorous assessment of continuity and smooth distributions validates the identification strategy utilized in this study. By ensuring that necessary assumptions are satisfied, the analysis provides a robust framework for examining the relationship between inter-municipal cooperation and local outcomes. Maintaining the design's integrity further strengthens confidence in the policy implications drawn from the findings. Future research should explore these relationships further, particularly by incorporating additional variables that may influence the effectiveness of inter-municipal cooperation in enhancing local governance and public service delivery.

6. Mechanism

The main result indicates that municipalities joining an inter-municipal community (IMC) experience a decrease in house prices in both the residential and commercial sectors. Several factors may contribute to this finding. On the demand side, changes in property tax rates could directly impact housing affordability and influence buyers' purchasing power. Additionally, variations in the quality of local public goods—such as education, public safety, and infrastructure—might affect residents' quality of life and, consequently, the desirability of housing. Research by Tricaud (2025) further suggests that supply-side factors may also play a role, particularly regarding changes in the issuance of housing construction permits, to which I add land supply measures.

6.1. Property Taxes

To examine demand-side factors, I begin by analyzing the property tax policies and rate-setting behaviors of municipalities that participate in inter-municipal communities (IMCs). Although existing literature on the impact of IMCs on local taxation is limited, it offers valuable insights. For instance, Breuillé et al. (2018) identifies a correlation between inter-municipal cooperation in France and increased taxation, as reduced competition enables municipalities to avoid undercutting one another. However, various dynamics are also at play; a principal motivation for endorsing IMCs is their potential to yield economies of scale, possibly leading to lower public expenditures and, consequently, reduced taxation (Duncombe and Yinger 1993). Furthermore, the presence of positive or negative spillover effects may influence taxation. In scenarios characterized by positive spillovers, IMCs may necessitate increased taxation as benefits become internalized, whereas negative spillovers could exert downward pressure on tax rates (Wilson 1986). Thus, the relationship between IMCs and taxation remains ambiguous, warranting further investigation in this section. Additionally, substantial literature highlights the negative relationship between property tax rates and house prices (Oates 1969; Elinder and Persson 2017; Oliviero et al. 2019). Collectively, these factors position property taxes as a plausible channel through which joint management of municipal functions may affect the housing market.

Property tax is the primary source of revenue for local governments in Italy. In 2015, property tax revenues accounted for 18% of total municipal revenue and 42% of total tax revenue for the average municipality[4]. Mayors are empowered to adjust tax rates within limits established by the central government, rendering the property tax rate a critical instrument for managing local taxation and revenues. Although the structure of the property tax has evolved throughout the analysis period, these changes have uniformly impacted all municipalities, ensuring that they do not skew the results[5]. The property tax is distinguished by two rates: one applicable to primary residences[6] and another for non-residential properties. Primary residences are exempt from taxation unless categorized as luxury homes[7]. All other buildings are subject to taxation. The central government establishes a base tax rate, allowing municipalities to modify it within specified parameters[8]

Figure 6 presents the yearly reduced-form estimates for the period from 2002 to 2018. Subfigures a) and b) display the estimates for the main dwelling and base building tax rates, respectively. There is no evidence of any significant change in these rates following the implementation of the 2010 mandate, nor is there a noticeable change after 2014 when joint function management became mandatory. In both cases, a stable pre-trend is observed, but no clear alteration occurs post-policy implementation, suggesting that the average difference between the pre- and post-periods is likely not statistically significant. Robustness checks reveal that the results hold under different bandwidth specifications, as shown in Figure A2.

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[4]Ministry of Finance, 2015

[5]The principal change involved expanding the range for adjusting tax rates, thereby granting mayors greater discretion in rate-setting (Shi and Tulli 2020)

[6]A residence is classified as primary if an individual and their family officially and habitually reside there.

[7]All primary residences were taxed uniformly in 2012 when a new government partially altered the tax structure.

[8]The base tax rate for primary residences is 0.4%, while it is 0.76% for non-residential properties. Mayors can adjust this rate by up to 0.2% for primary residences and 0.3% for non-residential properties.

The trends observed in the graphical analysis are corroborated by the estimates presented in Table 5, which detail the effects of inter-municipal communities (IMCs) on property tax rates. The results indicate no statistically significant effect on the tax rate for either primary residences or other types of buildings. Notably, the coefficients display opposing signs—positive for the primary dwelling rate and negative for the rate applied to other properties—but lack significance across all specifications. This finding implies that the joint management of municipal functions does not meaningfully influence the tax-setting behavior of participating municipalities. This may be attributed to the nature of the IMC, which does not directly collect revenues but rather receives transfers from member municipalities based on their populations. Therefore, while cooperation may diminish competitive pressures, it does not extend to tax-setting dynamics, as the IMC is not directly influenced by these competitive interactions.

6.2. Public good quality

The next mechanism to consider involves changes in the quality of local public goods. As previously mentioned, Italian municipalities are responsible for managing eleven functions: administration and control, justice, local police, education, culture, sports, tourism, transportation, environment, welfare, and trade. Since 2001, municipalities have been granted greater autonomy in managing local public goods, reflecting a broader decentralization of powers from the State. For instance, municipalities can now oversee not only the infrastructure of school buildings (e.g., lighting, heating, maintenance) but also the establishment of new schools and the closure of outdated ones.

In this section, I focus on a specific set of public goods commonly studied in the literature that are also pertinent to the Italian context. I compute supply measures as ratios of satisfied applications to total applications submitted for childcare services, as well as the ratio of households served by trash collection services to the total number of households. Additionally, I assess the adequacy of school canteen and soup kitchen services by calculating the ratio of satisfied demands to total demands. Public lighting is measured by the ratio of public roads equipped with lighting to total kilometers of public roads. Furthermore, I include data on the number of local police officers per 100,000 inhabitants, as well as the number of libraries per 100,000 inhabitants and car accident rates (both with and without casualties) as proxies for infrastructure quality.

Figure 7 presents the reduced-form estimates for various public good measures. A noticeable negative trend is evident across all three measures following the implementation of the policy in 2010. Specifically, both childcare supply and library availability exhibit a declining trend that commences immediately after 2010, whereas the availability of street lighting shows a more pronounced decrease starting in 2014. Overall, the pre-trends remain relatively stable, with changes in trends emerging only after the policy was enacted, as anticipated. This stability supports the parallel trends assumption necessary for accurately estimating the causal effects of interest.

Table 7 evaluates the impact of joining an inter-municipal community (IMC) on various public goods, including childcare, street lighting, and libraries. The results indicate a statistically significant decrease in the probability associated with childcare, with a coefficient of −0.156 and a standard error of 0.045, significant at the 1% level. This suggests that participation in an IMC negatively impacts childcare services. Similarly, street lighting shows a significant decline, with a coefficient of −0.780 and a standard error of 0.372, significant at the 5% level. In contrast, the effect on libraries is minimal and not statistically significant, with a coefficient of −0.003 and a standard error of 0.009, indicating no substantial impact. The first-stage F-statistics, all exceeding 50, confirm the strength of the instruments used. The analysis includes controls for demographic and regional factors, and the reported standard errors are robust. Figure A3 illustrates that the results are stable when alternative bandwidth specifications are applied.

These findings collectively highlight the potential adverse effects of IMC participation on certain public goods. The negative impacts on childcare and street lighting suggest that municipalities may struggle to maintain service quality when consolidating functions under IMCs. This underscores the need for policymakers to carefully consider the implications of such cooperation on public service provision, ensuring that the expected efficiencies do not come at the expense of service quality.

6.2.1. Population

Moreover, the findings do not support the concept of "voting with their feet," which posits that residents may relocate in response to perceived changes in the quality of local public goods. To explore this hypothesis, I analyze various measures of population change, including birth rates (expressed per 1,000 individuals), net immigration (calculated as the difference between inflows and outflows of residents), and both total and percentage changes in population. Additionally, I consider income indicators such as average municipal taxable income. According to Tiebout's hypothesis, fluctuations in the quality of local public goods should incentivize residents to migrate between jurisdictions in search of an optimal balance between taxes and amenities. Such demographic shifts could significantly influence local population distributions and potentially contribute to gentrification, as suggested by the findings of Sieg et al. (2004) and Vigdor (2002).

Figure 8 illustrates the reduced-form estimates for the analyzed population measures, concentrating on two primary indicators: a) population growth and b) net immigration. In Subfigure a), the chart presents yearly reduced-form estimates of population growth, calculated as the logarithm of the population for municipalities with fewer than 5,000 inhabitants. The data reveal a declining trend in population growth over the observed period, suggesting challenges related to demographic dynamics within these municipalities.

Subfigure b) displays the yearly estimates of net immigration, determined by subtracting outflows from inflows of residents. The graphical representation highlights notable fluctuations in net immigration figures, reflecting the influence of local policies and conditions on migratory patterns.

The results presented in Table 7 indicate a significant negative effect on both population growth and net immigration. Specifically, population growth decreases by approximately 6.5% to 7.3%, while net immigration reveals an increase in out-migration, quantified as a loss of approximately 88 to 89 individuals. These findings underscore the limited responsiveness of the population to changes in local public goods, suggesting a potential disconnect between public service quality and residential mobility. The results exhibit robustness to different bandwidth configurations, as evidenced by Figure A4.

6.3. Housing and land supply

On the supply side, I examine both housing and land availability. Although comprehensive data on housing construction permits in Italy is limited—aside from a snapshot from 2001—I use revenues from housing construction permits as a proxy. This revenue is calculated by multiplying the number of permits issued by the constant price of a permit during the period of interest. Thus, revenue serves as an approximate measure of variations in permits granted[9].

Regarding land supply, I utilize data from ISPRA, the Italian Higher Institute for Environmental Protection and Research, which provides information on the percentage of unused land per municipality for the years 2006, 2012, and 2015-2021. Assuming that water bodies and land with high steepness remain unchanged, reductions in unused

[9] This analysis assumes that the number of illegal constructions does not change significantly over time. This assumption is reasonable, given the stable enforcement of tax evasion regulations in this sector.

land can be attributed to human construction activities, including buildings of various types, serving as a useful proxy.

Figure 10 provides insights into the dynamics of housing and land use in municipalities with populations under 5,000 inhabitants. The first plot, depicting house permits, showcases trends over time, illustrating fluctuations in the volume of permits issued. This trend can indicate the local real estate market's health, reflecting potential demand for new housing developments. Analyzing these patterns helps stakeholders understand how regulatory environments and market conditions impact housing availability.

The second plot focuses on land use, revealing the percentage of surface area designated for construction across these small municipalities. This metric is crucial for urban planning and resource allocation, as it highlights how much land is being utilized for housing versus other purposes. The combination of these plots allows for a comprehensive overview of the relationship between housing policy, land use, and economic factors in these communities, offering valuable insights for policymakers and planners aiming to enhance housing strategies and urban development initiatives.

Table 8 presents findings that indicate no significant changes in either revenues from construction permits or land usage. These results are consistent across various specifications and bandwidths, as illustrated in Figure A5. Given that these measures are proxies and the land usage data cover only limited years, the results should be interpreted cautiously.

In conclusion, the analysis suggests that the current policy framework has not led to significant alterations in housing and land supply metrics. These observations highlight the need for further investigation into the factors influencing supply dynamics and suggest that alternative measures or datasets may be necessary to capture nuanced changes within the sector.

6.4. Expenditure

This the results related to expenditure measures, specifically focusing on two types: current expenditures—such as staff salaries and rental payments—and capital expenditures, which encompass costs associated with purchasing real estate and funding infrastructure projects or long-term initiatives. Both types are calculated on a per capita basis and expressed in real terms (2015 euros).

To begin, I plot the yearly reduced-form RD estimates for each type of expenditure. This analysis not only examines trends but also serves as a check on a key assumption of the difference-in-discontinuity design: the absence of pre-trends, similar to a difference-in-difference approach. The expectation is that, prior to the policy's implementation, the yearly RD estimates will exhibit a flat trend; following the policy's onset, we anticipate detecting a break in the trend if the policy impacts the outcome in question.

Figure 10 displays these estimates, which represent yearly RD regressions of per capita real current and capital expenditures against the population cutoff, serving as the treatment instrument. The plots are centered around 2010, the year when the municipal union mandate was enforced for municipalities with fewer than 5,000 inhabitants. No clear pattern emerges regarding capital expenditure, while a distinct trend break is evident in current expenditure. The pre-trends appear fairly flat, but after 2010, current expenditure shows a notable increase.

Table 8 provides estimates of the effects of inter-municipal communities (IMCs) on municipal expenditures, specifically differentiating between current and investment expenditures. The results indicate a statistically significant positive relationship between IMC participation and current expenditure, with a coefficient of 0.461. This suggests that municipalities involved in IMCs tend to increase their current spending. This increase could reflect enhanced service delivery as communities consolidate resources and improve the efficiency of public service provision, or it might stem from the additional organizational costs associated with managing the new community. In contrast, the investment expenditure estimates reveal no significant effect, with a coefficient close to zero and no statistically significant findings. As shown in Figure A6, the findings remain significant across a range of bandwidth specifications.

The analysis also includes robust controls for demographic and economic factors, such as the proportion of workers in various sectors and the age distribution of the population. The first-stage F-statistics indicate that the instruments employed are sufficiently strong, supporting the validity of the inferences drawn regarding expenditure behaviors. These findings underscore the complexities of municipal finance dynamics under IMC arrangements, where changes primarily affect day-to-day operational spending rather than long-term investment decisions.

7. Other results

7.1. Active vs inactive IMC

One potential reason for the observed negative effects of sharing functions across municipalities may be that not all Integrated Municipalities Consortia (IMCs) are genuinely active; some may exist solely for the purpose of receiving grants and transfers from the State and the Regions. This situation could bias the results, as we would be estimating not an average treatment effect (ATE) but rather an intent-to-treat (ITT) effect, both of which are locally estimated.

To obtain a more accurate assessment of the ATE, I identify the active IMCs by applying the criteria established by the Madia law, which requires them to demonstrate activity through the submission of financial reports to the central government. This examination reveals that, in certain Regions such as Campania, Calabria, and Sicily, some "existing IMCs" have not, for instance, elected their councils, and, in severe cases, there is no evidence of any activity. It is reasonable to conclude that these Municipal Unions (MUs) were created primarily to qualify for the initial ad hoc incentives provided by regional governments but have never engaged in meaningful activities. Of the 532 IMCs in existence in 2018, 101 were identified as inactive, meaning they reported no expenditures from the time of their establishment up until 2018.

Inactive IMCs are dispersed throughout the nation, with a notable concentration in Central and Southern regions; however, small inactive MUs can also be found in Piedmont, Veneto, and Liguria. Conversely, unsuccessful IMCs are relatively rare in Veneto, Lombardy, and Tuscany. This discrepancy may stem from the administrative oversight of local governments by regional authorities, which possess legislative powers over these matters.

In the primary analysis comparing municipalities within active Inter-Municipal Communities (IMCs) to those not affiliated, we find that the previously observed negative effects disappear, as shown in Table A3. Residential rent estimates yield significant results, especially using the bias-corrected (0.142*) and robust methods, suggesting a substantial impact of IMC status on rental prices. Conversely, the analysis of commercial properties reveals no statistically significant estimates through similar metrics. The first-stage F statistics demonstrate strong instrumentation across all categories, reinforcing the reliability of the underlying regressions. Table A4 further supports these housing market conclusions by showing no effect on the analyzed mechanisms—taxes, public good quality, population, or supply. This comprehensive approach highlights the nuanced effects of IMC status on property markets, with distinct differences between residential and commercial sectors.

8. Conclusions

This article provides new evidence on the effects of inter-municipal cooperation (IMC) on member municipalities. By exploiting a mandate requiring municipalities with populations below 5,000 to join an IMC, I find that Italian municipalities experience an increase in industrial property prices and rents, while there are no significant changes in residential house prices and rents. This price increase is explained as a consequence of changes in tax rate setting among cooperative municipalities; specifically, I observe a 24% decrease in the property tax rate, aligning with findings in previous literature (Cebula 2009; Lutz 2008, 2015; Oliviero et al. 2019). Importantly, these price changes are not attributable to alterations in public good quality, as evidenced by the absence of effects on population movements and income. Notably, municipalities benefit from IMCs, as decreasing the property tax rate positively affects revenues.

Collectively, these results indicate that inter-municipal cooperation fosters economies of scale, enhancing efficiency within local government. However, this efficiency manifests in lower taxes rather than improvements in public goods. This finding resonates with the observations of Oates (1969), who noted that when a reduction in tax rates is not accompanied by investment in public goods, house prices may increase, but amenities do not improve, which can explain the lack of population mobility across jurisdictions.

These insights prompt several avenues for future research. One potential direction is to investigate the long-term effects of IMCs on property values and the quality of public goods beyond the initial post-implementation period. Understanding how perceptions of public goods quality evolve over time in response to IMC participation could shed light on community dynamics and resident satisfaction.

Additionally, probing the relationship between IMC participation and demographic changes—such as migration patterns and local population dynamics—may provide a richer understanding of how these collaborations influence tax bases and community composition. Comparative studies examining different regional or international contexts could also enhance our comprehension of the diverse outcomes and best practices associated with municipal cooperation.

Finally, incorporating qualitative research that captures the perspectives of local policymakers and residents will be crucial for unraveling the complexities of intermunicipal cooperation. Insights into the motivations, challenges, and expectations of stakeholders involved in IMCs can inform the development of more effective policies that align local governance with community needs and aspirations.

In summary, while this research highlights the immediate economic implications of IMC participation, it also lays the groundwork for future explorations that can enhance our understanding of the multifaceted impacts of municipal cooperation on local governance and community welfare.

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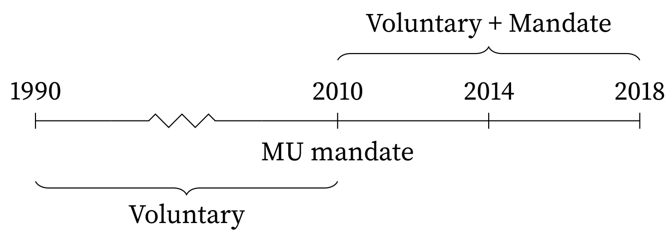
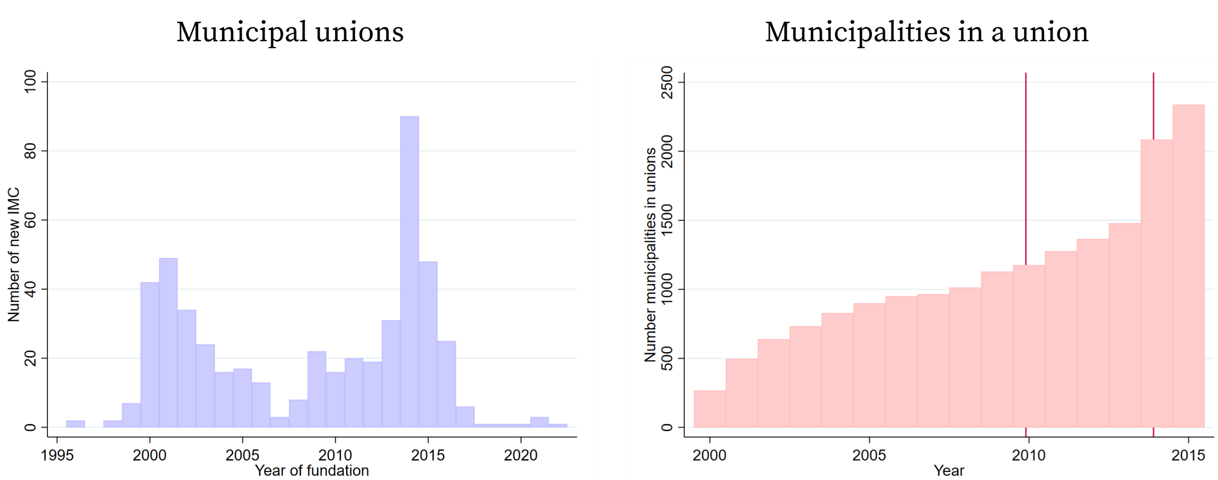
Appendix 9. Figures

FIGURE 1. Inter-Municipal Cooperation (IMC) timeline



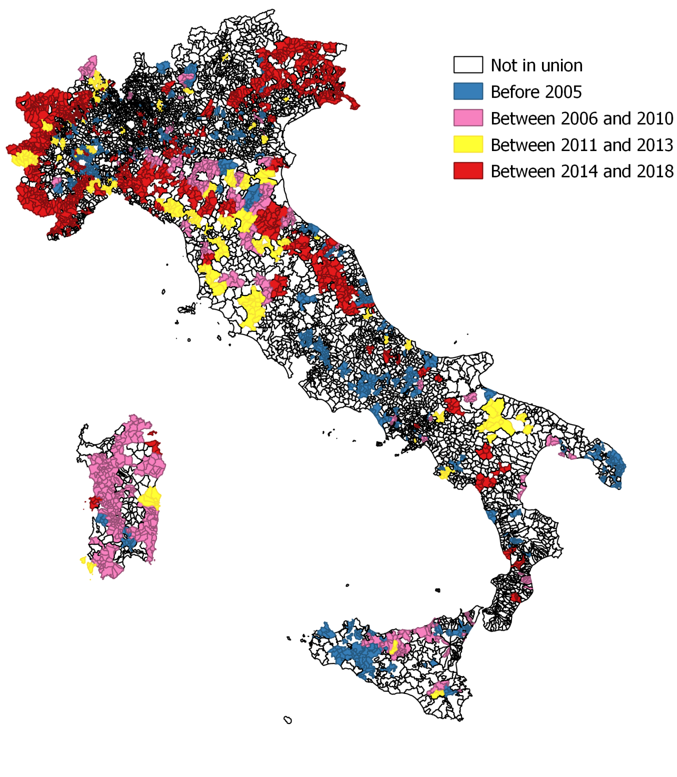
- In 1990, municipal unions were introduced in the Italian public law. Municipalities were free to join but they had to merge after 10 years of union.
- In 2000, the mandatory fusion requirement has been removed.
- In 2010, Italy passed a law that **mandate** municipalities with less than 5,000 inhabitants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

FIGURE 2. Inter-municipal community statistics



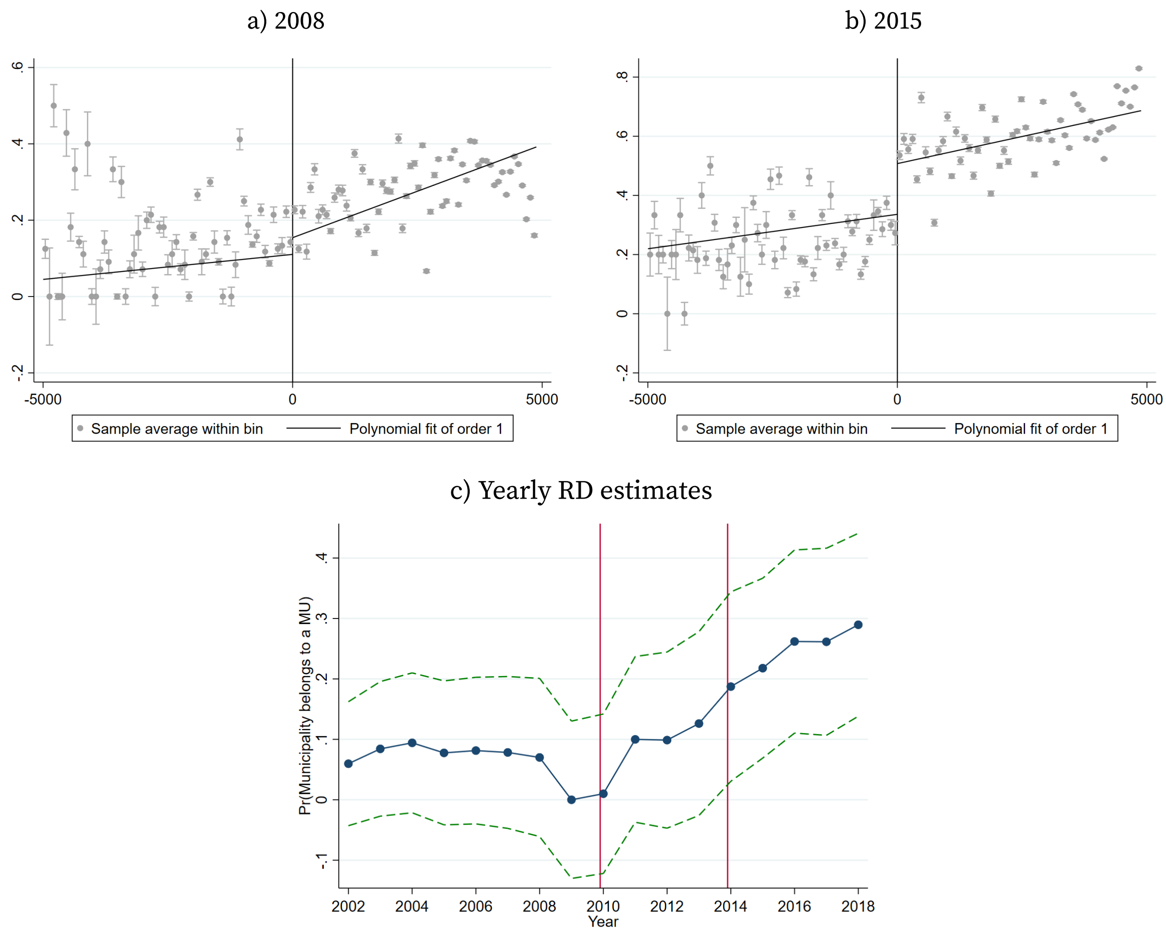
Note: The plot on the left reports the number of municipal unions by year of foundation, the plot on the right shows the number of municipalities in a municipal union by year.

FIGURE 3. Map of inter-municipal communities over time



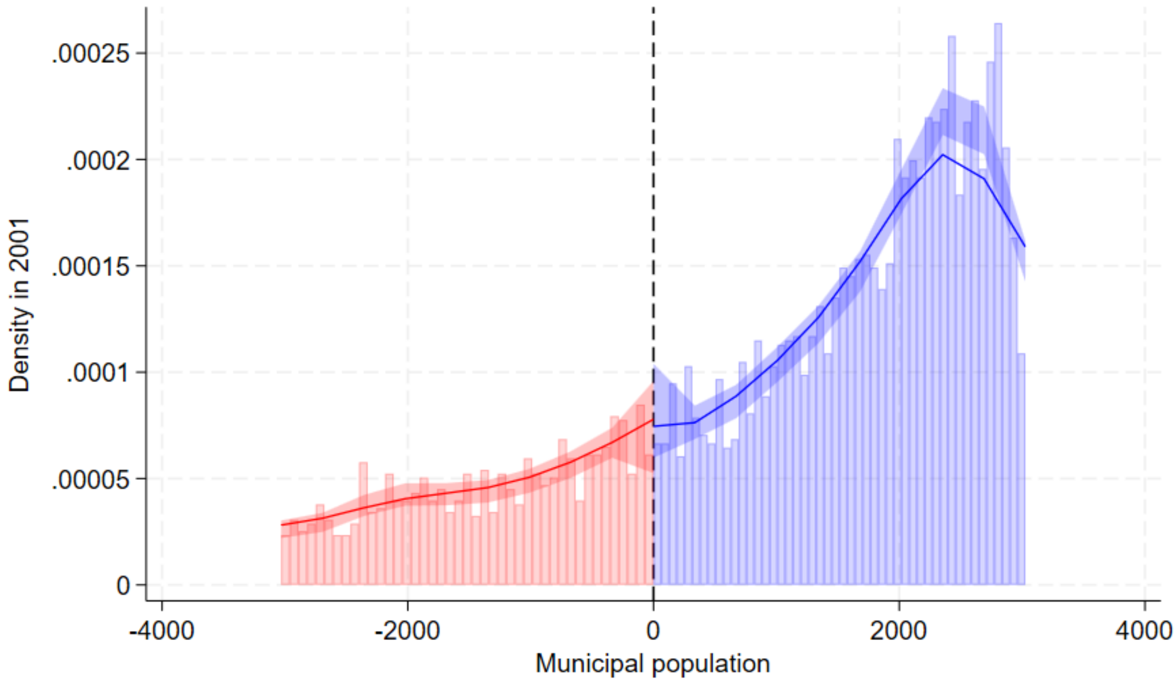
Note: The map shows Italian municipalities borders and their status, in or not in an IMC. For the municipalities in an IMC, the different colors indicate the different time period when the municipality first joined an IMC. Yellow and red refer to those municipalities which joined an IMC after the 2010 mandate.

FIGURE 4. Regression Discontinuity estimates



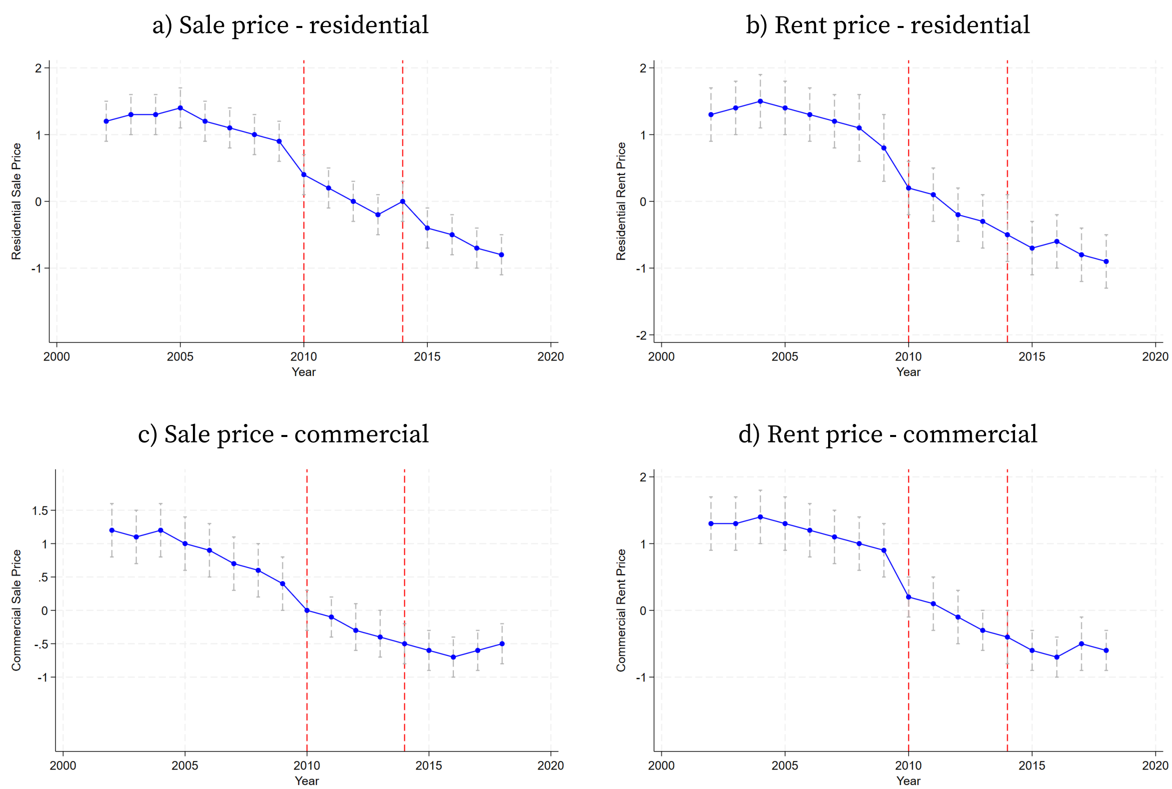
Note: This figure shows the RD estimates for the probability of belonging to an IMC over time. Subfigures a) and b) show RD plots for the years 2008 and 2015, before and after the IMC reform, respectively. The running variable is centered around 5000 and the dots above the cutoff represent municipalities with less than 5000 inhabitants and viceversa. 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 two stages of the reform, implementation in 2010 and reinforcement in 2014. The optimal bandwidth is computed using Calonico et al. (2017), the polynomial is first degree, and the kernel is triangular.

FIGURE 5. McCrary's test



Note: This figure illustrates the results of the McCrary test for discontinuities in the population count at the cutoff. The population used by the law is the 2010 intercensal population.

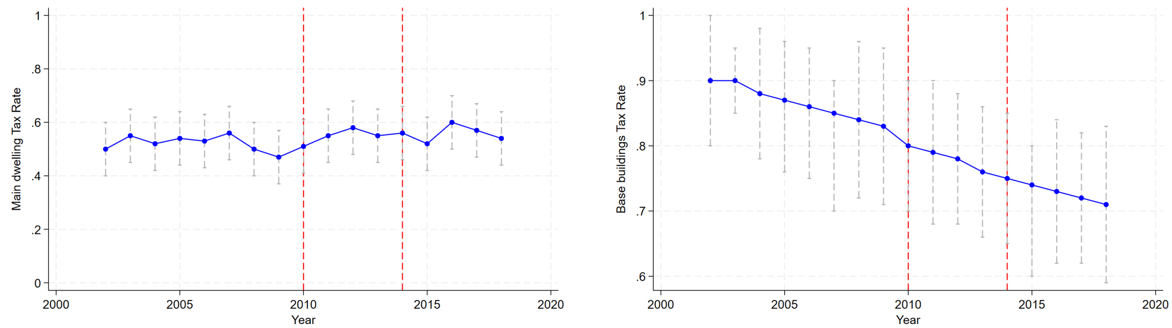
FIGURE 6. Reduced form estimates for house prices



Note: 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 industrial buildings. The kernel used is triangular, and the bandwidths are computed using the Calonico et al. (2017) algorithm.

FIGURE 7. Reduced form estimates for property tax rates

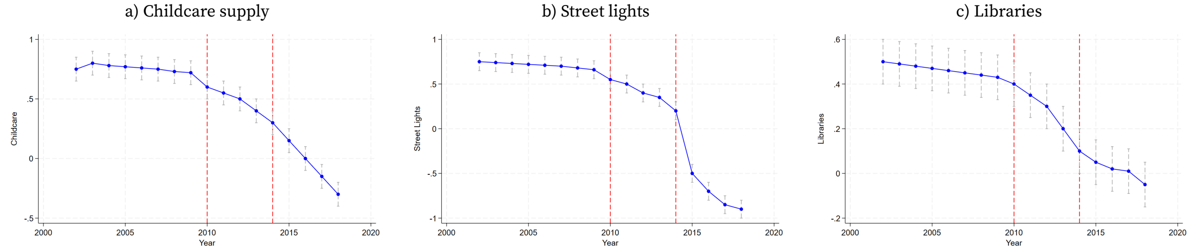
a) Main dwelling | b) Base building



Note: These plots show the yearly reduced form estimates of property tax rates on the instrument, having less than 5,000 inhabitants. Subfigure a) shows the main dwelling tax rate, and b) the base building tax rate. The kernel used is triangular, and the bandwidths are computed using the Calonico et al. (2017) algorithm.

FIGURE 8. Reduced form estimates for public good quality

a) Childcare supply | b) Street lights | c) Libraries

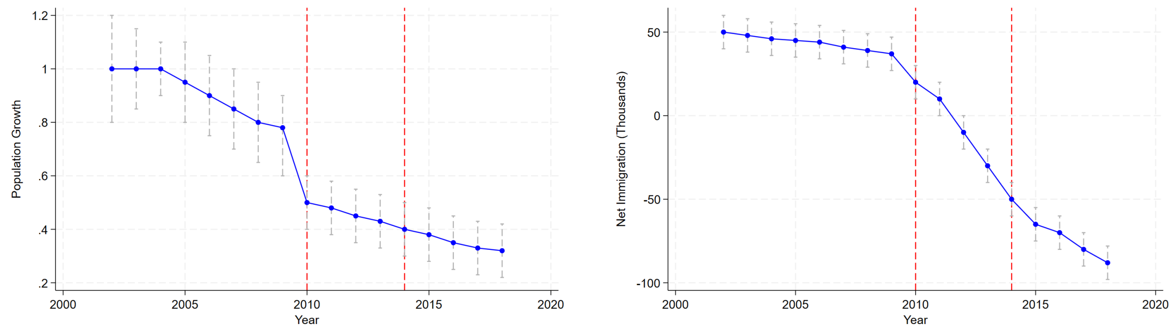


Note: These plots show the yearly reduced form estimates of house price measures on the instrument, having less than 5,000 inhabitants. Subfigure a) reports chilcare supply, b) shows street lights supply, and c) the number of libraries per 100,000 inhabitants. The kernel used is triangular, and the bandwidths are computed using the Calonico et al. (2017) algorithm.

FIGURE 9. Reduced form estimates for population measures

a) Population growth

b) Net immigration

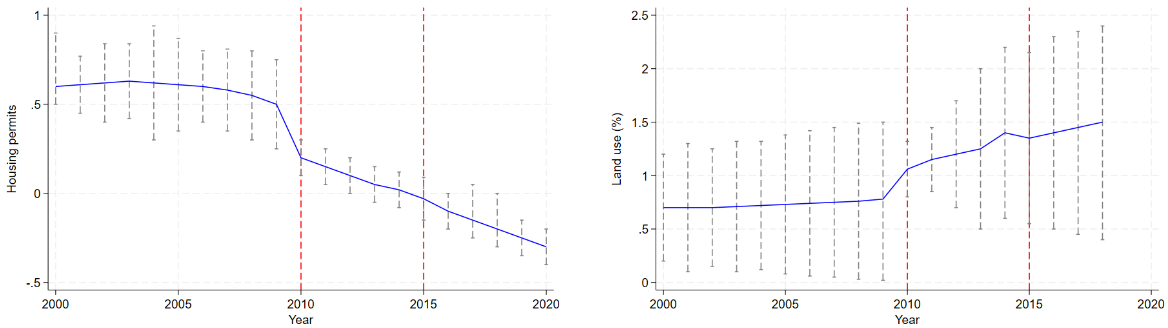


Note: These plots show the yearly reduced form estimates of house price measures on the instrument, having less than 5,000 inhabitants. Subfigure a) shows population growth computes as the logarithm of population and b) reports net immigration computed as the difference between in- and out-migration. The kernel used is triangular, and the bandwidths are computed using the Calonico et al. (2017) algorithm.

FIGURE 10. Reduced form estimates for housing supply

a) House permits

b) Land use

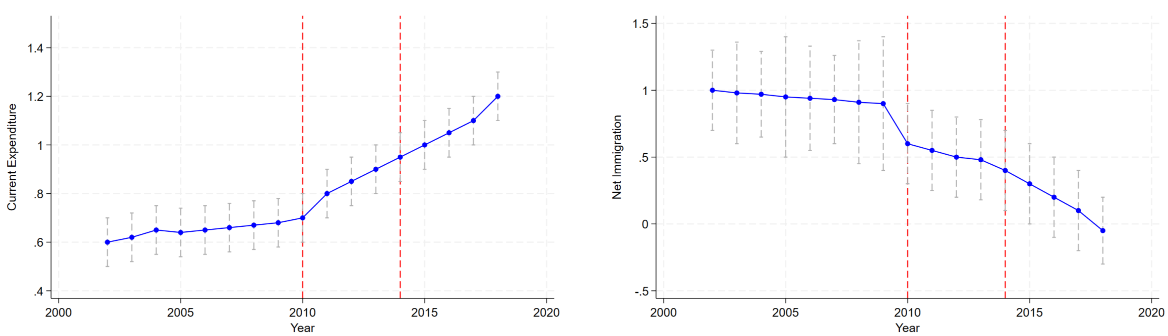


Note: These plots show the yearly reduced form estimates of house price measures on the instrument, having less than 5,000 inhabitants. Subfigure a) shows the revenues from house permits per capita, in logs and 2015 real euros and b) reports the percentage of surface used by constructions for a municipalities. The kernel used is triangular, and the bandwidths are computed using the Calonico et al. (2017) algorithm.

FIGURE 11. Reduced form estimates for expenditure

a) Current

b) Capital



Note: These plots show the yearly reduced form estimates of expenditure measures on the instrument, having less than 5,000 inhabitants. Subfigure a) shows current expenditure and b) capital expenditure. The kernel used is triangular, and the bandwidths are computed using the Calonico et al. (2017) algorithm.

Appendix 10. Tables

TABLE 1. Inter-Municipal communities across Italy

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 2. Summary statistics

	(1) Treated		(2) Untreated	
	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				
Area (sqm)	27.35	28.98	57.52	72.33
Altitude (m)	419.51	306.57	231.60	230.77
Population	1680.71	1197.72	18513.79	68710.13
Population density	130.37	217.11	617.24	971.02
North	0.54	0.50	0.48	0.50
Center	0.11	0.31	0.15	0.36
South and Islands	0.31	0.46	0.34	0.47
Rural	0.85	0.36	0.23	0.42
Mountainous	0.37	0.48	0.21	0.41
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. *Treated* means having 2010 population below 5000 inhabitants (or 3000 inhabitants for mountainous municipalities). 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 3. Continuity of covariates

	(1) North-West	(2) North-East	(3) South	(4) Altitude	(5) Area	(6) 0-14 age	(7) 65+ age	(8) Foreigners
Estimate	-0.000	0.009	-0.015	-0.007				
	(0.044)	(0.053)	(0.011)	(0.014)				
Observations	11,817	11,817	11,817	11,817				
Mean	0.0874	0.325	0.132	0.221				
First-stage F	22.12	20.99	21.88	21.51				

Notes: * significant at 10%; ** significant at 5%; *** significant at 1%. Standard errors clustered at the municipality level are reported in parentheses. The table reports difference-in-discontinuity for a selection of time-varying municipal characteristics including the age composition of the population, the share of foreign residents, population density, and per capita income. 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.

TABLE 4. House prices

	Residential		Commercial	
	(1)	(2)	(3)	(4)
	ln(sale)	ln(rent)	ln(sale)	ln(rent)
Conventional	-0.043**	-0.060**	-0.115***	-0.150**
	(0.014)	(0.029)	(0.033)	(0.049)
First-stage F	37.78	38.38	21.24	20.85
Bias-corrected	-0.040**	-0.062**	-0.131***	-0.181**
	(0.014)	(0.029)	(0.033)	(0.049)
First-stage F	42.09	42.75	23.71	23.28
Robust	-0.040*	-0.062*	-0.131***	-0.181*
	(0.022)	(0.34)	(0.037)	(0.058)
First-stage F	34.53	34.64	19.17	18.92
Mean	1236.243	4.385	890.597	4.289
Bandwidth	1211.44	1427.2	1950.34	1067.97
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.

Table 5. Property Taxes

	(1) Main dwelling	(2) Base
Conventional	0.014	-0.036
	(0.018)	(0.023)
First-stage F	31.04	25.17
Bias-corrected	-0.023	-0.035
	(0.018)	(0.023)
First-stage F	33.22	27.59
Robust	-0.023	-0.035
	(0.020)	(0.027)
First-stage F	27.56	21.93
Bandwidth	794.01	994.69
Observations	7,895	7,895
Mean	0.48	0.74

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 %). 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.

TABLE 6. Public goods

	(1) Childcare	(2) Street lights	(3) Libraries
Conventional	-0.156***	-0.750**	-0.003**
	(0.045)	(0.372)	(0.001)
First-stage F	54.74	57.57	55.56
Bias-corrected	-0.145***	-0.723**	-0.002**
	(0.045)	(0.372)	(0.001)
First-stage F	58.64	61.35	59.28
Robust	-0.145***	-0.723**	-0.002**
	(0.061)	(0.386)	(0.003)
First-stage F	52.29	54.29	50.12
Bandwidth	1292	1045	702
Observations	5,563	7,850	7,856
Mean	0.055	16.946	0.181

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 public good measures (log childcares per 1000 inhabitants and log kilometers of street lights per 1000 inhabitants, and the number of libraries per 100,000 inhabitants). 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.

TABLE 7. Population

	(1) Log(Population)	(2) Net Immigration
Conventional	-0.065***	-88.737***
	(0.020)	(10.177)
First-stage F	59.12	59.64
Bias-corrected	-0.073***	-89.554***
	(0.020)	(10.177)
First-stage F	62.32	63.52
Robust	-0.073***	-89.554***
	(0.032)	(12.256)
First-stage F	57.02	56.84
Bandwidth	488	1092
Observations	7,895	7,895
Mean	19,656.65	58.128

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 population growth and net immigration. 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.

TABLE 8. Housing and land supply

	(1) Housing supply	(2) Land use (%)
Conventional	0.537	-0.054
	(0.539)	(0.800)
First-stage F	23.79	99.72
Bias-corrected	0.690	-0.088
	(0.539)	(0.800)
First-stage F	22.82	105.4
Robust	0.690	-0.088
	(0.650)	(0.954)
First-stage F	14.55	68.54
Bandwidth	1241	1149
Observations	6,488	6,330
Mean	39.56	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 current and investment expenditures (in per capita and 2015 real terms). 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.

Table 9. Expenditure

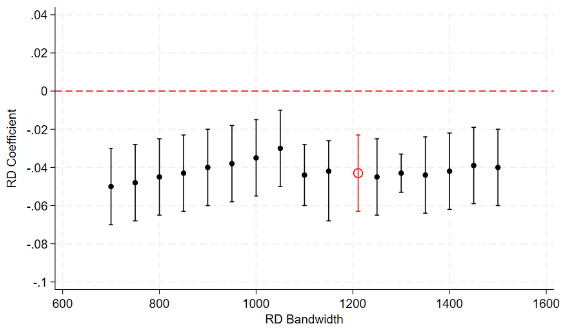
	(1) Current	(2) Investment
Conventional	0.461**	-1.89
	(0.222)	(1.500)
First-stage F	22.66	21.95
Bias-corrected	0.420**	-1.79
	(0.222)	(1.500)
First-stage F	20.82	20.20
Robust	0.420**	-1.79
	(0.260)	(1.723)
First-stage F	13.43	13.09
Bandwidth	864	1149
Observations	6,488	6,330
Mean	474.942	42.659

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 current and investment expenditures (in per capita and 2015 real terms). 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.

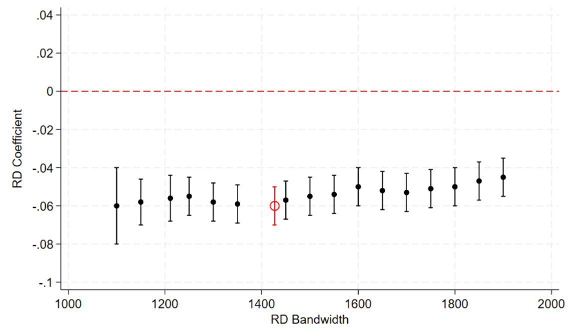
Appendix A. Other Figures

FIGURE A1. House prices - Different bandwidths

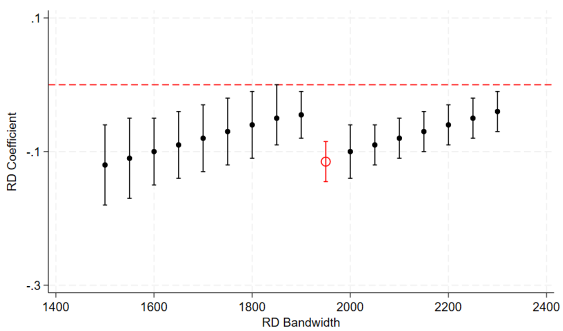
a) Sale price - residential



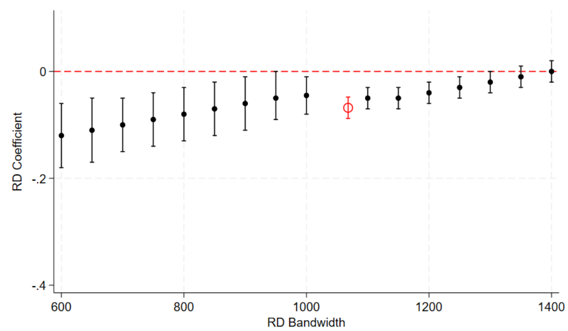
b) Rent price - residential



c) Sale price - commercial



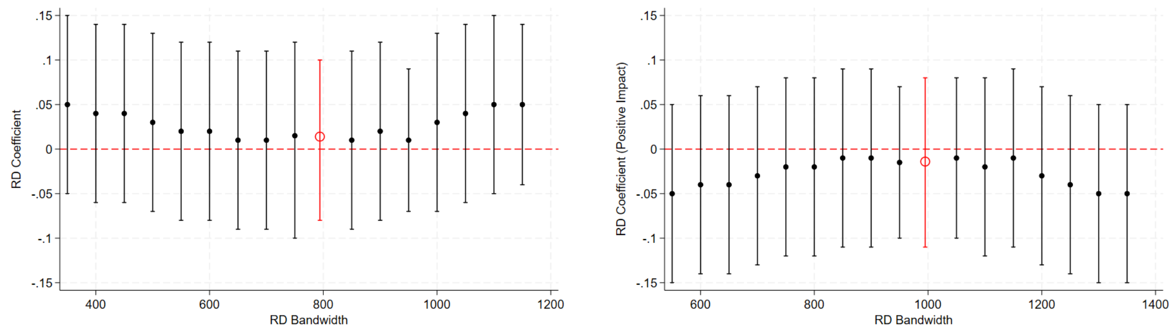
d) Rent price - commercial



Note: This figure displays plots of estimates corresponding to varying bandwidth sizes. The dependent variables are sale and rent prices for both residential and commercial properties, with values computed in logarithmic terms. The main estimate, highlighted in red, utilizes the optimal bandwidth as determined by the method proposed by Calonico et al. (2017).

FIGURE A2. Property tax rates - Different bandwidths

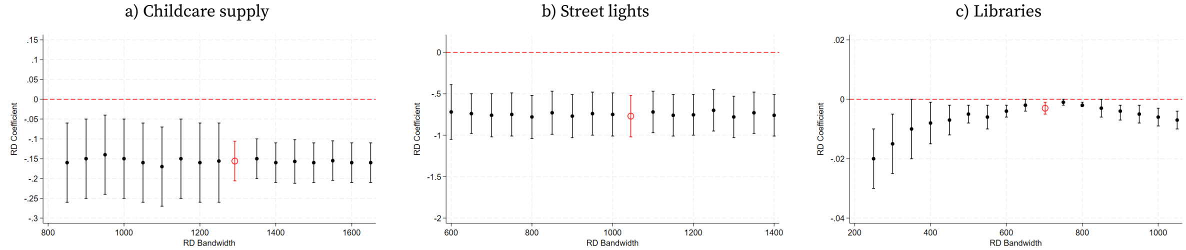
a) Main dwelling | b) Base building



Note: This figure displays plots of estimates corresponding to varying bandwidth sizes. The dependent variables are property tax rates for main dwelling and base buildings. The main estimate, highlighted in red, utilizes the optimal bandwidth as determined by the method proposed by Calonico et al. (2017).

FIGURE A3. Public good quality - Different bandwidths

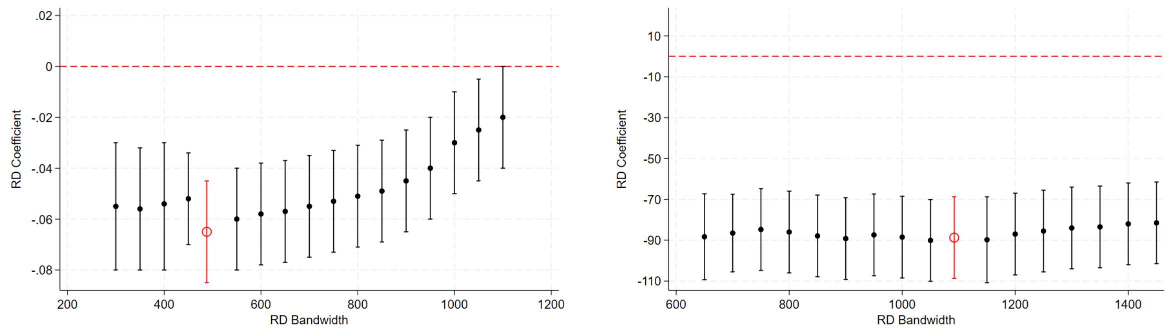
a) Childcare supply | b) Street lights | c) Libraries



Note: This figure displays plots of estimates corresponding to varying bandwidth sizes. The dependent variables are childcare supply, street light supply and number of libraries per 100,000 inhabitants. The main estimate, highlighted in red, utilizes the optimal bandwidth as determined by the method proposed by Calonico et al. (2017).

FIGURE A4. Population - Different bandwidths

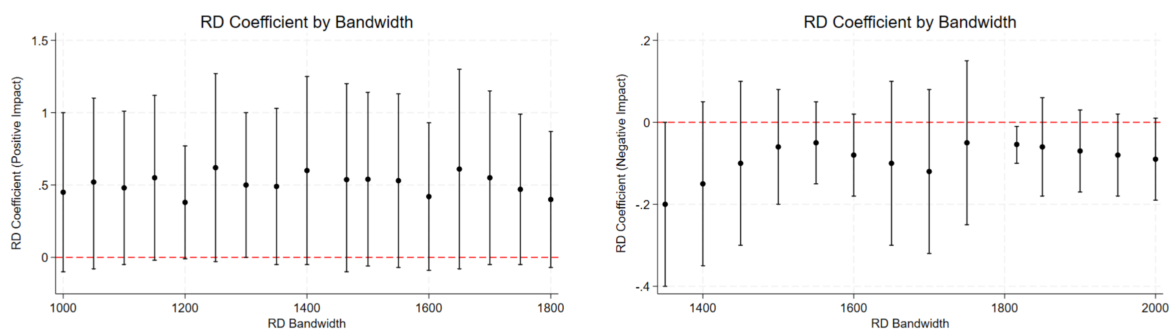
a) Population growth b) Net migration



Note: This figure displays plots of estimates corresponding to varying bandwidth sizes. The dependent variables are population growth rate and net migration. The main estimate, highlighted in red, utilizes the optimal bandwidth as determined by the method proposed by Calonico et al. (2017).

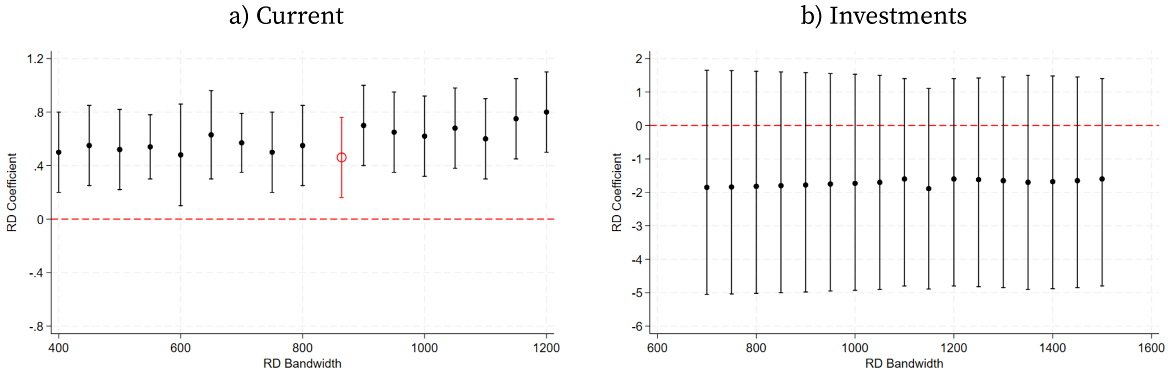
FIGURE A5. Supply - Different bandwidths

a) House permits b) Land use



Note: This figure displays plots of estimates corresponding to varying bandwidth sizes. The dependent variables are the revenues from housing permits, in logs, per capita and real 2015 euros, and the percentage of used land in a municipality. The main estimate, highlighted in red, utilizes the optimal bandwidth as determined by the method proposed by Calonico et al. (2017).

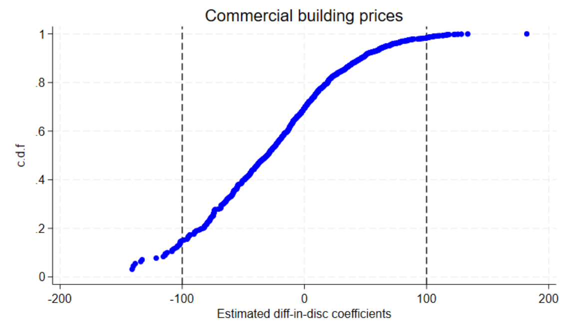
FIGURE A6. Expenditure - Different bandwidths



Note: This figure displays plots of estimates corresponding to varying bandwidth sizes. The dependent variables are current and capital expenditures, in logs, per capita and real 2015 euros. The main estimate, highlighted in red, utilizes the optimal bandwidth as determined by the method proposed by Calonico et al. (2017).

FIGURE A7. Placebo test - House prices

a) Residential prices



b) Commercial prices

Note: Placebo tests based on permutation methods for the probability of re-election. The figures reports the empirical c.d.f. of normalized point estimates from a set of diff-in-disc estimations at 400 false thresholds below and above the true thresholds at 5,000 (namely at any 5 inhabitants from 4,000 to 4,900 and any 5 inhabitants from 5,100 to 6,000). Estimation methods: local linear probability model. The optimal bandwidth h is estimated implementing the algorithm introduced by Calonico et al. (2017). The vertical line indicates our benchmark estimate (i.e. true coefficient normalized to 100) and its negative value.

Appendix B. Other Tables

Table A1. House prices - Absolute prices

	Residential			Commercial	
	(1)	(2)		(3)	(4)
	Sale	Rent		Sale	Rent
Conventional	114.801**	0.138	-5.034	0.166	
	(50.934)	(0.162)	(35.584)	(0.265)	
First-stage F (Conv.)	39.39	37.78		20.64	21.60
Bias-corrected	104.324**	0.113	-18.938	0.309	
	(50.934)	(0.162)	(35.584)	(0.265)	
First-stage F (Bias-corr.)	43.88	42.09		23.04	24.11
Robust	104.324*	0.113	-18.938	0.309	
	(60.029)	(0.193)	(42.572)	(0.313)	
First-stage F (Robust)	35.81	34.44		18.75	19.46
Observations	10,191	15,893	13,184	7,693	
Mean	1056	3.593	753.8	3.511	
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.

Table A2. House prices - Other polynomial specifications

	Residential			**Industrial**	
	(1)	(2)		(3)	(4)
	ln(sale)	ln(rent)		ln(sale)	ln(rent)
Panel A: 2nd degree polynomial					
Estimate	-0.035**	-0.071*		-0.113**	-0.010*
	(0.018)	(0.043)		(0.058)	(0.006)
First-stage F	52.64	54.52	39.06	48.23	
Panel B: 3rd degree polynomial					
Estimate	-0.020*	-0.073		-0.138**	-0.145
	(0.012)	(0.138)		(0.070)	(0,269)
First-stage F	50.47	33.97	34.24	46.73	
Observations	15,969	11,302	13,322	17,778	
Mean	6.827	1.462		6.517	1.456
Bandwidth	1219	1493		1618	1849

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.

TABLE A3. House prices - Active IMCs

	Residential		Commercial	
	(1)	(2)	(3)	(4)
	Sale	Rent	Sale	Rent
Conventional	0.015	0.176**	-0.021	0.062
	(0.053)	(0.077)	(0.047)	(0.076)
First-stage F	91.63	65.41	197.6	108.6
Bias-corrected	-0.015	0.142*	-0.030	0.086
	(0.053)	(0.077)	(0.047)	(0.076)
First-stage F	94.24	70.48	184.1	112
Robust	-0.015	0.142	-0.030	0.086
	(0.062)	(0.093)	(0.056)	(0.093)
First-stage F	67.02	48.85	119.2	69.59
Observations	6,710	5,203	12,774	7,673
Mean	7.051	1.370	6.722	1.364

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.

TABLE A4. Mechanisms - Active IMCs

	Property taxes		Public goods				
	(1)	(2)	(3)	(4)	(5)		
	Main dwelling	Base	Childcare	Light rent	Libraries		
Conventional	0.003	0.012					
	(0.027)	(0.025)	(0.)	(0.)	(0.)		
First-stage F	355.4	70.90					
	Population		**Supply**			**Expenditure**	
	(6)	(7)	(8)	(9)		(10)	(11)
	Log(pop)	Net Immigration	Housing	Land		Current	Capital
Conventional	-0.036	7.832	0.066	-0.284		0.125	1.080
	(0.069)	(10.549)	(0.459)	(2.584)		(0.157)	(0.789)
First-stage F	48.41	133.4	30.13	77.24		13.89	23.52
Observations	6,710	5,203	12,774	7,673			
Mean	7.051	1.370	6.722	1.364			

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.