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

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

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Abstract

This paper estimates the causal effect of mandatory inter-municipal cooperation on local welfare, using housing markets as the primary indicator. I study Italy's 2010 reform, which required small municipalities to jointly manage core administrative functions, and identify its impact through a fuzzy difference-in-discontinuity design. Among municipalities whose cooperation status changed because of the mandate, residential property values fell by 4–6 percent and commercial values by 11–18 percent. These declines stem from deterioration in childcare, policing, street lighting, and waste collection rather than from changes in taxation or housing supply, both of which remain stable. The mandate also reduced population growth and net migration, consistent with residents responding to lower service quality. Compliance was limited—about 29 percent of eligible municipalities participated—and concentrated among those with greater administrative capacity. The results show that mandatory cooperation can erode local amenities and capitalized wealth, suggesting that policymakers should be cautious with uniform consolidation mandates and consider voluntary or capacity-building approaches instead.

JEL: H70, H71, H72, R23, R31

Keywords: Inter-municipal cooperation, Housing markets, Local public services, Administrative capacity, Local welfare and amenities

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1. Introduction

The optimal size of local jurisdictions remains a central question in public economics and political science, with clear implications for administrative efficiency and policy performance (Epple and Romer 1989; Ostrom et al. 1961; Ostrom 2010). Whether the benefits of scale outweigh the inefficiencies of consolidation is unresolved. Per capita public spending in Europe has doubled over the past five decades (Schuknecht 2020), and local governments now account for roughly 22 percent of total public expenditure. These trends heighten the importance of understanding how jurisdictional design shapes public finances and service delivery.

Public choice theory and fiscal federalism emphasize the advantages of decentralized governance—local knowledge, responsiveness, and accountability (Oates 1972, 1999; Ostrom et al. 1961). Yet excessive fragmentation can limit economies of scale and raise coordination costs. Many small municipalities also lack the administrative capacity needed to deliver specialized services efficiently. These constraints can weaken governance and reduce the quality of public goods provision (Oates 1999; Tiebout 1956; Alesina and Spolaore 1997; Bolton and Roland 1997).

Against this backdrop, numerous countries—including France, Spain, Germany, Italy, and the United States—have adopted consolidation reforms since the late 1990s, with reforms accelerating after the 2008 financial crisis (Bel and Mur 2009; Frère et al. 2014; Warner 2006). These efforts aim to capture scale economies and reduce redundancy. At the same time, they risk diluting accountability and weakening civic engagement. The challenge for policymakers is to expand capacity without eroding representation.

Housing markets offer a particularly informative lens for evaluating these trade-offs. Prices incorporate both property characteristics and the performance of local institutions, including service quality, fiscal management, and local amenities. Changes in housing wealth, in turn, affect consumption, borrowing, and migration decisions. Housing prices therefore provide a broad measure of how local governance shapes economic well-being (Atalay and Edwards 2022; Christelis et al. 2021; Campbell and Cocco 2007; Disney et al. 2010; Mian et al. 2015).

This paper examines how mandatory inter-municipal cooperation (IMC) affects local housing markets, using an Italian reform that required municipalities with fewer than 5,000 residents—3,000 in mountainous areas—to share specific administrative functions. The reform sought to reduce duplication and exploit economies of scale. Using administrative data and a fuzzy difference-in-discontinuity design, the analysis estimates the causal effect of mandatory cooperation while accounting for overlapping institutions and partial compliance.

A central feature of the reform is its low compliance: by 2018, only about 29 percent of eligible municipalities had joined an inter-municipal community. As a result, the empirical strategy identifies a Local Average Treatment Effect (LATE) for the subset of municipalities whose cooperation status was shifted by the population threshold. These "compliers" are typically mid-sized and administratively capable jurisdictions—precisely those for whom a mandate plausibly alters behavior relative to voluntary cooperation. Assignment at the threshold is as good as random, and the first stage is strong. Non-compliance therefore affects external, but not internal, validity. The interpretation throughout the paper reflects this scope.

Among municipalities induced to cooperate, residential prices fall by about 5 percent and commercial prices by roughly 13 percent. This pattern contrasts with Tricaud (2025), who finds no effect in France due to offsetting supply responses. In Italy, the decline reflects reduced service quality and resource misallocation triggered by the mandate. Consistent with this mechanism, treated municipalities experience higher out-migration, suggesting that residents relocate in response to deteriorating services.

Property tax rates show no discontinuity at the cutoff, indicating limited reductions in tax competition (Breuillé et al. 2018). Building permits and land development also exhibit no detectable changes. The reform's main effects therefore operate through governance quality rather than through tax or housing supply channels.

This distinction matters for interpretation. Compliers were generally larger, denser, and less rural than the small municipalities the policy sought to support. Yet even these relatively well-resourced jurisdictions experienced higher operating expenditures and lower welfare following the mandate. If mandatory cooperation generates adverse effects where administrative capacity is comparatively strong, smaller and more fragile jurisdictions would likely struggle even more. Uniform mandates therefore appear ill-suited to Italy's heterogeneous municipal landscape.

Taken together, the findings highlight the limits of mandatory inter-municipal cooperation. Mandated integration often fails to deliver efficiency gains and can instead reduce service quality, depress housing values, and encourage out-migration. Policymakers should shift from blanket cooperation requirements toward targeted technical assistance, fiscal incentives, and institutional support that enable municipalities to collaborate while preserving local autonomy.

The consequences of jurisdiction size have long been debated. Proponents of decentralization, beginning with Tiebout (1956) and Oates (1972), argue that local provision of public goods better matches residents' preferences than national provision. Others highlight that scale economies may come at the cost of greater heterogeneity and weaker local control (Alesina et al. 2005; Bolton and Roland 1997).

A complementary literature shows that decentralization outcomes hinge on governance quality. Faguet (2014) documents wide variation in institutional capacity, political competition, and accountability across jurisdictions. This heterogeneity produces correspondingly heterogeneous welfare effects. Related political-economy research stresses that modes of coordination matter. Coercive institutional change can generate administrative resistance and reduce local autonomy (Erlingsson et al. 2021), whereas voluntary cooperation tends to rely on political alignment and bureaucratic support (Myksvoll et al. 2022). Determining the optimal scale of local government therefore requires balancing agglomeration benefits against congestion and coordination costs. It also requires recognizing that governance quality shapes these trade-offs (Brueckner 1981).

Local government consolidation—whether through mergers or the creation of intermunicipal communities (ICs)—illustrates these tensions. ICs offer a particularly informative setting. Municipalities retain their legal identity, allowing before–after comparisons and avoiding the confounding effects of boundary changes.

A large empirical literature studies both the determinants and consequences of municipal mergers in Germany, Israel, Denmark, Sweden, and elsewhere (Reingewertz 2012; Welling Hansen 2014; Blesse and Baskaran 2016; Harjunen et al. 2021). Evidence from coerced consolidation shows that top-down integration tends to increase administrative costs and reduce citizen satisfaction. These findings are consistent with the frictions associated with mandated cooperation (Hansen 2015).

Another line of work examines why municipalities choose to integrate. Motivations include anticipated fiscal gains, access to pooled services, and the characteristics of neighboring jurisdictions (Saarimaa and Tukiainen 2015; Bel and Warner 2015; Di Porto and Paty 2018; Bergholz and Bischoff 2018). This literature also evaluates aggregate efficiency effects (Reingewertz 2012; Blesse and Baskaran 2016). Meta-analyses report mixed results. Some countries, such as Israel and Germany, achieve cost savings under mandatory mergers. Others—including France, the Netherlands, Italy, and Finland—show limited efficiency gains owing to institutional constraints (Frère et al. 2014; Blom-Hansen et al. 2016; ?; Luca and Modrego 2021). Cross-country differences in administrative capacity and institutional design appear to be central drivers of this heterogeneity.

Evidence from Italy reflects the same pattern. Ferraresi et al. (2018) find that cooperation reduced expenditures in Emilia–Romagna, a region with strong administrative capacity and a long history of voluntary collaboration. Cooperative arrangements in this setting were also broader than those mandated by the national reform. More broadly, gains from consolidation depend on service cost structures, baseline capacity, and the institutional design of cooperative arrangements (Bel and Warner 2015).

Recent work examines fiscal effects in France (Charlot et al. 2015; Breuillé et al. 2018; Agrawal et al. 2025). Other studies explore the relationship between integration and outcomes such as unemployment (Banaszewska et al. 2022), public employment (Harjunen et al. 2021), business activity (Wolfschütz 2020), and night-light intensity (Egger and Koethenbuerger 2010; Pickering et al. 2020). Together, these studies underscore that the effects of integration are highly context-dependent and span multiple domains. By focusing on housing markets, this paper captures the aggregate consequences of these mechanisms in a single forward-looking measure. Housing prices reflect service quality, fiscal capacity, and local economic vitality.

A recent study by Tricaud (2025) closely aligns with the goals of this paper. Tricaud examines the effects of mandatory cooperation in France on building permits, housing prices, and related outcomes. The study finds increases in building permits in high-demand areas and declines in public services in rural municipalities. Effects are concentrated among jurisdictions subject to mandatory integration. In contrast, mandatory cooperation in Italy does not affect housing supply but is associated with lower housing prices, consistent with a deterioration in public service quality.

This paper also contributes by analyzing a setting with high non-compliance and weak enforcement. These features motivate the use of a fuzzy difference-in-discontinuity design (Galindo-Silva et al. 2021; Millán-Quijano 2020; Picchetti et al. 2024). They also motivate a complier analysis, which is essential for credible evaluation when compliance is partial (Marbach and Hangartner 2020).

More broadly, this paper provides one of the first comprehensive analyses of inter-municipal cooperation in Italy. Italy's extensive fiscal and administrative decentralization makes it a relevant setting. Municipalities hold substantial autonomy in fiscal decisions and service delivery and respond strongly to institutional reforms (Bianchi et al. 2023). The findings also complement recent work using advanced econometric methods to study local government behavior.

These considerations underscore the need for evidence from settings where local governments enjoy substantial autonomy yet face strong central pressures to consolidate. Italy's 2010 cooperation mandate provides such a context.

The remainder of the paper proceeds as follows. Section 2 describes Italy's system of inter-municipal cooperation and the 2010 mandate. Section 3 introduces the data. Section 4 outlines the fuzzy difference-in-discontinuity design. Section 5 presents the main effects of mandatory cooperation on housing markets. Section 6 investigates underlying mechanisms, focusing on taxes, public goods, population dynamics, and housing supply. Section 7 analyzes compliance patterns and clarifies the interpretation of the Local Average Treatment Effect. Section 8 concludes with policy implications.

2. Institutional Setting

Italy's system of local governance consists of Regions, Provinces, and Municipalities, with municipalities forming the most decentralized tier. As of 2018, the country had 7,954 municipalities, many extremely small: the median municipality has only 2,522 residents. Municipalities manage a wide range of public services—welfare programs, education, urban planning, policing, water, and waste management—financed through a mix of own-source revenues and intergovernmental transfers. Many municipalities lack the scale or administrative capacity to perform these tasks effectively. As a result, national policymakers have long promoted inter-municipal cooperation to strengthen service delivery.

Inter-municipal communities (ICs) were formalized under Law 142/1990 as the primary mechanism for joint management. Municipalities may delegate specific functions and financial resources to an IC, which operates as an autonomous legal entity with its own budget. Governance is shared: a President (typically a mayor) and a Council composed of mayors or designated councilors represent member municipalities in proportion to population. Each municipality may belong to only one IC.

Italian ICs are similar to cooperation arrangements in France, Spain, and the Netherlands, where municipalities collaborate to manage selected functions and share administrative responsibilities. In practice, Italian ICs most frequently coordinate financial administration, waste management, policing, social services, and urban planning.

The most consequential institutional change occurred in 2010, when the central government introduced a population-based cooperation mandate. Municipalities with fewer than

5,000 residents—3,000 in mountainous areas—were required to jointly manage at least six essential functions. Implementation was phased: three functions by 2013 and all six by late 2014. Because compliance was partial, the reform generated substantial variation. Many eligible municipalities did not cooperate ("never-takers"), while others had already formed ICs voluntarily ("always-takers"). This incomplete take-up underpins the fuzzy difference-in-discontinuity design used in the empirical analysis.

Figure 1 shows the evolution of ICs over time. Before 2010, cooperation expanded slowly and unevenly. Participation increased only after the mandate and its procedural simplification in 2014. By 2018, 445 ICs were active, involving 2,369 municipalities—roughly 35 percent of municipalities in Ordinary Status regions. ICs remain most common in small, rural, and especially mountainous areas. This pattern reflects both historical collaboration and the structure of the population cutoff (Figure A2).

These institutional features motivate the empirical strategy. Italian municipalities have extensive responsibilities but widely varying administrative capacity. Cooperation is meant to reduce these disparities, yet it may also introduce coordination frictions. The 2010 reform created a sharp, externally imposed discontinuity in incentives to cooperate while leaving municipal boundaries unchanged. This setting provides a credible environment for identifying the causal effects of cooperation on public spending, service provision, and welfare.

3. Data

Inter-municipal Communities (IC). The dataset on ICs includes all *Unioni di Comuni* operating in Italy as of 2020. It covers 559 ICs and identifies their member municipalities, years of establishment, and, when relevant, dissolution dates. The data were assembled from the Ministry of Internal Affairs and supplemented with regional registries, local newspapers, IFEL, and other government sources.

Population. Population figures come from the 2001 and 2011 Censuses and from annual intercensal estimates for 2000–2020. Because the legislation does not specify which population measure determined eligibility, the analysis uses 2010 intercensal population as the primary running variable. Robustness checks rely on the 2001 Census measure for 2000–2012 and the 2011 Census measure for 2013 onward. Additional demographic variables—net immigration (inflows minus outflows) and births—are drawn from ISTAT.

Housing prices. Housing prices and rents come from the *Agenzia delle Entrate – Ter-*

ritorio – Osservatorio del Mercato Immobiliare, covering 2002–2020. For each municipality and year, sale prices and rents are defined as the average value of properties in normal condition, excluding outliers.[1] Values are reported separately for residential, commercial, and office units. Transaction counts are available starting in 2011.

Public goods. Measures of public good provision are constructed from municipal balance sheets. Childcare access is the share of eligible children receiving care; streetlight coverage is the ratio of illuminated to total public-street kilometers; local police is measured as officers per 1,000 inhabitants; and waste collection as the share of households served. Library supply—drawn from the Italian Registry of Libraries—is the number of public libraries per 1,000 inhabitants.

Expenditure and revenues. Detailed balance-sheet data for 1998–2018 come from the Ministry of Internal Affairs. Expenditures are divided into current and capital categories and allocated across twelve functional areas. Revenues include taxes, transfers, loans, sales, and third-party contributions. All monetary variables are expressed in per capita terms and in 2015 euros.

Housing supply. Housing supply is proxied by municipal revenues from construction permits, reported in balance sheets. To approximate the quantity of permits, municipal revenues are scaled by provincial-level permit prices—the lowest available level of aggregation. A broader proxy for housing supply—the municipal share of developed land—comes from ISPRA (Italian Institute for Environmental Protection and Research).

Controls. Control variables include time-invariant municipal characteristics such as land area, altitude, island or coastal status, and rural designation from ISTAT.

After merging all sources, municipalities in Special Status regions were excluded because their fiscal rules differ from those in Ordinary Status regions. Municipalities that merged or dissolved during the sample period were also removed to ensure consistent units. The final dataset contains 6,742 municipalities observed from 2000 to 2020, yielding 121,326 municipality-year observations.

Table 1 reports pre-reform summary statistics (averaged over 2000–2009) for municipalities just below and above the population threshold determining mandate eligibility.

Panel A documents large differences in real estate markets. Residential and commercial prices, as well as rents, are substantially lower in treated municipalities, reflecting weaker housing demand in smaller jurisdictions.

[1] Sale and rent values are trimmed below the 1st and above the 99th percentiles.

Panel B summarizes potential mediating variables. Property tax rates are similar across groups, while population differs mechanically due to the eligibility threshold. Untreated municipalities exhibit higher net immigration and stronger housing supply, whereas treated municipalities display higher per capita current and capital expenditures. Measures of public service provision vary across dimensions, with no uniform advantage for either group.

Panel C reports geographic and demographic characteristics. Treated municipalities are smaller, less dense, more rural, and located at higher elevations. They are disproportionately concentrated in northern and mountainous areas, reflecting historical settlement patterns and the structure of the population cutoff.

With these data, I next exploit the population thresholds introduced by the 2010 reform to identify the causal effect of mandatory cooperation. Section 4 describes the empirical strategy in detail.

4. Methodology

Since 2010, the cooperation mandate has imposed a population cutoff of 5,000 inhabitants: municipalities below this threshold were required to share selected administrative functions with neighboring jurisdictions. Two longstanding policies also hinge on this cutoff. Since the early 1960s, municipalities under 5,000 residents have received lower compensation for mayors and executive board members, and since 2001 they have been exempt from the Domestic Stability Pact (DSP), a set of fiscal constraints on local budgets. These overlapping threshold-based rules create a dense institutional environment, making it essential to isolate the effect of the 2010 cooperation mandate from pre-existing discontinuities in political remuneration and fiscal flexibility.

The analysis follows a Difference-in-Discontinuity (Diff-in-Disc) design, which compares the discontinuity at the population threshold after 2010 to the corresponding discontinuity before 2010. Mayoral compensation rules and DSP exemptions already generated jumps at the 5,000-inhabitant threshold; differencing across periods removes these pre-existing effects. The remaining post-2010 discontinuity captures only the incentives introduced by the cooperation mandate. Identification requires that, absent the reform, outcomes would have evolved smoothly around the threshold—a "parallel discontinuities" condition.

Partial compliance introduces fuzziness. Many municipalities below the cutoff did not cooperate ("never-takers"), while others above it did ("always-takers"). The cutoff therefore shifts the probability of cooperation rather than assigning treatment deterministically. The first stage measures the discontinuous change in cooperation after netting out the pre-existing jump, and the reduced form measures the corresponding change in outcomes. Their ratio yields a Local Average Treatment Effect (LATE) for municipalities whose cooperation status was altered by the population threshold. Identification further requires that the threshold be exogenous, that potential outcomes be continuous in population, and that municipalities cannot manipulate their recorded population.

The reform imposed a cutoff of 5,000 residents, lowered to 3,000 in mountainous municipalities. Both thresholds operate analogously: they determine eligibility and generate discontinuities in cooperation. In practice, the analysis re-centers population around the applicable cutoff for each municipality and estimates a pooled Diff-in-Disc specification. This increases precision while preserving the identifying variation from each threshold. Robustness checks estimate the thresholds separately and yield consistent results.

Together, these elements imply that the estimator compares the size of the cooperation-induced discontinuity after the reform to the corresponding pre-reform discontinuity. It then scales this difference by the change in cooperation probabilities at the cutoff and pools the two thresholds through re-centering. The resulting LATE identifies the causal effect of mandatory cooperation for municipalities whose cooperation decision was shifted by the cutoff.

Identification relies on several conditions that can be assessed empirically. First, absent the reform, outcomes near the cutoff must evolve smoothly over time. Reduced-form pre-trends show no systematic differences before 2010. Second, the running variable—municipal population—must not be manipulable. Population counts are certified by ISTAT, and dropping below 5,000 residents would reduce mayoral salaries by roughly one-third, making manipulation unlikely. McCrary density tests on the 2001 and 2011 Censuses show no discontinuity at the cutoff, and the intercensal 2010 population used for assignment displays the same smoothness. Third, other threshold-based rules must remain stable over time so that differencing pre- and post-2010 discontinuities removes their influence. These rules did not change during the sample period, and balance tests reveal no new discontinuities in covariates or outcomes after 2010. Finally, the pool of municipalities near the cutoff must remain stable. Municipalities that merged or dissolved are excluded, keeping both the sample and the running variable consistent across periods.

Estimation proceeds nonparametrically using local polynomial regressions with bandwidths selected via the MSE-optimal procedure of Calonico et al. (2014). The main specification employs the optimal CCT bandwidth. Appendix C reports results using alternative bandwidths—including narrow, wide, and donut-hole choices—all of which yield similar estimates. The post-reform period begins in 2010, with 2010–2013 treated as a gradual implementation phase. The main specification uses first-order polynomials. Robustness checks consider alternative polynomial orders and models including municipality fixed effects and province-by-year fixed effects. The latter absorb heterogeneous housing-market trends across provinces, ensuring identification relies on within-province variation near the cutoff.

The first-stage relationship between population and cooperation is shown in Figure 2. In 2008 (Panel A), municipalities just below and above 5,000 inhabitants were equally likely to participate, indicating no pre-existing discontinuity. In 2015 (Panel B), a clear jump emerges at the cutoff. Panel C traces yearly RD estimates, showing that the discontinuity appears in 2010 and grows through 2018. Formally, in each year t the first stage is given by:

$$\text{IC}_{mt} = \pi_0 + \pi_1 \mathbb{1}\{\tilde{\text{Pop}}_m < 0\} + f(\tilde{\text{Pop}}_m) + \varepsilon_{mt},$$

where IC_{mt} is an indicator for participation in an inter-municipal community, $\mathbb{1}\{\tilde{\text{Pop}}_m < 0\}$ equals one if municipality m lies below the population cutoff, $\tilde{\text{Pop}}_m$ denotes municipal population centered at the applicable cutoff (5,000 or 3,000), and $f(\cdot)$ is a flexible function of population estimated separately on each side of the cutoff.

After the mandate, sub-threshold municipalities became roughly 30 percent more likely to participate. The timing and persistence of this shift suggest that non-compliance reflects political and administrative frictions rather than selection on unobservables related to housing or public goods. Because population is predetermined and not manipulable, this partial take-up can be treated as quasi-random near the cutoff.

Together, these elements justify the use of a fuzzy Difference-in-Discontinuity design. By removing stable pre-existing threshold effects, exploiting quasi-random assignment near the cutoff, and using the discontinuity in cooperation as an instrument, the estimator identifies the causal effect of the cooperation mandate for municipalities induced to cooperate by the reform.

The analysis compares municipalities above and below the population cutoff before and after the reform. The baseline model is:

$$Y_{mpt} = \alpha_1 + \alpha_2 \,\text{Treat}_m + \delta_t + \tau^{FRD}\big(\text{Treat}_m \times \text{Post}_t\big) + f(\tilde{\text{Pop}}_m, \text{Post}_t) + \gamma_p \times \delta_t + \varepsilon_{mpt},$$

where $\text{Treat}_m = \mathbb{1}\{\tilde{\text{Pop}}_m < 0\}$, $\tilde{\text{Pop}}_m$ denotes population centered at the applicable cutoff, and Post_t captures the post-2010 period. The function $f(\tilde{\text{Pop}}_m, \text{Post}_t)$ includes population, the post indicator, and their interaction. The term $\gamma_p \times \delta_t$ represents province-by-year fixed effects. Because compliance is incomplete, the causal effect τ^{FRD} is estimated via two-stage least squares.

4.1. Identification validity

The credibility of the fuzzy Difference-in-Discontinuity design rests on the identification assumptions outlined above. This section evaluates their validity along three dimensions: (i) the strength and exogeneity of the population cutoff, (ii) continuity of the running variable, and (iii) smoothness of predetermined municipal characteristics at the threshold. Taken together, these checks show that the observed first-stage and subsequent discontinuities reflect the causal effect of the mandate rather than institutional features or statistical artifacts.

I begin with the instrument. For the population cutoff to serve as a valid instrument, it must generate a strong first stage and remain independent of potential outcomes. Across all specifications, first-stage F-statistics comfortably exceed conventional thresholds, indicating instrument strength. Exogeneity follows from institutional design: the cutoff was set by national legislation and is orthogonal to local economic or demographic conditions.

Next, I assess continuity of the running variable. A smooth density around the cutoff indicates that municipalities could not manipulate their population counts to become eligible or avoid eligibility. While one might worry that some jurisdictions under-reported population to remain below 5,000 residents, manipulation is implausible: population counts are certified by ISTAT, and dropping below the threshold reduces mayoral compensation by roughly one-third. Following McCrary (2008), Figure A5 shows that population density is smooth around 5,000 inhabitants in both the 2001 and 2011 Censuses. The 2010 intercensal population figures—the values used for implementation—exhibit the same pattern. These results indicate the absence of strategic sorting.

Continuity of population alone does not guarantee identification. The design also requires that predetermined municipal characteristics evolve smoothly at the threshold.

Balance tests for geographic, demographic, and socioeconomic variables, reported in Table B4, show no discontinuities. This supports the assumption that potential outcomes would vary smoothly in the absence of treatment, as required for identification.

Pre-existing rules tied to the 5,000-resident threshold—such as mayoral salary schedules or DSP exemptions—also do not generate new breaks around 2010; otherwise discontinuities in covariates would be apparent. Controlling for these characteristics leaves the estimated treatment effects essentially unchanged (Table B5), alleviating concerns about omitted-variable bias.

These findings confirm that the population cutoff provides a valid source of quasi-experimental variation and that the empirical strategy satisfies the core identification requirements of the fuzzy Difference-in-Discontinuity design.

5. The effect of mandatory cooperation on housing markets

This section examines how mandatory inter-municipal cooperation affects housing prices. Housing values are central to household wealth, consumption, and local welfare (Guren et al. 2021). Because shifts in property values influence spending, investment, and municipal fiscal capacity, housing markets both reflect and transmit changes in local economic conditions. Institutional reforms that alter public service quality, taxation, or governance can therefore affect housing demand by shaping expectations about amenities, fiscal capacity, and community attractiveness.

The analysis uses municipal-level data on sale and rental prices for residential and commercial properties, described in Section 3. Although property-level characteristics such as unit size or construction year are unavailable, the data include a widely used indicator classifying average housing-stock quality into poor, normal, or optimal (Fenizia and Saggio 2024; Accetturo et al. 2021). While less detailed than full hedonic controls, this proxy combined with the identification strategy supports credible inference on the policy's effect.

Figure 3 plots yearly reduced-form RD estimates at the 5,000-inhabitant cutoff (3,000 in mountainous areas), using optimal bandwidths from Calonico et al. (2014). Before 2010, residential and commercial prices display a stable trend, consistent with the parallel-discontinuities assumption (Grembi et al. 2016). After the mandate, all market segments decline sharply: residential sale and rental prices fall, and commercial prices drop even more. These patterns signal a broad deterioration in local real estate conditions among municipalities required to cooperate.

Figure 4 shows the main Diff-in-Disc estimates, which mirror the reduced-form patterns. Significant negative discontinuities appear across all outcomes. Estimated effects range from roughly 4 percent for residential sale prices to about 15 percent for commercial rents, indicating economically meaningful declines. The larger commercial effects are plausible given the sensitivity of business-location decisions to governance quality, service provision, and fiscal expectations.

Table 2 reports the corresponding numerical estimates. Residential sale prices fall by 4–4.3 percent and residential rents by 6–6.2 percent. Commercial sale prices decline by 11.5–13.1 percent, and commercial rents by 15–18 percent. Unless stated otherwise, I discuss the conventional estimates. First-stage F-statistics are large, and coefficients remain stable across alternative specifications. Results are also robust when expressed in levels (Table B2) and across polynomial specifications (Table B3).

A natural concern is compositional bias: declining average prices could reflect changes in which properties transact rather than genuine capitalization effects. To assess this, commercial transaction volumes are examined within the optimal bandwidth. As Figure A4 shows, transaction activity evolves similarly in treated and control municipalities, falling during the 2012–2014 downturn and recovering thereafter, with no break at the mandate. This symmetry rules out liquidity or compositional changes as explanations for the observed price declines. The evidence instead points to reduced capitalization of public goods and fiscal capacity into land values.

These results are further supported by a set of outcome-specific robustness checks.

Appendix Figure A6 shows that estimated treatment effects remain stable as the bandwidth expands in 50-inhabitant increments, indicating that the results are not driven by narrow samples around the cutoff. Donut specifications excluding municipalities within 10–50 inhabitants of the threshold yield similar estimates (Appendix Table B10), ruling out local noise or measurement error near the cutoff.

Placebo thresholds, implemented by re-estimating the design at nearby artificial cutoffs that exclude 5,000 inhabitants, produce no discontinuities; the distribution of these placebo estimates clusters tightly around zero (Appendix Figure A7). Polynomial and level specifications also yield comparable results (Tables B3 and B2), confirming that the findings are not sensitive to functional-form choices, bandwidth selection, or local irregularities in population measurement.

Overall, mandatory inter-municipal cooperation exerts a negative and persistent effect on local housing markets. The reform generates sizable declines in residential and commercial property values, implying substantial negative wealth effects. Year-specific RD estimates show that declines begin immediately after 2010 and do not attenuate through 2014. These findings highlight how governance structures shape real estate dynamics and frame the mechanism analysis that follows, focusing on taxation, public goods, and housing policy.

5.1. Conceptual framework and interpretation

Before turning to the mechanisms, it is useful to outline a simple framework linking mandatory cooperation to housing demand. Residents value municipalities along three dimensions: the quality of local public services and amenities, the effective tax burden, and the efficiency with which spending is transformed into services. Housing prices embed forward-looking expectations about these attributes. Any reform that alters service quality, fiscal conditions, or administrative performance should therefore be capitalized into property values.

Mandatory cooperation can, in principle, affect all three channels. Shared administration may reshape tax competition and change statutory rates. Coordination frictions may weaken service quality by diluting administrative capacity or increasing overhead. Cooperation could also influence housing supply and land use if permit issuance or development incentives shift. The net effect is theoretically ambiguous: cooperation may generate efficiencies, but it may also impose new administrative burdens.

The declines in residential and commercial prices documented above align with residents revising downward their expectations of future governance quality. The sections that follow test each of the conceptual channels directly. Section 6.1 examines fiscal adjustments, Section 6.2 analyzes public-goods provision and administrative spending, Section 6.2.1 studies population movements, Section 6.2.2 examines expenditure patterns, and Section 6.3 investigates supply-side responses. This structure links the conceptual arguments to the subsequent empirical evidence.

6. Mechanisms

The decline in housing prices documented in Section 5 is consistent with residents revising downward their expectations of future governance quality. Building on the framework in Section 5.1, I now examine the mechanisms in turn, beginning with taxation, then public goods and population adjustments, and finally housing and land supply.

The evidence points toward the public-goods and administrative-efficiency channels. Tax rates and property-tax revenues remain smooth at the cutoff, and housing supply shows no detectable response. In contrast, current expenditures rise and several public services—childcare, policing, street lighting, and waste collection—deteriorate. These patterns indicate that coordination frictions absorb resources previously used for service delivery, reducing the efficiency with which municipalities convert spending into amenities.

The timing aligns with this interpretation. Service deterioration and rising operating costs appear immediately after 2010, and housing prices fall in the same period. Population outflows further suggest that residents respond primarily to worsening services rather than to changes in asset values alone.

While these outcomes capture central components of local well-being, the empirical analysis measures effects on observable quantities—prices, spending, service provision, and migration—rather than welfare directly. The welfare interpretation therefore follows from established links between these outcomes and residents' indirect utility, not from direct measurement.

The subsections below examine each channel in turn.

6.1. Property taxes

This section examines demand-side mechanisms by focusing on property taxation and how municipalities within an IC set local tax rates. Existing evidence is mixed. Breuillé et al. (2018) show that cooperation in France raises taxes by reducing inter-jurisdictional competition, while other work argues that ICs may exploit economies of scale and lower spending, ultimately reducing tax burdens (Duncombe and Yinger 1993). A separate literature links higher property tax rates to lower housing prices (Oates 1969; Elinder and Persson 2017; Oliviero et al. 2019), making taxation a potentially important channel through which the mandate might affect housing markets.

Property taxation is a major revenue source for Italian municipalities, accounting in 2023 for 17.3 percent of total municipal revenue and 21 percent of own-source taxes. Mayors can adjust statutory rates within centrally defined limits: the baseline is 0.4 percent for primary residences and 0.76 percent for other buildings, with allowed increases of up to 0.2 and 0.3 percentage points. Although the tax structure changed during the study period, all changes were national in scope and therefore do not threaten identification. One reform expanded the allowable adjustment range, giving mayors additional discretion (Shi and Tulli 2022).

Figure 5 presents the Diff-in-Disc estimates for tax rates. Neither the primary-residence rate nor the rate on other buildings shows a significant change at the cutoff, and both series evolve smoothly across the threshold. Reduced-form pre-trends in Figure A8 confirm the absence of pre-reform divergence, and robustness checks across bandwidths (Figure A9) yield consistent results.

Table 3 reinforces this evidence. Point estimates are slightly negative for both main dwellings and other buildings and range between 0.044 and 0.064 percentage points, but none are statistically significant. Joint management therefore does not appear to affect rate setting.

The absence of rate effects does not rule out shifts in the tax base. Declines in assessed values or in the number of taxable units could lower revenues even if rates remain unchanged. To test this, I examine real municipal property tax revenues per capita. As shown in the final column of Table 3 and in Figure 5, revenues remain continuous at the cutoff and are thus unaffected by the cooperation mandate. The null effect on rates is therefore not offset by changes in the underlying tax base.

These findings are robust to alternative specifications, including adding controls (Table B6) and using a donut-hole specification (Table B13).

Taken together, these results indicate that the mandate did not affect fiscal extraction. The discretion available to mayors within nationally imposed limits may simply have been too narrow to generate meaningful tax adjustments under the new cooperative arrangements.

Since neither tax rates nor revenues respond to the mandate, taxation cannot account for the decline in housing prices. The next section examines public-good provision, where mandatory cooperation is most likely to affect residents' utility.

6.2. Public good quality

This section examines how the mandate affected the provision of local public goods. Since 2001, municipalities have been responsible for a broad set of decentralized services—welfare programs, childcare, schooling, policing, and urban planning—financed through a mix of local revenues and state transfers.

The analysis focuses on services that are both central in the literature and especially relevant in Italy. Childcare provision is measured as the share of approved applications, waste collection as the proportion of households served, and public lighting as the share of illuminated road kilometers. I also consider local police officers and public libraries per 1,000 inhabitants. These indicators reflect both data quality and the functions most commonly shared within inter-municipal communities. Table B11, based on IC statutes collected by OpenItaliae, reports the share of ICs that jointly manage each function; the indicators used here correspond to the most frequent and reliably measured shared services.

Figure 6 shows clear negative effects at the policy cutoff for nearly all public goods, with childcare, street lighting, and waste collection experiencing the largest declines. These patterns are reinforced by flat pre-trends and stable estimates across bandwidths (Figures A11 and A12).

Table 4 quantifies these patterns. Mandatory cooperation reduces satisfied childcare demand by 15.6 p.p., lowers street-lighting coverage by 12.3 p.p., and reduces the supply of libraries and local police officers per capita by 0.3 p.p. and 6.6 p.p., respectively. Waste-collection coverage declines by 23.7 p.p., pointing to coordination challenges under shared governance. These effects represent declines of roughly 20–35 percent relative to pre-reform means across the main services. These reductions in public-goods provision provide a plausible mechanism for the decline in housing values, as deteriorating services reduce residents' willingness to pay for local housing.

Controlling for municipal characteristics leaves the estimates essentially unchanged (Table B7). Donut-hole specifications that exclude municipalities close to the cutoff yield similarly negative and statistically significant effects (Table B12).

As with the main results, these estimates reflect a Local Average Treatment Effect for municipalities induced to cooperate by the reform. Compliers were generally larger and better resourced than the smallest or most rural jurisdictions, yet their service provision still deteriorated. This pattern suggests that coordination frictions created by mandatory cooperation are substantial even when baseline administrative capacity is relatively strong, though effects outside the complier group remain unknown.

Overall, the evidence indicates that mandatory inter-municipal cooperation weakens the provision of essential public goods. Municipalities struggle to maintain service quality when administrative and financial responsibilities are shared by mandate rather than adopted voluntarily. These findings underscore the need to account for capacity constraints and coordination costs when designing institutional reforms intended to promote cooperation.

The deterioration in public goods also suggests potential demographic responses. If residents "vote with their feet" in response to worsening services, we should observe changes in population dynamics around the cutoff. The next section examines these adjustments by analyzing changes in municipal population size and composition.

6.2.1. Population

This section examines how mandatory municipal cooperation affects residential mobility. The analysis builds on Tiebout (1956)'s idea of "voting with your feet," in which residents relocate when the quality or availability of local public goods changes. A large literature documents similar behavior: households move toward jurisdictions offering preferred bundles of taxes and services (Banzhaf and Walsh 2008; Gürerk et al. 2014; Liu and Ngo 2020). I test this mechanism by studying how population growth and migration flows respond to the IMC mandate.

Population growth is measured as the logarithmic change in municipal population, and net internal migration is defined as in-migration minus out-migration within Italy. Under a Tiebout logic, deteriorating public service quality should induce outflows and reduce both measures.

Figure 7 presents the Diff-in-Disc estimates. Both population growth and net migration display a clear negative jump at the 5,000-inhabitant cutoff: municipalities subject to the mandate experience slower growth and more negative net migration, likely reflecting both higher out-migration and lower in-migration. Local tax rates remain unchanged at the threshold, ruling out fiscal incentives as an alternative mechanism. Reduced-form pre-trends in Figure A14 show stable patterns before 2010 and a sharp decline afterward, with the effects strengthening after 2014. These patterns hold across a set of outcome-specific robustness checks.

Table 5 quantifies these effects. Population growth falls by roughly 6.5–7.3 percent, and net internal migration declines by about 13 residents per municipality—a 20 percent decrease—largely driven by increased outflows. Although a frictionless Tiebout model would predict stronger responses, the magnitudes observed here are consistent with partial sorting in a setting where mobility frictions—social ties, moving costs, and thin housing markets—limit immediate relocation. Robustness checks across bandwidths and alternative specifications (Figure A15 and Tables B6 and B13) confirm the stability of these findings.

These estimates fit the broader interpretation of the paper: mandatory inter-municipal cooperation reduces service quality and, over time, shifts local population dynamics. Even modest net outflows can meaningfully affect housing demand within a 5–8 year period, especially in small municipalities where population bases are thin and market liquidity is low. Although the data do not allow a full decomposition by age group, national evidence suggests that mobile cohorts—young families and working-age residents—tend to respond first to service deterioration. Such departures have persistent consequences, as younger households drive community vitality and future housing demand. Within this framework, the observed declines likely represent the early phase of an adjustment process that continues gradually in a setting with limited mobility.

The next section examines the fiscal mechanisms behind these changes by analyzing how municipal spending adjusts after the reform.

6.2.2. Expenditure

The Italian inter-municipal cooperation mandate was introduced to reduce costs and streamline public spending (Gori et al. 2023). By requiring municipalities to share administrative functions and operate through larger jurisdictions, the policy aimed to capture economies of scale and eliminate redundancy. This section evaluates whether those goals were achieved by examining the mandate's effects on current and capital expenditures. Current expenditures cover personnel costs, rent, and maintenance; capital expenditures reflect long-term investment in infrastructure, real estate, and other durable assets. Together, these outcomes indicate whether the deterioration in public goods arises from reduced investment or from inefficiencies in organizing joint service delivery.

Figure 8 presents the Diff-in-Disc estimates. Capital expenditures show no discontinuity at the 5,000-inhabitant cutoff, indicating that the mandate does not materially affect investment activity. Current expenditures, by contrast—and contrary to the reform's stated objective—rise sharply and immediately after the reform. The jump appears in the first post-reform period, consistent with short-run transaction and coordination costs rather than a gradual increase in service intensity. Flat pre-trends (Figure A17) and stable estimates across bandwidths (Figure A18) reinforce this interpretation. These patterns hold across the outcome-specific robustness checks.

Table 6 quantifies these effects. Mandatory cooperation increases current expenditures by roughly 6 percent, while capital expenditures remain unchanged. Among smaller municipalities—the primary targets of the mandate—the rise in current spending likely reflects the direct cost of establishing and operating joint authorities rather than an expansion of service capacity. A decomposition of current expenditures into personnel, purchases and services, transfers, financial costs and taxes, and the residual supports this view: personnel, purchases and services, and transfers all rise significantly by 8.3, 7.2, and 9.1 percent, respectively. There are no detectable changes in financial costs or taxes. All these findings are robust to the inclusion of controls (Table B8) and to donut-hole specifications (Table B14).

These results echo the well-known "cost of cooperation" paradox. Coordination and integration are inherently resource-intensive: establishing joint authorities often adds managerial layers and administrative staff rather than eliminating them. Shared service delivery typically requires new IT systems, harmonized service standards, consultants, and other forms of technical support. Transfers among member municipalities or to the joint entity can further inflate expenditures. Economies of scale may exist in theory, but they often require substantial upfront investment and harmonization costs before any gains can be realized.

Similar patterns are documented in France, where inter-municipal cooperation initially raises current expenditures before stabilizing as institutions mature (DGCL 2023). In Italy, no such convergence is yet visible. Current expenditures increase sharply without a corresponding rise in investment, suggesting that the decline in public goods provision reflects organizational inefficiency rather than fiscal contraction. In this respect, the policy appears to fall short of its intended efficiency gains.

6.3. Supply: Housing and Land

The demand-side evidence suggests that mandatory cooperation reduces amenity value without easing fiscal pressure. I next ask whether the mandate affects the supply side of local housing markets, via construction activity or land development.

Tricaud (2025) finds that in France, inter-municipal cooperation is associated with increased construction activity. They attribute this pattern partly to municipal resistance and partly to NIMBY dynamics, highlighting how political economy considerations and supply-side factors can shape cooperation's effects. Motivated by this comparison, the analysis here examines two supply-side channels in the Italian context: housing construction and land development.

Because Italy lacks municipal-level building-permit data, urbanization revenues serve as the primary proxy. Italian planning rules impose an impact fee on each construction permit, and municipalities set these fees independently. Urbanization revenues therefore capture both permit quantity and fee levels. While these components cannot be disentangled directly at the municipal level, provincial data on average permit fees allow for an indirect adjustment that yields a proxy for the number of municipal permits.[2] Combining revenues with this quantity proxy helps distinguish changes in construction volume from changes in permit pricing.

Land supply is assessed using ISPRA data, which report total hectares and the share of unused land for each municipality in 2006, 2012, and annually from 2015 to 2021. Assuming that water bodies and steep terrain remain constant, reductions in unused land reflect new construction and development.

Figure 9 presents the Diff-in-Disc plots for housing-permit revenues and land use. The discontinuity in permit revenues is positive but statistically insignificant, and land use shows no discernible jump at the cutoff. Both outcomes exhibit flat pre-trends (Figure A20) and remain stable across bandwidth choices (Figure A21).

Table 7 summarizes the estimates and consistently shows no significant changes in construction permit revenues or land use across specifications. This robustness reinforces the absence of detectable supply-side responses to the cooperation mandate. This is robust to including controls B9 and to donut-hole specification B15.

These null effects should also be interpreted in light of Italy's well-documented housing-supply rigidity. Italian land-use regulation is highly discretionary and administratively complex, and development rights require multilayered approvals that evolve only gradually. Empirical work consistently finds low supply elasticities in both urban and rural areas, reflecting binding zoning constraints, fragmented planning authority, and lengthy permitting procedures. In such an institutional environment, even sizable changes in local governance are unlikely to generate rapid adjustments in construction activity or land development. The absence of measurable supply responses is therefore consistent with theoretical expectations and reinforces the interpretation that the housing price declines operate primarily through demand-side channels.

Taken together, the evidence points to no meaningful adjustments on the supply side of the housing market—neither in new construction nor in land development. These null

[2] The Italian Statistical Institute provides permit counts at the provincial level. Municipal revenues are aggregated within each province and divided by the number of provincial permits to obtain an implicit provincial permit price. A proxy for municipal permits is then constructed by dividing municipal revenues by this implicit price.

results warrant some caution given the limits of the proxies and the partial time coverage of ISPRA data, but within these constraints, the findings strongly indicate that the observed changes in housing prices stem chiefly from demand-side mechanisms rather than shifts in supply or land availability.

Having documented how mandatory cooperation affects prices, services, and fiscal outcomes, I now turn to the question of who is actually treated by the mandate—that is, which municipalities are compliers, and how this shapes the interpretation of the estimates.

7. Compliance analysis and policy implications

Because the empirical strategy identifies a Local Average Treatment Effect, understanding which municipalities are compliers is essential for interpreting the results. Compliance with the mandate was far from universal: among municipalities below the threshold, 71 percent participated in a union, whereas among those above, the participation rate drops to 44 percent. These figures imply an average compliance rate of 27 percentage points and show that the reform substantially altered cooperation only for a subset of jurisdictions.

Non-compliance reflects political and administrative frictions. Anecdotal accounts highlight disagreements among mayors, resistance within existing unions, shortages of technical staff, and coordination bottlenecks—constraints especially acute in very small municipalities. Profiling these patterns helps clarify the sources of friction and the types of municipalities the mandate actually affected. Identifying the characteristics of each group also clarifies to whom the estimated effects apply.

Municipalities are grouped into never-takers (eligible but did not cooperate), always-takers (cooperated regardless of the mandate), and compliers (cooperated only when required). Following Marbach and Hangartner (2020), observable always-takers and never-takers are identified directly, while the characteristics of the latent complier group are inferred by subtracting weighted averages of observable groups from overall means. This procedure provides consistent estimates of each subgroup's pre-treatment profile.

Table 8 summarizes the results. Compliers differ markedly from both never-takers and the full sample. They govern larger territories (46.2 vs. 24.3 km^2), have much larger populations (10,008 vs. 1,840), and are substantially denser (703.6 vs. 164.9 inhabitants per km^2). They are also less rural (61.9 vs. 80.3 percent), and their mayors are younger, more often professionally employed, and more frequently politically affiliated. Resident age structures, however, are similar across groups.

These patterns indicate that compliers were not the reform's intended targets. The smallest and most administratively fragile municipalities—the ones the policy sought to support—were the least likely to comply. Many viewed cooperation as a loss of autonomy or as a bureaucratic burden. This mismatch between policy goals and municipal capacity likely contributed to the low compliance rate.

Treatment heterogeneity is examined by estimating effects for the complier subgroup. Table 9 reports these estimates. Panel A shows the baseline effects; Panel B isolates effects among compliers[3]. The decline in housing prices and public-good quality documented in earlier sections is concentrated almost entirely among compliers—the municipalities whose cooperation status the reform actually altered.

Overall, the IMC mandate struggled to engage the municipalities with the weakest administrative capacity. Ideological resistance, limited staff, and administrative fragility constrained cooperation and undermined the reform's effectiveness. For similar initiatives to succeed, mandates must be paired with technical assistance, capacity-building, and institutional support that reduce the cost of collaboration.

These patterns also refine the interpretation of the LATE in settings where cooperation is otherwise voluntary. The estimates capture the consequences of mandatory cooperation for municipalities induced to join by the threshold—jurisdictions that would not have cooperated absent the mandate. Voluntary ICs typically arise where municipalities share interests or possess stronger administrative capacity, and their outcomes may differ substantially. The LATE therefore reflects the effects of coercive integration rather than the broader impacts of inter-municipal collaboration.

8. Conclusions

This paper estimates the causal effect of Italy's 2010 inter-municipal cooperation mandate on local spending and welfare. Using a fuzzy difference-in-discontinuity design, the analysis identifies a Local Average Treatment Effect for municipalities whose cooperation status was altered by the reform. Compliance was low: only about 29 percent of eligible municipalities participated, and compliers were typically larger, denser, and less rural than the small towns the policy aimed to assist. The estimated effects therefore capture how mandatory cooperation affected municipalities induced to integrate by the population threshold, not all Italian municipalities.

[3]Appendix Tables B16, B17, B18, and B19 present analogous results for additional outcomes.

For this subset of jurisdictions, the mandate raised current expenditures by more than 6 percent without increasing investment and lowered housing prices by roughly 5 percent. These patterns reflect higher administrative and coordination costs that crowded out resources for service delivery. The associated deterioration in service efficiency contributed to out-migration, indicating that mandatory integration can weaken community welfare and local economic vitality. Even among relatively well-resourced municipalities, the short-run costs of consolidation outweighed its intended efficiency gains.

These findings should not be generalized to all small or rural municipalities. If comparatively capable jurisdictions experienced declines in spending efficiency, service quality, and housing markets, smaller and more capacity-constrained municipalities are likely to face even greater difficulties under a similar mandate. The evidence therefore suggests that mandatory cooperation is a weak instrument for strengthening local governance.

Persistent non-compliance further underscores the limits of coercive institutional design. Mandating cooperation without the administrative capacity, political alignment, or technical support needed for joint management risks entrenching inefficiencies rather than reducing them. Experiences in regions such as Emilia–Romagna—where voluntary cooperation evolved gradually alongside sustained institutional support—illustrate that successful collaboration hinges on trust, continuity, and administrative capability.

A more effective strategy is to enable, rather than require, cooperation. The mechanisms identified here point to several levers: centralized technical support that lowers the administrative cost of coordination; targeted fiscal incentives that finance start-up costs or reward verifiable integration; training programs that strengthen budgeting, procurement, and planning; and regional platforms that help municipalities identify shared priorities. These forms of support align more closely with the heterogeneous administrative realities documented in this study and offer a more promising path to durable improvements in local governance.

References

Accetturo, A., A. R. Lamorgese, S. Mocetti, and D. Pellegrino (2021). Housing supply elasticity and growth: evidence from Italian cities. *Journal of Economic Geography 21*(3), 367–396.

Agrawal, D. R., M.-L. Breuillé, and J. Le Gallo (2025). Tax Competition With Intermunicipal Cooperation. *National Tax Journal 78*(1), 5–43.

Alesina, A. and E. Spolaore (1997). On the Number and Size of Nations. *The Quarterly Journal of Economics 112*(4), 1027–1056.

Alesina, A., E. Spolaore, and R. Wacziarg (2005). Trade, Growth and the Size of Countries. In P. Aghion and S. N. Durlauf (Eds.), *Handbook of Economic Growth*, Volume 1, pp. 1499–1542. Elsevier.

Atalay, K. and R. Edwards (2022). House prices, housing wealth and financial well-being. *Journal of Urban Economics 129*, 103438.

Banaszewska, M., I. Bischoff, E. Bode, and A. Chodakowska (2022). Does inter-municipal cooperation help improve local economic performance? – Evidence from Poland. *Regional Science and Urban Economics 92*, 103748.

Banzhaf, H. S. and R. P. Walsh (2008). Do People Vote with Their Feet? An Empirical Test of Tiebout's Mechanism. *The American Economic Review 98*(3), 843–863. Publisher: American Economic Association.

Bel, G. and M. Mur (2009). Intermunicipal cooperation, privatization and waste management costs: Evidence from rural municipalities. *Waste Management 29*(10), 2772–2778.

Bel, G. and M. E. Warner (2015). Inter-Municipal Cooperation and Costs: Expectations and Evidence. *Public Administration 93*(1), 52–67.

Bergholz, C. and I. Bischoff (2018). Local council members' view on intermunicipal cooperation: does office-related self-interest matter? *Regional Studies 52*(12), 1624–1635.

Bianchi, N., M. Giorcelli, and E. M. Martino (2023). The Effects of Fiscal Decentralisation on Publicly Provided Services and Labour Markets. *The Economic Journal 133*(653), 1738–1772.

Blesse, S. and T. Baskaran (2016). Do municipal mergers reduce costs? Evidence from a German federal state. *Regional Science and Urban Economics 59*, 54–74.

Blom-Hansen, J., K. Houlberg, S. Serritzlew, and D. Treisman (2016). Jurisdiction Size and Local Government Policy Expenditure: Assessing the Effect of Municipal Amalgamation. *American Political Science Review 110*(4), 812–831.

Bolton, P. and G. Roland (1997). The Breakup of Nations: A Political Economy Analysis. *The Quarterly Journal of Economics 112*(4), 1057–1090.

Breuillé, M.-L., P. Duran-Vigneron, and A.-L. Samson (2018). Inter-municipal cooperation and local taxation. *Journal of Urban Economics 107*, 47–64.

Brueckner, J. K. (1981). Congested public goods: The case of fire protection. *Journal of Public Economics 15*(1), 45–58.

Calonico, S., M. D. Cattaneo, and R. Titiunik (2014). Robust Data-Driven Inference in the Regression-Discontinuity Design. *The Stata Journal 14*(4), 909–946.

Campbell, J. Y. and J. F. Cocco (2007). How do house prices affect consumption? Evidence from micro data. *Journal of Monetary Economics 54*(3), 591–621.

Charlot, S., S. Paty, and V. Piguet (2015). Does Fiscal Cooperation Increase Local Tax Rates in Urban Areas? *Regional Studies 49*(10), 1706–1721.

Christelis, D., D. Georgarakos, T. Jappelli, L. Pistaferri, and M. V. Rooij (2021). Heterogeneous wealth effects. *European Economic Review 137*, 103805.

Della Vigna, S. and E. La Ferrara (2010). Detecting Illegal Arms Trade. *American Economic Journal: Economic Policy 2*(4), 26–57.

DGCL (2023). Les finances des communautés de communes en 2023. *BIS n°188*. Paris: Ministère de l'Intérieur et des Outre-mer.

Di Porto, E. and S. Paty (2018). Cooperation among Local Governments to Deliver Public Services. *Politics & Policy 46*(5), 790–820.

Disney, R., J. Gathergood, and A. Henley (2010). House Price Shocks, Negative Equity, And Household Consumption In The United Kingdom. *Journal of the European Economic Association 8*(6), 1179–1207.

Duncombe, W. and J. Yinger (1993). An analysis of returns to scale in public production, with an application to fire protection. *Journal of Public Economics 52*(1), 49–72.

Egger, P. and M. Koethenbuerger (2010). Government Spending and Legislative Organization: Quasi-experimental Evidence from Germany. *American Economic Journal: Applied Economics 2*(4), 200–212.

Elinder, M. and L. Persson (2017). House price responses to a national property tax reform. *Journal of Economic Behavior & Organization 144*, 18–39.

Epple, D. and T. Romer (1989). On the flexibility of municipal boundaries. *Journal of Urban Economics 26*(3), 307–319.

Erlingsson, G. , J. Ödalen, and E. Wångmar (2021). How Coerced Municipal Amalgamations Thwart the Values of Local Self-Government. *Urban Affairs Review 57*(5), 1226–1251.

Faguet, J.-P. (2014). Decentralization and Governance. *World Development 53*, 2–13.

Fenizia, A. and R. Saggio (2024). Organized Crime and Economic Growth: Evidence from Municipalities Infiltrated by the Mafia. *American Economic Review 114*(7), 2171–2200.

Ferraresi, M., G. Migali, and L. Rizzo (2018). Does intermunicipal cooperation promote efficiency gains? Evidence from Italian municipal unions. *Journal of Regional Science 58*(5), 1017–1044.

Frère, Q., M. Leprince, and S. Paty (2014). The Impact of Intermunicipal Cooperation on Local Public Spending. *Urban Studies 51*(8), 1741–1760. Publisher: Sage Publications, Ltd.

Galindo-Silva, H., N. H. Some, and G. Tchuente (2021). Fuzzy Difference-in-Discontinuities: Identification Theory and Application to the Affordable Care Act. arXiv:1812.06537.

Gori, G., P. Lattarulo, F. Porcelli, L. Rizzo, and R. Secomandi (2023). Does Inter-Municipal Cooperation Increase Efficiency? Evidence From Italy. *SIEP Working Paper 777*.

Grembi, V., T. Nannicini, and U. Troiano (2016). Do Fiscal Rules Matter? *American Economic Journal: Applied Economics 8*(3), 1–30.

Guren, A. M., A. McKay, E. Nakamura, and J. Steinsson (2021). Housing Wealth Effects: The Long View. *The Review of Economic Studies 88*(2), 669–707.

Gürerk, O., B. Irlenbusch, and B. Rockenbach (2014). On cooperation in open communities. *Journal of Public Economics 120*, 220–230.

Hansen, S. W. (2015). The Democratic Costs of Size: How Increasing Size Affects Citizen

Satisfaction with Local Government. *Political Studies 63*(2), 373–389.

Harjunen, O., T. Saarimaa, and J. Tukiainen (2021). Political representation and effects of municipal mergers. *Political Science Research and Methods 9*(1), 72–88.

Liu, W.-M. and P. Ngo (2020). Voting with your feet: Political competition and internal migration in the United States. *European Journal of Political Economy 65*, 101931.

Luca, D. and F. Modrego (2021). Stronger together? Assessing the causal effect of inter-municipal cooperation on the efficiency of small Italian municipalities. *Journal of Regional Science 61*(1), 261–293.

Marbach, M. and D. Hangartner (2020). Profiling Compliers and Noncompliers for Instrumental-Variable Analysis. *Political Analysis 28*(3), 435–444.

McCrary, J. (2008). Manipulation of the running variable in the regression discontinuity design: A density test. *Journal of Econometrics 142*(2), 698–714.

Mian, A., A. Sufi, and F. Trebbi (2015). Foreclosures, House Prices, and the Real Economy. *The Journal of Finance 70*(6), 2587–2634.

Millán-Quijano, J. (2020). Fuzzy difference in discontinuities. *Applied Economics Letters 27*(19), 1552–1555.

Myksvoll, T., M. Tatham, and A. L. Fimreite (2022). Understanding bureaucratic support for coerced institutional change. *Governance 35*(4), 1119–1138.

Oates, W. E. (1969). The Effects of Property Taxes and Local Public Spending on Property Values: An Empirical Study of Tax Capitalization and the Tiebout Hypothesis. *Journal of Political Economy 77*(6), 957–971.

Oates, W. E. (1972). *Fiscal Federalism*. Edward Elgar Publishing.

Oates, W. E. (1999). An Essay on Fiscal Federalism. *Journal of Economic Literature 37*(3), 1120–1149.

Oliviero, T., A. Sacchi, A. Scognamiglio, and A. Zazzaro (2019). House prices and immovable property tax: Evidence from OECD countries. *Metroeconomica 70*(4), 776–792.

Ostrom, E. (2010). Beyond Markets and States: Polycentric Governance of Complex Economic Systems. *American Economic Review 100*(3), 641–672.

Ostrom, V., C. M. Tiebout, and R. Warren (1961). The Organization of Government in Metropolitan Areas: A Theoretical Inquiry. *American Political Science Review 55*(4), 831–842.

Picchetti, P., C. C. X. Pinto, and S. T. Shinoki (2024). Difference-in-Discontinuities: Estimation, Inference and Validity Tests. arXiv:2405.18531.

Pickering, S., S. Tanaka, and K. Yamada (2020). The Impact of Municipal Mergers on Local Public Spending: Evidence From Remote-Sensing Data. *Journal of East Asian Studies 20*(2), 243–266.

Reingewertz, Y. (2012). Do municipal amalgamations work? Evidence from municipalities in Israel. *Journal of Urban Economics 72*(2), 240–251.

Saarimaa, T. and J. Tukiainen (2015). Common pool problems in voluntary municipal mergers. *European Journal of Political Economy 38*, 140–152.

Schuknecht, L. (2020). The Growth of Government Expenditure over the Past 150 Years. In *Public Spending and the Role of the State: History, Performance, Risk and Remedies*, pp. 17–35. Cambridge University Press.

Shi, M. and A. Tulli (2022). Free to Spend? The Effect of Fiscal Autonomy on Local Governments. *Working Paper*.

Tiebout, C. M. (1956). A Pure Theory of Local Expenditures. *Journal of Political Economy 64*(5), 416–424.

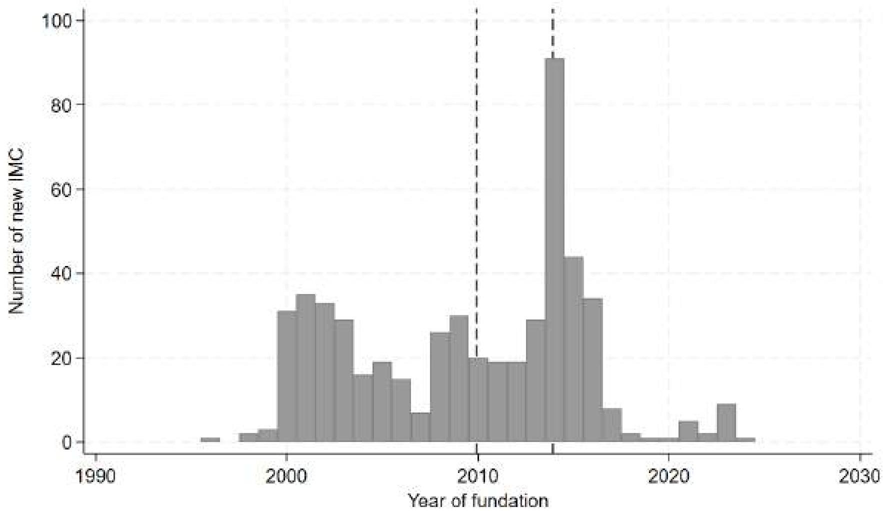
Tricaud, C. (2025). Better Alone? Evidence on the Costs of Intermunicipal Cooperation. *American Economic Journal: Applied Economics 17*(1), 160–207.

Warner, M. E. (2006). Inter-municipal Cooperation in the U.S.: A Regional Governance Solution? *Urban Public Economics Review* (6), 221–240.

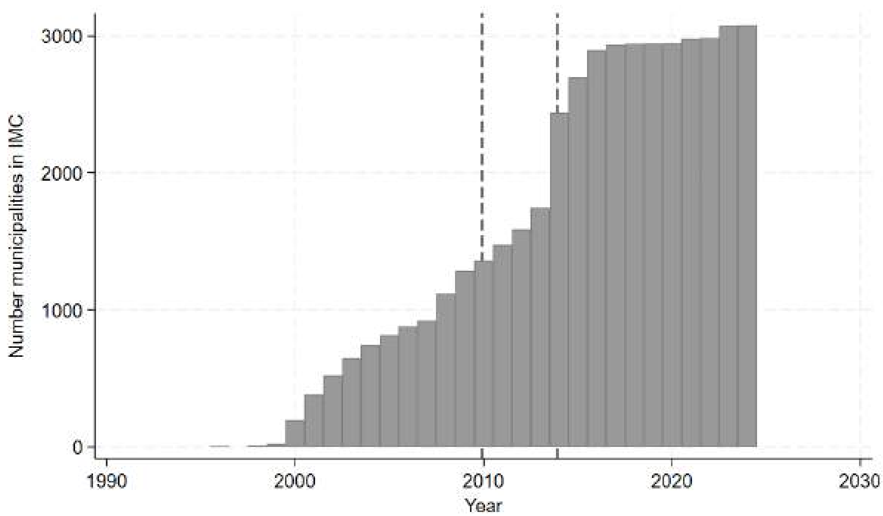
Welling Hansen, S. (2014). Common pool size and project size: an empirical test on expenditures using Danish municipal mergers. *Public Choice 159*(1), 3–21.

Wolfschütz, E. (2020). The Effect of Inter-municipal Cooperation on Local Business Development in German Municipalities. *AGKS Joint Discussion Paper Series in Economics 5*.

Figure 1. Inter-municipal community over time



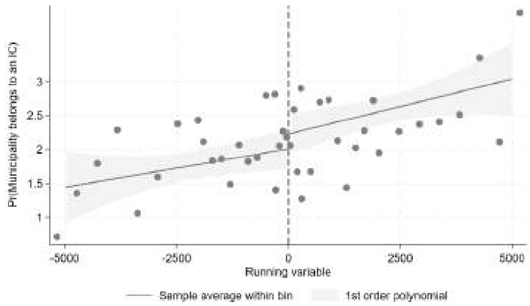
(A) Number of IC



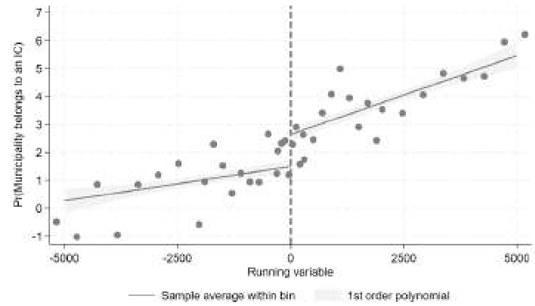
(B) Number of municipalities in IC

Notes: Evolution of inter-municipal communities (ICs) in Italy, 2000–2018. Subfigure (A) plots the number of newly established ICs in each year. Subfigure (B) reports the cumulative number of municipalities involved in ICs. The vertical dashed lines represent the two steps of the reform: 2010, when the mandate was implemented and 2014, when simplification was introduced.

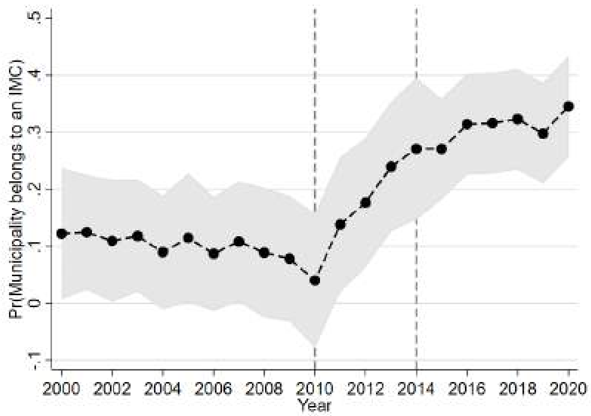
Figure 2. Regression Discontinuity estimates for IC membership



(A) RD estimate for year 2008



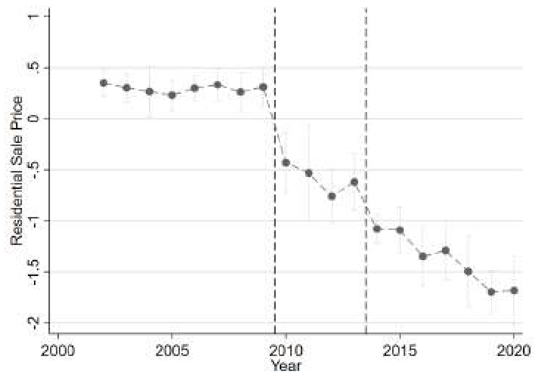
(B) RD estimate for year 2015



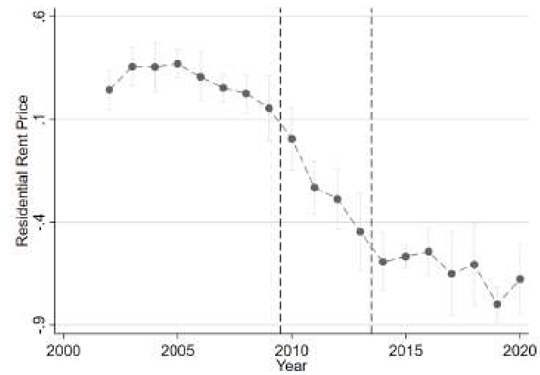
(C) Yearly RD estimates

Notes: Regression Discontinuity (RD) estimates for the probability of a municipality belonging to an inter-municipal community (IC) over time. Subfigures (A) and (B) show RD plots for the years 2008 and 2015. The running variable, population, is centered around 5,000 (3,000 for mountainous municipalities). Subfigure (C) presents the annual RD coefficients for the time from 2000 to 2020. The shaded area denotes 95% confidence intervals. The two vertical lines mark key reform stages: its implementation in 2010 and reinforcement in 2014. The optimal bandwidth for the RD estimates was determined using Calonico et al. (2014), employing a first-degree polynomial and a triangular kernel.

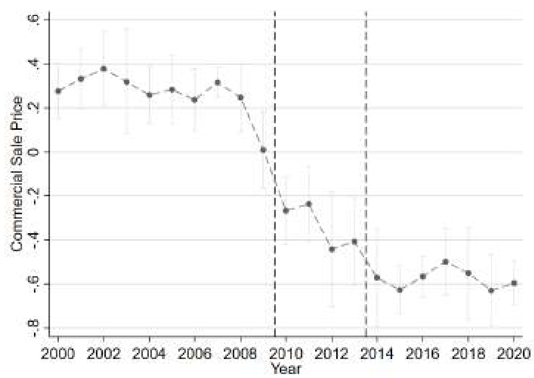
Figure 3. Reduced form regression discontinuity (RD) estimates for housing prices



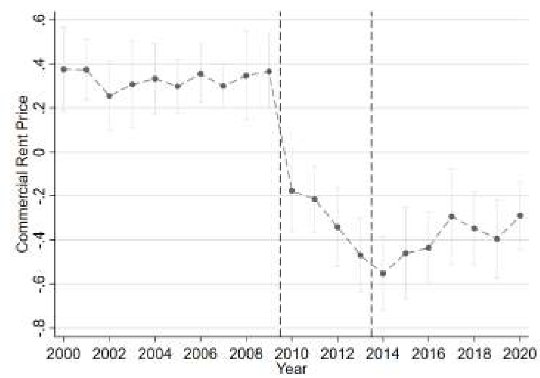
(A) Sale price - residential



(B) Rent price - residential



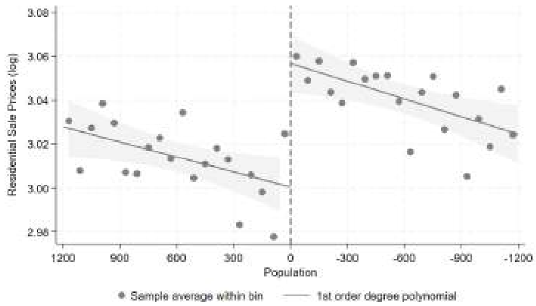
(C) Sale price - commercial



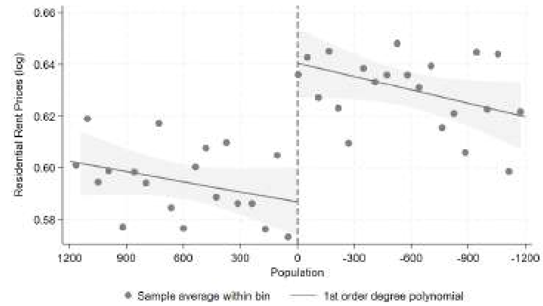
(D) Rent price - commercial

Notes: Reduced-form regression discontinuity (RD) estimates for residential and commercial property prices, 2000–2020. Each plot displays the annual RD estimates based on a regression of the outcome on the instrument—that is, whether the municipality has less than 5,000 (or 3,000 for mountainous municipalities) inhabitants. Subfigures (A) and (B) present sale and rental prices for residential buildings, respectively, while subfigures (C) and (D) show similar plots for commercial building prices. The prices are computed in logs. The estimation uses a triangular kernel, with bandwidths determined using the algorithm by Calonico et al. (2014). The bars indicate 95% confidence intervals.

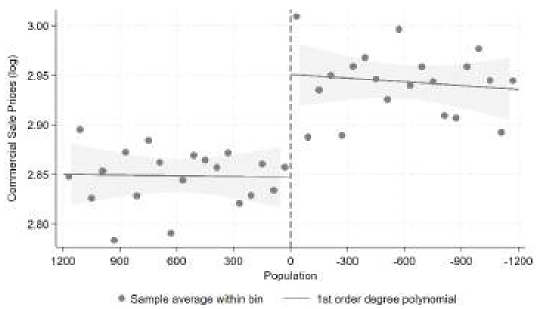
Figure 4. Difference-in-discontinuities for housing prices



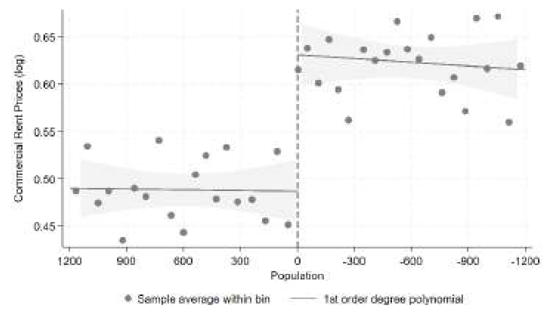
(A) Sale price - residential



(B) Rent price - residential



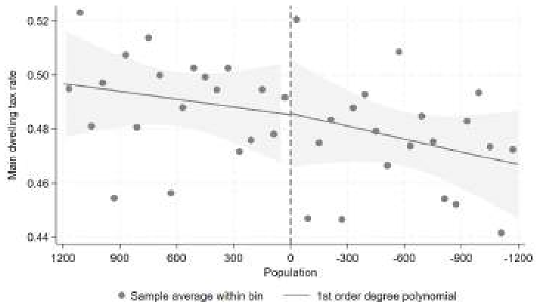
(C) Sale price - commercial



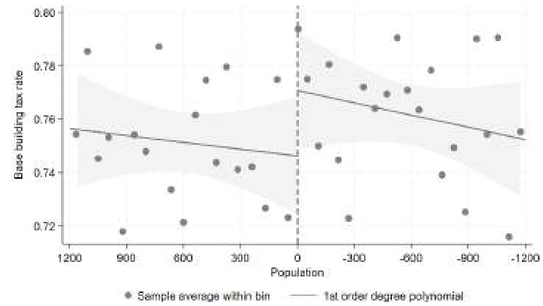
(D) Rent price - commercial

Notes: Difference-in-discontinuity estimates for the impact of mandatory cooperation on house price outcomes. Subfigures (A) and (B) present sale and rental prices for residential buildings, respectively, while subfigures (C) and (D) show similar plots for commercial building prices. The prices are computed in logs. The horizontal axis represents the 2010 intercensal population centered around 5,000 (or 3,000 for mountainous municipalities). The central line represents a linear fit, while the scatter points represent averages over intervals of 100 inhabitants. Estimation uses a triangular kernel, with bandwidths determined by the algorithm of Calonico et al. (2014). The shaded region depicts 95% confidence intervals.

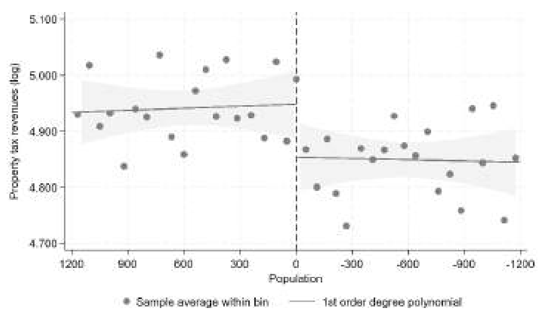
Figure 5. Difference-in-discontinuities for property taxes



(A) Main dwelling



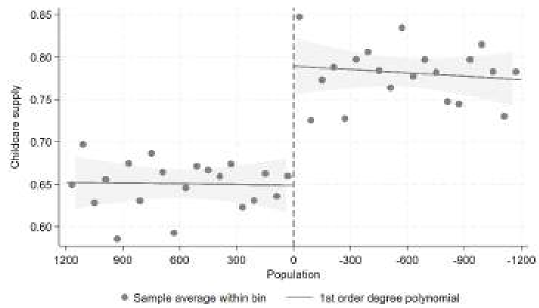
(B) Base building



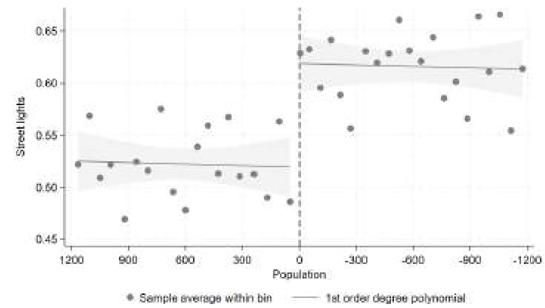
(C) Property tax revenues

Notes: Difference-in-discontinuities plots for property tax outcomes. Subfigures represent the main dwelling (A) and base building (B) percent property tax rates, and property tax revenues computed in 2015 real euros per capita and transformed in logarithms (C). The horizontal axis displays the 2010 intercensal population size centered around 5,000 (or 3,000 for mountainous municipalities). The central line represents a linear fit, while the scatter points represent averages over intervals of 100 inhabitants. Estimation uses a triangular kernel, with bandwidths determined by the algorithm of Calonico et al. (2014). The shaded regions indicate 95% confidence intervals.

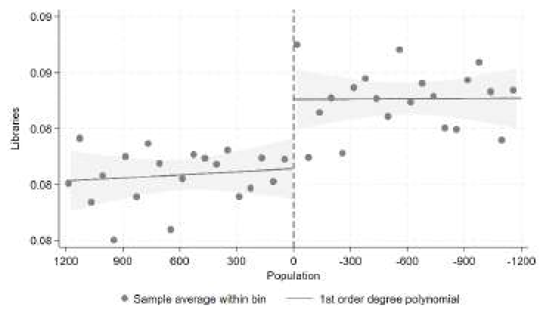
Figure 6. Reduced form estimates for public good quality



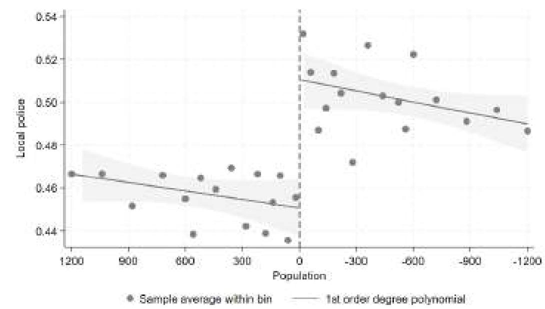
(A) Childcare



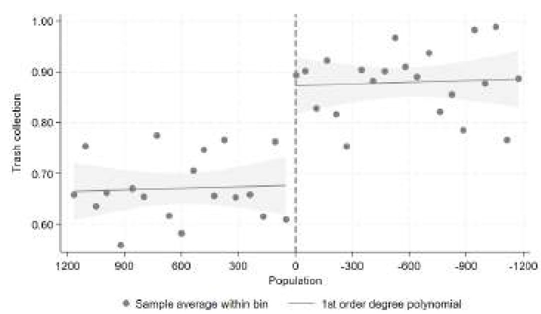
(B) Street lights



(C) Libraries



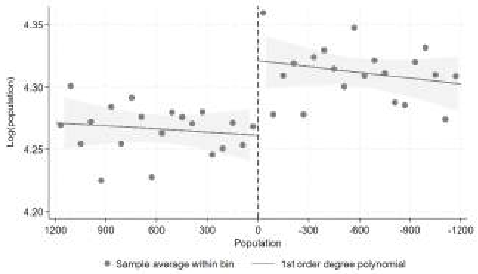
(D) Local police



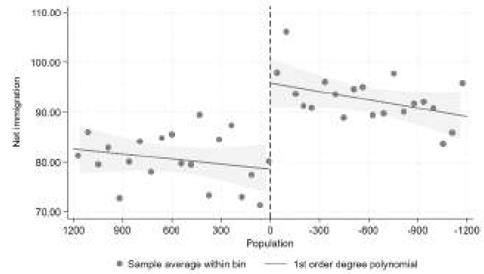
(E) Waste collection

Notes: Difference-in-discontinuities plots for public goods supply. Subfigures represent childcare supply, i.e. ratio of successful applications to the total number of applications (A), street light supply, i.e. ratio of lit kilometers of roads to the total kilometers of road (B), libraries per 1,000 inhabitants (C), log of number of local policemen (D), and trash collection supply, i.e. ratio of houses served by trash collection to the total number of houses (E). The horizontal axis displays the 2010 intercensal population centered around 5,000 (or 3,000 for mountainous municipalities). The central line represents a linear fit, while the scatter points represent averages over intervals of 100 inhabitants. Estimation uses a triangular kernel, with bandwidths determined by the algorithm of Calonico et al. (2014). The shaded regions indicate 95% confidence intervals.

Figure 7. Difference-in-discontinuities for population outcomes



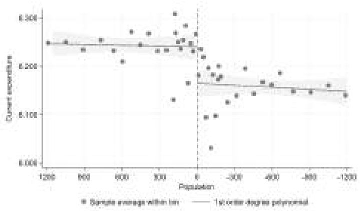
(A) Population growth



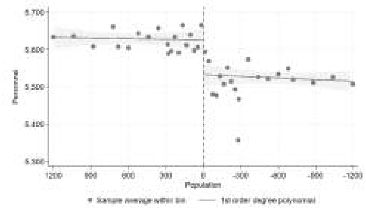
(B) Net immigration

Notes: Difference-in-discontinuities plots for population outcomes. Subfigures represent population growth computed as the log of intercensal population (A), and net immigration (B). The horizontal axis displays the 2010 intercensal population centered around 5,000 (or 3,000 for mountainous municipalities). The central line represents a linear fit, while the scatter points represent averages over intervals of 100 inhabitants. Estimation uses a triangular kernel, with bandwidths determined by the algorithm of Calonico et al. (2014). The shaded regions indicate 95% confidence intervals.

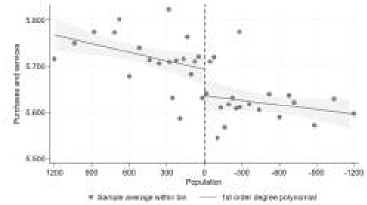
FIGURE 8. Reduced form estimates for expenditure



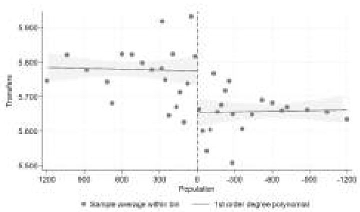
(A) Current expenditure



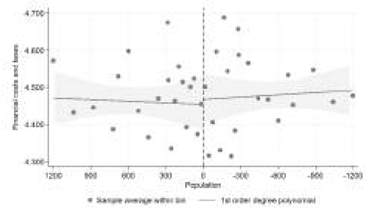
(B) Personnel expenditure



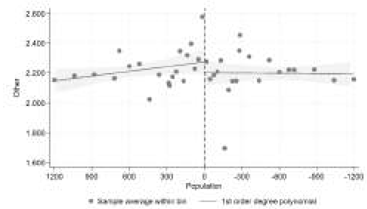
(C) Purchases and services expenditure



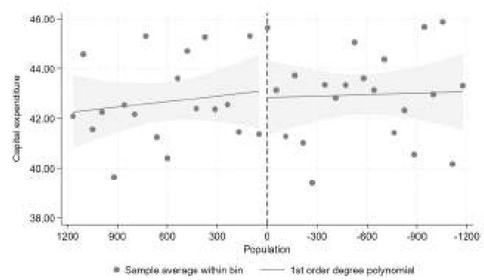
(D) Transfers expenditure



(E) Financial and taxes expenditure



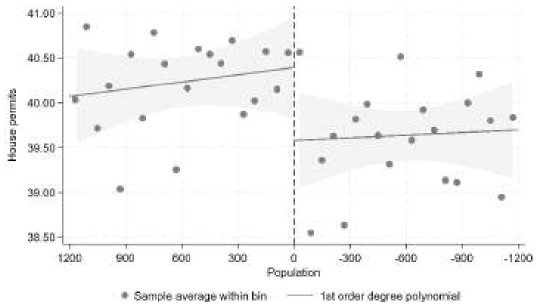
(F) Other expenditures



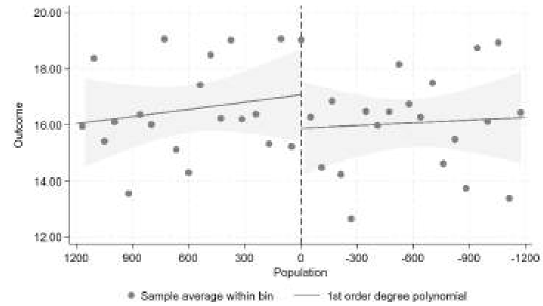
(G) Capital expenditure

Notes: Difference-in-discontinuities plots for expenditure outcomes. Subfigures represent current expenditures (A) and its components, personnel (B), purchases and services (C), transfers (D), financial costs and taxes (E), and other expenditures (F), and capital (G) expenditures, all computed in 2015 real euros per capita and transformed in logarithms. The horizontal axis displays the 2010 intercensal population centered around 5,000 (or 3,000 for mountainous municipalities). The central line represents a linear fit, while the scatter points represent averages over intervals of 100 inhabitants. Estimation uses a triangular kernel, with bandwidths determined by the algorithm of Calonico et al. (2014). The shaded regions indicate 95% confidence intervals.

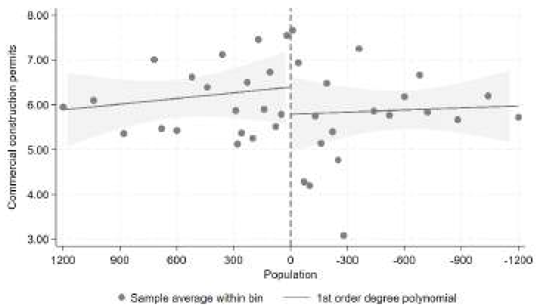
FIGURE 9. Difference-in-discontinuity for housing supply



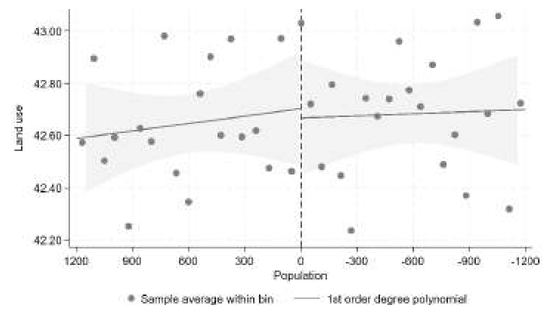
(A) House permit revenues



(B) Number of residential building permits



(C) Number of commercial building permits



(D) Land use

Notes: Difference-in-discontinuities plots for housing supply. Subfigures represent revenue from housing building permits computed in 2015 real euros per capita and transformed in logarithms (A), proxied number of residential (B) and commercial (C) construction permits, and percentage of used land (D). The horizontal axis displays the 2010 intercensal population centered around 5,000 (or 3,000 for mountainous municipalities). The central line represents a linear fit, while the scatter points represent averages over intervals of 100 inhabitants. Estimation uses a triangular kernel, with bandwidths determined by the algorithm of Calonico et al. (2014). The shaded regions indicate 95% confidence intervals.

Table 1. Summary statistics

	Treated		Untreated			Treated		Untreated	
	Mean	SD	Mean	SD		Mean	SD	Mean	SD
Panel A: Outcomes									
Residential sale price	859.16	319.56	1,179.67	481.11	Current expenditure	664.72	355.04	505.80	211.20
Residential rent price	2.97	1.36	4.15	1.92	Personnel	252.25	185.44	179.61	76.15
Commercial sale price	607.99	237.62	842.80	334.51	Purchases and services	281.69	185.44	213.88	115.14
Commercial rent price	2.85	1.24	4.02	1.69	Transfers	289.27	381.56	141.65	133.06
Panel B: Mechanism					Financial costs and taxes	87.09	85.10	79.87	62.98
Main dwelling tax rate	0.48	0.18	0.45	0.18	Others	9.08	45.01	9.67	16.65
Base building tax rate	0.60	0.07	0.63	0.07	Capital expenditure	97.77	173.15	50.13	98.09
Property tax revenues	143.79	84.57	876.84	347.92	**Panel C: Controls**				
Population	1,549.34	1,233.79	19,890.09	76,492.00	Area (km^2)	27.35	28.98	57.52	72.33
Net immigration	7.08	36.01	105.33	484.82	Population density	128.20	212.98	604.44	966.34
Childcare	0.02	0.11	0.05	0.07	Altitude (m)	419.51	306.57	231.60	230.77
Street lights	2.23	1.00	1.51	0.65	North-West	0.43	0.50	0.28	0.45
Local police	0.52	0.45	0.56	0.24	North-East	0.14	0.35	0.23	0.42
Trash collection	6.17	3.44	5.98	3.52	Center	0.11	0.31	0.15	0.36
Libraries	0.26	0.59	0.08	0.08	South and Islands	0.31	0.46	0.34	0.47
House permit revenues	35.08	43.42	46.00	41.86	Rural	0.85	0.36	0.23	0.42
House permits (residential)	1.71	3.67	15.81	44.80	Mountainous	0.37	0.48	0.21	0.41
House permits (commercial)	0.68	2.21	5.76	12.80					
Land use	5.81	5.77	16.75	13.31					
Observations	75,829		32,931			75,829		32,931	

Notes: This table displays the summary statistics (mean and standard deviation) for the outcomes and control variables utilized in the main analysis. Treated refers to municipalities with a 2010 population below 5,000 inhabitants (or 3,000 inhabitants for mountainous municipalities). In Panel A, all prices are expressed in logarithmic form. In Panel B, property tax rates are presented in percentage points; childcare is defined as the ratio of accepted applications to total applications; streetlight supply is measured as the ratio of lit kilometers of municipal roads over total kilometers of roads; local police is measured in logs; trash collection is the ratio of houses served by municipal trash services over total houses; libraries are per 1,000 inhabitants. Land use is a percentage. Expenditures are per capita real terms (2015 euros). In Panel C, all variables are indicators unless otherwise specified.

Table 2. Housing prices

	Residential		Commercial	
	(1)	(2)	(3)	(4)
	Sale	Rent	Sale	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	1,236.243	4.385	890.597	4.289
Bandwidth	1211	1427	1950	1068
Observations	24,822	29,249	36,969	21,891

Notes: * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level. Standard errors, clustered at the municipality level, are reported in parentheses. All dependent variables are presented in logarithms, while the means are reported in non-transformed terms. The F statistics correspond to first-stage regressions of the probability of belonging to an inter-municipal community (IC) against an indicator for whether the population is below 5,000 (or 3,000 for mountainous municipalities). Estimation employs a triangular kernel, and the optimal bandwidth is determined using the MSE-optimal bandwidth selector of Calonico et al. (2014).

TABLE 3. Property Taxes

	Rates		
	(1) Main dwelling	(2) Base	(3) Revenues
Conventional	-0.049	-0.064	0.066
	(0.032)	(0.042)	(0.044)
First-stage F	31.04	25.17	21.59
Bias-corrected	-0.044	-0.058	0.061
	(0.032)	(0.042)	(0.044)
First-stage F	33.22	27.59	23.47
Robust	-0.044	-0.058	0.061
	(0.020)	(0.027)	(0.041)
First-stage F	27.56	21.93	19.27
Mean	0.48	0.74	127.88
Bandwidth	794	995	853
Observations	13,364	15,224	13,051

Notes: * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level. Standard errors, clustered at the municipality level, are reported in parentheses. The dependent variables include the property tax rates for main dwellings and other buildings (expressed in percentages), and the property tax revenues in real per capita terms and computed in logs (the mean is reported in non-transformed terms). The F statistics correspond to first-stage regressions of the probability of belonging to an inter-municipal community (IC) against an indicator for whether the population is below 5,000 (or 3,000 for mountainous municipalities). Estimation employs a triangular kernel, and the optimal bandwidth is determined using the MSE-optimal bandwidth selector of Calonico et al. (2014).

Table 4. Public goods

	(1) Childcare	(2) Street lights	(3) Libraries	(4) Local police	(5) Trash collection
Conventional	-0.156***	-0.123**	-0.003**	-0.066***	-0.237**
	(0.045)	(0.063)	(0.001)	(0.023)	(0.139)
First-stage F	54.74	57.57	55.56	49.78	51.87
Bias-corrected	-0.145***	-0.112**	-0.002**	-0.080***	-0.232**
	(0.045)	(0.063)	(0.001)	(0.023)	(0.139)
First-stage F	58.64	61.35	59.28	52.18	56.24
Robust	-0.145***	-0.112**	-0.002**	-0.080***	-0.232**
	(0.061)	(0.386)	(0.003)	(0.027)	(0.142)
First-stage F	52.29	54.29	50.12	45.56	47.53
Mean	0.789	0.625	0.086	0.717	0.884
Bandwidth	1292	1045	702	714	1259
Observations	26,482	21,419	14,389	14,635	25,806

Notes: * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level. Standard errors, clustered at the municipality level, are reported in parentheses. The dependent variables include public good supply satisfaction measures: the ratio of satisfied applications for childcare over the total number of applications, the ratio of lit kilometers of municipal roads over the total number of kilometers of municipal roads, the number of libraries per 1000 inhabitants, the logarithm of the number of local policemen, and the ratio of houses served by trash collection over the total number of houses in a municipality. The F statistics correspond to first-stage regressions of the probability of belonging to an inter-municipal community (IC) against an indicator for whether the population is below 5,000 (or 3,000 for mountainous municipalities). Estimation employs a triangular kernel, and the optimal bandwidth is determined using the MSE-optimal bandwidth selector of Calonico et al. (2014).

TABLE 5. Population

	(1) Log(Population)	(2) Net Immigration
Conventional	-0.065***	-12.35***
	(0.020)	(4.582)
First-stage F	59.12	59.64
Bias-corrected	-0.073***	-12.86***
	(0.020)	(4.582)
First-stage F	62.32	63.52
Robust	-0.073***	-12.86***
	(0.032)	(4.984)
First-stage F	57.02	56.84
Mean	19,656.65	58.128
Bandwidth	488	1092
Observations	9,275	22,383

Notes: * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level. Standard errors, clustered at the municipality level, are reported in parentheses. The dependent variables include population growth (computed as the logarithm of population) and net immigration, computed as the difference between in- and out-migration to a municipality. The F statistics pertain to the first-stage regressions of the probability of belonging to an inter-municipal community (IC) against an indicator for whether the population is less than 5,000 (or 3,000 for mountainous municipalities). The optimal bandwidth is estimated using the MSE-optimal bandwidth selector of Calonico et al. (2014).

Table 6. Expenditure

	Current						
	(1) Total	(2) Personnel	(3) Purchases & Services	(4) Transfers	(5) Fin costs & Taxes	(6) Other	(7) Investment
Conventional	0.062**	0.083**	0.072***	0.091**	0.012	0.015	-0.288
	(0.029)	(0.021)	(0.025)	(0.033)	(0.056)	(0.062)	(0.188)
First-stage F	22.66	17.42	22.11	26.85	18.95	29.34	21.95
Bias-corrected	0.057**	0.079**	0.068**	0.087**	0.009	0.011	-0.253
	(0.029)	(0.021)	(0.025)	(0.033)	(0.056)	(0.062)	(0.188)
First-stage F	20.82	14.72	18.58	24.94	16.87	27.63	20.20
Robust	0.057**	0.079**	0.068**	0.087**	0.009	0.011	-0.253
	(0.028)	(0.026)	(0.034)	(0.042)	(0.062)	(0.073)	(0.163)
First-stage F	18.43	13.68	16.78	22.45	15.55	25.23	13.09
Mean	474.942	252.254	281.689	289.272	87.097	9.084	42.659
Bandwidth	864	842	917	1083	1164	995	1149
Observations	17,709	17,259	18,796	22,198	28,859	20,395	23,551

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 expenditures and its components, personnel, purchases and services, transfers, financial costs and taxes, and other, and investment expenditures (in per capita and 2015 real terms). Means are reported non-transformed. The F statistics correspond to first-stage regressions of the probability of belonging to an inter-municipal community (IC) against an indicator for whether the population is below 5,000 (or 3,000 for mountainous municipalities). Estimation employs a triangular kernel, and the optimal bandwidth is determined using the MSE-optimal bandwidth selector of Calonico et al. (2014).

Table 7. Housing building permits and land supply

	(1) House permits revenues	(2) House permits number	(3)	(4) Land use
		Residential	Commercial	
Conventional	0.054	0.423	0.213	-0.054
	(0.043)	(0.311)	(0.196)	(0.058)
First-stage F	23.79	15.52	18.52	99.72
Bias-corrected	0.069	0.511	0.253	-0.088
	(0.043)	(0.311)	(0.196)	(0.058)
First-stage F	22.82	14.23	17.32	105.4
Robust	0.069	0.511	0.253	-0.088
	(0.058)	(0.203)	(0.152)	(0.071)
First-stage F	14.55	14.11	16.24	68.54
Mean	39.561	15.810	5.761	42.659
Bandwidth	1241	521	489	1149
Observations	25,437	10,679	10,023	23,551

Notes: * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level. Standard errors, clustered at the municipality level, are reported in parentheses. The dependent variables are measures of housing supply. House permits are the revenues collected by a municipality for housing permits, required to start construction of a new building; land use is the percentage of municipal area covered by human constructions (i.e., excluding water bodies, forests, etc.). The F statistics correspond to first-stage regressions of the probability of belonging to an inter-municipal community (IC) against an indicator for whether the population is below 5,000 (or 3,000 for mountainous municipalities). Estimation employs a triangular kernel, and the optimal bandwidth is determined using the MSE-optimal bandwidth selector of Calonico et al. (2014).

Table 8. Compliers analysis

	(1)	(2)	(3)		(1)	(2)	(3)
	Whole sample	Compliers	Never-takers		Whole sample	Compliers	Never-takers
Area (sqm)	37.709	46.199	24.319	Rural	0.637	0.619	0.803
	(0.137)	(1.091)	(0.119)		(0.001)	(0.011)	(0.002)
Altitude (m)	354.975	430.848	394.360	Mountainous	0.313	0.273	0.347
	(0.804)	(6.013)	(1.282)		(0.001)	(0.008)	(0.002)
Coastal	0.082	0.131	0.045	Left-wing mayor	0.167	0.199	0.010
	(0.001)	(0.006)	(0.001)		(0.373)	(0.399)	(0.099)
Island	0.004	-0.000	0.006	Right-wing mayor	0.088	0.114	0.014
	(0.000)	(0.001)	(0.000)		(0.284)	(0.317)	(0.116)
Population	7465.279	10084.520	1840.969	Mayor's education	14.704	14.647	14.646
	(40546.460)	(52853)	(1235.920)		(3.493)	(3.550)	(3.429)
Population density	297.579	703.575	164.920	Mayor's age	49.442	49.016	52.213
	(1.696)	(14.206)	(1.167)		(10.447)	(10.241)	(11.264)
Population $<$ 14	0.133	0.135	0.131	Female mayor	0.109	0.101	0.141
	(0.029)	(0.031)	(0.029)		(0.312)	(0.301)	(0.348)
Population $>$ 65	0.219	0.216	0.225	Professional mayor	0.263	0.283	0.190
	(0.062)	(0.066)	(0.058)		(0.440)	(0.450)	(0.392)
Income	14250.73	13515.44	16631.49				
	(5054.04)	(5211.15)	(3934.96)				
North-West	0.381	0.631	0.432				
	(0.001)	(0.010)	(0.002)				
North-East	0.174	-0.079	0.144				
	(0.001)	(0.009)	(0.002)				
Center	0.122	0.122	0.106				
	(0.001)	(0.006)	(0.001)				
South	0.324	0.326	0.318				
	(0.001)	(0.008)	(0.002)				
Share of municipalities	100%	28.6%	70.2%		100%	28.6%	70.2%

Notes: This table presents summary statistics for a set of characteristics of municipalities across the entire sample (1), as well as for compliers (2), and never-takers (3). The means of the covariates for compliers, never-takers, and always-takers are calculated using the methodology outlined in Marbach and Hangartner (2020). Bootstrapped standard errors are reported in parentheses.

Table 9. Housing price estimates for compliers

	Residential		Commercial	
	(1)	(2)	(3)	(4)
	Sale	Rent	Sale	Rent
Panel A: Baseline (IV on full sample)				
Full sample	-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
Panel B: Compliers only				
Compliers	-0.048**	-0.057**	-0.108***	-0.165**
	(0.016)	(0.027)	(0.031)	(0.052)
First-stage F	39.45	40.12	22.87	22.43
Mean	1,236.243	4.385	890.597	4.289
Bandwidth	1211	1427	1950	1068
Observations	24,822	29,249	36,969	21,891

Notes: * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level. Panel A replicates the main estimates, while Panel B focuses on the sample of compliers. Standard errors, clustered at the municipality level, are reported in parentheses. All dependent variables are presented in logarithms, while the means are reported in non-transformed values. The F statistics correspond to first-stage regressions of the probability of belonging to an an inter-municipal community (IC) against an indicator for whether the population is below 5,000 (or 3,000 for mountainous municipalities). Estimation employs a triangular kernel, and the optimal bandwidth is determined using the MSE-optimal bandwidth selector of Calonico et al. (2014).

Appendix A. Additional Institutional Background

A.1. Historical Evolution of Inter-Municipal Cooperation

Italy's interest in reducing municipal fragmentation dates back decades. Law 142/1990 created several instruments for inter-municipal integration, including the Unioni di Comuni (inter-municipal communities, ICs). These entities allowed municipalities to transfer designated responsibilities and resources to a shared administrative body, with the long-run goal of encouraging voluntary mergers.

Participation remained limited. By 1999, only sixteen ICs had formed, reflecting political resistance, weak incentives, and the complexity of establishing shared governance structures. Law 265/1999 removed population-based restrictions and eliminated the temporary status of ICs, but growth remained modest.

In 2010, the national government shifted from encouragement to coercion, introducing a population-based mandate requiring municipalities with less than 5,000 residents (or 3,000 in mountainous areas) to cooperate on a minimum number of essential functions. This reform aimed to strengthen administrative capacity and reduce duplication, especially following the 2008 financial crisis.

Implementation was phased:

- By January 1, 2013, municipalities had to jointly manage three functions.
- By September 30, 2014, cooperation expanded to five functions.
- By December 31, 2014, a minimum of six functions had to be shared.

Compliance was low and enforcement weak, generating wide cross-sectional and temporal variation in cooperation.

A.2. Governance Structure of ICs

Each IC is governed by a President—typically a mayor elected by the Council—and a Council composed of all mayors or designated councilors from member municipalities. Representation is proportional to municipal population to preserve influence for smaller jurisdictions. The President may appoint an Executive Board with delegated responsibilities.

ICs prepare their own budgets and financial plans. Although the law grants partial fiscal autonomy, ICs rarely hold independent taxing authority. Revenues typically consist of:

- contributions from member municipalities (proportional to population or service use),

- regional or national transfers, and
- occasionally, project-based funds.

This structure limits long-term investment capacity unless member municipalities agree on resource allocations.

A.3. Geographic Distribution and Descriptive Patterns

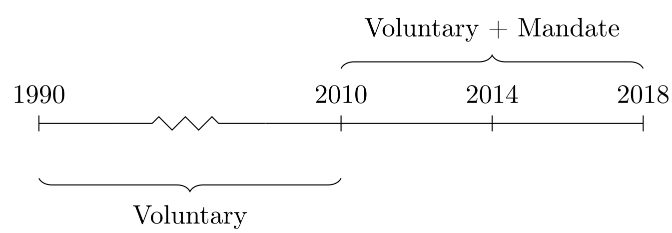
ICs are distributed throughout Italy but are most concentrated in northern Regions, especially Lombardy and Piedmont, and in mountainous and hilly terrain. Figure A2 maps all ICs and highlights their clustering, while Figure A3 zooms in on several examples.

Mountain communities (*Comunità Montane*), established in 1971 to coordinate development in mountainous areas, provide additional context. In some Regions they were transformed into ICs after 2010, and many municipalities subject to the lower 3,000-inhabitant threshold are located in these areas. Their historical presence contributes to the distinctive geography of cooperation.

The average IC includes roughly five municipalities and serves about 26,000 residents, though substantial variation exists. Table B1 provides descriptive statistics by Region.

A.4. Timeline of Legislative Reforms

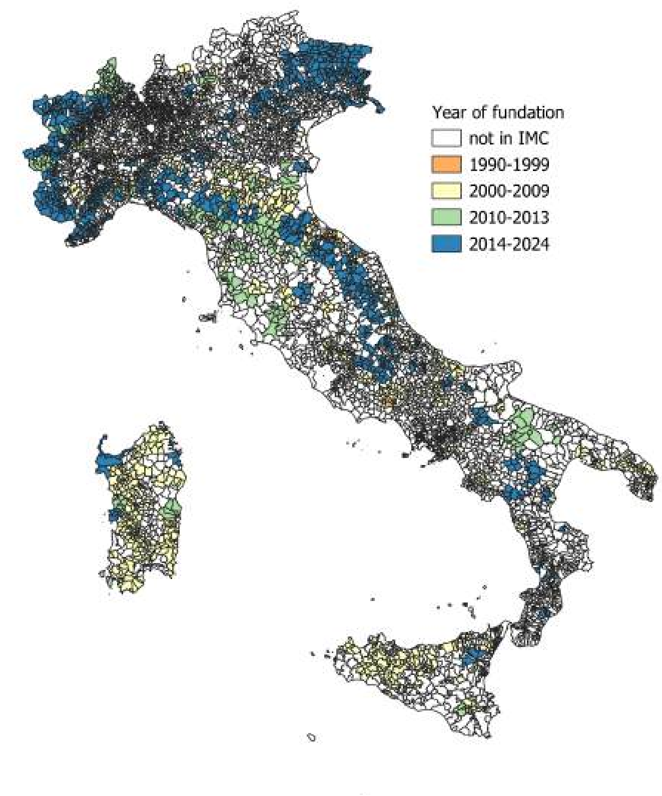
Figure A1. Inter-municipal cooperation law timeline



- 1990: ICs are introduced in Italian public law. Municipalities were free to cooperate, but were required to merge after ten years.
- 2000: The mandatory merge requirement is removed.
- 2010: A law mandates municipalities with less than 5,000 (or 3,000) inhabitants to join an IC.
- 2014: The regulation of ICs is simplified and harmonized.

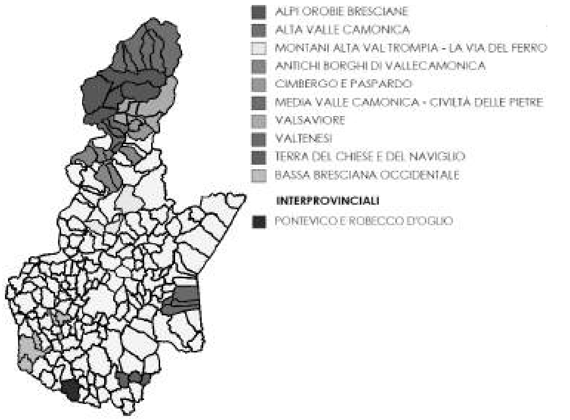
Appendix B. Other Figures

FIGURE A2. Map of inter-municipal communities over time

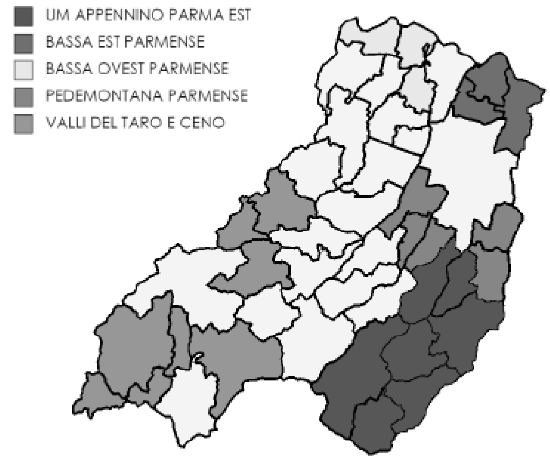


Notes: The map depicts the borders of Italian municipalities along with their membership status in inter-municipal communities (IC). For municipalities that are part of an IC, different colors represent the time periods in which they first joined. The colors refer to the four periods of different IC legislation (1990-1999, 2000-2009, 2010-2013, and 2014 and after). Green and blue municipalities are the ones that joined after the 2010 mandate. White municipalities are not involved in any form of cooperation.

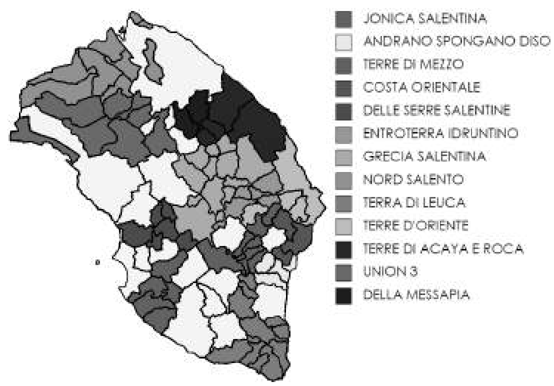
FIGURE A3. Maps of IC in Italy



(A) IC in Brescia province



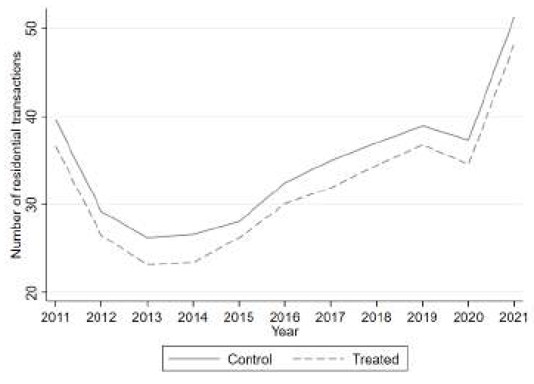
(B) IC in Parma province



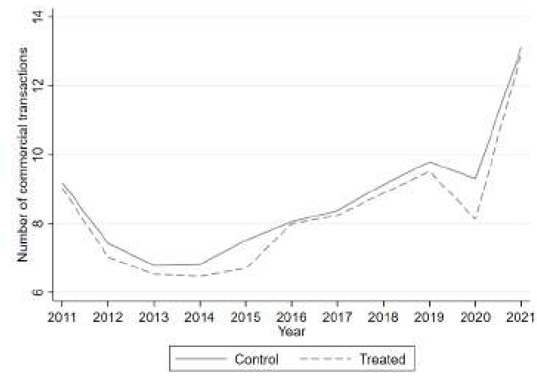
(C) IC in Lecce province

Notes: This figure presents maps of inter-municipal communities around Italy, in particular in three provinces, Brescia, Parma, and Lecce. The outer boundaries indicate the provincial area, and the inner borders indicate municipalities. Each color represents a distinct IC. In subfigure (A), Pontevico and Robecco d'Oglio are an inter-provincial IC, so only one of the two municipalities is in the Brescia province and is colored in dark green.

FIGURE A4. Housing transactions (2011-2021)



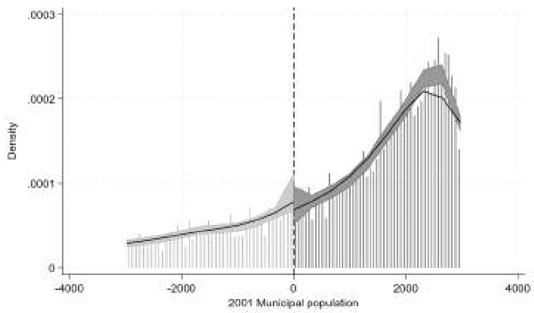
(A) Residential buildings



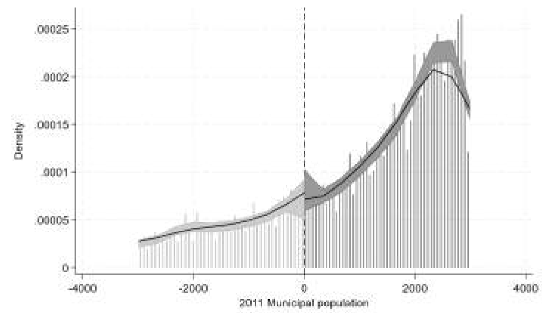
(B) Commercial buildings

Notes: House transactions at the municipal level, 2011-2021. The continuous line represents the treated municipalities, or those with less than 5,000 (3,000) inhabitants in 2010, while the dashed line represents the control municipalities. The transactions are computed per capita.

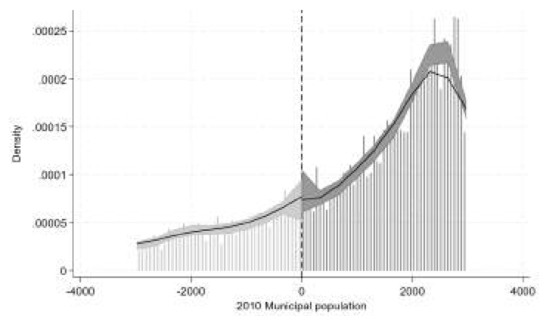
FIGURE A5. McCrary's test



(A) McCrary test 2001



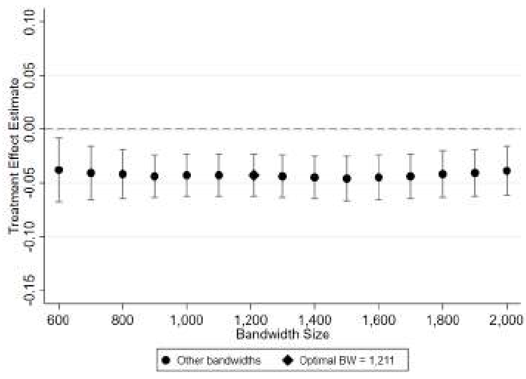
(B) McCrary test 2011



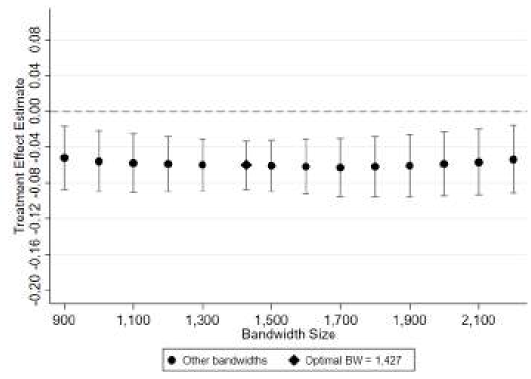
(C) McCrary test 2010

Notes: McCrary (2008) test for discontinuities in the running variable, i.e., the population count at the cutoff. The measure used for the main analysis is the 2010 intercensal population. The figure also reports the test for the population reported in the 2001 and 2011 Censuses.

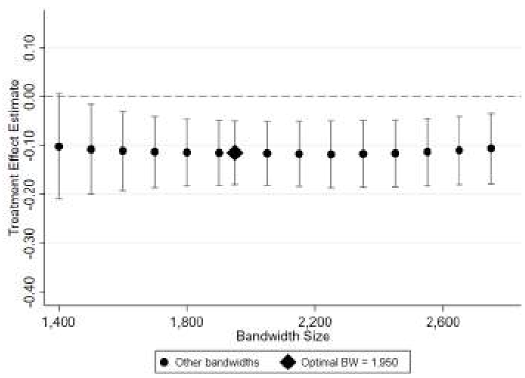
FIGURE A6. Housing prices - Different bandwidths



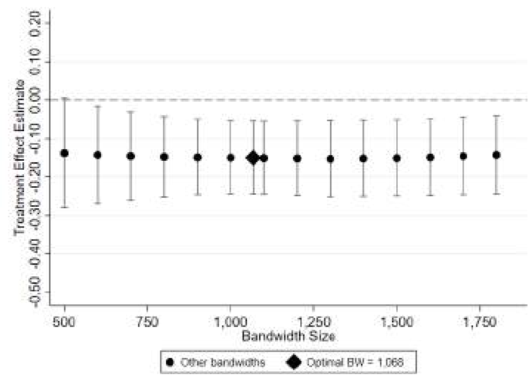
(A) Sale price - residential



(B) Rent price - residential



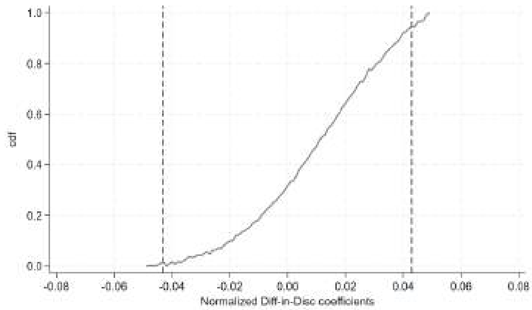
(C) Sale price - commercial



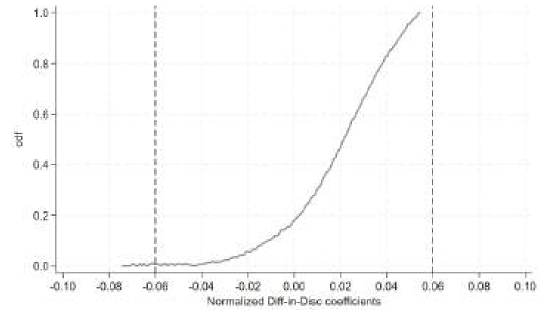
(D) Rent price - commercial

Notes: Difference-in-discontinuity estimates across various bandwidth sizes. The dependent variables are the logarithmic sale and rental prices for residential and commercial properties. The main estimate, indicated by the diamond, uses the optimal bandwidth identified by Calonico et al. (2014). The other estimates employ bandwidths at 25-unit increments around the optimal value. The bars represent 95% confidence intervals.

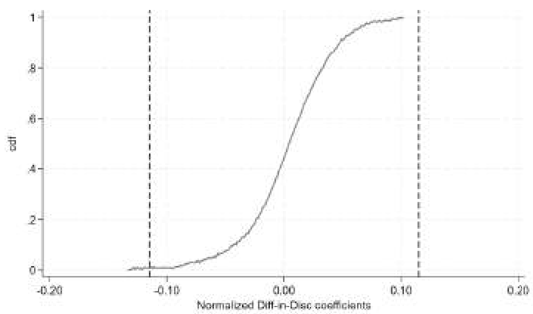
Figure A7. Placebo test - Housing prices



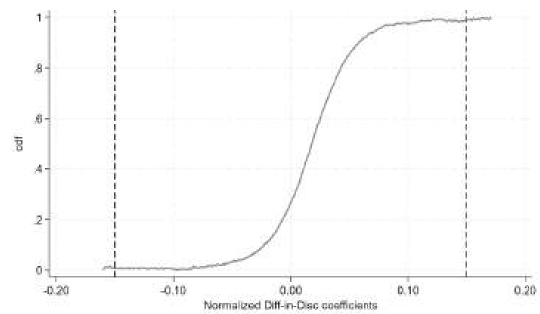
(A) Residential sale prices



(B) Residential rent prices



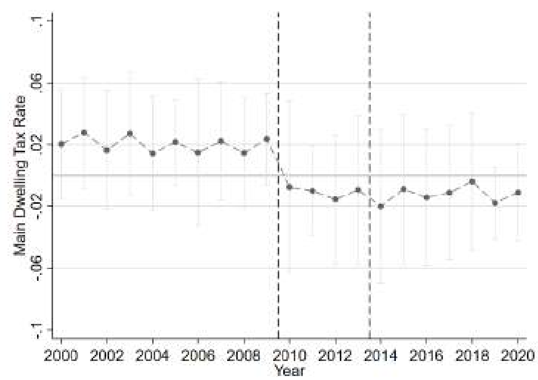
(C) Commercial sale prices



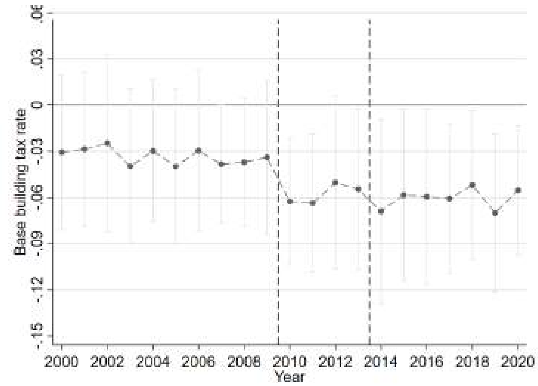
(D) Commercial rent prices

Notes: Placebo tests based on permutation methods for residential and commercial sale and rent prices as in Della Vigna and La Ferrara (2010). The figures report the empirical cumulative distribution function of normalized point estimates derived from a set of difference-in-differences estimations at 400 false thresholds, both below and above the true threshold of 5,000 (specifically, any 5 inhabitants from 4,000 to 4,900 and any 5 inhabitants from 5,100 to 6,000). The estimation method employed is a local linear probability model. The optimal bandwidth is estimated using the algorithm introduced by Calonico et al. (2014). The vertical line indicates our benchmark estimate (i.e., the true coefficient normalized to 100) along with its negative value.

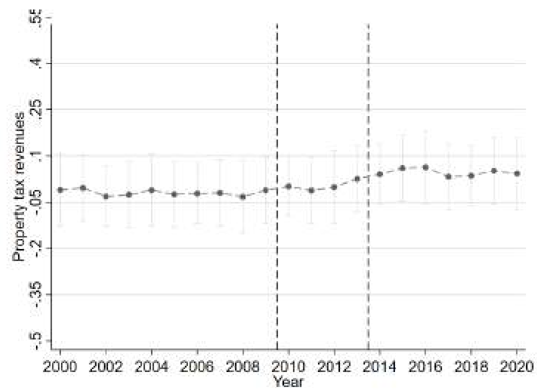
Figure A8. Reduced form estimates for property tax rates



(A) Main dwelling



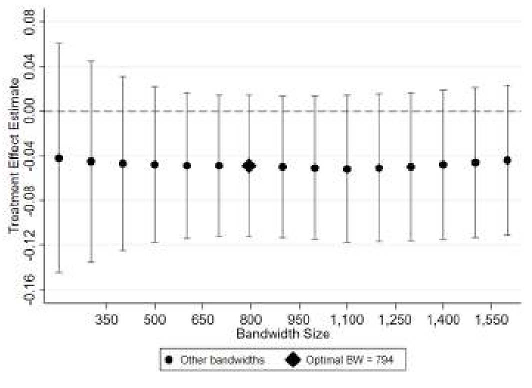
(B) Base building



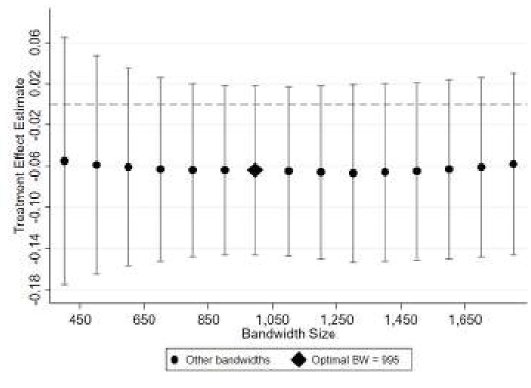
(C) Property tax revenues

Notes: Reduced-form regression discontinuity (RD) estimates for property tax outcomes, 2000–2020. Each plot displays the annual RD estimates based on a regression of the outcome on the instrument—that is, whether the municipality has less than 5,000 (or 3,000 for mountainous municipalities) inhabitants. Subfigure (A) displays the tax rate for main dwellings, subfigure (B) shows the tax rate for base buildings, and (C) reports the property tax revenues computed in 2015 real euros per capita and transformed in logarithms. The estimation uses a triangular kernel, with bandwidths determined using the algorithm by Calonico et al. (2014). The bars indicate 95% confidence intervals.

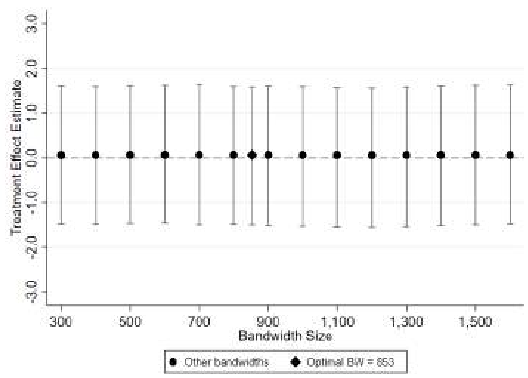
Figure A9. Property tax rates - Different bandwidths



(A) Main dwelling



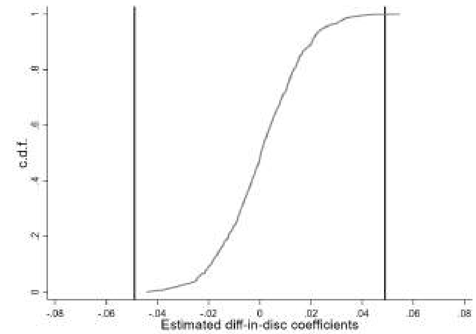
(B) Base building



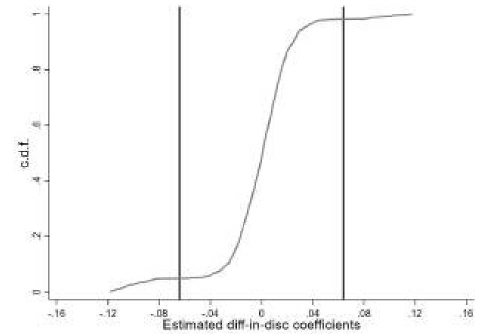
(C) Property tax revenues

Notes: Difference-in-discontinuity estimates across different bandwidth sizes. The dependent variables are the property tax rates for main dwellings and base buildings, in percentage points, and property tax revenues computed in 2015 real euros per capita and transformed in logarithms. The main estimate, indicated by the diamond, uses the optimal bandwidth identified by Calonico et al. (2014). The other estimates employ bandwidths at 25-unit increments around the optimal value. The bars represent 95% confidence intervals.

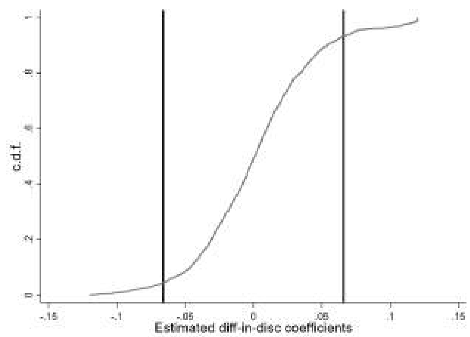
Figure A10. Placebo test - Property tax



(A) Main dwelling



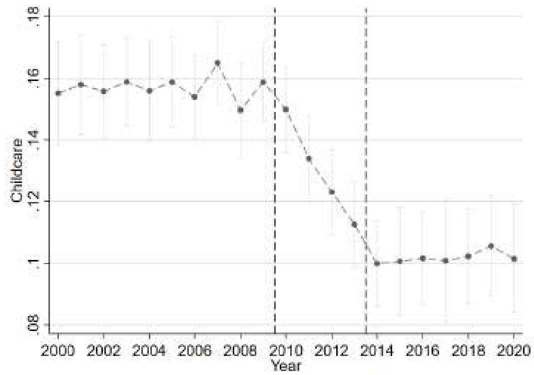
(B) Base building



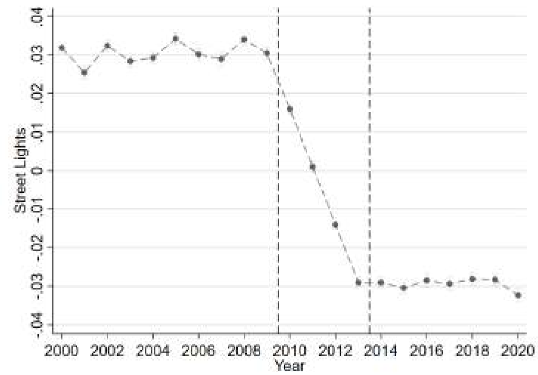
(C) Property tax revenues

Notes: Placebo tests based on permutation methods for property tax rates for main dwellings and base buildings and property tax revenues as in Della Vigna and La Ferrara (2010). The figures report the empirical cumulative distribution function of normalized point estimates derived from a set of difference-in-differences estimations at 400 false thresholds, both below and above the true threshold of 5,000 (specifically, any 5 inhabitants from 4,000 to 4,900 and any 5 inhabitants from 5,100 to 6,000). The estimation method employed is a local linear probability model. The optimal bandwidth is estimated using the algorithm introduced by Calonico et al. (2014). The vertical line indicates our benchmark estimate (i.e., the true coefficient normalized to 100) along with its negative value.

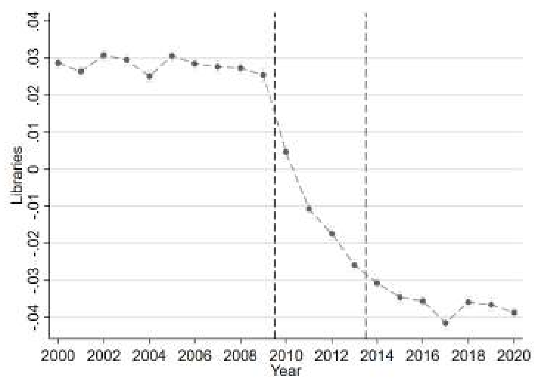
FIGURE A11. Reduced form estimates for public good supply



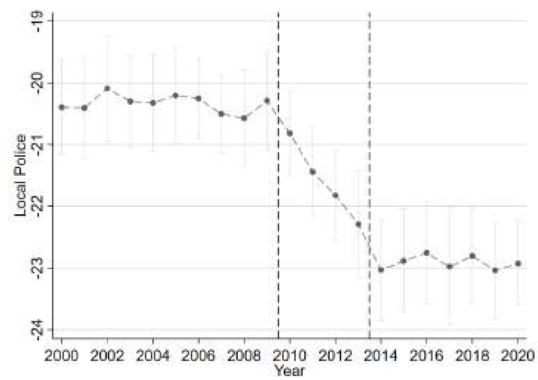
(A) Childcare



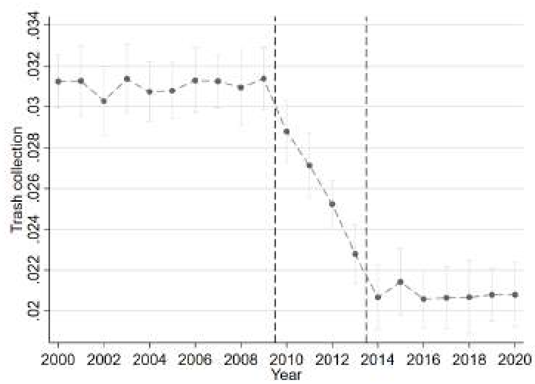
(B) Street lights



(C) Libraries



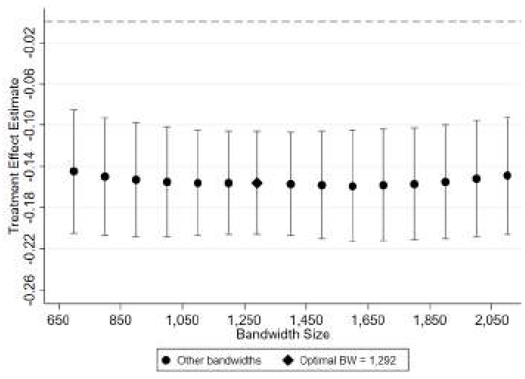
(D) Local police



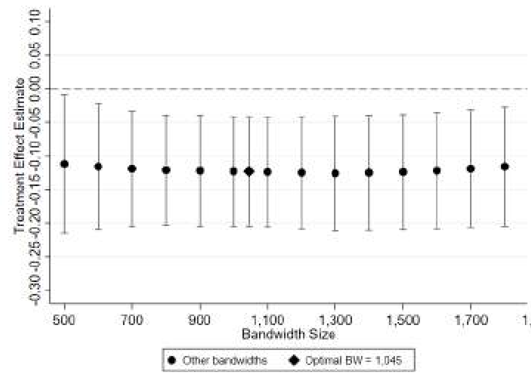
(E) Waste collection

Notes: Reduced-form regression discontinuity (RD) estimates for measures of local public goods, 2000-2020. Each plot displays the RD estimates over time based on a regression of the outcome on the instrument—that is, whether the municipality has less than 5,000 (or 3,000 for mountainous municipalities) inhabitants. The outcomes include childcare supply, i.e. ratio of successful applications to the total number of applications (A), street light supply, i.e. ratio of lit kilometers of roads to the total kilometers of road (B), libraries per 1,000 inhabitants (C), log of number of local policemen (D), and trash collection supply, i.e. ratio of houses served by trash collection to the total number of houses (E). The estimation uses a triangular kernel, with bandwidths determined using the algorithm by Calonico et al. (2014). The bars indicate 95% confidence intervals.

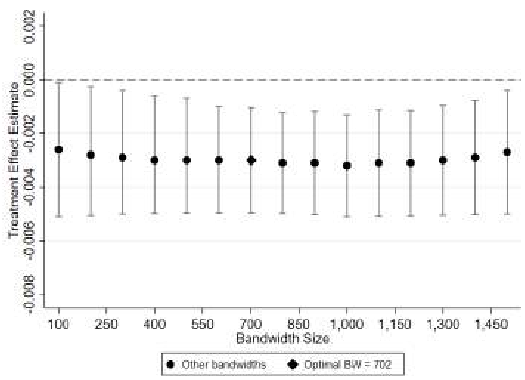
FIGURE A12. Public goods supply - Different bandwidths



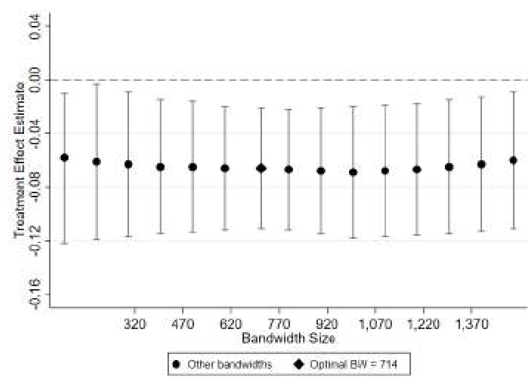
(A) Childcare



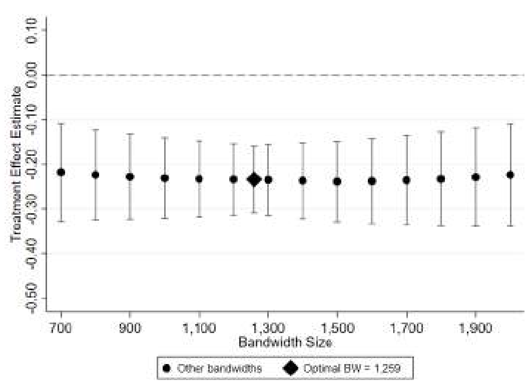
(B) Street lights



(C) Libraries



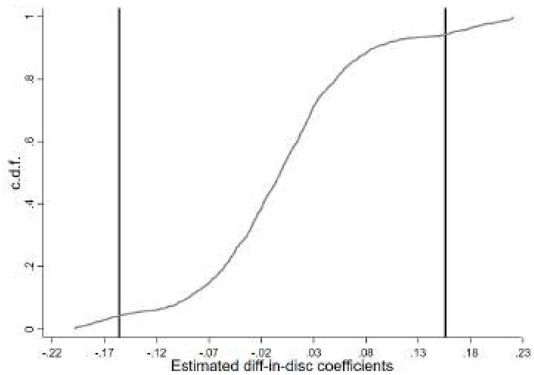
(D) Local police



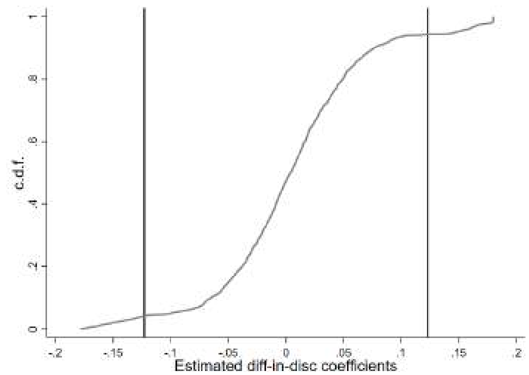
(E) Waste collection

Notes: Difference-in-discontinuity estimates across different bandwidth sizes. The outcomes include childcare supply, i.e. ratio of successful applications to the total number of applications (A), street light supply, i.e. ratio of lit kilometers of roads to the total kilometers of road (B), libraries per 1,000 inhabitants (C), log of number of local policemen (D), and trash collection supply, i.e. ratio of houses served by trash collection to the total number of houses (E). The main estimate, indicated by the diamond, uses the optimal bandwidth identified by Calonico et al. (2014). The other estimates employ bandwidths at 25-unit increments around the optimal value. The bars represent 95% confidence intervals.

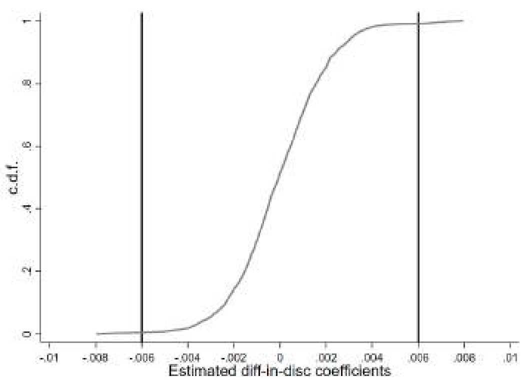
Figure A13. Placebo test - Public goods



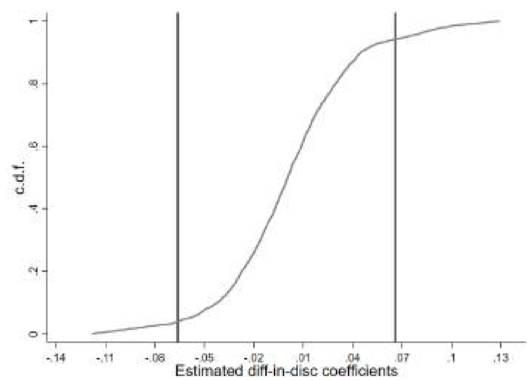
(A) Childcare



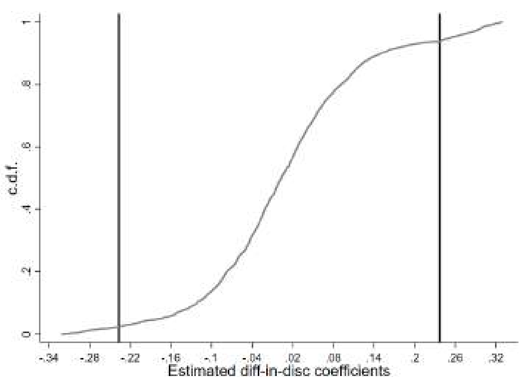
(B) Street lights



(C) Libraries



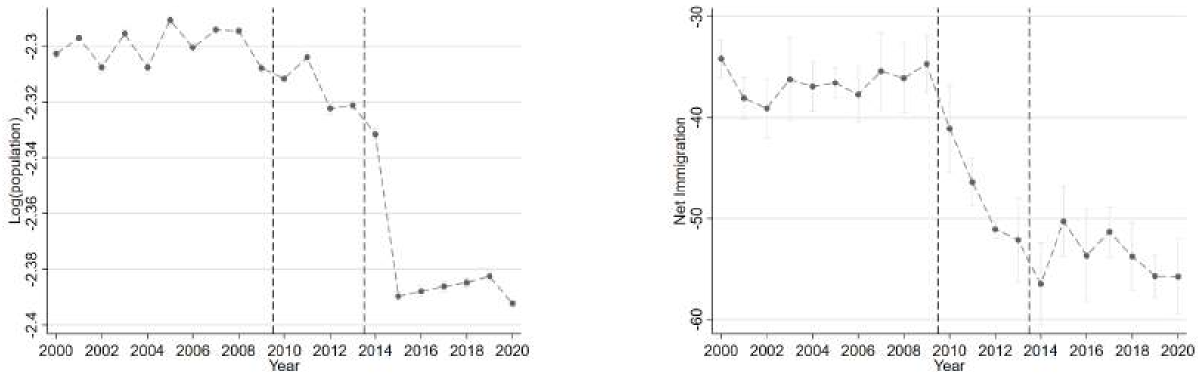
(D) Local police



(E) Waste collection

Notes: Placebo tests based on permutation methods for childcare supply, i.e. ratio of successful applications to the total number of applications (A), street light supply, i.e. ratio of lit kilometers of roads to the total kilometers of road (B), libraries per 1,000 inhabitants (C), log of number of local policemen (D), and trash collection supply, i.e. ratio of houses served by trash collection to the total number of houses (E) as in Della Vigna and La Ferrara (2010). The figures report the empirical cumulative distribution function of normalized point estimates derived from a set of difference-in-differences estimations at 400 false thresholds, both below and above the true threshold of 5,000 (specifically, any 5 inhabitants from 4,000 to 4,900 and any 5 inhabitants from 5,100 to 6,000). The estimation method employed is a local linear probability model. The optimal bandwidth is estimated using the algorithm introduced by Calonico et al. (2014). The vertical line indicates our benchmark estimate (i.e., the true coefficient normalized to 100) along with its negative value.

Figure A14. Reduced form estimates for population measures

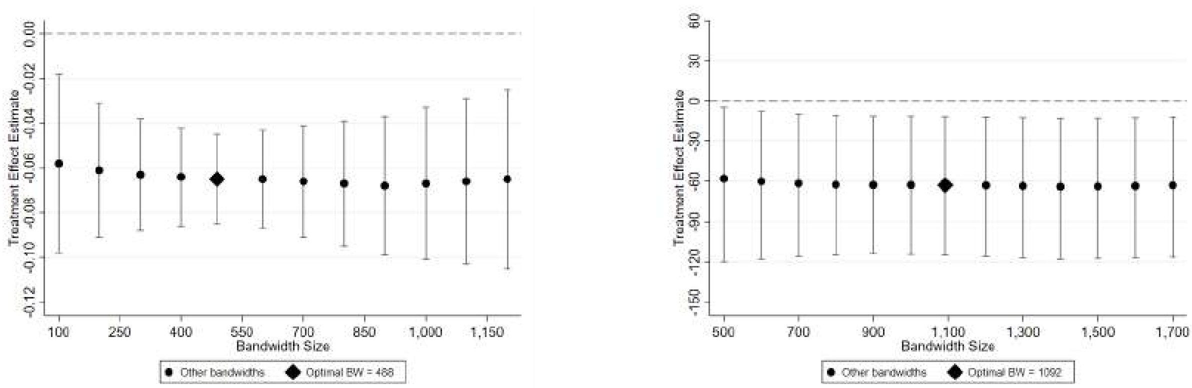


(A) Population growth

(B) Net immigration

Notes: Reduced-form regression discontinuity (RD) estimates for population measures, 2000-2020. Each plot displays the RD estimates over time based on a regression of the outcome on the instrument—that is, whether the municipality has less than 5,000 (or 3,000 for mountainous municipalities) inhabitants. Subfigure (A) presents population growth, calculated as the logarithm of the population, while subfigure (B) reports net immigration, computed as the difference between in-migration and out-migration. The estimation uses a triangular kernel, with bandwidths determined using the algorithm by Calonico et al. (2014). The bars indicate 95% confidence intervals.

Figure A15. Population - Different bandwidths

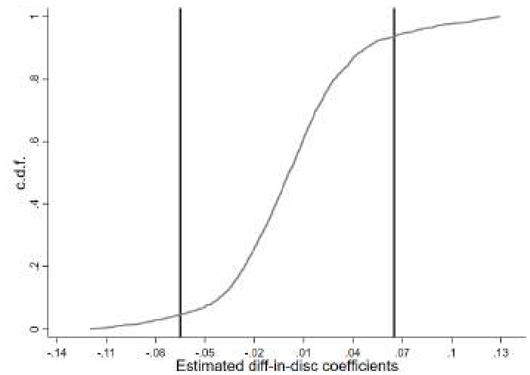


(A) Population growth

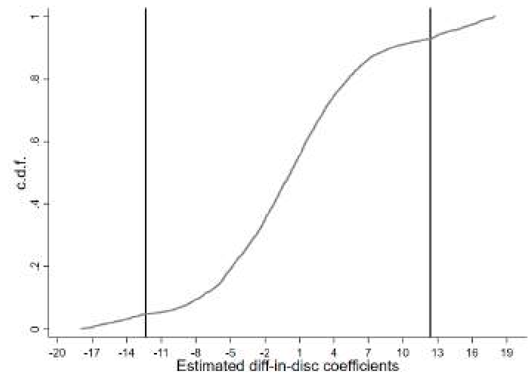
(B) Net migration

Notes: Difference-in-discontinuity estimates across different bandwidth sizes. The dependent variables are the population growth rate and net migration. The main estimate, indicated by the diamond, uses the optimal bandwidth identified by Calonico et al. (2014). The other estimates employ bandwidths at 25-unit increments around the optimal value. The bars represent 95% confidence intervals.

Figure A16. Placebo test - Population



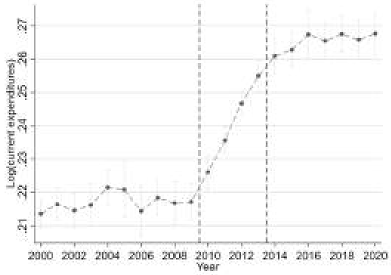
(A) Population growth



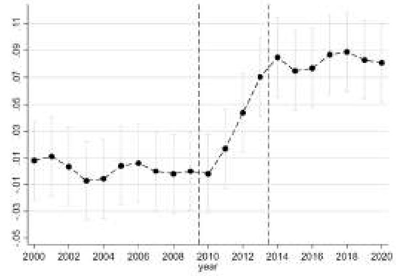
(B) Net migration

Notes: Placebo tests based on permutation methods for population growth rate and net migration as in Della Vigna and La Ferrara (2010). The figures report the empirical cumulative distribution function of normalized point estimates derived from a set of difference-in-differences estimations at 400 false thresholds, both below and above the true threshold of 5,000 (specifically, any 5 inhabitants from 4,000 to 4,900 and any 5 inhabitants from 5,100 to 6,000). The estimation method employed is a local linear probability model. The optimal bandwidth is estimated using the algorithm introduced by Calonico et al. (2014). The vertical line indicates our benchmark estimate (i.e., the true coefficient normalized to 100) along with its negative value.

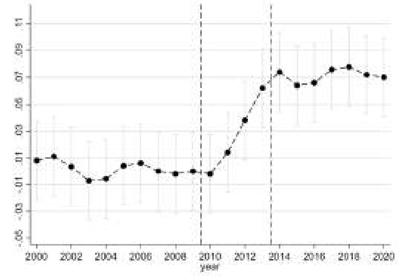
Figure A17. Reduced form estimates for expenditure



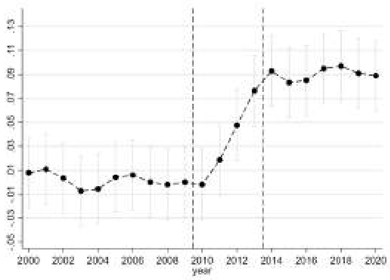
(A) Current expenditure



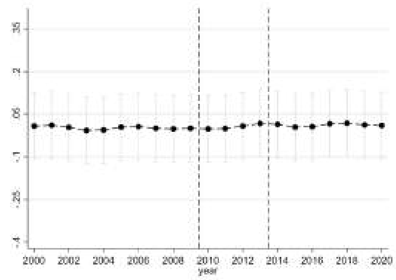
(B) Personnel



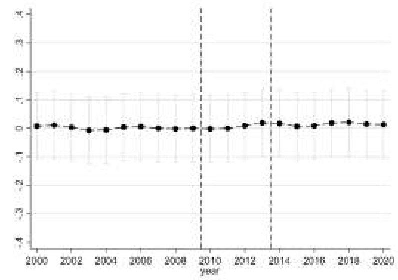
(C) Purchases and services



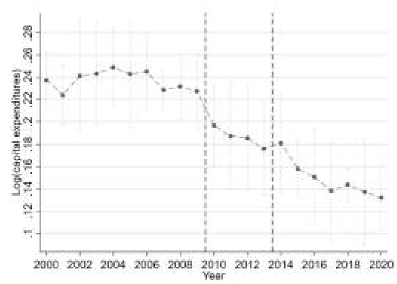
(D) Transfers



(E) Financial costs and taxes



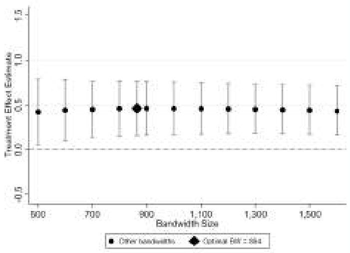
(F) Others



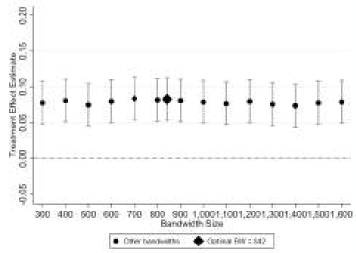
(G) Capital expenditure

Notes: Reduced-form regression discontinuity (RD) estimates for expenditure items, 2000-2020. Each plot displays the RD estimates over time based on a regression of the outcome on the instrument—that is, whether the municipality has less than 5,000 (or 3,000 for mountainous municipalities) inhabitants. Subfigure (A) presents current expenditure, subfigures (B)-(F) present its components, and subfigure (G) depicts capital expenditure. All are measured in logarithms, and in 2015 per capita euros. The estimation uses a triangular kernel, with bandwidths determined using the algorithm by Calonico et al. (2014). The bars indicate 95% confidence intervals.

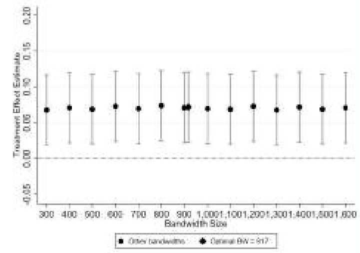
Figure A18. Expenditure - Different bandwidths



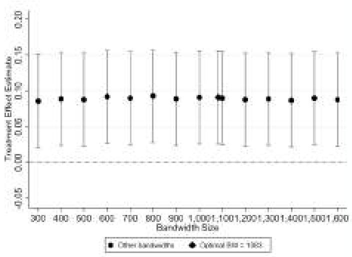
(A) Current expenditure



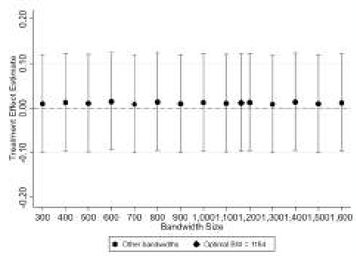
(B) Personnel



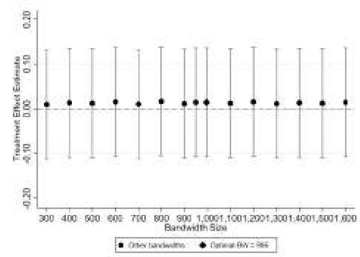
(C) Purchases and services



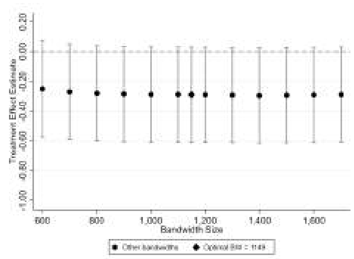
(D) Transfers



(E) Financial costs and taxes



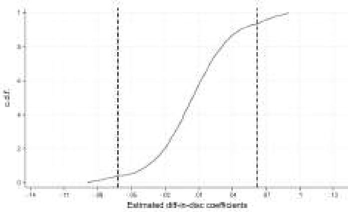
(F) Others



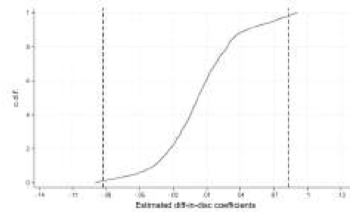
(G) Capital expenditure

Notes: Difference-in-discontinuity estimates across different bandwidth sizes. The dependent variables are current expenditure and its components, and capital expenditures, computed in 2015 real euros per capita and transformed in logarithms. The main estimate, indicated by the diamond, uses the optimal bandwidth identified by Calonico et al. (2014). The other estimates employ bandwidths at 25-unit increments around the optimal value. The bars represent 95% confidence intervals.

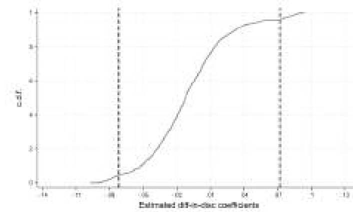
FIGURE A19. Placebo test - Expenditure



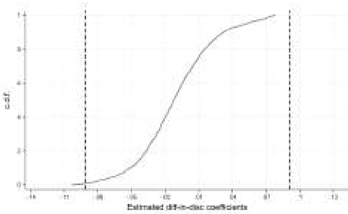
(A) Current expenditure



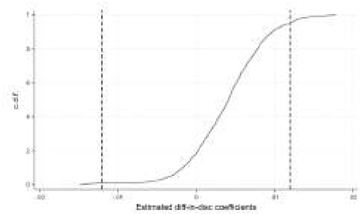
(B) Personnel



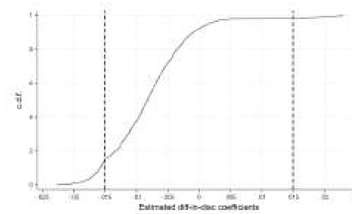
(C) Purchases and services



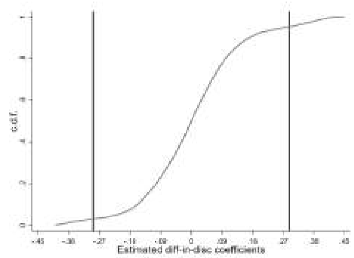
(D) Transfers



(E) Financial costs and taxes



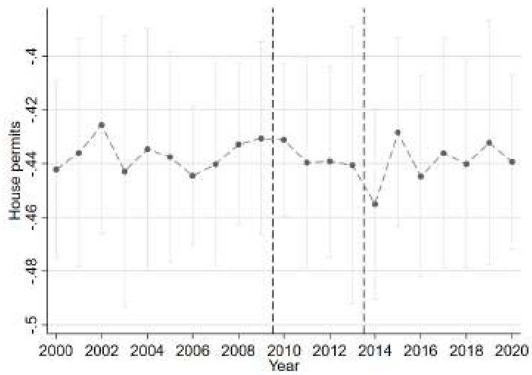
(F) Others



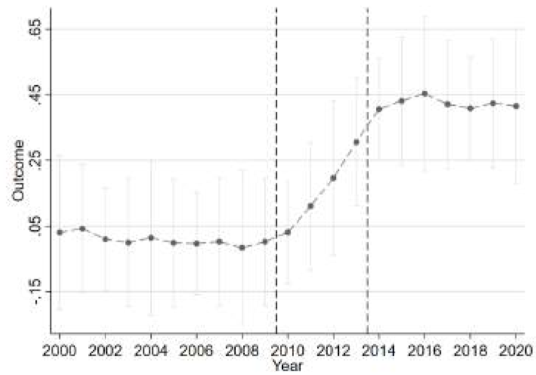
(G) Capital expenditure

Notes: Placebo tests based on permutation methods for current expenditure and its components, and capital expenditures as in Della Vigna and La Ferrara (2010). The figures report the empirical cumulative distribution function of normalized point estimates derived from a set of difference-in-differences estimations at 400 false thresholds, both below and above the true threshold of 5,000 (specifically, any 5 inhabitants from 4,000 to 4,900 and any 5 inhabitants from 5,100 to 6,000). The estimation method employed is a local linear probability model. The optimal bandwidth is estimated using the algorithm introduced by Calonico et al. (2014). The vertical line indicates our benchmark estimate (i.e., the true coefficient normalized to 100) along with its negative value.

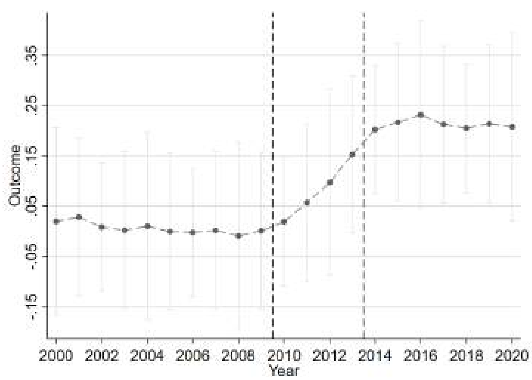
Figure A20. Reduced form estimates for housing supply



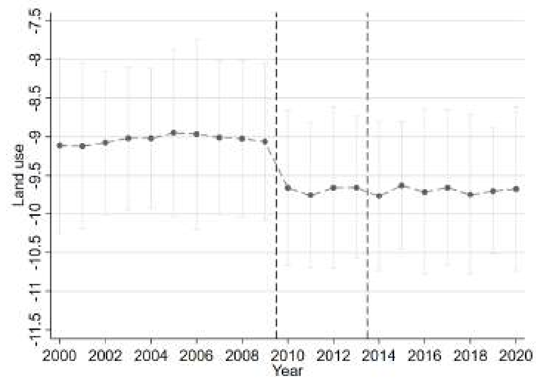
(A) Housing building permits



(B) Number of residential permits



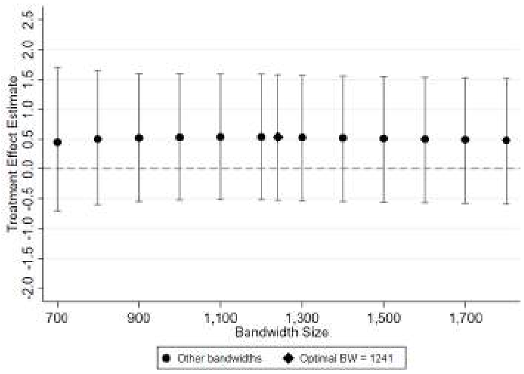
(C) Number of commercial permits



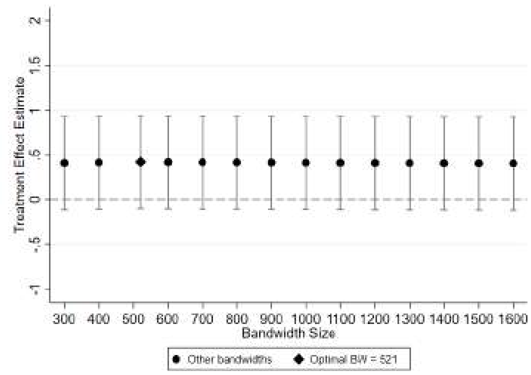
(D) Land use

Notes: Reduced-form regression discontinuity (RD) estimates for housing and land supply, 2000-2020. Each plot displays the RD estimates over time based on a regression of the outcome on the instrument—that is, whether the municipality has less than 5,000 (or 3,000 for mountainous municipalities) inhabitants. Subfigure (A) presents the revenues from building permits per capita, computed in 2015 real euros per capita and transformed in logarithms, subfigures (B) and (C) report the number of residential and commercial housing building permits, and (D) presents the percentage of surface area utilized for construction within municipalities. The estimation uses a triangular kernel, with bandwidths determined using the algorithm by Calonico et al. (2014). The bars indicate 95% confidence intervals.

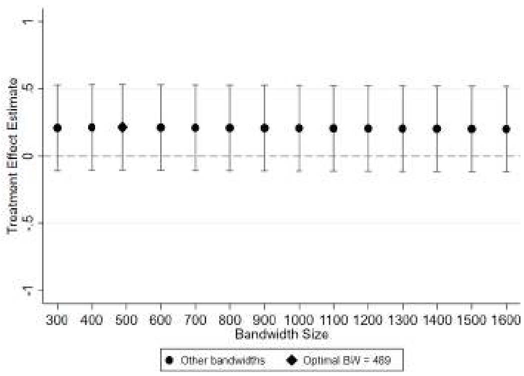
Figure A21. Supply - Different bandwidths



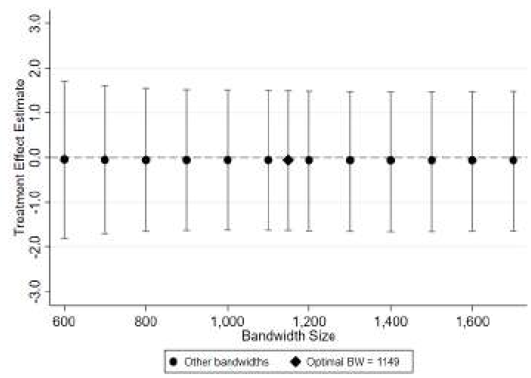
(A) Housing building permits



(B) Number of residential building permits



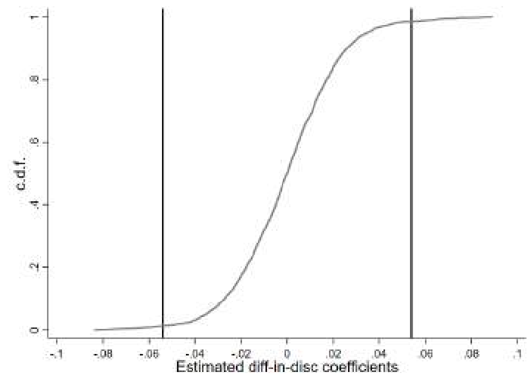
(C) Number of commercial building permits



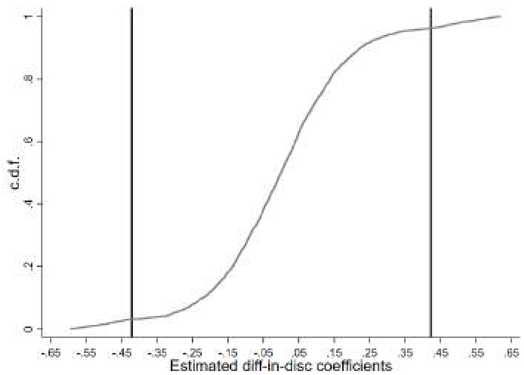
(D) Land use

Notes: Difference-in-discontinuity estimates across different bandwidth sizes. The dependent variables include the revenues from housing building permits, computed in 2015 real euros per capita and transformed in logarithms, as well as the number of residential and commercial permits, and the percentage of land utilized in a municipality. The main estimate, indicated by the diamond, uses the optimal bandwidth identified by Calonico et al. (2014). The other estimates employ bandwidths at 25-unit increments around the optimal value. The bars represent 95% confidence intervals.

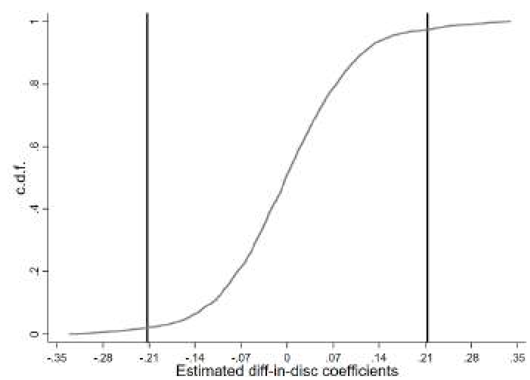
Figure A22. Placebo test - Housing and land supply



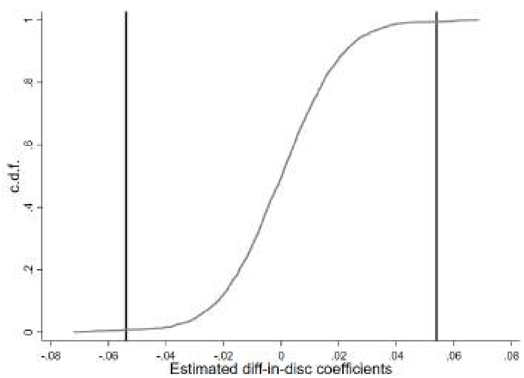
(A) Housing building permits



(B) Number of residential building permits



(C) Number of commercial building permits



(D) Land use

Notes: Placebo tests based on permutation methods for revenues from housing building permits, number of residential and commercial permits, and used land as in Della Vigna and La Ferrara (2010). The figures report the empirical cumulative distribution function of normalized point estimates derived from a set of difference-in-differences estimations at 400 false thresholds, both below and above the true threshold of 5,000 (specifically, any 5 inhabitants from 4,000 to 4,900 and any 5 inhabitants from 5,100 to 6,000). The estimation method employed is a local linear probability model. The optimal bandwidth is estimated using the algorithm introduced by Calonico et al. (2014). The vertical line indicates our benchmark estimate (i.e., the true coefficient normalized to 100) along with its negative value.

Appendix C. Other Tables

Table B1. Geographical distribution of inter-municipal communities (IC)

Region	IC	Municipalities	Avg. # municipalities	Avg. population
Abruzzo	12	75	6.25	31,040.57
Basilicata	4	27	6.75	18,757
Calabria	14	64	4.57	19,384.5
Campania	19	90	4.74	25,350.24
Emilia-Romagna	41	266	6.49	54,668.68
Lazio	21	102	4.86	10,797.52
Liguria	20	91	4.55	6,862.18
Lombardia	75	258	3.44	8,232.31
Marche	20	121	6.05	29,852.9
Molise	11	61	5.55	11,081.6
Piemonte	116	753	6.49	12,113.04
Puglia	23	111	4.83	44,784.67
Toscana	23	136	5.91	38,370
Umbria	2	16	8	48,368
Veneto	43	198	4.60	29,832.27
Total	525	2369	5.54	25,966.36

Notes: This table presents the following information: the total number of inter-municipal community (IC), the number of municipalities participating in an IC, the average number of municipalities within each IC, and the average population served by each IC. All the figures are measured at the regional level.

Table B2. Housing prices - Absolute prices

	Residential		**Commercial**	
	(1)	(2)	(3)	(4)
	Sale	Rent	Sale	Rent
Conventional	-53.249**	-0.261**	-102.5***	-0.232**
	(27.18)	(0.115)	(51.34)	(0.107)
First-stage F	37.78	38.38	21.24	20.85
Bias-corrected	-52.812**	-0.273**	-116.9***	-0.332**
	(27.18)	(0.115)	(51.34)	(0.107)
First-stage F	42.09	42.75	23.71	23.28
Robust	-52.812*	-0.273*	-116.9***	-0.332*
	(32.13)	(0.166)	(45.412)	(0.202)
First-stage F	34.53	34.64	19.17	18.92
Mean	1,236.243	4.385	890.597	4.289
Bandwidth	1211	1427	1950	1068
Observations	24,822	29,249	36,969	21,891

Notes: * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level. Standard errors, clustered at the municipality level, are reported in parentheses. All dependent variables are presented in absolute numbers. The F statistics correspond to first-stage regressions of the probability of belonging to an inter-municipal community (IC) against an indicator for whether the population is below 5,000 (or 3,000 for mountainous municipalities). Estimation employs a triangular kernel, and the optimal bandwidth is determined using the MSE-optimal bandwidth selector of Calonico et al. (2014).

Table B3. Housing prices - Other polynomial specifications

	Residential		Commercial	
	(1)	(2)	(3)	(4)
	Sale	Rent	Sale	Rent
Panel A: 2nd degree polynomial				
	-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				
	-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
Mean	1236.243	4.385	890.597	4.289
Bandwidth	1219	1493	1618	1849
Observations	24,986	30,602	33,164	37,899

Notes: * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level. Standard errors, clustered at the municipality level, are reported in parentheses. All dependent variables are presented in logarithmic form, while means are reported in their non-transformed state. The polynomial form of the running variable is second-degree (Panel A) and third-degree (Panel B). The F statistics correspond to first-stage regressions of the probability of belonging to an inter-municipal community (IC) against an indicator for whether the population is below 5,000 (or 3,000 for mountainous municipalities). Estimation employs a triangular kernel, and the optimal bandwidth is determined using the MSE-optimal bandwidth selector of Calonico et al. (2014).

Table B4. Continuity of covariates

	(1) North West	(2) North East	(3) Center	(4) South	(5) Area	(6) Altitude	(7) Rural	(8) Mountainous
Conventional	-0.025	-0.021	-0.001	0.068	3.558	-2.888	0.036	0.002
	(0.380)	(0.364)	(0.133)	(0.458)	(46.710)	(150.629)	(0.415)	(0.272)
First-stage F	6.117	5.039	14.22	3.980	3.979	13.49	4.621	15.69
Bias-corrected	-0.021	-0.023	0.001	0.111	2.767	-3.036	0.054	0.007
	(0.380)	(0.364)	(0.133)	(0.458)	(46.710)	(150.629)	(0.415)	(0.272)
First-stage F	9.649	6.889	23.51	3.059	2.704	23.40	3.365	25.70
Robust	-0.021	-0.023	0.001	0.111	2.767	-3.036	0.054	0.007
	(0.455)	(0.436)	(0.157)	(0.557)	(57.979)	(180.010)	(0.493)	(0.334)
First-stage F	6.726	4.769	16.09	2.125	1.810	15.71	2.357	17.48
Bandwidth	1234	876	1923	1345	1567	1789	1456	1678
Mean	0.381	0.174	0.122	0.324	37.71	355	0.637	0.313
Observations	37,845	41,715	21,016	52,924	54,202	22,042	47,367	18,388

Notes: * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level. Standard errors, clustered at the municipality level, are reported in parentheses. The table presents difference-in-discontinuity estimates for a selection of time-varying municipal characteristics, including dummy variables for the location (North-West, North-East, Center, South, and Islands), municipality area in square kilometers, elevation in meters, as well as dummy variables indicating whether a municipality is rural or mountainous. The F statistics correspond to first-stage regressions of the probability of belonging to an inter-municipal community (IC) against an indicator for whether the population is below 5,000 (or 3,000 for mountainous municipalities). Estimation employs a triangular kernel, and the optimal bandwidth is determined using the MSE-optimal bandwidth selector of Calonico et al. (2014).

TABLE B5. Housing prices - Including controls

	Residential		**Commercial**	
	(1)	(2)	(3)	(4)
	Sale	Rent	Sale	Rent
Conventional	-0.045**	-0.058**	-0.114***	-0.148**
	(0.015)	(0.028)	(0.032)	(0.050)
First-stage F	37.80	38.20	21.30	20.90
Bias-corrected	-0.038**	-0.060**	-0.132***	-0.179**
	(0.015)	(0.028)	(0.032)	(0.050)
First-stage F	43.00	42.60	23.80	23.30
Robust	-0.042*	-0.061*	-0.129***	-0.182*
	(0.021)	(0.036)	(0.036)	(0.057)
First-stage F	34.80	34.70	19.10	19.00
Mean	1236.243	4.385	890.597	4.289
Bandwidth	1350	1500	2050	1100
Observations	27,671	30,746	42,019	22,547

Notes: * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level. Standard errors, clustered at the municipality level, are reported in parentheses. Dependent variables are residential and commercial housing sale and rent prices. All dependent variables are presented in logarithms, while the means are reported in non-transformed values. All regressions include covariates as age composition of the population, share of foreign residents, population density, per capita income, indicator variables for geographical areas (North-West, North-East, Center, and South), municipal area in square kilometers, altitude of the municipality in meters, and indicators for rural and mountainous municipalities. The F statistics correspond to first-stage regressions of the probability of belonging to an inter-municipal community (IC) against an indicator for whether the population is below 5,000 (or 3,000 for mountainous municipalities). Estimation employs a triangular kernel, and the optimal bandwidth is determined using the MSE-optimal bandwidth selector of Calonico et al. (2014).

Table B6. Taxes and population - Including controls

	Property tax			Population	
	(1)	(2)	(3)	(4)	(5)
	Main dwelling	Base	Revenues	Pop growth	Net Immigration
Conventional	–0.041	–0.058	0.071	–0.067***	–11.84***
	(0.035)	(0.047)	(0.049)	(0.021)	(4.325)
First stage	31.2	26.8	18.9	57.4	60.1
Bias-corrected	–0.044	–0.061	0.073	–0.066***	–12.02***
	(0.034)	(0.046)	(0.048)	(0.020)	(4.410)
First stage	32.5	27.9	19.7	58.1	59.7
Robust	–0.046	–0.063	0.070	–0.064***	–12.21***
	(0.036)	(0.048)	(0.050)	(0.022)	(4.505)
First stage	30.7	25.9	18.3	56.0	61.2
Mean	0.48	0.74	127.88	19,656.65	58.128
Bandwidth	794	995	853	488	1092
Observations	13,364	15,224	13,051	9,275	22,383

Notes: * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level. Standard errors, clustered at the municipality level, are reported in parentheses. The dependent variables include the property tax rates for main dwellings and other buildings (expressed in percentage), and the property tax revenues in real per capita terms and computed in logs (the mean is reported in non-transformed terms). The latter two columns refer to the logarithm of population and net immigration. All regressions include covariates as age composition of the population, share of foreign residents, population density, per capita income, indicator variables for geographical areas (North-West, North-East, Center, and South), municipal area in square kilometers, altitude of the municipality in meters, and indicators for rural and mountainous municipalities. The F statistics correspond to first-stage regressions of the probability of belonging to an inter-municipal community (IC) against an indicator for whether the population is below 5,000 (or 3,000 for mountainous municipalities). Estimation employs a triangular kernel, and the optimal bandwidth is determined using the MSE-optimal bandwidth selector of Calonico et al. (2014).

Table B7. Public good provision - Including controls

	(1) Childcare	(2) Street lights	(3) Libraries	(4) Local police	(5) Trash collection
Conventional	–0.148***	–0.117**	–0.004**	–0.071***	–0.219**
	(0.047)	(0.058)	(0.002)	(0.022)	(0.131)
First-stage F	51.6	55.2	52.4	48.1	50.9
Bias-corrected	–0.139***	–0.108**	–0.003**	–0.077***	–0.227**
	(0.046)	(0.059)	(0.002)	(0.023)	(0.134)
First-stage F	55.8	58.9	56.0	50.3	53.7
Robust	–0.142***	–0.111**	–0.003**	–0.074***	–0.224**
	(0.059)	(0.373)	(0.003)	(0.026)	(0.138)
First-stage F	49.4	52.1	48.9	44.2	46.7
Mean	0.789	0.625	0.086	0.717	0.884
Bandwidth	1292	1045	702	714	1259
Observations	26,482	21,419	14,389	14,635	25,806

Notes: * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level. Standard errors, clustered at the municipality level, are reported in parentheses. The dependent variables include public good supply satisfaction measures: the ratio of satisfied application for childcare over the total number of applications, the ratio of lit kilometers of municipal roads over the total number of kilometers of municipal roads, the number of libraries per 1000 inhabitants, the logarithm of the number of local policemen, and the ratio of houses served by trash collection over the total number of houses in a municipality. All regressions include covariates as age composition of the population, share of foreign residents, population density, per capita income, indicator variables for geographical areas (North-West, North-East, Center, and South), municipal area in square kilometers, altitude of the municipality in meters, and indicators for rural and mountainous municipalities. The F statistics correspond to first-stage regressions of the probability of belonging to an inter-municipal community (IC) against an indicator for whether the population is below 5,000 (or 3,000 for mountainous municipalities). Estimation employs a triangular kernel, and the optimal bandwidth is determined using the MSE-optimal bandwidth selector of Calonico et al. (2014).

Table B8. Expenditures - Including controls

	Current						
	(1) Total	(2) Personnel	(3) Purch. & Serv.	(4) Transfers	(5) Fin. costs & Taxes	(6) Other	(7) Capital
Conventional	0.058**	0.077**	0.081***	0.085**	0.014	0.017	-0.261
	(0.027)	(0.020)	(0.024)	(0.032)	(0.053)	(0.058)	(0.176)
First-stage F	21.3	16.0	20.7	24.8	17.9	27.4	20.2
Bias-corrected	0.054**	0.072**	0.076**	0.081**	0.011	0.013	-0.238
	(0.028)	(0.021)	(0.025)	(0.033)	(0.055)	(0.060)	(0.182)
First-stage F	19.2	14.6	18.0	23.4	16.1	25.6	18.9
Robust	0.052**	0.070**	0.074**	0.079**	0.010	0.012	-0.244
	(0.031)	(0.025)	(0.032)	(0.041)	(0.061)	(0.071)	(0.159)
First-stage F	17.6	13.2	16.4	21.2	14.9	23.8	16.7
Mean	474.942	252.254	281.689	289.272	87.097	9.084	42.659
Bandwidth	864	842	917	1083	1164	995	1149
Observations	17,709	17,259	18,796	22,198	28,859	20,395	23,551

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 expenditures and its components, personnel, purchases and services, transfers, financial costs and taxes, and other, and investment expenditures (in per capita and 2015 real terms). Means are reported non-transformed. The F statistics correspond to first-stage regressions of the probability of belonging to an inter-municipal community (IC) against an indicator for whether the population is below 5,000 (or 3,000 for mountainous municipalities). Estimation employs a triangular kernel, and the optimal bandwidth is determined using the MSE-optimal bandwidth selector of Calonico et al. (2014).

Table B9. Supply - Including controls

	(1) House permits revenues	(2) House permits number	(3)	(4) Land use
		Residential	Commercial	
Conventional	0.047	0.391	0.198	-0.049
	(0.052)	(0.327)	(0.214)	(0.845)
First-stage F	23.9	18.4	17.2	96.1
Bias-corrected	0.050	0.404	0.205	-0.051
	(0.049)	(0.319)	(0.207)	(0.829)
First-stage F	24.7	19.1	17.9	94.8
Robust	0.044	0.376	0.185	-0.047
	(0.055)	(0.339)	(0.223)	(0.862)
First-stage F	22.6	17.3	16.5	97.4
Mean	39.561	15.810	5.761	42.659
Bandwidth	1241	521	489	1149
Observations	25,437	10,679	10,023	23,551

Notes: * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level. Standard errors, clustered at the municipality level, are reported in parentheses. The dependent variables are measures of housing supply. House permits are the revenues collected by a municipality for housing permits, required to start construction of a new building; land use is the percentage of municipal area covered by human constructions (i.e., excluding water bodies, forests, etc.). All regressions include covariates as age composition of the population, share of foreign residents, population density, per capita income, indicator variables for geographical areas (North-West, North-East, Center, and South), municipal area in square kilometers, altitude of the municipality in meters, and indicators for rural and mountainous municipalities. The F statistics correspond to first-stage regressions of the probability of belonging to an inter-municipal community (IC) against an indicator for whether the population is below 5,000 (or 3,000 for mountainous municipalities). Estimation employs a triangular kernel, and the optimal bandwidth is determined using the MSE-optimal bandwidth selector of Calonico et al. (2014).

Table B10. Housing prices - Donut-Hole Specification

	Residential		Commercial	
	(1)	(2)	(3)	(4)
	Sale	Rent	Sale	Rent
Panel A: Baseline (No Donut)				
Full Sample	–0.043**	–0.060**	–0.115***	–0.150***
	(0.014)	(0.029)	(0.033)	(0.042)
Panel B: Donut Hole Specifications				
Donut = 10	–0.041**	–0.058**	–0.112***	–0.148***
	(0.016)	(0.028)	(0.037)	(0.044)
Donut = 20	–0.039**	–0.055**	–0.108***	–0.145***
	(0.018)	(0.026)	(0.041)	(0.047)
Donut = 30	–0.037**	–0.052**	–0.104**	–0.142***
	(0.018)	(0.025)	(0.046)	(0.049)
Donut = 40	–0.034**	–0.048*	–0.098**	–0.138**
	(0.016)	(0.024)	(0.047)	(0.053)
Donut = 50	–0.031*	–0.044*	–0.093*	–0.135**
	(0.017)	(0.023)	(0.048)	(0.055)
Mean	1,236.243	4.385	890.597	4.289
Bandwidth	1211	1427	1950	1068
Observations	24,822	29,249	36,969	21,891

Notes: * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level. Standard errors, clustered at the municipality level, are reported in parentheses. Donut specifications exclude observations within the specified distance of the cutoff on either side of it. All dependent variables are presented in logarithmic form. The F statistics correspond to first-stage regressions of the probability of belonging to an inter-municipal community (IC) against an indicator for whether the population is below 5,000 (or 3,000 for mountainous municipalities). Estimation employs a triangular kernel, and the optimal bandwidth is determined using the MSE-optimal bandwidth selector of Calonico et al. (2014).

Table B11. Shared functions

Functions, Services and Other Activities	**Freq.**	**Share**
Registry Office and Civil Status	59	13.5%
Childcares	**36**	**8.24%**
Cultural activities and various interventions	35	8.01%
Landscape Authorization and Commission	84	19.22%
Libraries	**24**	**5.5%**
Cadastre	100	22.88%
Central Purchasing Body (CUC)	144	32.95%
Right to study	45	10.30%
School building	81	18.54%
Personnel management	78	17.85%
Management of tax and other revenues	47	10.76%
Economic, financial management	33	7.55%
Interventions for the elderly	27	6.18%
Interventions for children and minors	22	5.03%
Maintenance of urban and extra-urban green areas	23	5.26%
Strategic planning and development	38	8.7%
Local Police	**197**	**45.08%**
Planning and governance of the network of	110	25.17%
Promotion and enhancement of the territory	32	7.32%
Civil Protection	246	56.29%
School catering - Canteen service	80	18.31%
Responsible for the digital transition	69	15.79%
Waste - Urban Hygiene	**125**	**28.6%**
Social assistance and inclusion services	65	14.87%
IT and digital services (ICT)	72	16.48%
Water service/Soil defense/Environmental protection	35	8.01%
One-Stop Shop for Productive Activities - SUAP	123	28.15%
One-Stop Shop for Building - SUE	47	10.76%
Statistics	105	24.03%
Specialized support for drafting	47	10.76%
Local Public Transport	26	5.95%
School transport	79	18.08%
Tourism	58	13.27%
Protection and promotion of the mountains	43	9.84%
Technical Office - Public Works	51	11.67%
Urban planning and land use	92	21.05%
Road network and infrastructure	**34**	**7.78%**
Total	**3,468**	

Notes: The table reports the most commonly shared functions within inter-municipal community (IC). The table reports the functions shared by more than 20 IMC. The data come from the OpenItaliae website which aggregates data from IC statutes. The full list of functions include 124 different functions.

Table B12. Public good provision - Donut-Hole Specification

	(1) Childcare	(2) Street lights	(3) Libraries	(4) Local police	(5) Trash collection
Panel A: Baseline (No Donut)					
Full Sample	–0.156***	–0.123**	–0.003**	–0.066***	–0.237**
	(0.045)	(0.063)	(0.001)	(0.023)	(0.139)
Panel B: Donut Hole Specifications					
Donut = 10	–0.151***	–0.119**	–0.003**	–0.064***	–0.230**
	(0.049)	(0.058)	(0.001)	(0.025)	(0.112)
Donut = 20	–0.146***	–0.115**	–0.003**	–0.062**	–0.223**
	(0.054)	(0.056)	(0.001)	(0.028)	(0.109)
Donut = 30	–0.141**	–0.111**	–0.002**	–0.060**	–0.216**
	(0.059)	(0.054)	(0.001)	(0.030)	(0.105)
Donut = 40	–0.136**	–0.107*	–0.002*	–0.058*	–0.209*
	(0.065)	(0.054)	(0.001)	(0.033)	(0.106)
Donut = 50	–0.131*	–0.103*	–0.002*	–0.056*	–0.202*
	(0.071)	(0.052)	(0.001)	(0.036)	(0.103)
Mean	0.789	0.625	0.086	0.717	0.884
Bandwidth	1292	1045	702	714	1259
Observations	26,482	21,419	14,389	14,635	25,806

Notes: * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level. Standard errors, clustered at the municipality level, are reported in parentheses. The dependent variables include public good supply satisfaction measures: the ratio of satisfied applications for childcare over the total number of applications, the share of lit kilometers of municipal roads, the number of libraries per 1000 inhabitants, the logarithm of the number of local policemen, and the ratio of houses served by trash collection over the total number of houses in a municipality. Donut specifications exclude observations within the specified distance of the cutoff on either side of it. The F statistics correspond to first-stage regressions of the probability of belonging to an inter-municipal community (IC) against an indicator for whether the population is below 5,000 (or 3,000 for mountainous municipalities). Estimation employs a triangular kernel, and the optimal bandwidth is determined using the MSE-optimal bandwidth selector of Calonico et al. (2014).

Table B13. Taxes and population - Donut-Hole Specification

	Property tax			**Population**	
	(1)	(2)	(3)	(4)	(5)
	Main dwelling	Base	Revenues	Pop growth	Net Immigration
Panel A: Baseline (No Donut)					
Full Sample	–0.049	–0.064	0.066	–0.065***	–12.35***
	(0.032)	(0.042)	(0.044)	(0.020)	(4.582)
Panel B: Donut Hole Specifications					
Donut = 10	–0.047	–0.062	0.063	–0.063***	–11.98**
	(0.035)	(0.046)	(0.046)	(0.022)	(5.01)
Donut = 20	–0.045	–0.060	0.061	–0.061***	–11.61**
	(0.038)	(0.050)	(0.048)	(0.024)	(5.48)
Donut = 30	–0.043	–0.058	0.059	–0.059**	–11.24**
	(0.042)	(0.055)	(0.050)	(0.026)	(5.99)
Donut = 40	–0.041	–0.056	0.057	–0.057**	–10.87*
	(0.046)	(0.060)	(0.052)	(0.029)	(6.55)
Donut = 50	–0.039	–0.054	0.055	–0.055*	–10.50*
	(0.050)	(0.065)	(0.054)	(0.032)	(7.16)
Mean	0.48	0.74	127.88	19,656.65	58.128
Bandwidth	794	995	853	488	1092
Observations	13,364	15,224	13,051	9,275	22,383

Notes: * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level. Standard errors, clustered at the municipality level, are reported in parentheses. Property tax rates are expressed in percentages, land use is also computed in percentages, and the expenditure variables are in logarithmic form, per capita and in 2015 real euros. Donut specifications exclude observations within the specified distance of the cutoff on either side of it. All dependent variables are presented in logarithmic form. The F statistics correspond to first-stage regressions of the probability of belonging to an inter-municipal community (IC) against an indicator for whether the population is below 5,000 (or 3,000 for mountainous municipalities). Estimation employs a triangular kernel, and the optimal bandwidth is determined using the MSE-optimal bandwidth selector of Calonico et al. (2014).

Table B14. Expenditures - Donut-Hole Specification

	Current						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Total	Personnel	Purch. & Serv.	Transfers	Fin. costs & Taxes	Other	Capital
Panel A: Baseline (No Donut)							
Full Sample	0.062**	0.083**	0.072***	0.091**	0.012	0.015	-0.288
	(0.029)	(0.021)	(0.025)	(0.033)	(0.056)	(0.062)	(0.188)
Panel B: Donut Hole Specifications							
Donut = 10	0.447**	0.078***	0.068**	0.085**	0.010	0.012	-0.310
	(0.221)	(0.023)	(0.028)	(0.036)	(0.060)	(0.067)	(0.185)
Donut = 20	0.433**	0.075***	0.065**	0.082**	0.009	0.011	-0.295
	(0.220)	(0.024)	(0.030)	(0.038)	(0.062)	(0.070)	(0.189)
Donut = 30	0.419**	0.072***	0.062*	0.079**	0.008	0.010	-0.278
	(0.214)	(0.026)	(0.032)	(0.040)	(0.065)	(0.073)	(0.198)
Donut = 40	0.405*	0.070***	0.060*	0.076*	0.007	0.009	-0.260
	(0.240)	(0.028)	(0.034)	(0.043)	(0.067)	(0.076)	(0.215)
Donut = 50	0.391*	0.067***	0.057	0.073	0.006	0.008	-0.245
	(0.240)	(0.030)	(0.036)	(0.045)	(0.070)	(0.079)	(0.230)
Mean	474.942	252.254	281.689	289.272	87.097	9.084	42.659
Bandwidth	864	842	917	1083	1164	995	1149
Observations	17,709	17,259	18,796	22,198	28,859	20,395	23,551

Notes: * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level. Standard errors, clustered at the municipality level, are reported in parentheses. Property tax rates are expressed in percentage, land use is also computed in percentage, and the expenditure variables are in logarithmic form, per capita and in 2015 real euros. Donut specifications exclude observations within the specified distance of the cutoff on either side of it. All dependent variables are presented in logarithmic form. The F statistics correspond to first-stage regressions of the probability of belonging to an inter-municipal community (IC) against an indicator for whether the population is below 5,000 (or 3,000 for mountainous municipalities). Estimation employs a triangular kernel, and the optimal bandwidth is determined using the MSE-optimal bandwidth selector of Calonico et al. (2014).

Table B15. Supply - Donut-Hole Specification

	(1) House permits revenues	(2) House permits number: Residential	(3) House permits number: Commercial	(4) Land use
Panel A: Baseline (No Donut)				
Full Sample	0.054	0.423	0.213	-0.054
	(0.043)	(0.311)	(0.196)	(0.800)
Panel B: Donut Hole Specifications				
Donut = 10	0.051	0.401	0.197	-0.052
	(0.045)	(0.327)	(0.205)	(0.835)
Donut = 20	0.048	0.382	0.188	-0.050
	(0.048)	(0.345)	(0.214)	(0.872)
Donut = 30	0.045	0.364	0.179	-0.048
	(0.051)	(0.364)	(0.223)	(0.911)
Donut = 40	0.042	0.347	0.170	-0.046
	(0.054)	(0.384)	(0.233)	(0.952)
Donut = 50	0.038	0.329	0.161	-0.044
	(0.058)	(0.405)	(0.244)	(0.995)
Mean	39.561	15.810	5.761	42.659
Bandwidth	1241	521	489	1149
Observations	25,437	10,679	10,023	23,551

Notes: * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level. Standard errors, clustered at the municipality level, are reported in parentheses. The dependent variables are measures of housing supply. House permits are the revenues collected by a municipality for housing permits, required to start construction of a new building; land use is the percentage of municipal area covered by human constructions (i.e., excluding water bodies, forests, etc.). Donut specifications exclude observations within the specified distance of the cutoff on either side of it. All dependent variables are presented in logarithmic form. The F statistics correspond to first-stage regressions of the probability of belonging to an inter-municipal community (IC) against an indicator for whether the population is below 5,000 (or 3,000 for mountainous municipalities). Estimation employs a triangular kernel, and the optimal bandwidth is determined using the MSE-optimal bandwidth selector of Calonico et al. (2014).

Table B16. Taxes and population - Complier sample

	Property tax			Population	
	(1)	(2)	(3)	(4)	(5)
	Main dwelling	Base	Revenues	Pop growth	Net Immigration
Panel A: Baseline (IV on full sample)					
Full sample	-0.049	-0.064	0.066	–0.065***	–12.35***
	(0.032)	(0.042)	(0.044)	(0.020)	(4.582)
First-stage F	31.04	25.17	19.27	59.12	59.64
Panel B: Compliers only					
Compliers	-0.043	-0.051	0.060	–0.058***	–11.72***
	(0.035)	(0.044)	(0.047)	(0.018)	(4.215)
First-stage F	36.72	37.88	24.85	42.65	43.18
Mean	0.48	0.74	127.88	19,656.65	58.128
Bandwidth	794	995	853	488	1092
Observations	13,364	15,224	13,051	9,275	22,383

Notes: * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level. Panel A replicates the main estimates, while Panel B focuses on the sample of compliers. Standard errors, clustered at the municipality level, are reported in parentheses. Property tax rates are expressed in percentages; revenues are in per capita logarithmic terms. Population growth and net immigration are expressed in levels (means reported in non-transformed terms). The F statistics pertain to the first-stage regressions of the probability of belonging to an inter-municipal community (IC) against an indicator for whether the population is less than 5,000 (or 3,000 for mountainous municipalities). The optimal bandwidth is estimated using the MSE-optimal bandwidth selector of Calonico et al. (2014).

Table B17. Public good provision - Complier sample

	(1)	(2)	(3)	(4)	(5)
	Childcare	Street lights	Libraries	Local police	Trash collection
Panel A: Baseline (IV on full sample)					
Full Sample	–0.156***	–0.123**	–0.003**	–0.066***	–0.237**
	(0.045)	(0.063)	(0.001)	(0.023)	(0.139)
First-stage F	54.74	57.57	55.56	49.78	51.87
Panel B: Compliers only					
Compliers	–0.148***	–0.115**	–0.003**	–0.062***	–0.225**
	(0.042)	(0.057)	(0.001)	(0.021)	(0.105)
First-stage F	48.92	52.18	49.84	44.65	46.73
Mean	0.789	0.625	0.086	0.717	0.884
Bandwidth	1292	1045	702	714	1259
Observations	26,482	21,419	14,389	14,635	25,806

Notes: * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level. Panel A replicates the main estimates, while Panel B focuses on the sample of compliers. Standard errors, clustered at the municipality level, are reported in parentheses. The dependent variables include public good supply satisfaction measures: the ratio of satisfied applications for childcare over the total number of applications, the ratio of lit kilometers of municipal roads over the total number of kilometers of municipal roads, the number of libraries per 1000 inhabitants, the logarithm of the number of local policemen, and the ratio of houses served by trash collection over the total number of houses in a municipality. The F statistics correspond to first-stage regressions of the probability of belonging to an inter-municipal community (IC) against an indicator for whether the population is below 5,000 (or 3,000 for mountainous municipalities). Estimation employs a triangular kernel, and the optimal bandwidth is determined using the MSE-optimal bandwidth selector of Calonico et al. (2014).

Table B18. Supply - Complier sample

	(1) House permits revenues	(2) House permits number: Residential	(3) House permits number: Commercial	(4) Land use
Panel A: Baseline (IV on full sample)				
Full sample	0.054	0.423	0.213	-0.054
	(0.043)	(0.311)	(0.196)	(0.800)
First-stage F	23.79	15.52	18.52	99.72
Panel B: Compliers only				
Compliers	0.061	0.462	0.236	-0.061
	(0.057)	(0.341)	(0.216)	(0.845)
First-stage F	28.91	20.14	23.51	76.44
Mean	39.561	15.810	5.761	42.659
Bandwidth	1241	521	489	1149
Observations	25,437	10,679	10,023	23,551

Notes: * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level. Panel A replicates the main estimates, while Panel B focuses on the sample of compliers. Standard errors, clustered at the municipality level, are reported in parentheses. Property tax rates are expressed in percentage, land use is also computed in percentage, and the expenditure variables are in logarithmic form, per capita and in 2015 real euros. Donut specifications exclude observations within the specified distance of the cutoff on either side of it. All dependent variables are presented in logarithmic form. The F statistics correspond to first-stage regressions of the probability of belonging to an inter-municipal community (IC) against an indicator for whether the population is below 5,000 (or 3,000 for mountainous municipalities). Estimation employs a triangular kernel, and the optimal bandwidth is determined using the MSE-optimal bandwidth selector of Calonico et al. (2014).

Table B19. Expenditures - Complier sample

	Current						
	(1) Total	(2) Personnel	(3) Purch. & Serv.	(4) Transfers	(5) Fin. costs & Taxes	(6) Other	(7) Capital
Panel A: Baseline (IV on full sample)							
Full sample	0.062**	0.083**	0.072***	0.091**	0.012	0.015	-0.288
	(0.029)	(0.021)	(0.025)	(0.033)	(0.056)	(0.062)	(0.188)
First-stage F	22.66	17.42	22.11	26.85	18.95	29.34	21.95
Panel B: Compliers only							
Compliers	0.058**	0.079**	0.067***	0.087**	0.011	0.014	-0.262
	(0.030)	(0.023)	(0.027)	(0.035)	(0.058)	(0.064)	(0.177)
First-stage F	24.10	19.85	23.92	28.41	20.77	31.56	23.48
Mean	474.942	252.254	281.689	289.272	87.097	9.084	42.659
Bandwidth	864	842	917	1083	1164	995	1149
Observations	17,709	17,259	18,796	22,198	28,859	20,395	23,551

Notes: * indicates significance at the 10% level; ** indicates significance at the 5% level; *** indicates significance at the 1% level. Panel A replicates the main estimates, while Panel B focuses on the sample of compliers. Standard errors, clustered at the municipality level, are reported in parentheses. Property tax rates are expressed in percentages, land use is also computed in percentages, and the expenditure variables are in logarithmic form, per capita and in 2015 real euros. The F statistics pertain to the first-stage regressions of the probability of belonging to an inter-municipal community (IC) against an indicator for whether the population is less than 5,000 (or 3,000 for mountainous municipalities). The optimal bandwidth is estimated using the MSE-optimal bandwidth selector of Calonico et al. (2014).