Better Together?
The impact of municipal mergers on economic efficiency in Italy

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Abstract

Different territorial challenges such as urbanization, agglomeration, decentralization, and increased autonomy and responsibilities may require the progressive adaptation of administrative bodies' boundaries to new required functions. However, Italy experienced the lowest number of mergers across European countries over the period 1995-2020 and existing evidence struggles to provide a complete overview of the impact of the amalgamation process. We aim to fill this gap by analyzing the effect generated by municipality mergers in terms of economic efficiency over the time frame 2016-2020 after the promulgation of the 'Delrio' law. Through a panel event study, we highlight that amalgamated administrative units experienced significantly larger current transfers, consistently with the regulatory framework establishing financial incentives for the merged municipalities. We also show that the larger financial capacity was not used neither to shrink the fiscal pressure nor to reduce the cost of local services. Conversely, merged administrative units experienced a significant increase in current expenditures with a specific focus on the Education, Tourism, and Transportation sectors. Growth in investments requires some years before being observed and is limited to a few specific years, with high heterogeneity across sectors and geographical macro-areas. This finding suggests a non-structural nature of the change, with investment projects needing some years to be designed and implemented.

Keywords: municipality mergers; amalgamations; panel event study; current expenditures; revenues.

1 Introduction

Ever-changing territorial challenges would need administrative bodies to evolve their boundaries and functions in order to consistently adapt to emerging conditions. A long-standing matter relates to urbanization. In most developed countries, after the 1950s economic boom, an increase in size and population of certain urban areas was observed in opposition to general depopulation in marginal or inner areas (Gottmann, 1957; van den Berg et al., 1982). Nevertheless, in none of these cases, administrative boundaries changed accordingly, usually leading to under or over-bounded local governments (Bennett, 1997).

Other issues concern the changed nature of local governments. A global trend towards political and/or fiscal decentralization made sub-national institutions more responsible in governing territories (OECD, 2016).[1] This territorial rescaling, coupled with the search for new forms of multilevel governance (Ferlaino and Molinari, 2009), made municipalities and regions (more so than States) responsible for competing to attract firms, organizations, human capital, events, etc. (Jacobs, 1969; Sassen, 2000).[2] Local institutions, therefore, became to be considered as determinant assets for territorial development (Amin, 1998; Rodríguez-Pose, 2013).

Eventually, the 2008/2010 financial and economic crisis made administrative fragmentation inefficient considering the spending review that in most Mediterranean countries affected all tiers of government. The austerity measures were particularly challenging for small municipalities since they generally experience larger per-capita expenditure for general functions (Iommi, 2018).[3]

In Italy, the case of this article, only 199 municipalities melted over the past 25 years (1995-2020), making it the case with the least number of amalgamations[4] in Europe (Spalla, 2020). Apart from rare cases, these mergers only involved small or very small municipalities.[5] This

[1] The European Union, for example, chose local governments as its main interlocutors for the implementation of cohesion policies (Formal et al., 2001)

[2] Messina et al. (2017) prove how regional competitiveness is negatively correlated with administrative fragmentation, showing a clear divide between Northern and Southern European countries.

[3] In Italy, 70% of municipalities count less than 5.000 residents, and despite being small, they are supposed to perform the same functions as bigger municipalities, contrary to what happens in other cases like France, where different systems for small, medium and large municipalities exist (Messina et al., 2017).

[4] In the rest of the paper, the terms amalgamations and mergers are used as synonyms.

[5] Regional and provincial capitals used to melt with bordering municipalities only until the fascist period (the 1920s-1930s), despite continuing to expand afterward. In contrast to what happened elsewhere in Europe, in two recent cases, the urban areas of Florence and Milan were further administratively divided in 1992 and 2009, respectively, when the provinces of Prato and Monza e Brianza were set up, 'splitting up' what could be considered single metropolitan areas. The only recent case of a provincial capital that voted in a referendum to incorporate two bordering municipalities is Pescara, where amalgamation is expected to happen by 2027.

contributed to characterizing the administrative geography of Italy as inefficient, at least until 2014, when a new law (n. 56/2014, known as "Legge Delrio") was promulgated (Zilli and Dini, 2023). Among other things, the law aimed at encouraging municipal amalgamations, mainly by providing a greater range of financial incentives and introducing organizational simplifications.[6]

Extant literature is limited and struggles to provide complete overviews of its effects. First, available studies often just theoretically discuss the challenges and advantages of amalgamations or report descriptive statistics, but do not implement empirical causal frameworks to disentangle their impact (Marinuzzi and Tortorella, 2014; Tortorella and Marinuzzi, 2016; Cestari and Dalla Torre, 2018; Fissi and Scalone, 2020).[7] Second, analysis usually focuses on single regions or groups of municipalities, thus not providing overviews of the phenomenon at the national level (Iommi, 2017; Dalla Torre and Cestari, 2018). Finally, the impact of amalgamations on local governments' balance sheets is usually measured in aggregate terms, with no specifications on the items where expenditures and revenues are generated.[8]

Against this background, our paper studies the impact of municipal mergers in Italy in terms of economic efficiency.[9] In particular, we apply a panel event study to investigate the causal impact of amalgamations on the expenditures and revenue dynamics of merged administrative units. Our analysis confirms that the Delrio law was responsible for a significant growth of current transfers of merged municipalities, with consistent effects across geographical macro-areas. However, we highlight how this larger availability of financial resources was not translated into a lower fiscal pressure or a lower cost of services for residents, since the impact of mergers on fiscal and non-fiscal revenues does not tend to be statistically significant both at national and sub-national level. A limited exception is the North-East, where we observe a weakly significant reduction of the latter equal to -21.5%.

[6]For a recap on the history of the legislation regulating municipal mergers in Italy, as well as on why law n. 56/2014 substantially fostered municipal mergers, see Bolgherini et al. (2018) and Marinuzzi and Tortorella (2018).

[7]Challenges related to identifying common patterns, are not only connected to the analysis of municipal amalgamations. Indeed, with particular reference to the case of Italy, even if looking at analysis on municipal unions (*Unioni di Comuni*, i.e. an institution allowing two or more bordering municipalities to unify certain functions or provide services together), consensus does not emerge: Ferraresi et al. (2018) and Gori et al. (2023) find decreases in per-capita expenditures, while Luca and Modrego (2021) do not find any significant effect, and Vidoli et al. (2023) find cost savings only when larger municipalities are analyzed.

[8]See for instance the documents available at the following links: `https://dait.interno.gov.it/documenti/studio-le-fusioni-dei-comuni.pdf` and `https://autonomie.regione.emilia-romagna.it/fusioni-di-comuni/osservatorio-regionale-delle-fusioni`.

[9]Literature considers three areas where the effects of amalgamations have mostly been studied: economic efficiency, managerial implications, and democratic outcomes (Tavares, 2018).

We rather find stronger effects in terms of current expenditures and investments. The former is subject to an overall growth of 14.9% when aggregating expenditures across all sectors and focusing on the national level. A significant growth of this figure is highlighted also when deploying expenditures across sectors for Education, Transportation, and Tourism activities, with effects ranging between 15.7% and 71.8% and confirmed across geographical macro-areas. Interestingly, notice how this growth tends to be persistent over the years after the amalgamations and not just transient in one single or few years. We find the absence of current expenditure growth in the Security and Healthcare sectors at the national level, while significant treatment effects are spotted in the Northeast and Centre-South-Islands macro-regions for Security and Healthcare activities.

Higher heterogeneity characterizes our estimates on investments. We find a significant growth of such a figure by 17.1% at the national level when aggregating all sectors. However, this finding is the combined result of alternative dynamics across sectors and macro-regions. In particular, significant growth of investments is observed in the North-West for the Education sector, in the Security sector (except the Centre-South-Islands), and for Healthcare activities in the Centre-South-Islands. Furthermore, investments tend to be significantly larger in merged municipalities with respect to their counterfactual (e.g., comparable municipalities under a set of observable socio-economic characteristics, but not experiencing the amalgamation process) only in one single year after the merger. Moreover, coefficients are significant only two or three years after the amalgamation. These results suggest that municipalities may require time before designing and implementing relevant investment projects, that are realized in specific years, thus not leading to a structural growth of the local government's investment level. It is worth highlighting that our main findings hold true across different robustness checks, performed using more specific donor pools designed to account for the share of votes expressed in favor or against the amalgamation at the referendum.

The paper is organized as follows: Section 2 summarizes the available literature on the topic of administrative unit amalgamations and introduces our research hypotheses. Section 3 describes our data, whereas Section 4 explains our empirical methods. Section 5 discusses our main results, while the paper concludes by summarizing our contributions to the debate on the effects of administrative unit mergers.

2 Theoretical Framework

The law n.56/2014 ("Delrio") foresees that at least 30 million euros are allocated for the ten years following the amalgamation to those municipalities that merge; in 2017 the budgetary stability law of the Italian central government allocated 5 additional million € to the financing of amalgamations in favor of local administrative units; from 2018 onwards, also, these institutions are entitled to another grant corresponding to the 60% of the State transfers they received in 2010. Furthermore, administrative regions can establish a fund to encourage amalgamations within their boundaries.[10] As a consequence of such interventions, an analysis published by the "Department for Internal and Territorial Affairs" highlights a sharp growth in financial incentives received by municipalities experiencing a merging process, with funds raising from 1.55 million € to 83.21 million € between 2014 and 2020.[11]

Based on such considerations we introduce our base research hypothesis:

RH0: Current transfers increase in merged municipalities more than in similar administrative units not experiencing the process of amalgamation.

If theory says that municipal amalgamations should bring about some benefits in terms of revenues and expenditures of underlying administrative units, analysis carried out so far says it depends. Regarding revenues, existing studies distinguish between fiscal and non-fiscal. Despite this literature is not wide, theoretical considerations suggest that due to the larger availability of financial resources, municipalities could decide to limit local taxation and/or reduce the cost of services they provide. However, more practical considerations highlight that in the absence of structural interventions, such measures are likely to be temporary, risking being revoked as the additional funds will be stopped being allocated (e.g. after ten years). Consistently, descriptive evidence highlights the absence of a clear and consistent pattern in terms of fiscal and non-fiscal revenues across merged municipalities.[12] Based on these insights, we provide our first research hypothesis:

RH1: We do not expect to find a significant impact on fiscal, non fiscal and total revenues

[10] For details on the fiscal incentives on municipal mergers in Italy, see: `https://temi.camera.it/leg17/temi/unioni_fusioni_comuni`.

[11] The analysis published by the "Department for Internal and Territorial Affairs" is available at the following link: `https://dait.interno.gov.it/documenti/studio-le-fusioni-dei-comuni.pdf`.

[12] See for instance, the studies on available at the following link: `https://autonomie.regione.emilia-romagna.it/fusioni-di-comuni/osservatorio-regionale-delle-fusioni/relazione-comuni-fusi/monitoraggio-dei-comuni-nati-da-fusione`.

of merged municipalities with respect to comparable municipalities not experiencing the amalgamation process.

Concerning current expenditures, extant literature suggests that economies of scale, amalgamations, coordination costs, and higher funds availability, could affect their extent. In cases like Sweden and Germany, Hanes (2015) and Blesse and Baskaran (2016) warn that economies of scale can materialize only at certain conditions, that depend on the municipalities' population sizes and on the willingness to merge, respectively. Literature focusing on why economies of scale do not materialize in some cases points out that the number of residents can be an explanation of why U-shaped relationships between population size and cost of public services (Breunig and Rocaboy, 2008) or diseconomies of scale linked to labor-intensive services (Bish, 2001) occur. In the first case, even though no general consensus has been reached, a literature review by (Holzer et al., 2009) suggests that administrative efficiency increases in local governments with population size up to about 20,000/25,000 residents, then remains stable until about 250,000 people, and eventually declines with population after that threshold, which means that the smallest and largest municipalities are the least efficient. Regarding specific service types, capital-intensive provisions (e.g. water supply or sewerage) understandably become more efficient or less costly if users increase, while labor-intensive services such as police protection or public education become less efficient or require more funds after the population exceeds some thresholds.

Dis-economies of scales could also emerge due to rigid labor contracts preventing an efficient staff reallocation, as well as set up and coordination costs due to complex integration of different administrative bodies that may require some years (Moisio and Uusitalo, 2013; Blesse and Baskaran, 2016). Other possible barriers to cost reduction and service improvements that have been highlighted include unpreparedness of employees made redundant (Drew et al., 2023), local political habits (Blom-Hansen, 2010), power-related issues (Strebel, 2018), and pre-existing institutional and service delivery arrangements (Garlatti et al., 2022). Finally, the availability of larger financial resources may foster local governments to implement additional projects and activities to improve the current service level even for political opportunism in order to maximize future election chances (Gul and Pesendorfer, 2010; Hyytinen et al., 2014).

However, while the growth of current expenditures may contribute to realizing additional

projects just during the period when merged municipalities receive the financial incentives, with such effects being temporary and vanishing as amalgamated administrative units will stop gathering such funds, theory suggests that municipalities should use the additional available budget for investments aiming to structurally improve the local context and the services offered to residents (Iommi, 2017). Consistently, studies analysing the intensity of investments in merged municipalities confirm an upward trend for such variables after the conclusion of the amalgamation process.[13]

Considering such points, we state our second research hypothesis:

RH2: Both current expenditures and investments tend to increase in merged municipalities in a significant way with respect to comparable administrative units not experiencing the amalgamation process.

The following sections analyze the effects generated by the amalgamation process in merged municipalities in Italy in terms of revenues and expenditures. In this way, we fill a gap in the available literature that has not adequately investigated the effects of local government mergers in terms of economic efficiency, disaggregating revenues and expenditures across sectors and geographical macro-areas.

3 Data

We focus on the 96 municipalities amalgamations that occurred between 2016 and 2021, across 11 different Italian regions.[14] In particular, Trentino-Alto-Adige is the region experiencing the highest number of amalgamations (22) in the analyzed period. Figure 1 (left plot) clearly shows that municipality amalgamations were mainly performed in the North of Italy. For instance, the North-West macro-area accounts for 61% of total amalgamations, whereas North-East weights for the 20%. The rest of Italy (including Centre, South, and Islands) counts the remaining 19%. From a temporal perspective, we observe the highest number of amalgamations in the years

[13]For further details on the trend of investments in merged municipalities in the Emilia Romagna region, please see the studies on the available at the following link: `https://autonomie.regione.emilia-romagna.it/fusioni-di-comuni/osservatorio-regionale-delle-fusioni/relazione-comuni-fusi/monitoraggio-dei-comuni-nati-da-fusione`.

[14]We focus only on this period because it is the only time window for which the data are available at the needed level of spatial-sectoral granularity. Furthermore, 2015, marks a divide in the way municipal revenues and expenditures are recorded within financial statements, thus preventing us from including mergers that occurred before that year in our analysis.

2016 (27) and 2019 (30), while the year 2021 is characterized by the absence of amalgamations.

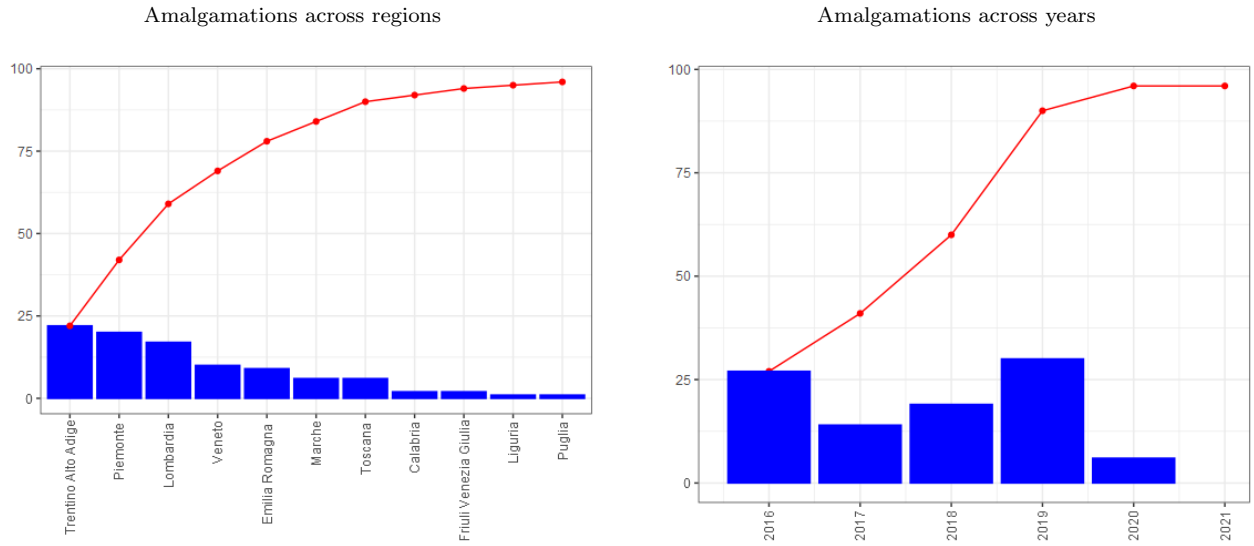

Figure 1: Municipalities amalgamations across regions and years.

Table 1: Descriptive statistics.

variable	Q1	mean	Q3	sd
		Dependent Variables:		
Revenues:				
Current transfers	3.834	4.726	5.848	1.342
Total revenues	7.36	7.84	8.42	0.792
Fiscal revenues	6.333	6.577	6.854	0.458
Not fiscal revenues	4.997	5.496	6.071	0.841
Current Expenditures:				
All sectors	6.414	6.652	6.984	0.496
Education	3.745	4.202	4.582	0.848
tourism	0.446	1.597	2.702	1.806
Transportation	3.744	4.164	4.631	0.919
Security	2.88	3.397	3.808	1.151
Healthcare	-0.33	0.574	1.603	1.693
Investments:				
All sectors	4.62	5.323	6.227	1.322
Education	1.883	3.062	4.207	1.846
tourism	0.789	2.396	3.928	2.411
Transportation	2.945	3.935	4.921	1.671
Security	0.028	1.129	2.137	1.791
Healthcare	0.094	1.785	3.687	2.76
		Control Variables:		
Population	1017	2468	6325	42735.891
Income pc	14633.068	17629.911	20058.089	3684.113

In terms of dependent variables, we consider alternative sources of revenues and expenditures of Italian municipalities. All such variables are log-transformed and normalized by the number of local inhabitants, to avoid our results being driven by the largest municipalities in our sample. Considering revenues, we distinguish between *Current transfers*[15], *Total revenues*[16], *Fiscal revenues*[17] and *Not fiscal revenues*[18].

In terms of expenditures, we distinguish between current expenditures and investments. Furthermore, we disentangle them across different sectors including Education, Tourism, Transportation, Security, and Healthcare. Moreover, we consider the total aggregate amount of current expenditures and investments. In this way, we provide a complete overview of the revenues and expenditures of municipalities, having the possibility to provide a fine-grained analysis of the specific dimensions impacted by the amalgamations of administrative units. We rather consider the number of inhabitants (*Population*) and the income per capita (*Income pc*) as our control variables to ensure that our variables are not driven by the size of the municipality and by the level of local wealth.

Table 1 shows descriptive statistics of our dependent and independent variables.

4 Methods

4.1 Panel Event Study

Our analysis aims to estimate the impact of municipality amalgamation on municipalities' performances in terms of revenues and expenditures. As municipalities may experience the amalgamation across different years, we rely on the panel event study recently introduced by Callaway and Sant'Anna (2021), since it allows us to deal with staggered treatment adoption and multiple periods. Moreover, this empirical method addresses certain challenges related to conventional Difference in Differences (DiD) techniques, including the "negative weight prob-

[15]Current transfers represent revenues deriving from contributions and transfers from third parties and they measure the degree of financial dependence of the municipality on external entities. In particular, they include transfers from the central or regional government, from national and international authorities, or from other entities of the public sector.

[16]They represent the total amount of revenues collected by municipalities.

[17]Fiscal revenues consist of municipal revenues deriving from the collection of taxes, contributing to the financial autonomy of a municipality.

[18]Not fiscal revenues include all sources of financing of the municipality that are not directly linked to the collection of taxes. They include any revenues obtained from the provision of public services or the rental of municipal real estate to third parties.

lem." Additionally, it mitigates concerns related to parameter estimation, which is notably influenced by factors such as group size, treatment timing, and the overall number of analyzed time periods (De Chaisemartin and d'Haultfoeuille, 2020; Goodman-Bacon, 2021).

More in detail, let G_i be the year in which municipality i is treated for the first time ($G_i = year\ t : \tau_{i,t} = 1\ \&\ \tau_{i,t-1} = 0$) and $G_{i,g} = 1\{G_i = g\}$. Our estimate of the average treatment on treated (ATT) relies on the following equation:

$$ATT(g,t) = [\frac{G_g}{[G_g]} * (Y_t - Y_{g-1} - m_{g,t}(X))] \tag{1}$$

where $\tau_{i,t}$ constitute our treatment variable that is equal to 1 in case municipality i is treated in year t and 0 otherwise. Furthermore, Y_t is our dependent variable observed in year t, $m_{g,t}(X) = [Y_t - Y_{g-1}|X, C = 1]$ with C being a binary variable equal to 1 for never treated units.[19] Finally, X_t corresponds to the vector of control variables including population and income per capita as explained in section 3.

We also calculate the following measures to summarize the causal impact of the examined policy. These metrics offer insights into the average effect of engaging in the treatment when firms are precisely e time periods from the start of the treatment ($\theta_{dynamic}(e)$). Additionally, we present an aggregated average of the treatment effect across all groups and years ($\theta_{aggregate}$):

$$\theta_{dynamic}(e) = \sum_{g \in G} 1\{g + e \leq T\} * P(G = g|G + e \leq t) * ATT(g, g + e) \tag{2}$$

$$\theta_{aggregate} = \sum_{g \in G} \sum_{t=2}^{T} \omega(g,t) * ATT(g,t) \tag{3}$$

where $\omega(g,t)$ are weights referring to the size of each set of municipalities observed in year t and belonging to group g. Although the pre-treatment parallel trends condition could be assessed through the parameter $\theta_{dynamic}(e)$, we also apply a Propensity Score Matching (PSM) before to estimate equation 1 (Rubin, 1973; Imbens, 2000; Rosenbaum et al., 2010). In this way, we restrict our analysis to a set of municipalities with comparable observable characteristics. We use income per capita and population as variables to identify comparable treated and not-treated units in the PSM. Furthermore, we impose an exact matching condition on the province, meaning that the matched treated and not-treated units should be located in the same

[19] We exclude from our control group those municipalities that experienced a successful merging process before 2016.

geographical province. Finally, we use the nearest neighbor as a matching method. We rather rely on the propensity score to measure the distance between each couple of municipalities. Indeed, this metric summarizes the contribution of all the covariates (X) to the probability of being treated. In line with (Rosenbaum and Rubin, 1983), we compute the propensity score as: $\pi_i(X_i) = P(\tau_i = 1|X_i)$.

4.2 Regression Discontinuity Design

The process of municipal merger involves two main steps. The first is of political initiative. The Mayor and municipal councils of potentially involved municipalities vote on the merger proposal. If approved, the request is forwarded to the regional government, which, in turn, contributes to the organization of the second phase. A referendum is then announced, allowing citizens to express their will regarding the merger. When, and if, the referendum is successful in all the municipalities involved, the merger process and the formation of a new municipality take place. Based on this, we further investigate the impact of amalgamations in terms of economic efficiency by comparing the expenditures and revenues of municipalities that rejected the referendum for the merger with those of administrative units successfully accomplishing the merger process. Considering that municipalities were merged in case the portion of votes in favor of the amalgamations was above 50% in all administrative units underlying the amalgamation, we perform a regression discontinuity design (RDD) using as a running variable the portion of votes in favor of the merger and a cut-off equal to 0.5. The intuition for this analysis is that comparing revenues and expenditures of merged municipalities, with a percentage of positive votes slightly above 50%, with those of administrative units failing to merge, due to contrary referendum percentages close but below 0.5, should allow us to consider very similar municipalities and capture the impact of the merger, reducing the risk of confounding factors.

Considering that no exceptions were admitted (e.g., municipalities merged even if the percentage of positive votes) was below 50%, we adopt a Sharp RDD. By denoting as $Y_i(1)$ and $Y_i(0)$ the potential outcome variable of municipality i (in terms of alternative types of revenues and expenditures), with $Y(1)$ referring to successfully merged municipalities and $Y(0)$ indicating administrative units with a negative referendum outcome, the conditioned expectation of the outcome representing the causal effect of the treatment can be computed as (Imbens, 2000):

$$\lim_{x \to c^-} E[Y_i|X_i = x] - \lim_{x \to c^+} E[Y_i|X_i = x] \tag{4}$$

Consequently, the average causal effect of the treatment at the discontinuity point is given as:

$$\tau_{RDD} = E[Y_i(1) - Y_i(0)|X_i = c] \tag{5}$$

In particular, we use the local polynomial Regression Discontinuity (RD) point estimators with robust bias-corrected confidence intervals and inference procedures developed in Calonico et al. (2014), Calonico et al. (2018), Calonico et al. (2019) and Calonico et al. (2020).

5 Empirical Results

5.1 Municipality Revenues

Regarding the entire country, Figure 2 provides a comprehensive overview of the dynamics surrounding municipal revenues, specifically focusing on the four types outlined in Section 3. As anticipated and in line with our *RH0*, there was a substantial increase in total transfers following the merger equal to 82.5% at the national level. This outcome aligns with the regulatory framework governing mergers, as discussed in detail earlier, and is consistent with previous descriptive results provided by the "Department for Internal and Territorial Affairs", highlighting the growth of current transfers by 79.5% in merged municipalities with the same figure accounting for only 4.2% in other administrative units. Notice how such finding is robust across geographical areas, with a stronger magnitude observed in the Centre-South of Italy.

Moreover, it is noteworthy to emphasize that the coefficients associated with total, fiscal, and non-fiscal revenues exhibit no statistical significance, coherently with our *RH1*. This means that the wider presence of financial resources was not spent to reduce the fiscal pressure on residents, nor to limit the cost of local services. To deepen the analysis of the dynamics of these variables, we present in Table 2 the varied effects observed across different geographical macro-areas. Notably, we observe some exceptions across the analyzed areas. For instance, an upswing in inflows corresponds to a decline by -21.5% in non-fiscal revenues in the North-East.

An opposite pattern is spotted for the Centre-South-Islands macro-region which is also subject to a surge in total transfers that is markedly more pronounced with respect to other macro-areas (ATT = 0.753). Simultaneously, in this region, the increase in inflows is associated with a rise in non-fiscal revenues. However, a contrasting trend emerges in the North-East municipalities, where This suggests a potential reduction in the costs associated with services provided to the citizens. This particular outcome is in line with some relevant pieces of research, such as the analysis carried out by Reingewertz (2012), Blom-Hansen (2010) and Cobban (2019).

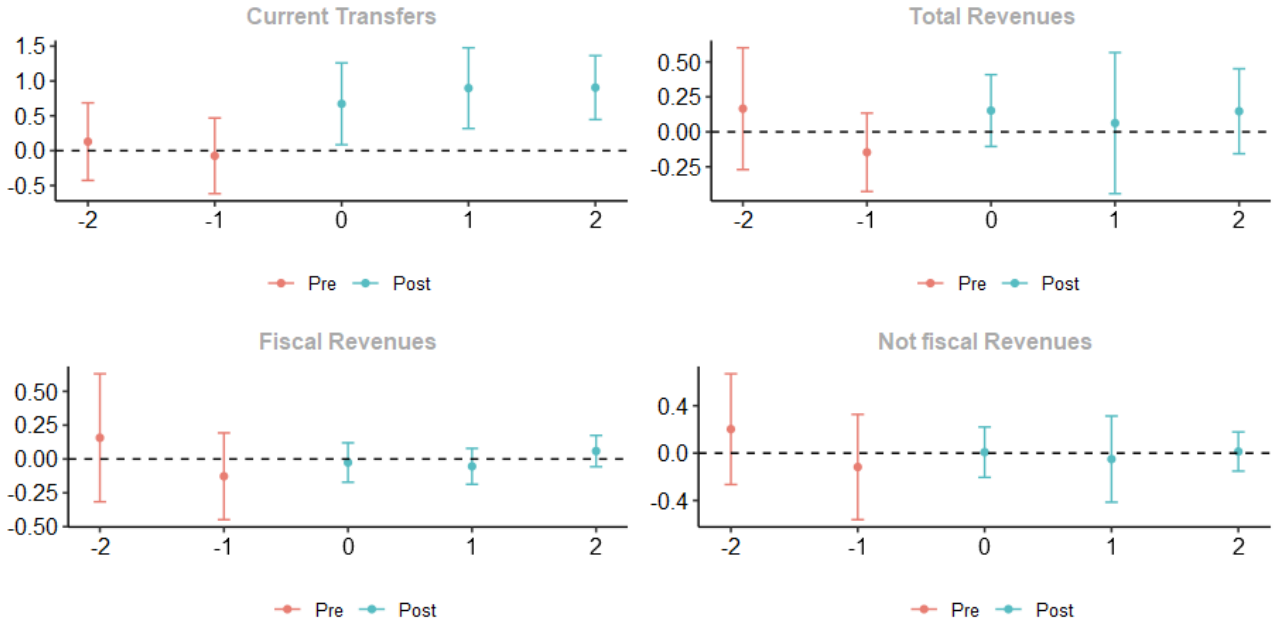

Figure 2: Municipality Revenues

Table 2: The impact of municipalities amalgamations on municipalities revenues across macro-regions.

	ATT Aggregate ($\theta_{aggregate}$)			
	Italy	*North-West*	*North-East*	*Centre-South-Islands*
Current transfers	0.825***	1.016***	0.410**	1.937***
	(0.251)	(0.206)	(0.175)	(0.256)
Total revenues	0.121	-0.006	-0.139	0.753***
	(0.198)	(0.055)	(0.114)	(0.184)
Fiscal revenues	-0.007	-0.077	-0.020	-0.015
	(0.039)	(0.050)	(0.083)	(0.073)
Non fiscal revenues	-0.010	-0.042	-0.215**	0.296*
	(0.103)	(0.080)	(0.105)	(0.165)
Treated Municipalities	57	30	14	13
Observations	361	198	83	79

5.2 Municipality Expenditures and Investments

Another noteworthy heterogeneity is observed between current expenditures and investments. Overall (across all sectors), current expenditures at the national level show a steady increase in

the years following the merger with a total growth of 14.9%, consistently with our *RH2*. At the sector level, as summarized in Figure 3 and Table 3, Education and Transportation activities are subject to a similar growth of current expenditures (ATT = 0.157 and 0.176), with consistent results across macro-areas. Notice how the Tourism sector experiences the strongest increase of this figure both at national and sub-national levels (ATT between 0.718 and 1.030). The growth is not significant in Security and Healthcare, although some exceptions emerge across macro-regions. The former obtains significant growth in the North-East, whereas the latter is in the Centre-South-Islands macro-regions.

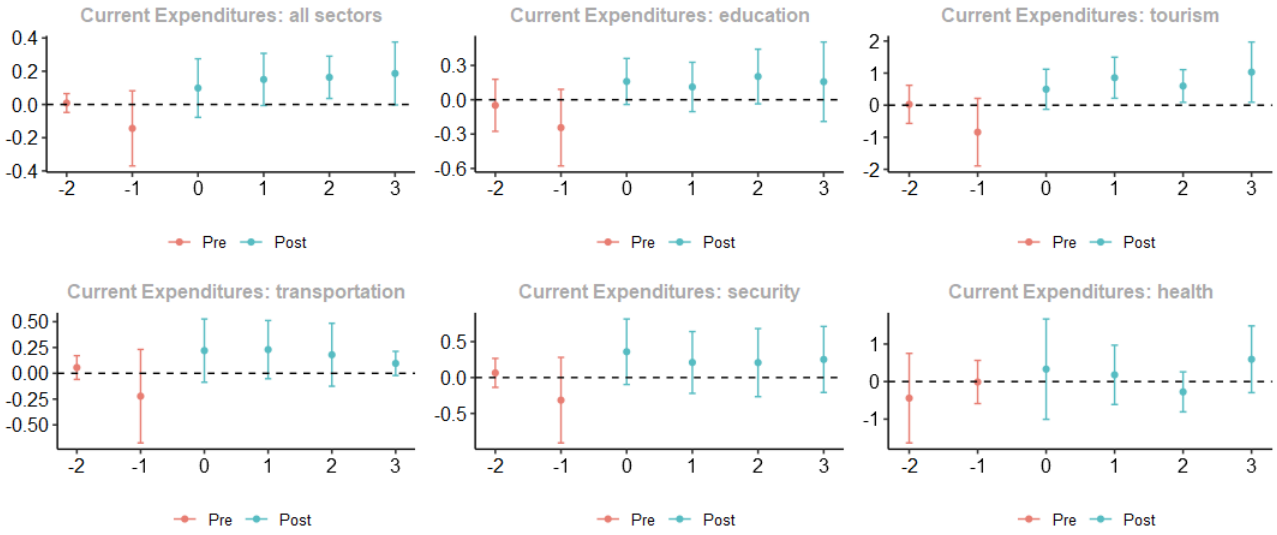

Figure 3: Municipality Current Expenditures

Table 3: The impact of municipalities amalgamations on municipalities' current expenditures across macro-regions and sectors.

	ATT Aggregate ($\theta_{aggregate}$)			
	Italy	*North-West*	*North-East*	*Centre-South-Islands*
All sectors	0.149**	0.047	0.076	0.356***
	(0.073)	(0.062)	(0.171)	(0.124)
Education	0.157*	0.233*	0.257*	0.271*
	(0.089)	(0.143)	(0.151)	(0.149)
Tourism	0.718***	0.875**	NA	1.030***
	(0.267)	(0.373)	(NA)	(0.329)
Transportation	0.176*	0.093*	0.578*	0.077
	(0.105)	(0.053)	(0.307)	(0.116)
Security	0.191	0.337	0.908*	0.157
	(0.184)	(0.246)	(0.533)	(0.201)
Healthcare	0.230	0.241	-0.617*	1.521**
	(0.439)	(0.336)	(0.331)	(0.697)
Treated Municipalities	57	30	14	13
Observations	361	198	83	79

Figure 4 illustrates the trends related to investments. At the national level, we observe significant growth of such figure equal to 17.1%, corroborating our *RH2*. However, this is the result of heterogeneous dynamics across sectors and macro-regions. Indeed, investments

significantly grow only in the Education sector in the North-West, for Security activities with the exception of the Centre-South-Islands macro-region, which is instead subject to a rise of this figure in the Healthcare sector.

We also show that investments take a few years before experiencing significant growth, suggesting that time is needed to plan and program such projects. Moreover, the effect remains significant for one or a few years post-merger, suggesting a non-structural nature of the change. However, this time dynamic seems reasonable, especially considering the effort required for a small-medium municipal entity to plan a consistent wave of investments. At the sector level, as summarized in Table 4, higher investments are observed throughout Italy (excluding the Center-South) in the security sector. A greater growth in investments compared to the counterfactual is evident in the Center-South of Italy, particularly in the healthcare and transportation sectors.

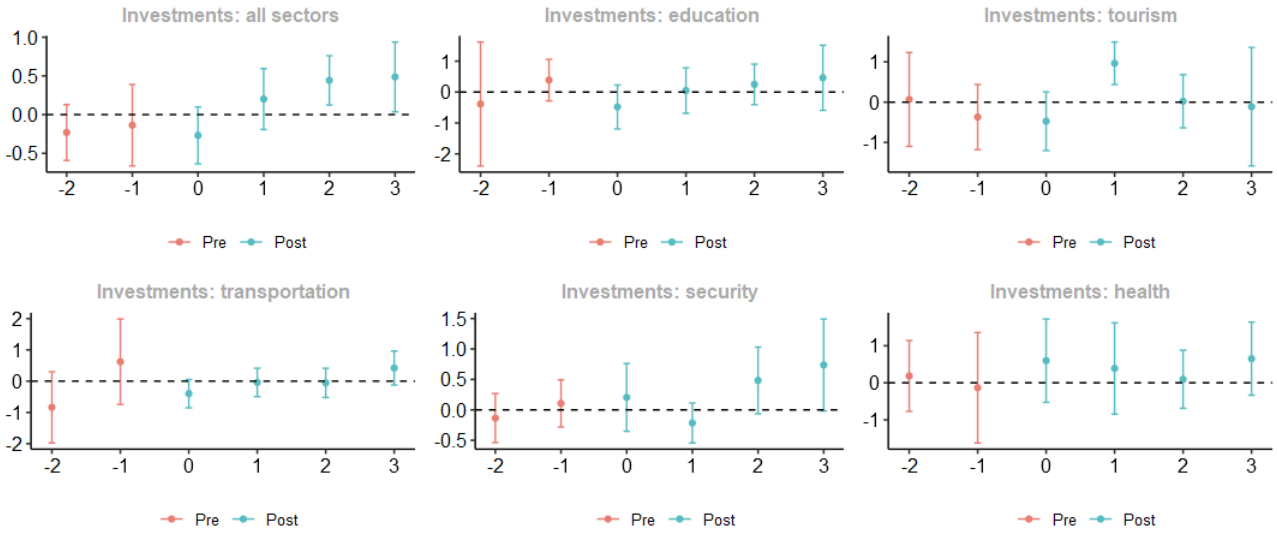

Figure 4: Municipality Investments

Table 4: The impact of municipalities amalgamations on municipalities investments across macro-regions and sectors.

	ATT Aggregate ($\theta_{aggregate}$)			
	Italy	*North-West*	*North-East*	*Centre-South-Islands*
All sectors	0.171*	-0.078	-0.300	0.446*
	(0.101)	(0.275)	(0.362)	(0.251)
Education	0.116	0.620*	-0.381	-0.565
	(0.335)	(0.361)	(0.600)	(0.552)
Tourism	0.049	-0.930	NA	-0.264
	(0.270)	(0.648)	(NA)	(0.331)
Transportation	-0.166	-0.177	-0.282	0.878**
	(0.204)	(0.329)	(0.529)	(0.439)
Security	0.410*	0.628**	0.385*	0.055
	(0.221)	(0.330)	(0.239)	(0.443)
Healthcare	0.620	0.275	-0.351	2.542***
	(0.596)	(0.323)	(0.458)	(0.779)
Treated Municipalities	57	30	14	13
Observations	361	198	83	79

Overall, municipalities can utilize their increased current transfers by either reducing fiscal/non-fiscal revenues or increasing expenditures (both current and investments). In general, except in the Northeast where a reduction in the cost of services is observed, there is no decrease in fiscal and non-fiscal revenues. Instead, there is an observed increase in current expenditure, particularly in Education, Tourism, and Transportation, and in Investments in Security. The Center-South, on the other hand, appears to have experienced a relatively greater growth in both current expenditure and investments.

5.3 Robustness Checks

We report in Table 5 the results of a set of robustness checks for our main findings exhibited in previous sections.

In particular, Column (1) shows the results of the same panel event study described in section 4 when we restrict our control group to the set of Italian municipalities that experienced a referendum for the amalgamation process with a negative result. We do this since such municipalities should display an adequate level of similarity with respect to our treated units since they were all eligible for a merging process.

In Column (2), we estimate a Regression Discontinuity Design on Italian municipalities inducing a referendum to accomplish the amalgamation process. As described in Section 4.2, our running variable is represented by the percentage of votes in favor of the merging with a cut-off equal to 0.5, since municipalities with a portion of residents contrary to the amalgamation larger than 50% blocked the merging process. We use a triangular kernel and an order of the local polynomial used to construct the point-estimator equal to 2. Similar results hold for alternative model specifications and are available upon request.

These two analyses tend to confirm the results of Sections 5.1 and 5.2. Indeed, we find that the amalgamation process increased current transfers, as postulated by our *RH0* and in line with the Italian regulatory framework, but did not contribute to reducing local taxation and services costs for residents. Moreover, we highlight a significant effect in terms of the growth of aggregate current expenditures, as well as in the Education, Tourism, and Transportation sectors. Differently, only aggregate and Security investments tend to experience a significant rise.

Table 5: We show the results of additional robustness checks. In particular, Column (1) replicates the results of our main analysis when we restrict the set of not-treated units to municipalities that established a referendum for the amalgamation, but whose result was negative. In column (2) we perform an RDD where our running variable is represented by the percentage of votes in favor of the amalgamation. We consider a cut-off equal to 0.5. Finally, column (3) reports the β coefficient of the regressor "percentage of votes in favor of the amalgamation" obtained through an OLS model where our dependent variable is represented by alternative municipalities' revenues and expenditures. For brevity, we omit the coefficients of other control variables (e.g., income per capita and number of residents).

Dependent Variable	Panel Event Study	RDD	OLS
Revenues:			
Current transfers	0.926***	1.161**	0.250
	(0.026)	(0.487)	(0.861)
Total revenues	0.146	0.173	-0.463
	(0.182)	(0.463)	(0.646)
Fiscal revenues	0.016	-0.240	-0.085
	(0.059)	(0.210)	(0.544)
Not fiscal revenues	-0.049	-0.136	-0.343
	(0.109)	(0.535)	(0.791)
Current Expenditures:			
All sectors	0.160***	0.152*	-0.473
	(0.065)	(0.081)	(0.566)
Education	0.215**	0.151**	0.050
	(0.103)	(0.071)	(0.627)
Tourism	0.853***	NA	NA
	(0.221)	(NA)	(NA)
Transportation	0.062	1.017***	-0.037
	(0.114)	(0.223)	(0.731)
Security	0.278	NA	-0.116
	(0.192)	(NA)	(1.148)
Healthcare	0.261	0.129	-0.085
	(0.398)	(0.802)	(1.654)
Investments:			
All sectors	0.238***	0.108*	-0.278
	(0.076)	(0.057)	(1.145)
Education	0.157	0.463	0.259
	(0.317)	(0.391)	(1.510)
Tourism	0.065	NA	NA
	(0.247)	(NA)	(NA)
Transportation	0.257	0.132	1.204
	(0.192)	(0.208)	(1.129)
Security	0.294*	NA	-0.941
	(0.164)	(NA)	(0.959)
Healthcare	0.415	0.209	0.461
	(0.495)	(0.231)	(0.512)

Column (3) eventually highlights the results of an OLS regression where we aim to investigate the relationship between the percentage of votes in favor of the referendum and alternative

outcome variables in terms of revenues and expenditures.[20]

More specifically, we restrict the models to the only portion of successfully merged municipalities. We do not find statistically significant coefficients in any of the estimated models, thus suggesting that a stronger commitment from local residents in favor of the amalgamation (e.g., a higher percentage of positive votes) was not associated with a better impact of the merger.

6 Conclusion

This paper analyzes the impact of municipal mergers that occurred in Italy between 2016 and 2020. In particular, focusing on economic efficiency, we discuss the effects on revenues and expenditures disaggregated across sectors and geographical macro-areas.

We provide evidence of significant growth in total transfers in line with the regulatory framework associated with the merger process. Conversely, we do not find significant increases in terms of total, fiscal, and non-fiscal revenues, suggesting that amalgamated local governments tend not to reduce fiscal pressure, nor the cost of local services. On the other hand, we observe a generally significant increase in total current expenditures. In particular, expenditures significantly increase in Education, Tourism, and Transportation, whereas we do not find significant results concerning Security and Healthcare. These findings are consistent across macro-regions, although, in general, a stronger growth in expenditure compared to the counterfactual is observed for the municipalities located in the Center-South of the country. In this area, we also observe a significant impact on Healthcare. An increase in investments was also found locally by Iommi (2017) in Emilia-Romagna. Our analysis of investments shows that such an increase remains significant only in the short run, perhaps reflecting the challenges connected to investment planning for medium and small municipalities.

Our results are robust to further analysis performed with alternative and more precise control groups, as detailed in Section 5.3. Furthermore, we show how the share of votes in favor of merging is not related to increased efficiency after the amalgamation.

[20] We rely on the following model specification:

$$Y_i = \alpha + \beta * Yes\ Percentage_i + \gamma * X_i + \epsilon_i$$

where Y_i are alternative measures of revenues and expenditures for municipality i. $Yes\ Percentrage_i$ is the percentage of votes in favor of the amalgamation. Finally, X_i is a vector of control variables including the income per capita and the number of residents in the underlying administrative units, while ϵ_i is the error term.

In light of this, we claim that our paper contribution is twofold. On the one hand, we fill a gap in the literature, with particular reference to the analysis of revenues and expenditures of merged municipalities with high sector-level disaggregation by applying a robust causal framework analysis to the case of Italy. On the other hand, we produce valuable evidence within the wider debate on how municipal mergers may affect local administrations' economic efficiency, contributing to the need for empirical analysis as highlighted by national policymakers [21], in particular considering that "most of the territorial reforms aiming to merge local governments were not supported by rigorous empirical research and reliable data analysis" (Tavares, 2018:5).

Nevertheless, it is essential to acknowledge a few limitations inherent in this study. First, the analysis is constrained by data availability. The level of granularity of the data used in our analysis is only accessible from 2016 onwards. While the majority of municipal amalgamations were officially recorded after this period, we are unable to account for those that occurred before 2016.

Second, the external validity of our results may be somewhat restricted by the peculiarities of the Italian context. Countries, indeed, differ not only in terms of administrative structure, levels of fiscal and political decentralization, and number of sub-national tiers of government but also in various geographical, historical, social, cultural, political, economic, and financial factors influencing municipal amalgamation processes. Additionally, variations arise from how municipal mergers are legally and politically conceptualized: whether voluntary or compulsory, occurring on a large or small scale, implemented through top-down or bottom-up processes, involving financial incentives, and having extended or expedited implementation periods based on 'emergency' reasons. Such a complex set of heterogeneities, which highlights the place-specific nature of the phenomenon analyzed, must inevitably be taken into account when trying to generalize the different research outcomes (Blesse and Baskaran, 2016; Cobban, 2019; Li and Takeuchi, 2023).

[21] See for instance the report on hypothetical advantages of municipal amalgamations by the Ministry of Home Affairs, available at the following link: https://www.aranagenzia.it/documenti-di-interesse/sezione-economico-statistica/altri/6309-fusioni-quali-vantaggi-risparmi-teorici-derivanti-da-unipotesi-di-accorpamento-dei-comuni-di-minori-dimensione-demografica-ministero-interno.html.

References

Amin, A. (1998). An institutionalist perspective on regional economic development.

Bennett, R. J. (1997). Administrative systems and economic spaces. *Regional Studies 31*(3), 323–336.

Bish, R. L. (2001). Local government amalgamations: discredited nineteenth century ideals alive in the twenty first. *Commentary-CD Howe Institute* (150), 1.

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. (2010). Municipal amalgamations and common pool problems: The danish local government reform in 2007. *Scandinavian Political Studies 33*(1), 51–73.

Bolgherini, S., M. Casula, and M. Marotta (2018). Pursuing defragmentation at the municipal level: signs of a changing pattern? *Modern Italy 23*(1), 85–102.

Breunig, R. and Y. Rocaboy (2008). Per-capita public expenditures and population size: a non-parametric analysis using french data. *Public choice 136*, 429–445.

Callaway, B. and P. H. Sant'Anna (2021). Difference-in-differences with multiple time periods. *Journal of Econometrics 225*(2), 200–230.

Calonico, S., M. D. Cattaneo, and M. H. Farrell (2018). On the effect of bias estimation on coverage accuracy in nonparametric inference. *Journal of the American Statistical Association 113*(522), 767–779.

Calonico, S., M. D. Cattaneo, and M. H. Farrell (2020). Optimal bandwidth choice for robust bias-corrected inference in regression discontinuity designs. *The Econometrics Journal 23*(2), 192–210.

Calonico, S., M. D. Cattaneo, M. H. Farrell, and R. Titiunik (2019). Regression discontinuity designs using covariates. *Review of Economics and Statistics 101*(3), 442–451.

Calonico, S., M. D. Cattaneo, and R. Titiunik (2014). Robust nonparametric confidence intervals for regression-discontinuity designs. *Econometrica 82*(6), 2295–2326.

Cestari, A. and R. Dalla Torre (2018). La fusione fa la forza: Le aggregazioni tra comuni per lo sviluppo del territorio. *La fusione fa la forza*, 1–128.

Cobban, T. W. (2019). Bigger is better: Reducing the cost of local administration by increasing jurisdiction size in ontario, canada, 1995–2010. *Urban Affairs Review 55*(2), 462–500.

Dalla Torre, R. and A. Cestari (2018). La fusione fa la forza, le aggregazioni tra comuni per lo sviluppo del territorio.

De Chaisemartin, C. and X. d'Haultfoeuille (2020). Two-way fixed effects estimators with heterogeneous treatment effects. *American Economic Review 110*(9), 2964–96.

Drew, J., D. McQuestin, and B. Dollery (2023). Fiscal outcomes arising from amalgamation: more complex than merely economies of scale. *Public Management Review*, 1–19.

Ferlaino, F. and P. Molinari (2009). *Neofederalismo, neoregionalismo e intercomunalità. Geografia amministrativa dell Italia e dell Europa*. Il mulino.

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.

Fissi, S. and G. Scalone (2020). Il fenomeno della fusione di comuni in italia: profili evolutivi ed evidenze empiriche. *Economia Aziendale Online- 11*(3), 285–305.

Formal, C., I. Blog, and S. R. Blog (2001). European governance. a white paper.

Garlatti, A., P. Fedele, and S. Iacuzzi (2022). Can amalgamations deliver? barriers to local government mergers from an historical institutionalist perspective. *Public Money & Management 42*(6), 420–430.

Goodman-Bacon, A. (2021). Difference-in-differences with variation in treatment timing. *Journal of Econometrics 225*(2), 254–277.

Gori, G., P. Lattarulo, F. Porcelli, L. Rizzo, and R. Secomandi (2023). Does inter-municipal cooperation increase efficiency? evidence from italy. Technical report.

Gottmann, J. (1957). Megalopolis or the urbanization of the northeastern seaboard. *Economic geography 33*(3), 189–200.

Gul, F. and W. Pesendorfer (2010). Strategic redistricting. *American Economic Review 100*(4), 1616–1641.

Hanes, N. (2015). Amalgamation impacts on local public expenditures in sweden. *Local Government Studies 41*(1), 63–77.

Holzer, M., J. Fry, E. Charbonneau, N. Riccucci, A. Henderson, S. Kwak, and E. Burnash (2009). *Literature review and analysis related to municipal government consolidation*. Rutgers–Newark, School of Public Affairs and Administration.

Hyytinen, A., T. Saarimaa, and J. Tukiainen (2014). Electoral vulnerability and size of local governments: Evidence from voting on municipal mergers. *Journal of Public Economics 120*, 193–204.

Imbens, G. W. (2000). The role of the propensity score in estimating dose-response functions. *Biometrika 87*(3), 706–710.

Iommi, S. (2017). Associazionismo e fusioni di comuni. *Punti di forza e criticità delle politiche di incentivo*.

Iommi, S. (2018). Un quinquennio di fusioni di comuni. *Amministrare 48*(3), 431–458.

Jacobs, J. (1969). *The Economy of Cities*.

Li, J. and K. Takeuchi (2023). Do municipal mergers reduce the cost of waste management? evidence from japan. *Regional Science and Urban Economics 103*, 103939.

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.

Marinuzzi, G. and W. Tortorella (2014). Lo stato dell'arte delle fusioni di comuni in italia. *Amministrare 44*(1), 149–160.

Marinuzzi, G. and W. Tortorella (2018). Le fusioni e le unioni di comuni. *Amministrare 48*(3), 477–488.

Messina, P. et al. (2017). Le politiche di riordino territoriale come strategia di sviluppo regionale? i casi di italia e francia a confronto. *LE ISTITUZIONI DEL FEDERALISMO 4*(XXXVIII).

Moisio, A. and R. Uusitalo (2013). The impact of municipal mergers on local public expenditures in finland. *Public Finance and Management 13*(3), 148–166.

OECD (2016). *World Organization of United Cities and Local Governments and OECD - Subnational Governments Around the World: Structure and Finance : a First Contribution to the Global Observatory on Local Finances*. OECD.

Reingewertz, Y. (2012). Do municipal amalgamations work? evidence from municipalities in israel. *Journal of Urban Economics 72*(2-3), 240–251.

Rodríguez-Pose, A. (2013). Do institutions matter for regional development? *Regional studies 47*(7), 1034–1047.

Rosenbaum, P. R., P. B. Rosenbaum, and Briskman (2010). *Design of observational studies*, Volume 10. Springer.

Rosenbaum, P. R. and D. B. Rubin (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika 70*(1), 41–55.

Rubin, D. B. (1973). Matching to remove bias in observational studies. *Biometrics*, 159–183.

Sassen, S. (2000). *Cities in a World Economy*. Sociology for a New Century Series. SAGE Publications.

Spalla, F. (2020). Settant'anni di fusioni comunali nei paesi europei: modelli, processi, esiti (1950-2020). *Quaderni di scienza politica 27*(1), 125–146.

Strebel, M. A. (2018). Incented voluntary municipal mergers as a two-stage process: Evidence from the swiss canton of fribourg. *Urban Affairs Review 54*(2), 267–301.

Tavares, A. F. (2018). Municipal amalgamations and their effects: a literature review. *Miscellanea Geographica. Regional Studies on Development 22*(1), 5–15.

Tortorella, W. and G. Marinuzzi (2016). La geografia delle fusioni, unioni e convenzioni intercomunali. *Amministrare 46*(1), 177–192.

van den Berg, L., E. C. C. for Research, and D. in Social Sciences (1982). *Urban Europe: A study of growth and decline*. Number v. 1 in Cross national comparative series. Elsevier Science & Technology Books.

Vidoli, F., F. Quintiliani, G. Ivaldi, G. Marinuzzi, F. Porcelli, and W. Tortorella (2023). Do municipal unions improve cost efficiency for the social function? a quasi-experimental endogenous stochastic frontier approach. *Journal of Regional Science*.

Zilli, S. and F. Dini (2023). Legge 56/2014 e geografia politica dell'italia: valutazione d'impatto ambientale. *GEOTEMA 70*, 6–23.