Dynamic Tax and Expenditure Effects of Municipal Mergers

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February 27, 2025
Preliminary Version

Abstract

Municipal mergers are commonly implemented in federally-organized economies, with the intention to realize economies of scale and cost savings. In this paper, we use the universe of Swiss municipalities to test for tax and expenditure effects of mergers. Swiss municipalities enjoy a huge degree of tax autonomy and experienced various merger waves over the time period 1991 to 2020. In this setting, expenditure effects are not muted due to missing tax autonomy. We find that municipal mergers reduce the municipal tax rate by 6 percent. The tax rate reduction primarily falls on the smaller merging partner and is significantly smaller for the larger partner in the merging process. In contrast, public expenditures are almost unchanged, while administrative expenditures decrease, as intended by municipal mergers.

Keywords: Municipal Mergers, Tax Effects, Efficiency Gains of Mergers, Asymmetric Merger Effects.
JEL classification: H11, H20

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1 Introduction

Fiscal federalism provides opportunities for public decision making to make use of local information to provide public services. Over time, local administrative units, most notably municipalities came under pressure due to their smallness and the associated difficulty to provide services in a cost-reducing way. Municipal mergers became central to policy discussions and reforms in many federations. For instance, in Switzerland the number of municipalities dropped from 3203 in 1850 to 2202 in 2020. Similarly, the number of municipalities has dropped considerably in the former West-Germany from 23,629 in 1970 to 8,502 in 1980 and again in the re-unified Germany from 16,177 in 1991 to 11,237 in 2013 mostly in the East German states. The primary goal of municipal mergers is related to the better use of economies of scale in public service provision and subsequent research has focused on the public expenditure effects of municipal mergers.

In this paper, we analyze the fiscal effects of municipal mergers in Switzerland where municipalities have a high degree of tax autonomy in international comparison. Analyzing the effects of mergers in a setting with tax autonomy provides a broader perspective on the fiscal effects of mergers. First, without tax autonomy potential expenditure effects tend to be muted due to missing budget balancing tax adjustments. A fiscal 'unconstrained' environment where municipalities enjoy significant tax autonomy and taxes are salient to voters offers the possibility to unleash potential expenditure effects of municipal mergers and to come closer to an 'unconstrained' expenditure estimate of mergers. Second, the level of taxes will be an important element in the design of the merger. They might well be chosen to 'mortgage' future efficiency gains of the merger and, thereby, to force politicians to 'pay out' efficiency gains. This will particularly apply in settings where public officials have a preference for keeping public funds under their control, as frequently voiced in public discussions. Third, the electorate might demand lower taxes to compensate for the loss of political independence and the diluted influence in the new legislature, in particular in smaller municipalities which are typ-

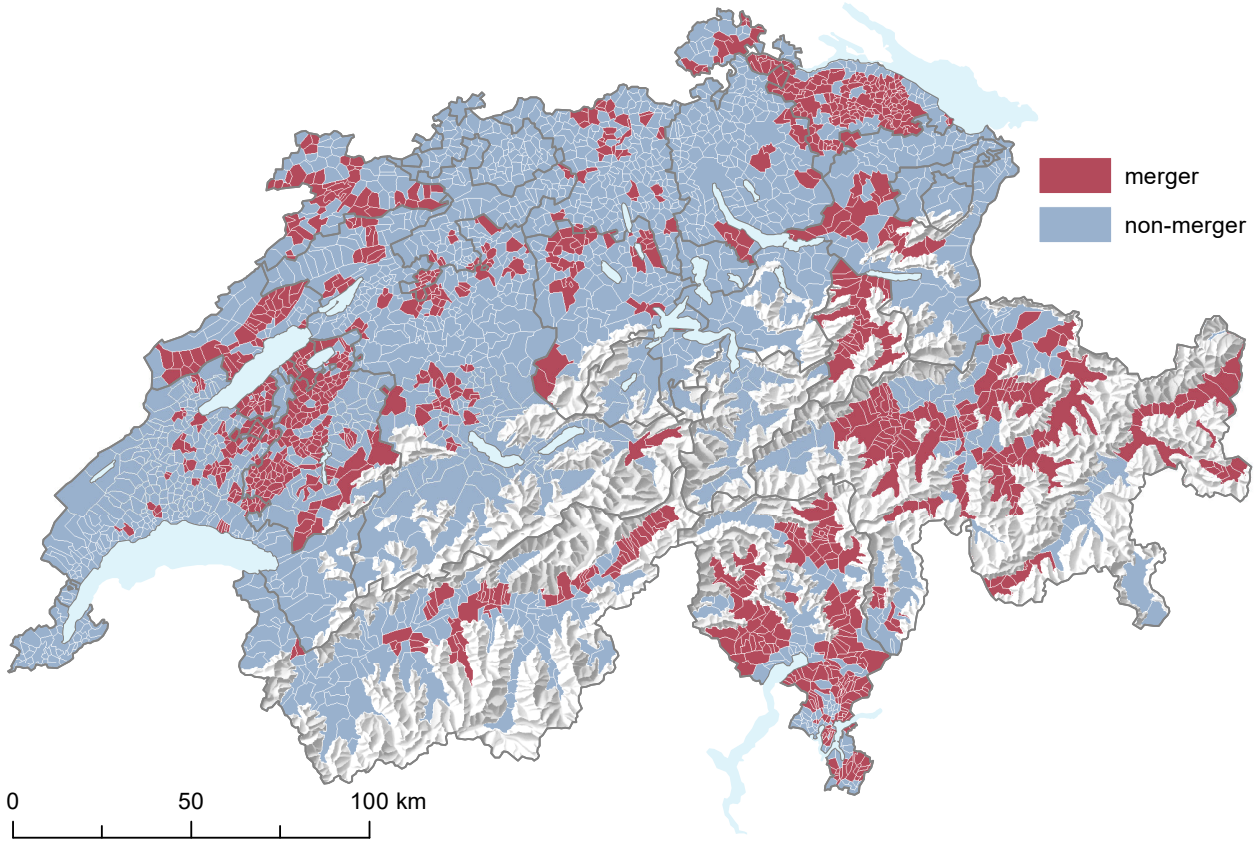
ically involved in a merger process. Municipal taxes are generally different before the merger and uniform afterwards. Heterogeneous adjustments in taxes across municipalities might reveal such cost considerations.

In this paper, we make use of the universe of Swiss municipalities over the time period 1986 to 2020 to analyze whether fiscal effects are associated with municipal mergers. Swiss fiscal federalism provides a unique laboratory for the analysis. First, the Swiss confederation is highly decentralized, which provides a high number of municipalities, our unit of observation. Second, municipalities have significant tax autonomy. They levy income taxes, wealth taxes and corporate taxes, among others, which account for 22% of the country's total tax revenue and for 62% of the municipal budgets.[1] Municipal taxes are salient to tax payers and a central element in location decisions of households and firms as well as in electoral campaigns. Third, as illustrated in Figure 1, over the time period 1991 and 2020, Switzerland experienced a large number of municipal mergers, where the timing of the merger waves differed across cantons. Fourth, although income taxes are progressive, which generally renders the measurement of the choice of the tax rate complex, Swiss municipalities choose a single tax multiplier that simultaneously applies to income, wealth and corporate taxes, while the tax base is determined by cantonal law. The tax multiplier compactly summarizes tax adjustments at the municipal level.

We use different empirical approaches to estimate the fiscal effects of mergers. We start out with an event-study design. Given that the timing of municipal mergers differs over the sample period, we first use municipalities that merge over the sample period to form time-dependent treatment and control groups. We find that the effect of mergers on total expenditures is not detectable on average and only statistically significant for municipalities that are small relative to the other municipalities that participate in a given merger. However, administrative expenditures decline by 10 to 13 percent. The

[1]The remaining part of the municipal budget mainly stems from fees for municipal services (17%), transfer payments (11%), and financial income (7%).

Figure 1: Municipal Mergers in Switzerland between 1991 and 2020



Notes: The graph shows Swiss municipalities that were involved in a merger (in red) and municipalities that never merged (in blue) for the time period between 1991 and 2020.

latter finding is consistent with the goal of municipal mergers to realize economies of scale. The cost savings do not systematically translate in overall expenditure decreases. This suggests that some of the cost savings might be spent on non-administrative expenditure. When looking at tax adjustments, we find that tax rates drop by roughly 7 percent. The effect is heterogeneous across municipalities. Municipalities that are small relative to the other municipalities that participate in a given merger experience a drop in the tax rate by 10 to 12 percent, while relatively larger municipalities reduce their tax rate by 3 to 6 percent. The tax and expenditure findings are similar to those we observe when including municipalities that never merged over the sample period in the control group. Across Swiss cantons, legislation generally differs, which includes the way mu-

nicipal tax rates are defined and the degree of municipal fiscal autonomy. This might give rise to time variation in cantonal legislation that is unobserved (to researchers). In the event-study analysis, we include canton-by-year fixed effects and municipal fixed effects (at the pre-merger level) so that we identify the effects of mergers by comparing treatment and control units within a canton, while controlling for canton-specific time trends.

As a second empirical strategy, we use a regression discontinuity design (RDD). Municipal mergers are subject to referenda. In the RDD, we compare merger projects that have just been accepted with those that have just been rejected. Thus, among these municipalities implementing a merger project is as good as random. At the threshold, we find a downward jump in administrative expenditures of around 18 percent while the change in total expenditures is close to zero and statistically insignificant. Tax rates jump downwards by roughly 6 to 7 percent. The overall findings are similar to those we observe in the event-study analysis. Since, the total expenditure does not change on average, we might interpret the downward jump in tax rates as a lower bound of the amount that citizens require to compensate them for the lost political independence and the diluted influence in the new legislature.

Existing work on the fiscal implications of mergers primarily focuses on expenditure effects. The literature documents mixed findings with respect to the realization of expenditure savings - ranging from no total expenditure savings to the effect that total expenditures decrease or even increase.[2] Despite the huge body of research that has

[2]For instance, (Reingewertz, 2012) find that, following municipal mergers in Israel in 2003, municipal expenditures decreased by about 9 percent. In response to a merger wave in the East German state of Brandenburg between 2000 and 2003, (Blesse and Baskaran, 2016) observe administrative cost-reductions in the German Land of Brandenburg, but no effects on expenditures. Differently, Moisio and Uusitalo (2013) report higher municipal expenditures following municipal mergers in Finland between 1970 and 1981. In a review article, Tavares (2018) concludes that '....the majority of the studies fail to find significant reductions in expenditures as a result of municipal amalgamations. In some cases, the authors find that the reduction of expenditures in general administration is offset by increased spending in other service categories.' (p. 9). Other studies look at the political economy implications of municipal mergers and the effect on the spatial distribution of economic activity (Hinnerich, 2009; Hyytinen et al., 2014; Egger et al., 2017; Saarimaa and Tukiainen, 2015).

accumulated so far, little is known about how taxes respond to municipal mergers. The lack of evidence on this issue might be related to the missing tax autonomy of local jurisdictions in many federations. As discussed above, Swiss fiscal federalism provides a unique laboratory for such analysis. Therein, tax adjustments are feasible and potential expenditure savings of mergers are not muted due to significant local tax authority that is also salient to voters. The fiscal environment provides the needed flexibility and also political incentives to public officials to unfold these savings. Studerus (2016) analyzes the effects of municipal mergers in Switzerland. We differ from her analysis in various ways. We analyze the fiscal effects of mergers at the pre-merger level as opposed to the post-merger level. Using the pre-merger level allows to analyze heterogeneous effects across municipalities that engage in a given merger. For instance, heterogeneous tax rate adjustment would be unobservable when using the post-merger structure as a unit of observation. Also, pre-merger expenditure effects in smaller municipalities, which we observe in our data, would be downward biased and potentially unobservable when aggregating expenditure at the post-merger level. With the pre-merger structure, we are able to shed light on how the merger benefits might be distributed among the merging entities and provide an assessment of the cost of losing political independence. Further, we do not match treatment units to control units. In a setting with pre-merger expenditure effects, matching tends to reduce these effects in the matched sample when expenditures are part of the characteristics used for matching. Expenditure effects of mergers might be overestimated when not controlling for such pre-merger effects. Finally, we use a different empirical methodology. In the main specification of the event study, we compare municipalities that merge at different points in time, while controlling for municipal and canton-by-year fixed effects. In this setting, we aim at estimating the fiscal effect of mergers for municipalities that merge, i.e. the average treatment effect on the treated (ATT) rather than the average treatment effect (ATE). For policy evaluation, the ATT might be well most important and sufficient for a welfare assessment of mergers, given

that the main goal of municipal mergers is to address shortcomings that predominantly apply to smaller municipalities. As a second empirical strategy, we resort to a RDD that allows us to use some quasi randomization in municipal mergers to estimate the fiscal effects of them.

The paper proceeds as follows. In Section 2, we provide information on the Swiss institutional background, followed by information on the merger process across Swiss cantons in Section 3. After a description of the data and the empirical methodology in Section 4 and 5.1, respectively, we turn to the empirical analysis of tax and expenditure effects in Section 6. Finally, we provide a summary of the results and offer some concluding remarks in Section 7.

2 Institutional Background

Fiscal federalism in Switzerland. The combination of Switzerland's high degree of jurisdictional fragmentation and its large degree of expenditure and tax decentralization is unique in international comparison.[3] The federation consists of 26 cantons that are divided into 2202 municipalities in 2020. Municipalities are the lowest political unit and have slightly less than 4000 residents on average. However, despite their smallness, municipalities are responsible for a broad range of public services, including local planning, compulsory schools and social welfare. To finance these services, Swiss municipalities enjoy a large degree of tax autonomy. They levy 22% of Switzerland's tax revenue, which corresponds to one of the highest degrees of tax decentralization to regional jurisdictions worldwide.[4] Two thirds of this tax revenue is raised through residence-based income taxation, with the remaining part stemming mainly from wealth taxes (10%) and corporate

[3]While expenditure decentralization is frequently observed in federal countries, tax decentralization is quite limited. See e.g., Brülhart et al. (2015) for an international comparison of municipal tax decentralization in Switzerland.

[4]All reported fiscal statistics are taken from the Swiss Federal Finance Administration (SFFA): Switzerland's financial statistics for 2017.

taxes (15%). Property taxes account for 3% of tax revenue.

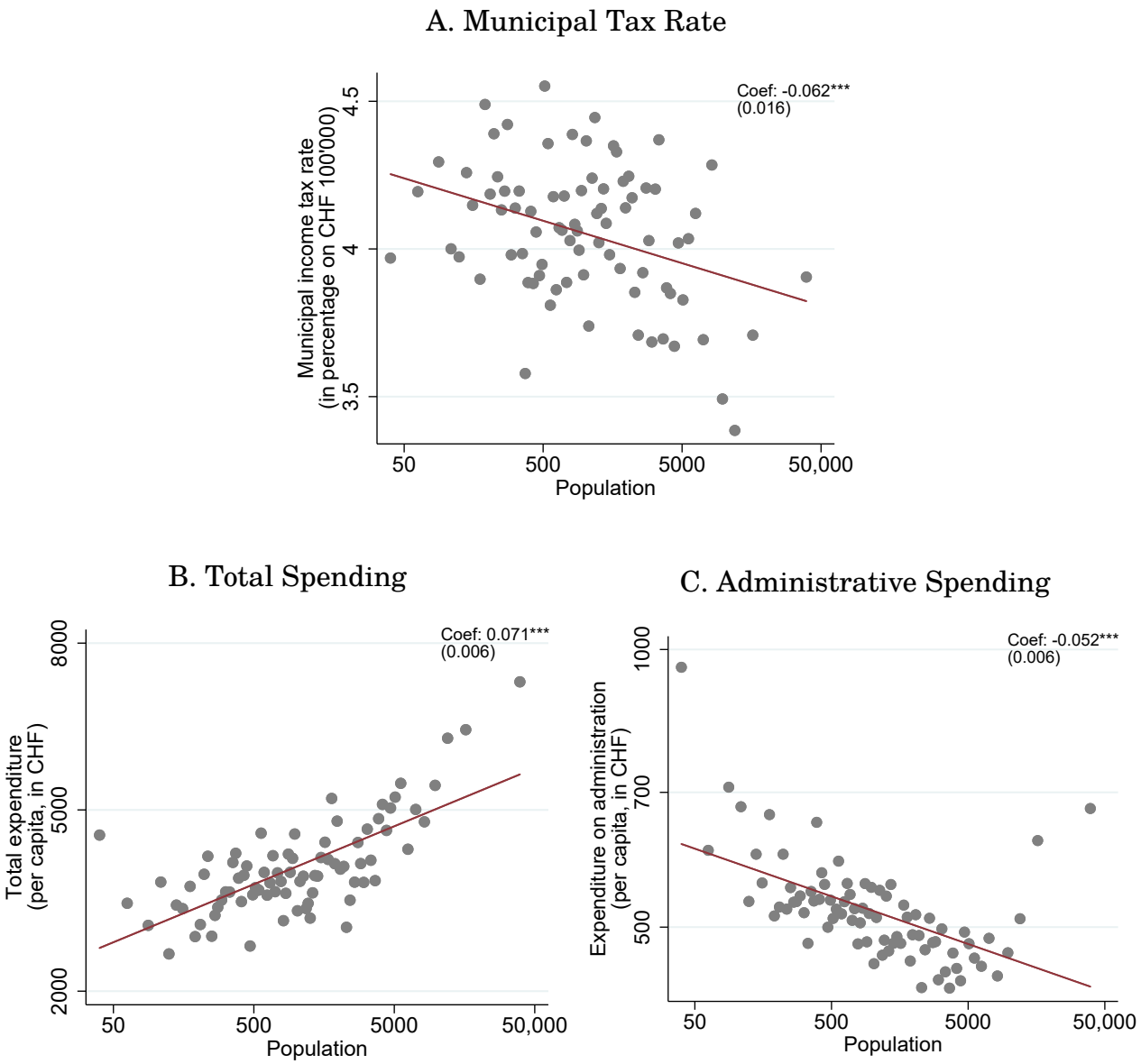
Cantonal income tax scheme and municipal multiplier. In Switzerland, income is taxed at the municipal, cantonal and federal level. The federal government and the 26 cantonal governments have the authority to design their own income and wealth tax schemes, which includes the choice of exemptions, deductions and the degree of tax progression. Municipalities are bound to the cantonal tax schemes. However, they annually decide on a constant (hereinafter referred to as "tax multiplier") which applies to the cantonal tax schedule. Wealth and income tax progression are therefore homogeneous within cantons. In addition, the same multiplier generally also applies to the cantonal corporate taxation schedules. Therefore, the tax multiplier largely constitutes the only tax instrument municipalities can choose, which allows for perfect comparison of the tax setting behavior of municipalities within cantons. In smaller municipalities, citizens directly vote on tax multipliers at town hall meetings.[5] In the remaining municipalities, they are set by municipal parliaments. However, citizens can call a referendum against the parliament's decision through the collection of signatures. Due to these direct participation rights and their simple comparison, municipal tax multipliers are salient for tax payers and a central element of local public policy discussions. The importance of tax multipliers is also reflected by the substantial tax-induced mobility of households and the large tax differentials that persist across municipalities.[6]

Municipal services and cantonal mandates. Municipalities spend on average 27% of their annual budget of around CHF 4600 per capita on education, 14% on social wel-

[5]At the assembly, the municipal council suggests a tax multiplier, which is then rejected or approved by the residents (see for instance Brülhart and Jametti (2019) for additional information). For the time period 1996 to 2015, we observe about 8'200 changes in municipal tax multipliers. On average, municipalities thus change their tax multiplier about once in five years.

[6]See for instance, Schmidheiny (2006), Basten et al. (2017), Schmidheiny and Slotwinski (2018) and Martínez (2021). Tax-induced mobility is particularly strong for high-income households and, although the federal and cantonal income tax schedules are progressive, the effectively paid country-wide average tax rate is regressive at the upper end of the income distribution (see e.g., Roller and Schmidheiny (2016)).

Figure 2: Tax Rate, Spending and Population Size



Notes: The graphs show the relationship between the log number of municipal residents and the municipal income tax rate (Panel A), log total municipal spending per capita (Panel B) and log spending on the municipal administration per capita (Panel C). The income tax rate is expressed as a percentage on an joint annual income of CHF 100'000 for married taxpayers with 2 children. All figures are based on 2025 municipalities and the year 2006, the first year for which data on almost the universe of Swiss municipalities is available (see Section 4). The plots (binscatter) group the population into 81 equal-sized bins so that each of the dots represents the mean value of 25 municipalities.

fare, 13% on administration, 9% on transport and 27% on other public services, including cultural promotion, water supply and waste disposal.[7] These numbers remained rela-

[7]All data on expenditure shares are for the year 2006, at the midst of the observed merger wave, and taken from the municipal finance data described in Section 4.

tively constant over time. Looking at spending levels of Swiss municipalities within a given year suggests a strong correlation with the number of residents. Panel B of Figure 2 plots the logarithm of per-capita total expenditure against the logarithm of municipal population. As apparent from the graph, there is a strong positive correlation between the two variables. On average, municipalities with a 10% larger population spend around 0.7% more in total. Looking at per-capita administrative expenditure instead, the correlation is negative. As shown by Panel C of Figure 2, municipalities with a 10% larger population spend on average around 0.5% less on purely administrative matters.[8]

While municipalities account for 23% of Switzerland's public expenditure, their services are generally regulated through cantonal or federal regulations. Municipalities' real spending autonomy is therefore more limited than suggested by expenditure data. The precise allocation of services between municipalities and cantons and their regulation through cantonal and federal legislation varies across canton. In general, upper-level regulation affects the quality of service provision in the field of social assistance, compulsory schools, daycare facilities, retirement homes, water supply and sewage disposal (Rühli, 2012). The requirements on the quality and professionalism of municipal services provision tend to have increased over time, which is seen as one of the main drivers for implementing municipal mergers.

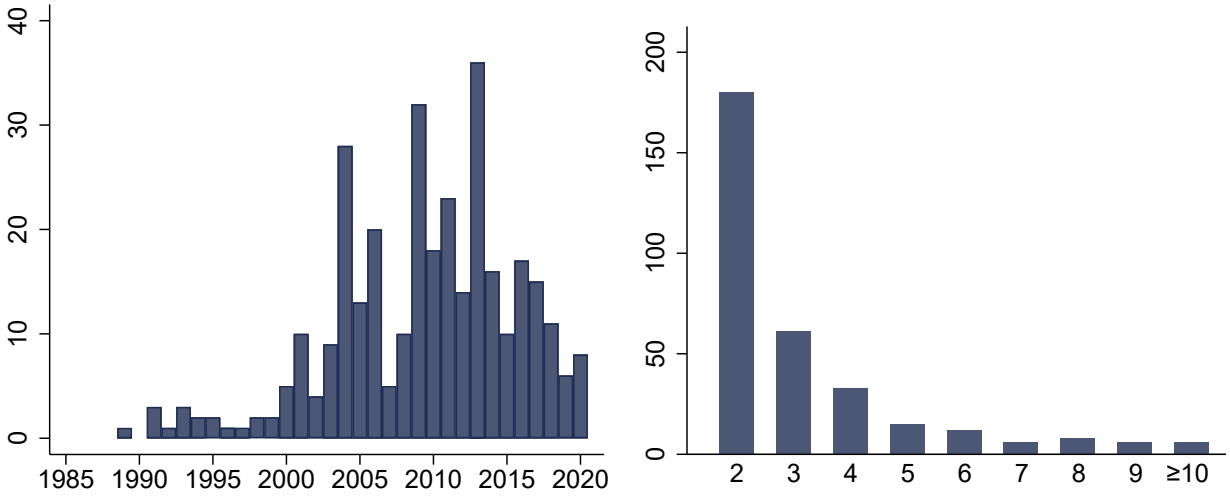
3 Municipal Merger Wave

Development of the municipal structure. At the time of its foundation in 1848, Switzerland consisted of 3203 municipalities. During the first 14 decades of the federation's existence, the number of municipalities stayed fairly constant. Starting in the early 1990s, the federation experienced a large wave of municipal mergers. As a conse-

[8]As shown by Figure B.3, we also observe a strong positive relationship between the number of residents and expenditure shares on culture, while spending on education seems to be largely independent of population size.

quence, the number of municipalities dropped by more than a quarter from 3021 in 1990 to 2202 in 2020, c.f. Figure 3. Figure 1 presents the geographical distribution of merged and non-merged municipalities for the time period between 1991 and 2020. Municipal mergers were implemented in 16 out of the 26 cantonal jurisdictions. For instance, as shown in Table 1, the merger wave involved 195 merging municipalities in the canton of Fribourg, 167 municipalities in Ticino and 149 municipalities in Graubünden. Most mergers involved between 2 and 4 municipalities, some included 5 municipalities and more, c.f. Figure 3.

Figure 3: Municipal Mergers by Year and Involved Municipalities



Notes: The panel on the left shows the number of municipal mergers per year. The panel on the right shows the number of mergers by the number of municipalities involved in a merger over all years between 1996 and 2015.

Merger process. In the light of the federation's direct democratic institutions and its emphasis on principles of subsidiarity and fiscal equivalence,[9] municipal mergers were not the results of a top town border reform. Instead, merger proposals were generally initiated and elaborated by municipal authorities or residents and had to be accepted by

[9]Article 5a of the Swiss constitution states that "the principle of subsidiarity must be observed in the allocation and performance of state task". Article 43a paragraph 2 states that "the community, in which the benefits of a state service accrues, bears their costs" and paragraph 3 of the same article states that "the community, which bears the cost of a state service, can decide over this service".

majority vote in each of the involved municipalities.[10]

A typical merger project generally starts with an assessment vote by the legislative of each candidate municipality. The aim of this vote is to save resources spend on detailed implementation proposals that would likely be rejected in a final vote. Votes in favor of the merger generally result in a mandate for municipal authorities to draw up a detailed merger contract. The final merger contract is then again subject to a majority vote by the legislative of each candidate municipality. In the majority of Swiss municipalities, the legislative consists directly of its residents who vote via show of hands on the merger proposals. In the remaining municipalities proposals are submitted to municipal parliaments. However, in this cases inhabitants can launch a referendum against the parliamentary decision.

To form an opinion on a proposed merger, residents receive voting documents that include detailed information on the structure of the future municipality and the financial effects of the merger. In particular, it includes information on merger-related cantonal subsidies[11] and a projection of the future tax multiplier. Generally, potential merging partners have different tax multipliers prior to the merger. The proposed joint tax multiplier thus implies heterogeneous changes in tax rates across the potential merging partners.

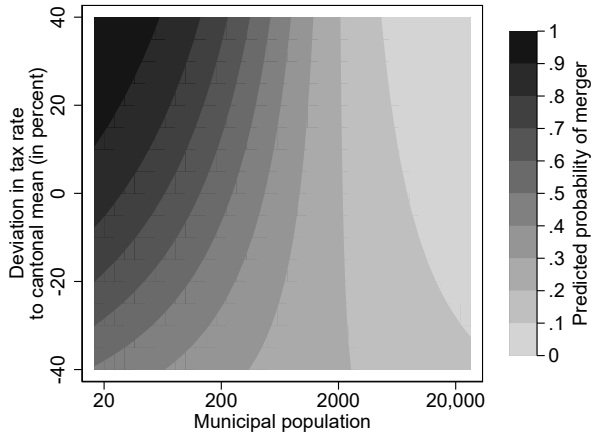
Key determinants. Municipal mergers are voluntary. The probability that a municipality engages in a merger between 1991 and 2020 strongly depends on the number of its residents, c.f. Figure 4. Large municipalities generally refrained from a merger. By con-

[10]The level of municipal autonomy is regulated by cantonal constitutional and legislative law and thus varies across cantons. 17 out of 26 cantonal constitutions protect the autonomy of municipalities through a guarantee of existence and thus prohibit forced municipal mergers by cantonal authorities Meyer (2011). In 6 further cantons, cantonal authorities have the possibility to enforce a municipal merger, though this never took place in practice. Only in 3 cantons (Thurgau, Ticino and Valais) rare cases of forced municipal mergers have been observed.

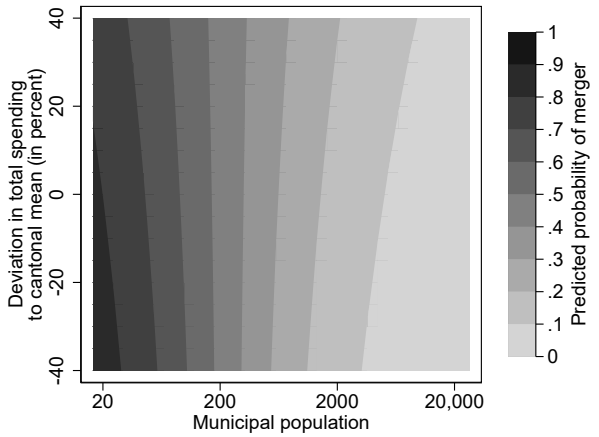
[11]For early mergers during the 1990s, the cantons generally determined the level and conditions for merger-conditional payments to municipalities on a discretionary base. With the onset of more frequent merger in the early 2000s, most cantons started to legislate the eligible amounts based on specific criteria, such as a capped number of residents in the respective merging municipalities.

Figure 4: Predicted Probability of a Municipal Merger

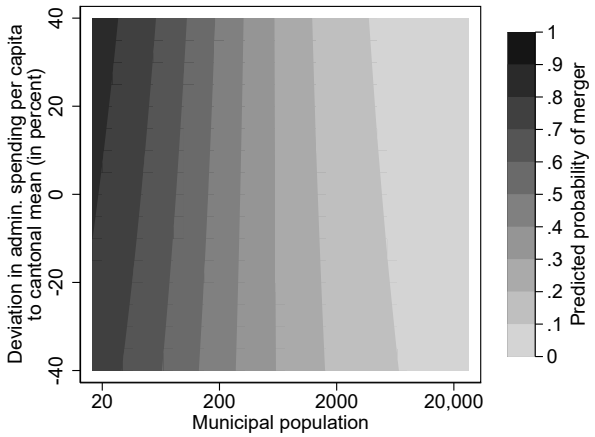
A. Tax Rate



B. Total Spending



C. Administrative Spending



Notes: The graphs display the predicted merger probabilities from three separate logit models. In all three models, the dependent variable is 1 if a municipality experienced at least one merger between 1991 and 2020, and zero otherwise. The predictor variables vary across panels. Panel A uses the log number of municipal residents, the deviation in the municipal tax multiplier (and hence income tax rate) from the cantonal mean, and the interaction term between these two variables. For Panel B and Panel C we replace the deviation in the tax multiplier by the deviation in total municipal spending per capita from the cantonal mean and by the deviation in administrative spending per capita from the cantonal mean, respectively. In all panels, the municipal structure and explanatory variables are for 1991.

trast, more than half of the municipalities with less than 500 residents merged within the three decades. However, Panel A shows that within the group of small municipalities the probability of a merger largely depended on tax levels. Municipalities with tax rates above the cantonal average largely disappeared, while small local tax heavens generally

retained their autonomy.[12] By contrast, Panel B suggests that municipal spending per capita - relative to the other municipalities of the canton - is a less important predictor. This also holds when replacing total municipal spending per capita with administrative spending per capita only (see Panel C).

4 Data

In this section, we provide information on the data sources and the data preparation process for our treatment and outcome variables. A detailed description and summary statistics of the control variables are left to Appendix A.

Municipal merger. The historical municipality register of the Swiss Federal Statistical Office (SFSO) tracks all border changes of Swiss municipalities. This includes municipal mergers, but also very rare cases of municipal separation and territorial exchange. Based on the register, we construct a panel data set that captures the entire merger-history of the universe of Swiss municipalities between 1991 and 2020. The first three Columns of Table 1 provide descriptive statistics on the number of merging municipalities, the number of resulting mergers and the average number of municipalities involved in a merger by canton.[13] In total, we observe 327 municipal mergers involving 1042 merging municipalities, which results in an average of around 3.2 merging partners per newly founded municipality. About two thirds of these mergers occurred in the cantons of Fribourg, Graubünden, Bern, Ticino and Vaud, although we document a considerable amount of mergers in further cantons. Figure B.1 illustrates for each canton the number

[12] While retaining tax autonomy, small non-merging municipalities may partially lost spending autonomy due to the necessity of increasing cooperation levels with other, mostly larger municipalities.

[13] Until the end of the 20th century, the canton of Thurgau knew two parallel community types: the smaller 'location communities' (Ortsgemeinden), which were responsible, among other things, for roads and the fire department, and the larger 'municipal communities', which, among others, were responsible for social security and taxation. During the 1990s, the 'location communities' were essentially dissolved and tasks were handed over to the 'municipal communities'. We exclude this 'partial amalgamation' of 'location communities' to 'municipal communities' from our analysis, since tax multipliers were always determined on the area of the 'municipal community'.

of municipalities that were involved in a merger over time. As shown by the figure, the bulk of amalgamations took place in the two decades after the turn of the millennium, although several cantons also experienced merger during the 90s.

Municipal tax multiplier. Municipal tax multipliers stem from two sources: Our main source is Parchet (2019), who compiled municipal tax multipliers up to 2013.[14] Tax multipliers of more recent years are publicly available from the Swiss Federal Tax Administration (SFTA).[15] Columns 4 to 11 of Table 1 compare tax multipliers of merged and never-merged municipalities at the first and last year of our 20-year observation window (described in more detail in section 5.1) and the municipal structure of 1991. Tax multipliers may not be comparable across cantons and years since they apply to different cantonal tax schemes and because of possible shifts in competences between cantons and municipalities over time. By contrast, one can perfectly compare tax multipliers within the same canton and year and, hence, between municipalities that selected into a merger with municipalities of the same canton that did not. Our empirical analysis builds on such within-canton comparison.

In 1991, the first year of our observation window, the mean tax multiplier from municipalities that (later) select into a merger generally exceed the ones of never-merged municipalities in most cantons. Post-treatment, these previously observed differences in tax multipliers largely vanished. Panel A of Figure B.2 provides density estimates for the deviation of municipal tax multipliers from the cantonal mean for municipalities that merge (in red) and for municipalities that never merge (in blue) for the years 1991 and 2020. The descriptive evidence is largely in line with the summary statistics provided in Table 1. In 1991, municipalities that merge within the subsequent three decades set on average almost 6% (=3.68% – (–2.10%)) higher tax rates than their non-merging counterparts, while post treatment this difference largely vanishes.

[14] We thank Raphael Parchët for the provision of these data.
[15] See: https://swisstaxcalculator.estv.admin.ch.

Table 1: Summary statistics of municipal merger and tax multiplier by canton

	merger (1991 – 2020)			tax multiplier (1991)				tax multiplier (2020)			
				later merger		never merged		merged		never merged	
	merging	merger	avg. inv.	mean	sd	mean	sd	mean	sd	mean	sd
Zurich	16	7	2.3	113.69	6.43	109.30	9.84	108.25	13.67	106.52	12.89
Bern	98	40	2.5	2.55	0.24	2.55	0.25	1.65	0.16	1.72	0.21
Lucerne	36	17	2.1	2.21	0.11	2.04	0.30	1.97	0.15	1.93	0.29
Glarus[a]	31	5	6.2	53.81	10.67			64.12	1.67		
Fribourg	195	69	2.8	1.00	0.14	0.94	0.17	0.81	0.09	0.79	0.13
Solothurn	32	11	2.9	133.13	14.66	126.23	13.36	113.50	6.24	117.72	12.63
Schaffhausen	13	5	2.6	120.17	10.92	116.82	7.46	95.64	8.12	97.91	15.58
St.Gallen	23	10	2.3	143.45	12.58	137.87	16.69	120.14	15.80	117.32	19.14
Graubünden	149	41	3.6	109.29	22.56	96.47	22.31	99.69	10.93	88.40	20.47
Aargau	39	17	2.3	112.34	11.06	112.98	9.02	101.59	7.42	106.76	13.17
Ticino	167	37	4.5	90.07	11.88	81.50	11.33	88.90	8.72	83.28	11.85
Vaud	104	28	3.7	107.43	14.65	91.64	21.09	69.96	3.58	69.87	7.28
Valais	59	21	2.8	1.33	0.11	1.26	0.13	1.19	0.09	1.21	0.11
Neuchâtel	37	6	6.2	94.53	11.67	91.71	8.65	68.51	4.55	73.12	4.27
Jura	43	13	3.3	2.53	0.29	2.50	0.27	2.15	0.16	2.07	0.21
Total[b]	1042	327	3.2								

Notes: This table shows descriptive statistics of the outcome and treatment variable by canton. The first three columns show the number of merging municipalities, the number of mergers and the average number of municipalities involved in a merger between 1991 and 2020. The remaining columns compare tax multipliers of merged and never-merged municipalities (at the municipal level of 1991) at the first and last year of our 20-year observation window. a) The canton of Glarus experienced a municipal reform in 2011 which comprised all of its municipalities. b) Municipal tax multipliers apply to the specific cantonal tax schemes and hence cannot be compared across cantons (see Section 2 for a detailed description). Therefore, we do not report total values on municipal tax multipliers.

Municipal accounts. Municipal accounting data are compiled by cantons. We succeeded in obtaining annual municipal expenditure data from 13 out of 15 relevant cantons.[16] The municipal expenditure data offer a breakdown into 10 spending categories, one of which is expenditure on municipal administration.[17] For a given canton and year, we collected accounting data from the universe of municipalities. The available time period varies across cantons, as depicted by the second column in Table 2. In general, the accounting data are available from the late 90s or early 2000s up to the years 2018 or 2019.

Table 2 presents the summary statistics by canton. On average, the municipalities spend around CHF 4550 per resident on public services of which administrative costs are about 12% or 550 CHF. Panel B of Figure B.2 compares density estimates of the deviation of total spending per capita from the cantonal mean in 2006 and 2018 for municipalities that merged between these two years and for municipalities that did not. The distributions of overall spending per capita are largely overlapping. By contrast, we observe diverging distributions on administrative spending per capita, as shown in Panel C of Figure B.2. In 2006, later merging municipalities spend around 7 percent more per resident on their administration than the ones that do not merge until 2018. After the merger wave, however, administrative spending is around 6 percent lower for merged municipalities.

Acceptance rates. We compile data on the acceptance rates of municipal merger proposals. The data are not available from federal or cantonal offices. However, the cantons of Zurich, Bern, Lucerne, Fribourg and Aargau maintain registers of merger proposals that were subject to a majority vote by the legislative (eligible residents or parliament). Based on these registers, we gather the acceptance rates of legally binding final votes

[16] Municipal expenditure data are not available for the cantons of Ticino and Jura.

[17] This corresponds to the functional expenditure category 0 of the Harmonised Accounting Model (HAM1 and HAM2). See https://www.hrm2.ch/kontenplan for detailed information on the included expenditure subcategories.

Table 2: Summary Statistics on Municipal Expenditure per capita by Canton

	obs. wind.	admin. exp. p.c.		total exp. p.c.	
		mean	sd	mean	sd
Zurich	2000–2019	634	219	7290	2500
Bern	2002–2019	521	186	4475	1432
Lucerne	1992–2018	530	133	5059	1131
Glarus	2001–2019	592	180	4517	875
Fribourg	1994–2018	413	215	3811	1343
Solothurn	2000–2018	599	211	5009	1011
Schaffhausen	1997–2019	554	326	5055	1542
St.Gallen	1995–2018	572	148	5062	1021
Graubünden	1994–2018	577	358	2889	1258
Aargau	1991–2019	505	190	3065	1010
Vaud	1991–2018	589	309	4906	2493
Valais	2006–2019	747	306	6801	2421
Neuchâtel	2003–2018	517	211	5259	1478
Total		547	248	4547	2094

Notes: This table shows descriptive statistics on administrative expenditure per capita (in CHF) and on total municipal expenditure per capita (in CHF) by canton. "Obs. win" denotes the available observation window by canton.

and, if conducted, of preceding assessment votes for each candidate municipality. We collect the acceptance rates for the near universe of accepted and rejected merger projects for the time period between 1991 and 2020 through online research and, if needed, emails and phone calls. For the mentioned five cantons, this provides us the voting results from 447 candidate municipalities on 159 merger projects. Summary statistics on the accepted and rejected merger projects are provided in Table D.1 of the Appendix.

Additional variables. Finally, we compile a set of additional variables to estimate heterogeneous effects and to conduct sensitivity analyses. These variables stem from different sources: First, we download annual data on the permanent residence popula-

tion by citizenship (Swiss/Foreign) and municipality from the website of the SFSO. We present the descriptive statistics of these variables in Panel A of Table A.1. Second, we use the Swiss Business Census Data conducted in 1995, 2001, 2005, 2008, and annually from 2011 to 2015 by the SFSO. The business census provides us with information on the sector, the number of employees (in FTE) and the geographical location of all establishments in Switzerland. Descriptive statistics are provided in Panel B of Table A.1. Finally, we use publicly available data on federal referenda outcomes at the municipal level from the SFSO that we match with official attributes of the referenda provided by Swissvotes (2020). This data allows us to construct the measure used by Eugster and Parchet (2019) on citizens preferences over the level of taxes and expenditure. We provide a detailed description of the measure in Appendix A.2.

5 Empirical Approach

We use different empirical models to estimate the effect of municipal merger on taxes and expenditure.

5.1 Event Study Design

We start out by using an event study difference-in-difference set-up, as formally described by

$$ln\, Y_{n,t} = \sum_{j=-\underline{j}}^{\bar{j}} \delta_j D_{n,t}^{j} + \mu_n + \gamma_{c,t} + \epsilon_{n,t}. \tag{1}$$

$Y_{n,t}$ is the tax multiplier or expenditure per capita of a municipality n in year t (using the pre-merger municipal structure). The effects of mergers are evaluated within a effect

window $\underline{j}$ years prior to a merger and $\overline{j}$ years after the year of the merger.[18] δ_j denotes the dynamic pre- and post-treatment effect j years away from the treatment year, $j \in \{\underline{j}, ..., \overline{j}\}$. $D^j_{n,t}$ are binned event indicators and are defined by

$$D^j_{n,t} = \begin{cases} \sum_{s=-\infty}^{\underline{j}} d_{n,t-s} & \text{if } j = \underline{j} \\ d_{n,t-j} & \text{if } \underline{j} < j < \overline{j} \\ \sum_{s=\overline{j}}^{\infty} d_{n,t-s} & \text{if } j = \overline{j}. \end{cases}$$

Following the definition of the event indicators, we assume that treatments effects stay constant before $\underline{j}$ and after $\overline{j}$, that is $\delta_j = \delta_{\underline{j}}$ for all $j < \underline{j}$ and $\delta_j = \delta_{\overline{j}}$ for all $j > \overline{j}$. μ_n and $\gamma_{c,t}$ are pre-merger unit and year-by-canton fixed effects, respectively.[19] At the start- and endpoint of the effect window, that is $\underline{j}$ and $\overline{j}$ respectively, the indicators take all observable past and future events beyond the effect window into account (McCrary, 2007; Schmidheiny and Siegloch, 2019). The event dummy $d_{n,t-j}$ is equal to one if a municipality n experiences a merger in year $t-j$, and zero otherwise. $\epsilon_{n,t}$ is the disturbance term. We choose the last event time of the flat pre-treatment trends as the reference periods.[20] As shown in more detail in the results section, this is $\delta_{j=-3} = 0$ for our analysis of tax and $\delta_{j=-5} = 0$ for our analysis of expenditure effects.

In our preferred specification, we exclude never treated municipalities, i.e. we restrict our sample to municipalities that experience at least one merger. In this case, observations of the same canton and year outside the effect window serve as control

[18] Almost all merger took place at the 1st of January of $j = 0$. For example, a range from $\underline{j} = -7$ to $\overline{j} = 6$ therefore represents a symmetric effect window with 7 leads and 7 lags.

[19] We also experimented with specifications that additionally include the time varying control variables at the district level described in Section 4, or that replace the canton-by-year fixed effects, $\gamma_{c,t}$, by district-by-year fixed effects. This specifications provided largely consistent point estimates on our treatment effects, albeit the corresponding confidence intervals tend to be moderately larger. As described below, we report estimates that include these variables in the results section of the generalized difference-in-differences model.

[20] In particular, we chose a reference point ahead of the event range in which estimates are likely affected by anticipation and preparation effects, as explained in more detail in Section 6.

group observations that pin down secular cantonal time trends. Figure B.1 shows that the number and variation of merger over time within cantons is relatively large. This gives us confidence of having a sufficiently high number of treatment and control group observations, even without the presence of never treated municipalities. However, the inclusion of never-merger municipalities comes with the advantage of a large increase in the number of control group observations. Therefore, we also provide estimates of a specification that includes never treated control units.

Sample Definition. Throughout our paper, we select a 30-year observation window spanning the years from 1991 to 2020. This provides us with a total of 327 municipal mergers involving 1042 merging municipalities. While this choice for a balanced panel in t results in an unbalanced panel in event time, it allows us to consider more recent mergers for the estimation of the post-treatment effects. This is important given the considerable share of recent municipal mergers in the entire merger wave.[21]

Effect Window Definition. One of our identifying assumptions is that treatments effects stay constant outside the effect window. In the result section, we will show that treatment effects tend to be constant at the beginning and towards the end of the effect window, which provides suggestive evidence in favor of our assumption. Moreover, we experiment with different effect windows. The coefficient estimates are not sensitive to reasonable deviations in the event window definition.

[21] A balanced panel in event-time and data on the treatment variable up to 2020 requires a restriction of the observation window to $2020 - \underline{j} + 1$. The reason is that a merger that occurs after the last year of the dependent variable can affect estimates on pre-treatment event dummies. Analogously, a merger that happened before the first year of the dependent variable can affect estimates on post-treatment dummies. The latter case is not a concern in our analysis since we observe the treatment variable up to 1960 and only one merger occurred from 1985 to 1990. Regarding the former case, we partially address the concern in two ways. First, we run regressions in which we consider mergers already announced by the Swiss Federal Statistical Office for the time period after 2020. Second, we experiment with a restriction of the observation window to $2020 - \underline{j} + 1$, which yields very similar point estimates albeit with larger confidence intervals. The results are available upon request. See Schmidheiny and Siegloch (2019) for a more in-depth discussion on data requirements.

Inference. We conduct our analysis at the pre-merger municipal level. After the merger took place, tax multiplier therefore take on the same values for the different merging partner resulting in correlated error terms across places of the newly founded municipality. Clustering at the pre-merger municipal level could therefore greatly overstate the precision of our estimate. Consequently, we cluster standard errors at the post-merger municipal level. Moreover, we follow the suggestion of Cameron and Miller (2015) and cluster standard errors on the next broader level of aggregation to test whether this results in an appreciable difference. In our case this is the district level. As we show in Appendix C.2, this hardly affects standard errors.

Additional Analysis. We also draw on the following generalized difference-in-differences model that yields an estimate of the effect of a merger on municipal tax rates and expenditure in a single parameter of interest:

$$ln\, Y_{n,t} = \alpha Merged_{n,t} + \mu_n + \gamma_{c,t} + \epsilon_{n,t}. \tag{2}$$

As in our event-study analysis, $Y_{n,t}$ denotes the tax multiplier or expenditure per capita of a municipality n in year t (at the pre-merger municipal structure). $Merged_{n,t}$ is an indicator variable that equals one if a municipality experiences a merger at or before year t, and zero otherwise. α captures the tax or expenditure effects after a merger. Again, μ_n and $\gamma_{c,t}$ are pre-merger unit and canton-by-year fixed effects, respectively. In some specifications, we additionally include the time varying control variables at the district level described in Section 4, or we replace the canton-by-year fixed effects, $\gamma_{c,t}$, by district-by-year fixed effects.[22] Considerable deviations in estimates compared to our baseline approach may point towards large unobserved regional factors that system-

[22]Including district-by-year fixed effects partially results in a lack of control group observations. 31% of mergers occur in districts that experience no other merger between 1991 and 2020. An additional 25% of mergers happen in districts that experience only one or two other merger.

atically affect treatment and our outcome variables and thus cast doubts on our baseline approach. However, as shown in the results section, adding district control variables moderately affect estimates. The same is true when replacing canton-by-year with district-by-year fixed effects. We also run difference-in-differences models using control variables as outcome variables. Significant coefficients might indicate the presence of systematic local shocks, which would raise concerns about our research design. However, as show in Appendix C.1 we do not find evidence for such local shocks.

Borusyak and Jaravel (2017), De Chaisemartin and d'Haultfoeuille (2020), Goodman-Bacon (2021) and Sun and Abraham (2020) show that the two-way fixed effects difference-in-differences estimator estimates a variance-weighted average of (pre-)treatment effect parameters, that may have negative weights if (pre-)treatment effects are heterogeneous across groups and periods. We account for this concern by additionally providing the estimated coefficients from the difference-in-difference estimator proposed by De Chaisemartin and d'Haultfoeuille (2020), which addresses this issue. As shown in the results section, the estimated coefficients are almost unchanged relative to the ones of the canonical difference-in-differences estimator.

5.2 Regression Discontinuity Analysis

Our two-way fixed effects event study approach allows us to estimates dynamic effects of municipal mergers on different outcome variables. Under standard conditions, one can interpret these estimates as the causal effect of a merger on merged municipalities (ATT). One concern in this context is that the assignment of the municipalities into treatment is potentially endogenous. Municipalities choose to merge and, thereby, treatment and control units might be different due to unobservable characteristics. In this case, one cannot even apply the estimate to e.g. small and high-tax municipalities that do not merge. To introduce some quasi-randomization of municipalities into treatment we make use of political institutions that influence the merger choice.

A municipal merger generally requires the consent of each participating municipality. In this context, we can apply a sharp regression discontinuity (RD) design to estimate local causal effects for the subset of cantons for which acceptance rates on merger referenda are available to us. We exploit the fact that a merger generally requires an approval rate of at least 50% in each candidate municipality. Our identifying assumption is that merger projects in the close neighborhood of the acceptance threshold are on average identical before the merger, while the developments of the outcome variables depend on whether a merger projects narrowly passes or not, which is as good as random. Municipalities that narrowly miss out a merger project thus serve as a control group to their counterparts narrowly above the threshold.

We use different RD approaches to estimate the discontinuity in our outcome variables. We rely on the linear approach[23] as our baseline and augment equation 2 to estimate the following equation:

$$\begin{aligned} \Delta ln\, Y_{n,t} = \alpha_0 + \alpha_1 Merged_n + \alpha_2 Dist_n + \alpha_3 Merged_n \cdot Dist_n + \epsilon_{n,t} \\ s.t. -h \leq Dist_n \leq h. \end{aligned} \tag{3}$$

$Y_{n,t}$ is the log deviation of the tax multiplier or expenditure per capita of municipality n in year t relative to the baseline year specified in our event study analysis.[24] Consistent with our event study analysis, we select a post-merger window of 6 years.

As described above, a successful merger projects requires acceptance in each vote (assessment and final) of each candidate municipality. Therefore, we use the lowest acceptance rate across candidate municipalities of a respective merger project as our running variable, denoted by $Vote_n$. $Dist_n = Vote_n - c$, measures the distance of this voting result

[23] Gelman and Imbens (2019) show that estimates from parametric RD approaches that control for higher-order polynomials of the running variable have poor statistical properties and might not be used. This is particularly true in our case with a relatively small number of observations.

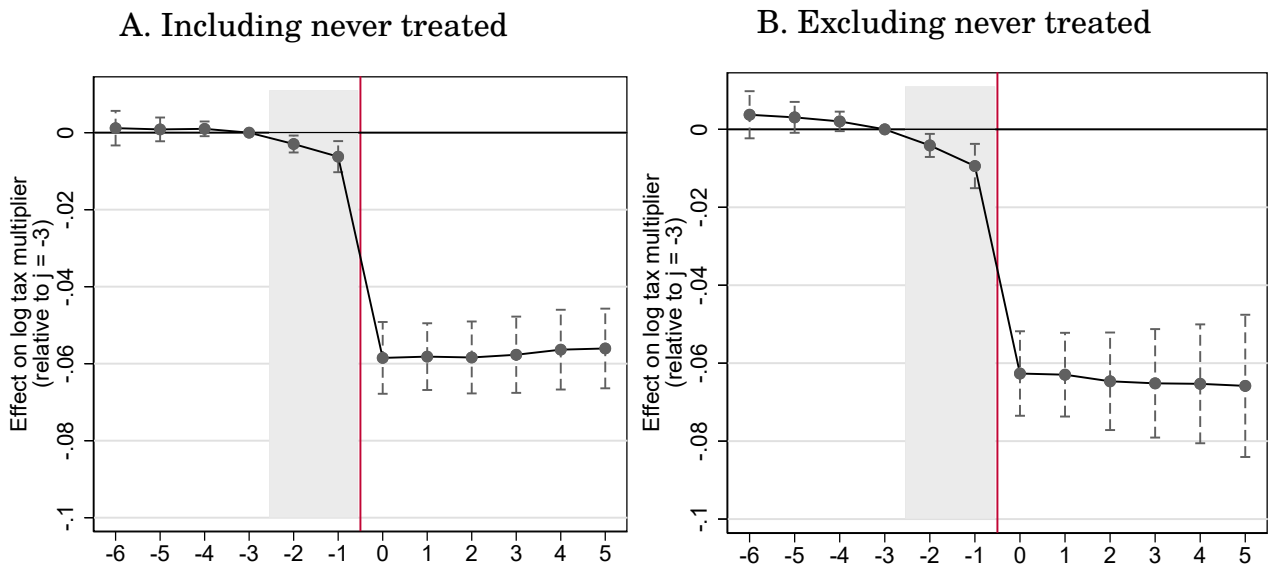
[24] Formally, our outcome variable is denoted by $\Delta ln\, Y_{n,t} = lnY_{n,t} - lnY_{n,j=-3}$ for the analysis of tax multipliers and $\Delta ln\, Y_{n,t} = lnY_{n,t} - lnY_{n,j=-5}$ for the analysis of municipal expenditure.

(in percentage points) to the cutoff $c = 0.5$. The indicator variable $Merged_n$ equals one if a municipality resulted from a merger (which requires $Vote_n$ to be larger or equal to $c = 0.5$), and zero otherwise. Our baseline choice of h is the estimated MSE-optimal bandwidth following Calonico et al. (2014). We also use a CER-optimal bandwidth (Calonico et al., 2018, 2020) in the main regression tables and larger bandwidths of 25 and 50 percentage points in Table D.2 of the Appendix. In addition to our preferred local linear specification, we also provide specifications with local polynomials of order zero and two, i.e., local intercept and local quadratic regressions, respectively. We cluster standard errors at the post-merger municipal level to account for auto-correlation of the error term. Finally, we provide a histogram and a discontinuity in density test of our running variable (McCrary, 2008; Cattaneo et al., 2020) in Figure D.1 of the Appendix.

6 Results

We start our analysis by providing evidence on the effect of municipal mergers on tax rates.[25] We then apply the same models to investigate the merger effect on total and administrative expenditure. For each outcome variable, we first show our event study estimates from equation 1, followed by a variety of robustness checks based on the difference-in-differences specification described by equation 2. We then close each subsection by presenting the findings based on the regression discontinuity approach detailed by equation 3.

Figure 5: Effects on Tax Rates



Notes: The two panels show event study estimates and the corresponding 95 percent confidence intervals for two specifications of equation 1. The specification in Panel A includes all never treated municipalities as control observations. The number of observations is 76,508. The specification in Panel B excludes never treated municipalities. The dynamic treatment effects are thus solely identified through the binning of endpoints. The number of observations is 28,416. The area shaded in gray indicates the time period during which mergers get approved by the population or by parliaments. The time of the actual implementation of a merger is indicated by the red line. All other model specifications are equal in both panels: The unit of observation is at the pre-merger structure and the baseline level is set to the pre-merger period $j = -3$. The dependent variable is the log tax multiplier. The models include municipality and canton $\times$ year fixed effects. Standard errors are clustered at the post-merger municipal structure.

6.1 Effects on Tax Rates

Figure 5 shows the tax effects of municipal mergers using equation 1. Panel A presents the results based on a specification in which the control group includes never-merged municipalities. By contrast, Panel B plots the estimated coefficients from a specification without never-merged municipalities. In both panels, the dynamic treatment effects are expressed relative to the event period three years before the merger. Comparing the two panels, point estimates are largely independent of the chosen control units, albeit confidence intervals are naturally larger in the specification without never-treated units.

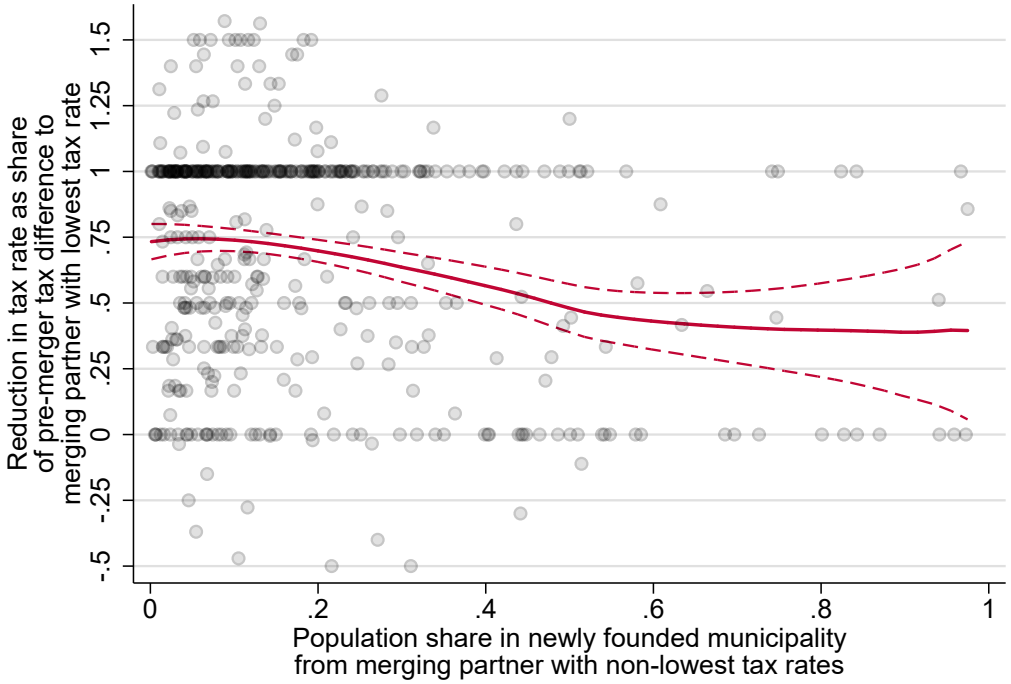
[25] As described in Section 2, municipal tax multipliers apply to cantonal income, wealth and, with a few exceptions, cooperate tax schemes. All our results on the effects of municipal mergers on the logarithm of municipal tax multipliers can therefore be interpreted as the effect on municipal income, wealth and cooperate tax rates.

The two panels offer several consistent findings: First, for municipalities that select into merger, a municipal merger causes a large and significant drop of tax multipliers of about 6%. For a household with a gross income of CHF 100,000 this corresponds to an average reduction in municipal income taxes of around CHF 350 annually.[26] Second, the effect hardly lessens during the post-merger effect window of 6 years. At the same time, tax multipliers barely react in the period prior to the decision on the merger. As detailed in Section 3, merger decisions are not random. However, the flat pre-merger trend already gives us some confidence about the causal interpretation of our estimates as an average treatment effects on the treated. Moreover, the low variation in the estimated effects towards both ends of the effect window points toward constant pre- and post-merger effects outside our effect window, which is one of our identifying assumptions. Finally, we observe a moderate but significant decrease in tax multipliers starting two years before the merger. Note that these effects are consistent with our identifying assumption of flat pre-trends if they result from the anticipation of the merger rather than from exogenous shocks that systematically affect merger and tax rates. The modest decline in tax rates coincides with the time period between the initial approval and the actual completion of the merger (as shaded in gray). Therefore, our finding might be explained by a free-riding behavior that arises from the later pooling of municipal finances. This finding is connected to the one of Saarimaa and Tukiainen (2015) who find that Finnish municipalities substantially increasing municipal debt and spending levels prior to voluntary municipal mergers. In our case, some municipalities may exploit the anticipated common pool by decreasing (or not increasing) tax multipliers prior to the actual merger.

Our findings largely seem to be driven by the initial setting of the joint tax multiplier in the newly founded municipality. Merging partners generally had different tax multipliers prior to the merger. Are our findings thus driven by a large share of newly founded

[26]The amount is calculated based on the average municipal tax liability for an unmarried taxpayer without children in 2020 (6% of CHF 5'904).

Figure 6: Decision on Joint Tax Multiplier



Notes: The figure plots the reduction in the municipal tax rate (relative to $j = -3$) as a share of the pre-merger tax difference to the merging partner with the lowest multiplier against the population share of a merging partner in the newly founded municipality. Considered are all merging partner with the non-lowest pre-merger tax rate.

municipalities that simply adopt the lowest tax multiplier of the respective merging partners? To answer this question, we investigate the tax setting behaviour of newly founded municipalities in Figure 6. We first calculate the reduction in the tax multiplier for each merging partner with the non-lowest pre-merger multiplier as a share of the pre-merger gap to the merging partner with the lowest multiplier. We then plot this value against the merging partner's population share in the newly founded municipality. If the newly founded municipality simply adopted the lowest tax multiplier of the different merging partner then the relative reduction in the tax rate would be one. However, as apparent from the graph, this reasoning does not hold in general. On average, the tax rate of the newly founded municipality is below the lowest pre-merger tax rate. Thereby, a merger tends to initiate a behavioral response in all units of a merger project. The behavioral

response of the newly founded municipality likely depends on various economic and political factors, such as the loss of political identity and the diluted political influence in the larger unit after the merger, which applies to all merging municipalities. A different explanation for the response of the pre-merger low-tax municipalities is that tax changes involve fixed costs and these predominantly larger municipalities wait with a tax adjustment until the merger is implemented. The explanation however implies that, at least shortly prior to the merger, these larger municipalities show an up-ward trend in the tax rate choice relative to the control group. Such a pattern cannot be observed in the data, c.f. Panel A of Figure 1.

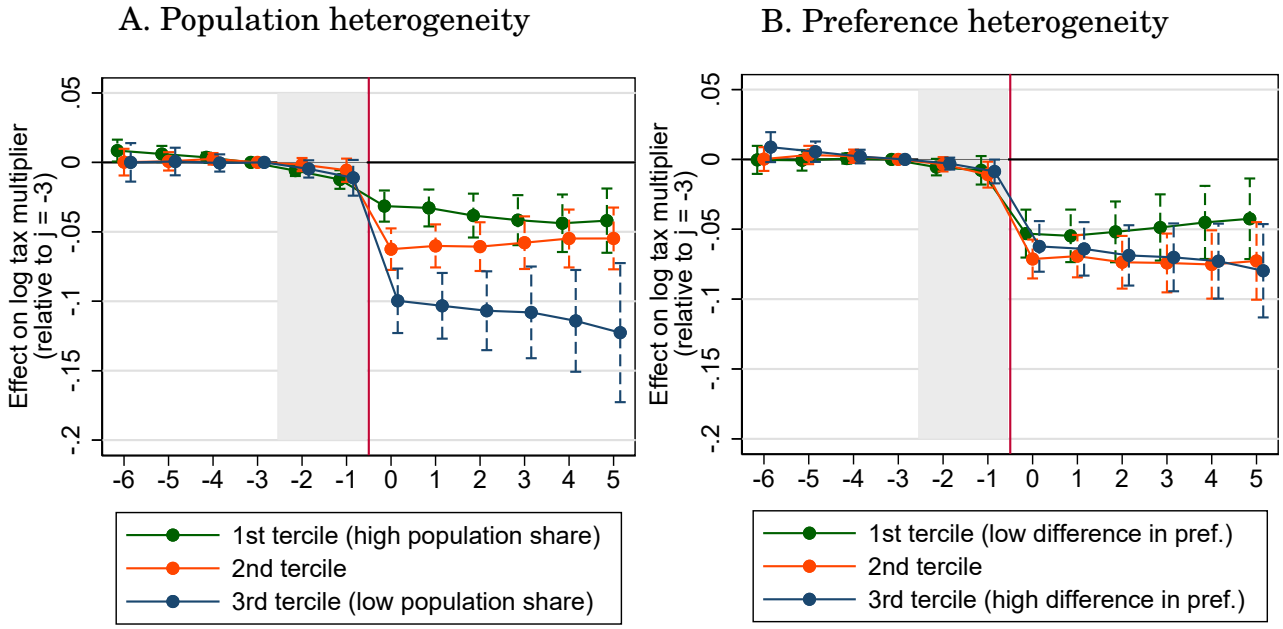
Heterogeneous Effects. Our event study estimates suggest that merger cause an average tax rate reduction in merging municipalities of about 6%. Next, we are interested to investigate whether this effect is constant across different merging partners.

We start, by grouping the merging municipalities according to their population share in the area of the later founded municipality. Panel A of Figure 7 plots the estimated effects from running equation 1 separably for the different terciles. As shown by the blue line, the tax reduction is particularly large for small merging partners, that contribute less than one out of eight residents to the merged municipality. For this municipalities we find an initial tax effect of around -10%. However, our findings also suggest significant negative effects for larger merging partners of around 3% to 6%. As for the universe of municipalities, we find largely flat pre- and post-treatment effects for the different subgroups.

Next, we test whether tax effects vary across the merging partners differences in preferred tax and expenditure levels. We follow Eugster and Parchet (2019) and measure fiscal preferences based on federal referenda outcomes at the municipal level.[27] Eugster

[27] Eugster and Parchet (2019) draw on these preference measure to show that tax competition impedes municipalities from setting the culturally preferred tax rate. In Switzerland, citizens regularly vote on an a wide spectrum of issues. This special feature of the Swiss semi-direct-democratic system is frequently exploited to measure preferences of voters towards various issues, such as working mothers (Steinhauer,

Figure 7: Heterogeneous Effects on Tax Multiplier



Notes: The panels plot event study estimates and the corresponding 95 percent confidence based on equation 1. Each panel shows the results form three separate regression with municipalities divided into terciles depending on a measure of population (Panel A) and preference heterogeneity (Panel B), respectively. In both panels the unit of observation is at the pre-merger structure and the baseline level is set to the pre-merger period $j = -3$. The dependent variable is the log tax multiplier. The area shaded in gray indicates the time period during which mergers get approved by the population or by parliaments. The time of the actual implementation of a merger is indicated by the red line. The models include municipality and canton $\times$ year fixed effects. The number of observations is 28,416. Standard errors are clustered at the post-merger municipal structure. *Panel A:* Population heterogeneity is defined by the population share of a merging place in the area of the later founded municipality. The first tercile includes places that account for 35.0% and more of the population (second tercile: $> 11.5\%$ and $< 35.0\%$; third tercile: $\leq 11.5\%$). *Panel B:* Preference heterogeneity is defined by the mean absolute difference in approval rates between pre-merger unit n and the area of all other merging partner for federal referenda between $j = -10$ and $j = -1$ on the levels of taxes and public expenditure as defined by Eugster and Parchet (2019). The mean absolute difference in approval rates of places in the first tercile is 6.1 and less percentage points (second tercile: > 6.1 percentage points and < 8.8 percentage points; third tercile: ≥ 8.8 percentage points).

and Parchet (2019) select all federal referenda from 1981 to 2011 on topics that were presented by the federal government as having an influence on tax and expenditure levels. We adopt their list and complete it with the corresponding referenda for the time period between 2012 and 2020. We then calculate the mean absolute difference in approval rates between each municipality and the other merging partners based on all selected referenda that took place during a time span of ten years before the merger. Finally, we

2018), elderly care (Gentili et al., 2017) or redistribution (Eugster et al., 2011).

use this measure to generate three equally sized groups. Panel B of Figure 7 plots the estimated effects from running equation 1 separably for the three different subsets. One might presumes that merging partners with lower differences in preferences set more similar tax levels prior to the merger, which then results in a smaller adaptation of tax levels once the merger takes place. However, as apparent from the graph, this does not seem to be the case. While our point estimates again suggest tax effects of around 5% to 7%, we detect no significant heterogeneity across groups.

Sensitivity Analysis. We continue our analysis on the tax effects of mergers by providing the estimates from different specifications of equation 2.

Table 3: Effects on Tax Rates (DID)

	Including never merged			Excluding never merged		
	(1)	(2)	(3)	(4)	(5)	(6)
Effect of merger ($j \geq 0$)	-0.055***	-0.058***	-0.048***	-0.062***	-0.066***	-0.059***
	(0.005)	(0.005)	(0.005)	(0.006)	(0.006)	(0.006)
Municipality FE	✓	✓	✓	✓	✓	✓
Canton × year FE	✓	✓		✓	✓	
District × year FE			✓			✓
District controls		✓			✓	
Observations	76447	56451	76447	28416	21180	28416

Notes: The table presents standard DID estimates, $\hat{\alpha}$, from equation 2. In all regressions the dependent variable is the log tax multiplier. Standard errors (in parentheses) are clustered at the post-merger municipality level: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 3 provides the findings from the canonical difference-in-differences estimator while Table 4 provides the estimated coefficients from the difference-in-difference estimator proposed by De Chaisemartin and d'Haultfoeuille (2020). Consistent with our event study estimates, we find that municipal mergers reduce the municipal tax rate by about 5% to 6%. We hardly observe any differences in the point estimates across the

different specifications. In the canonical difference-in-differences model, our estimates tend to be slightly more negative for our preferred models without never treated municipalities. This would point towards a slightly stronger secular downward trend in municipal tax rates of never merged municipalities when compared with municipalities that experience a merger. However, obtained differences in estimated coefficients across specification are small and almost completely vanish when using the difference-in-difference (DID_M) estimator proposed by De Chaisemartin and d'Haultfoeuille (2020).

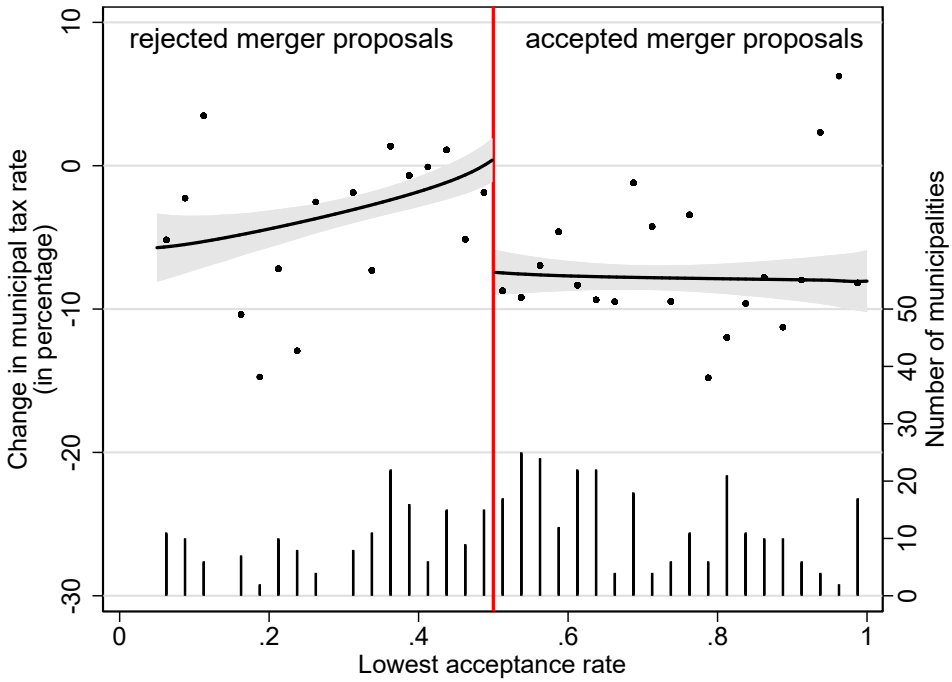
Table 4: Effects on Tax Rates (DID_M)

	Including never merged		Excluding never merged	
	(1)	(2)	(3)	(4)
Effect of merger ($j \geq 0$)	-0.051***	-0.053***	-0.050***	-0.052***
	(0.004)	(0.005)	(0.005)	(0.005)
Municipality FE	✓	✓	✓	✓
Canton × year FE	✓	✓	✓	✓
District controls		✓		✓
Observations	76447	56451	28416	21180

Notes: The table presents DID_M estimates proposed by De Chaisemartin and d'Haultfoeuille (2020). This estimator is valid even if treatment effects are heterogeneous over time and across cantons. All regressions include canton × year fixed effects. The dependent variable is the log tax multiplier. Standard errors (in parentheses) are clustered at the post-merger municipality level: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Regression Discontinuity Approach. We have established that municipal mergers lead to a drop in tax rates for municipalities that select into a merger. This evidence on the ATT is relevant in the Swiss context where municipal mergers generally result from a bottom-up process, in which smaller municipalities are asked to merge. The ATT captures the response of interest for policy makers. To allow for quasi-randomization among the subgroup of municipalities that lean towards a merger, we now use a regression discontinuity design.

Figure 8: Effect on Tax Multiplier



Notes: The figure plots the percentage change in the municipal tax multiplier between $j = -3$ and $j = 2$ against the lowest acceptance rate across candidate municipalities (lower of principle and final vote) for the cantons of Aargau, Bern, Fribourg, Lucerne and Zurich. The dots show the average change in the municipal tax rate for acceptance rate bandwidths of 2.5%. The lines represent the fitted values from a first order local polynomial with bandwidth 0.2 and with observations weighted by the Epanechnikov kernel function.

Figure 8 plots the percentage change in the municipal tax rate from three years before a final vote to three years after a final vote on a merger project against the lowest acceptance rate across candidate municipalities. To provide an overview, we include the entire range of the running variable. Each dot represents the average percentage change within a bin of the acceptance rate. Moreover, we overlay the fitted curve from a non-parametric local polynomial regression to illustrate the discontinuity at the cutoff. The figure suggests a considerable discontinuity in the percentage change in municipal tax rates around the cutoff. Merged places experienced a notable drop of the municipal tax rate, while the candidate municipalities of narrowly rejected projects do not.

Table 5 quantifies the discontinuity in the development of municipal tax rates by

Table 5: Discontinuity in Tax Rate

	MSE-optimal bandwidth			CER-optimal bandwidth		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Polynomial of order 0 (local intercept regression)						
RD in tax rate (log)	-0.062***	-0.057***	-0.075***	-0.062***	-0.057***	-0.075***
	(0.019)	(0.018)	(0.019)	(0.019)	(0.018)	(0.019)
Bandwidth	0.044	0.051	0.040	0.044	0.051	0.040
Panel B: Polynomial of order 1 (local linear regression)						
RD in tax rate (log)	-0.058**	-0.053**	-0.074***	-0.046*	-0.047*	-0.042
	(0.025)	(0.024)	(0.025)	(0.026)	(0.026)	(0.027)
Bandwidth	0.104	0.115	0.089	0.077	0.085	0.066
Panel C: Polynomial of order 2 (local quadratic regression)						
RD in tax rate (log)	-0.054*	-0.047*	-0.059*	-0.029	-0.028	-0.027
	(0.029)	(0.029)	(0.031)	(0.033)	(0.030)	(0.033)
Bandwidth	0.152	0.164	0.140	0.107	0.116	0.099
Kernel	Epanech.	Triangle	Uniform	Epanech.	Triangle	Uniform
Obs.	2299	2299	2299	2299	2299	2299

Notes: Each column and each panel in the table represents a separate sharp RD regression. The dependent variable is the log municipal tax multiplier. The running variable is the voting result (yes-share) of the candidate place with the lowest acceptance rate of each merger project. The cutoff level is 0.5. The post-treatment event window ($0 \leq j \leq 4$) and the reference period ($j = -3$) are consistent with the event study specifications. MSE- and CER-optimal bandwidths are estimated at the municipality level. Standard errors clustered at the level of the merging partners and reported below the estimates, * p<0.1, ** p<0.05, *** p<0.01.

presenting the results from different specifications of equation 3. The estimated discontinuity largely confirms the findings based on the two-way fixed effects models. Municipalities with narrowly-accepted mergers experience a significant drop in municipal tax rates when compared to municipalities that narrowly miss out a merger project. The estimates from our preferred linear specification presented in Panel B suggest that municipal mergers cause a drop of municipal tax rates in the range of 4% to 7%. The estimated discontinuities are robust to different choices of kernel functions and significant at the 1% or 5% level for specifications with lower-order polynomials and an MSE-

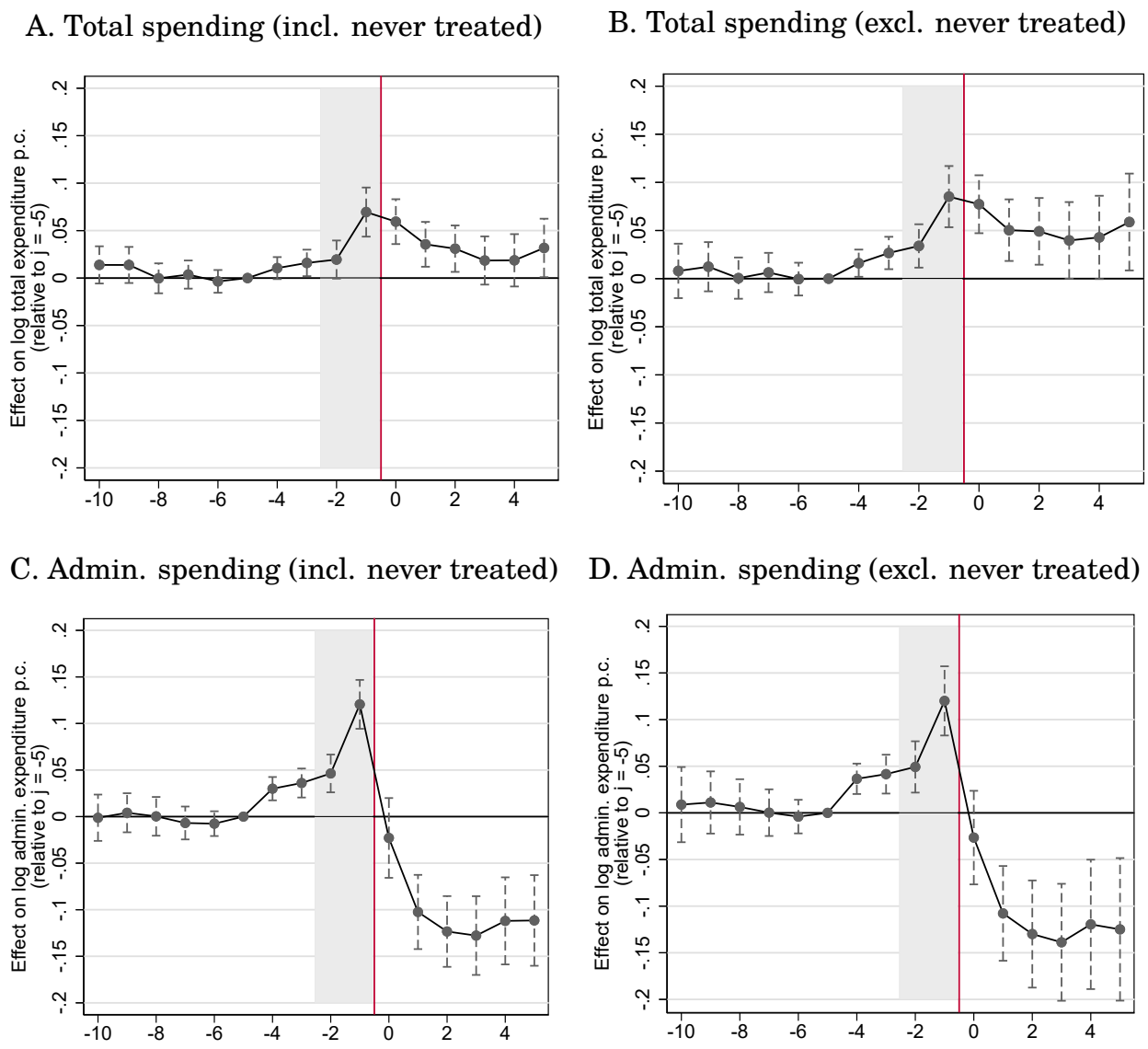
optimal bandwidth. By contrast, our results tend to be less significant in specifications with second-order polynomials. However, as shown in Table D.2 of the Appendix, we obtain more comparable second-order controlled discontinuity estimates as the bandwidth becomes larger. Overall, our regression discontinuity estimates provide additional evidence that our two-way fixed effects results are indeed driven by municipal mergers, rather than by other confounding differences between merging and non-merging municipalities.

6.2 Effects on Expenditure

Next, we apply the models of the preceding subsection to investigate the effects of mergers on municipal expenditure per capita. Consistent with our analysis on municipal tax rates, we conduct our analysis on expenditure at the pre-merger level. Once a merger is implemented, the different merging partners only administer consolidated accounts. Within the post-merger window, our outcome variables thus are the per-capita values of the newly-founded municipality. Experimenting with different base groups and event windows reveals a steady increase in municipal expenditure per capita starting several years before the actual implementation of the mergers. We thus set the reference period to $j = -5$ and extend the pre-event observation window to 10 years. We keep all other model specifications consistent with the analysis on municipal tax rates.

Figure 10 presents event study estimates from our two specifications of equation 1 for two outcome variables. Panel A and Panel B plot the estimated coefficients on pre- and post-merger effects on log total expenditure per capita. Panel C and Panel D present the estimated effects on log administrative expenditure per capita. For both outcome variables, our findings suggest flat trends up to and including the fifth year before the implementation of a merger. Again, this finding gives us some confidence regarding our identification strategy and the choice of the effect window. Starting four to one years prior to the merger, we observe a steady increase in municipal spending. This pattern

Figure 9: Effects on Municipal Expenditure



Notes: The four panels show event study estimates and the corresponding 95 percent confidence intervals for two specifications of equation 1 and two outcome variables. The specifications in Panel A and Panel C include all never treated municipalities as control observations. The number of observations is 49'792. The specifications in Panel B and Panel D excludes never treated municipalities. The number of observations is 17'585. The dependent variable in Panel A and Panel B is log total municipal expenditure per resident. The dependent variable in Panel C and Panel D is log municipal expenditure on the administration per resident. In all models, the unit of observation is at the pre-merger structure and the baseline level is set to the pre-merger period $j = -5$. The area shaded in gray indicates the time period during which mergers get approved by the population or by parliaments. The time of the actual implementation of a merger is indicated by the red line. All models include municipality and canton $\times$ year fixed effects. Standard errors are clustered at the post-merger municipal structure.

is present for both outcome variables, but particularly pronounced for administrative expenditure. Note that these effects are consistent with our identifying assumption of common trends if they are caused by the merger rather than from exogenous shocks that systematically affect merger and expenditure. We offer two possible explanations for the increased spending levels prior to the merger. Our first explanation is that they reflect the planning and preparation costs that arise from the merger. The cantonal administration of Zurich, for instance, identifies a vast amount of tasks that are necessary prior to a merger. This includes the negotiation and elaboration of directives and contracts, investments on the joint infrastructure, and the organisation of the new administration. This costs may fall over-proportionally on the municipal administrations. An additional explanation may be possible free-riding behavior. Similar to the evidence found by Saarimaa and Tukiainen (2015) for voluntary mergers in Finland, Swiss municipalities may exploit the common pool between the initial decision and the actual merger by increasing spending levels prior to the merger. In particular small municipalities may also anticipate limited political power in the post-merger legislature. Therefore, they may want to spend funds for the benefit of their citizens while autonomous decisions are still possible.

After the merger, the estimated effects on total spending per capita slightly vary across specifications. In the one with never treated municipalities, they tend to converge towards pre-merger effects. In the one without never treated units, they generally remain significantly above the reference period. We interpret these findings not primarily as a failure in the realization of cost savings or economies of scale. Instead, municipalities may spend freed-up resources from cost savings on other public services and, thereby, use the cost savings for different spending programs.

To understand the response more firmly, we turn to expenditure on purely administrative matters. An analysis on administrative costs per capita is of particular interest, as cost savings on this budget position are often stated as a key motivation for mergers. Looking at a cross-sectional correlation between municipal population and expenditure

shares, Figure 2 shows that larger municipalities tend to spend a much lower part of their budget on their administration. Consequently, one might expects that mergers eventually result in cost savings on administrative matters. The plotted coefficients in Panel C and D of Figure 10 suggest that this is indeed the case. We find large and significant cost savings on administrative expenses per capita of around 10% $(= \mathrm{e}^{-0.10} - 1)$ to 13% $(= \mathrm{e}^{-0.14} - 1)$. These savings almost fully realize in the second year after the merger and then remain constant throughout the post-treatment observation window.

Heterogeneous Effects. Next, we analyse whether the estimated expenditure effects are heterogeneous along the dimensions defined in Subsection 6.1. Panel A and Panel B of Figure 10 plot the estimated effects on log total expenditure per capita, while Panel C and Panel D plot the estimated coefficients for log administrative expenditure per capita. As apparent from Panel A, we find a substantial and significant increase in total expenditure per capita for smaller places. Again, we interpret the increased spending levels in the years prior to the merger with planning and preparation costs. In comparison, our findings point to slightly negative, albeit insignificant, expenditure effects for larger merging partners. In the light of Figure 2, a possible explanation for the observed post-merger effects is that smaller areas benefit from the larger per-capita spending levels of their larger merging partners.

The plotted coefficients on heterogeneous effects of municipal mergers on administrative expenditure provide a different picture. Panel C shows that the reduction in administrative costs per capita primarily falls on smaller merging partners. The graph in blue plots the coefficients for the tercile of merging partners with the lowest population share in the newly founded municipality (with a population share in the newly-founded municipality of 11.5% and less). As shown by the graph, these areas experience a drop in administrative expenditure per capita of around 19% $(= \mathrm{e}^{-0.21} - 1)$ to 23% $(= \mathrm{e}^{-0.26} - 1)$ when compared to the reference period. We interpret these cost savings as a realisation

of economies of scale as well as a higher proficiency in running the administration. Both rationales are prime motivations for implementing municipal mergers involving smaller municipalities. The obtained values on administrative expenditure per capita for small merging partners are economically large. For this group of smaller municipalities, average pre-merger per-capita spending on the municipal administration amounts to around CHF 815 per year.[28] For an average household consisting of 2.3 people, the obtained coefficients are thus equivalent to a reduction in administrative costs in the range of CHF 350 to CHF 430.

In comparison to the group of smaller municipalities, we do not obtain any significant post-merger coefficient estimates on log administrative expenditure per capita for larger merging partners. Moreover, we again obtain similar coefficient values across municipality groups with different levels of fiscal preference. This is true for our analysis on total (see Panel B) and on administrative municipal spending (see Panel D).

Sensitivity Analysis. Table 6 provides the estimated coefficients obtained from various difference-in-differences specifications of equation 2. Columns 1 to 3 include never merged municipalities, while columns 4 to 6 display the results from our preferred models without never merged municipalities. As shown in Panel A obtained coefficient values on total expenditure are largely consistent across specifications and in line with our event study estimates. We hardly find evidence for an statistically significant effect of municipal merger on total spending per capita. Nevertheless, it is notable that the coefficient values obtained from the canonical difference-in-differences (DID) estimator tend to be positive. In comparison, Table 7 shows that they are slightly negative, but statistically insignificant at conventional levels when using the heterogeneous treatment effects robust difference-in-differences estimator (DID_M) proposed by De Chaisemartin and d'Haultfoeuille (2020).

[28] Measured at the reference period ($j = -5$) and for municipalities that merged in 2015 or after. Note that inflation in Switzerland during the last decade was fairly low.

Table 6: Effects on Municipal Expenditure (DID)

	Including never merged			Excluding never merged		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Log total spending per capita						
Effect of merger ($j \geq 0$)	0.018	0.020	0.035***	0.014	0.014	0.013
	(0.011)	(0.011)	(0.010)	(0.012)	(0.012)	(0.013)
Panel B: Log administrative spending per capita						
Effect of merger ($j \geq 0$)	-0.122***	-0.118***	-0.113***	-0.153***	-0.151***	-0.144***
	(0.018)	(0.018)	(0.018)	(0.020)	(0.020)	(0.020)
Municipality FE	✓	✓	✓	✓	✓	✓
Canton × year FE	✓	✓		✓	✓	
District × year FE			✓			✓
District controls		✓			✓	
Observations	49753	41565	49753	17585	15028	17584

Notes: The table presents DID estimates, $\hat{\alpha}$, from equation 2. The dependent variable in Panel A is log total municipal expenditure per capita. The dependent variable in Panel B is log expenditure on the municipal administration per capita. Standard errors (in parentheses) are clustered at the post-merger municipality level: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

In contrast to the obtained coefficients on total spending, we find a large and significant negative effect on administrative spending per capita. In line with the findings from our event studies, the estimates in Panel B of Table 6 suggest a large reduction in administrative spending per capita in the range of 10% $(= \mathrm{e}^{-0.11} - 1)$ to 14% $(= \mathrm{e}^{-0.15} - 1)$. In Panel B of Table 7 we show that, when compared to the classical difference-in-differences (DID) estimates, the effects tend to be even more negative - and to vary less across specifications - when addressing a potential bias arising from inadequate weighting schemes. This is particularly true for the specifications with never-treated municipalities. Finally, we do not find evidence for a potential bias due to unobserved regional factors. Obtained coefficient values hardly change when adding district control variables or when replacing canton-by-year with district-by-year fixed effects.

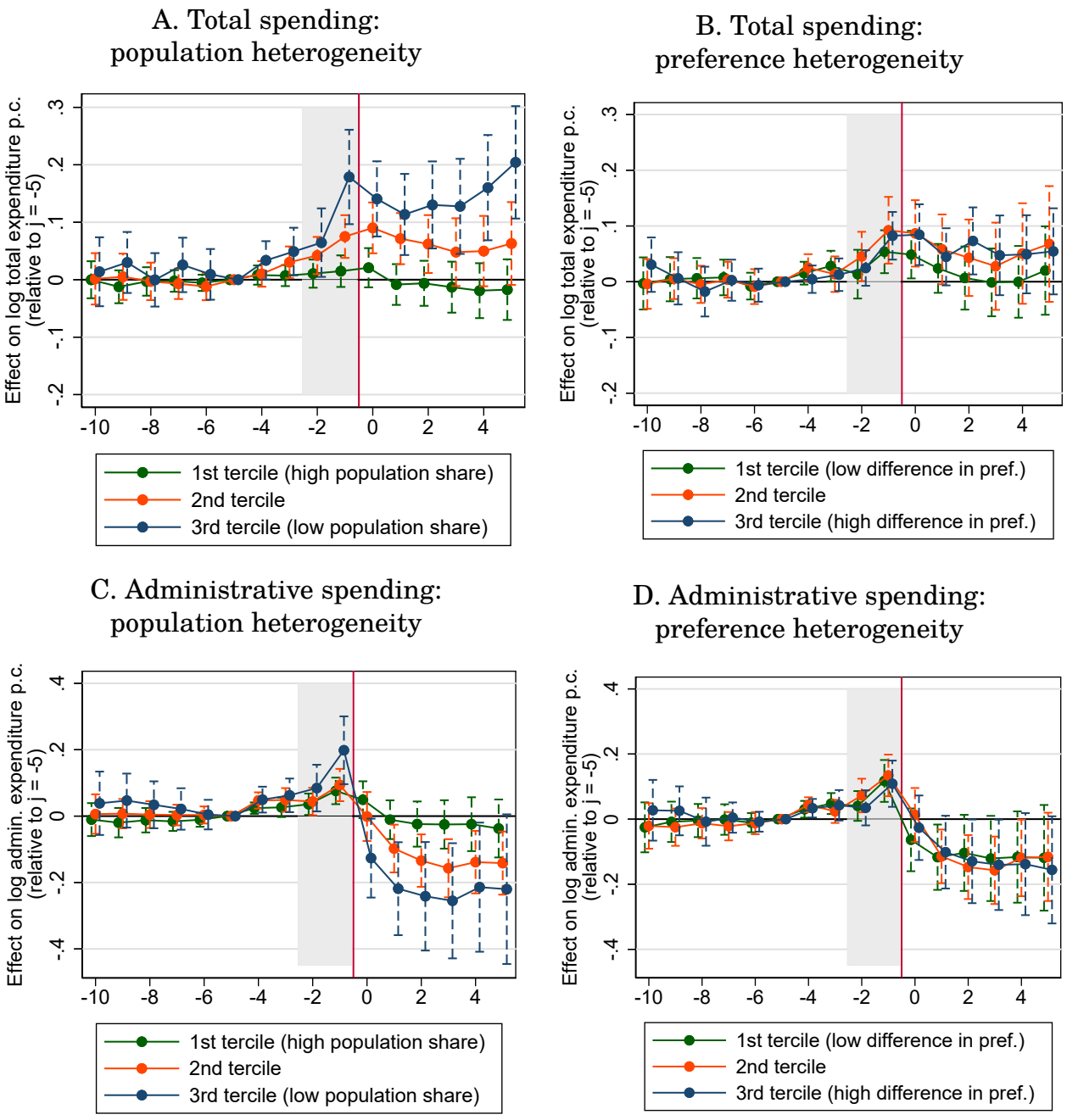
Table 7: Effects on Municipal Expenditure (DID_M)

	Including never merged		Excluding never merged	
	(1)	(2)	(3)	(4)
Panel A: Log total spending per capita				
Effect of merger ($j \geq 0$)	-0.014	-0.017	-0.023	-0.013
	(0.018)	(0.018)	(0.018)	(0.022)
Panel B: Log administrative spending per capita				
Effect of merger ($j \geq 0$)	-0.160***	-0.157***	-0.174***	-0.169***
	(0.027)	(0.024)	(0.025)	(0.022)
Municipality FE	✓	✓	✓	✓
District controls		✓		✓
Observations	49753	41565	17585	15028

Notes: The table presents DID_M estimates proposed by De Chaisemartin and d'Haultfoeuille (2020). This estimator is valid even if treatment effects are heterogeneous over time and across cantons. The dependent variable in Panel A is log total municipal expenditure per capita. The dependent variable in Panel B is log expenditure on the municipal administration per capita. All regressions include canton × year fixed effects. Standard errors (in parentheses) are clustered at the post-merger municipality level: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

While we find significant cost savings on administrative expenditure total per-capita spending is practically unchanged. This seems somehow at odds with the obtained negative effect on taxes reported in the previous section. To close the gap in municipal budgets, several effects may be at play. First, the lower tax rates following municipal mergers likely have a positive effect on the tax bases and hence tax revenues. This tax-induced mobility effect likely compensates for a part of the lost revenues through lower tax rates. Moreover, municipalities may also balance their budgets through merger-related cantonal payments or revenues from the sale of redundant assets, such as former community halls.

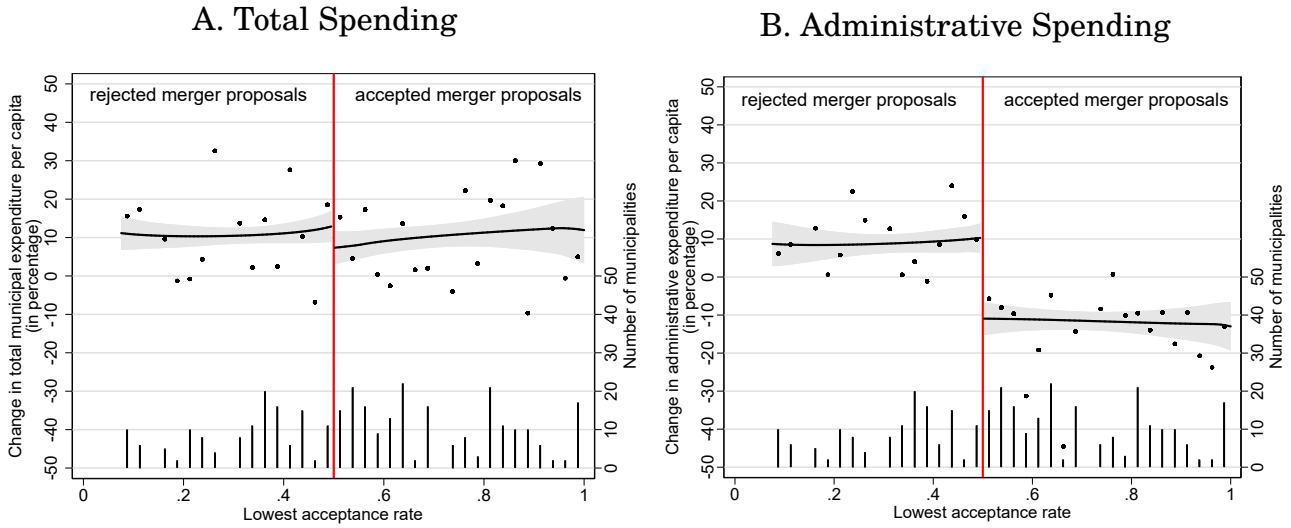
Figure 10: Heterogeneous Effects on Municipal Expenditure



Notes: The panels plot event study estimates and the corresponding 95 percent confidence based on equation 1. Each panel shows the results form three separate regression with municipalities divided into terciles depending on a measure of population (Panel A and Panel C) and preference heterogeneity (Panel B and Panel D), respectively, as described in the notes to Figure 7. In both panels the unit of observation is at the pre-merger structure and the baseline level is set to the pre-merger period $j = -5$. The dependent variable in Panel A and Panel B is log total expenditure per resident. The dependent variable in Panel C and Panel D is log expenditure on the administration per resident. The area shaded in gray indicates the time period during which mergers get approved by the population or by parliaments. The time of the actual implementation of a merger is indicated by the red line. The models include municipality and canton $\times$ year fixed effects. The number of observations is 17'585. Standard errors are clustered at the post-merger municipal structure.

Regression Discontinuity Approach. As before, we exploit some quasi-randomization among municipalities that intend to merge using a RD approach. Panel A and Panel B of Figure 11 provide a first overview by visualizing the discontinuity in the percentage change around the cutoff of 50% on total spending per capita and on administrative spending per capita, respectively. Panel A suggests a slight, but insignificant, discontinuity in total spending per capita. In comparison, Panel B suggests a large drop in administrative expenditure per capita at the cutoff of around 20%.

Figure 11: Effects on Municipal Expenditure



Notes: The two figures plot the percentage change in total municipal expenditure per capita (Panel A) and municipal expenditure on the administration per capita (Panel B) between $j = -3$ and $j = 2$ against the lowest acceptance rate across candidate municipalities (lower of principle and final vote) for the cantons of Aargau, Bern, Fribourg, Lucerne and Zurich. The dots show the average change in the municipal tax rate for acceptance rate bandwidths of 2.5%. The lines represent the fitted values from a first order local polynomial with bandwidth 0.2 and with observations weighted by the Epanechnikov kernel function.

Table 8 quantifies the discontinuities by following the approach detailed in Section 6.1. Panel A to Panel C present the regression discontinuity estimates on total expenditure per capita. All of our estimates are small in magnitude and statistically insignificant, suggesting small or nonexistent effects of mergers on total municipal expenditure. The estimates based on specifications with larger bandwidths, which are provided in Table D.2 of the Appendix, confirm this finding.

The estimated discontinuities only provide evidence on the average merger effect at the cutoff point and cannot be generalized beyond it. However, note that the discontinuity estimates are in line with our findings from the event study approach and difference-in-difference models.

In comparison, our models provided in Panel D to Panel F generally point to a sharp change in administrative spending per capita around the cutoff level. In terms of magnitude, our preferred linear specifications with an MSE-optimal bandwidth suggest a discontinuity in the range of 16% $(= \mathrm{e}^{-0.18} - 1)$ to 17% $(= \mathrm{e}^{-0.19} - 1)$. Comparisons of levels around the cutoff, displayed in Panel C, suggest slightly larger effects. By contrast, local quadratic regressions yield large standard errors and insignificant results (see Panel F). However, as in our estimates on the discontinuity in tax rates, second-order controlled discontinuity estimates are consistent to the ones from lower polynomials when selecting larger bandwidths (see Table D.2 of the Appendix). Overall, our findings largely confirm the estimates based on the event study and the difference-in-difference models. They provide evidence against the hypothesis that our findings are indicative of the ATT, but cannot be applied to municipalities that intend to merge, but do not get the required approval by the electorate.

Table 8: Discontinuity in Expenditure

	MSE-optimal bandwidth			CER-optimal bandwidth		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Total expenditure per capita: (polynomial of order 0)						
RD in expenditure (log)	0.016	0.020	0.005	0.016	0.020	0.005
	(0.047)	(0.046)	(0.053)	(0.047)	(0.046)	(0.053)
Bandwidth	0.071	0.087	0.048	0.071	0.087	0.048
Panel B: Total expenditure per capita: (polynomial of order 1)						
RD in expenditure (log)	0.044	0.028	0.029	0.016	0.040	-0.036
	(0.066)	(0.060)	(0.092)	(0.090)	(0.071)	(0.105)
Bandwidth	0.147	0.198	0.090	0.109	0.147	0.066
Panel C: Total expenditure per capita: (polynomial of order 2)						
RD in expenditure (log)	0.051	0.036	-0.017	-0.005	0.010	0.044
	(0.100)	(0.111)	(0.125)	(0.122)	(0.132)	(0.156)
Bandwidth	0.189	0.175	0.116	0.134	0.124	0.083
Panel D: Administrative expenditure per capita: (polynomial of order 0)						
RD in admin. exp. (log)	-0.209***	-0.198***	-0.239***	-0.209***	-0.198***	-0.239***
	(0.043)	(0.044)	(0.044)	(0.043)	(0.044)	(0.044)
Bandwidth	0.084	0.091	0.077	0.084	0.091	0.077
Panel E: Administrative expenditure per capita: (polynomial of order 1)						
RD in admin. exp. (log)	-0.181***	-0.180***	-0.191***	-0.104	-0.129*	-0.040
	(0.063)	(0.062)	(0.073)	(0.077)	(0.071)	(0.089)
Bandwidth	0.157	0.186	0.112	0.116	0.138	0.083
Panel F: Administrative expenditure per capita: (polynomial of order 2)						
RD in admin. exp. (log)	0.001	-0.000	-0.002	0.001	0.009	0.024
	(0.110)	(0.110)	(0.117)	(0.142)	(0.143)	(0.144)
Bandwidth	0.143	0.150	0.125	0.101	0.106	0.089
Kernel	Epanech.	Triangle	Uniform	Epanech.	Triangle	Uniform
Obs.	1965	1965	1965	1965	1965	1965

Notes: Each column and each panel in the table represents a separate sharp RD regression. The dependent variable in Panel A to Panel C is log total expenditure per capita. The dependent variable in Panel D to Panel F is log administrative expenditure per capita. The running variable is the voting result (yes-share) of the candidate municipality with the lowest acceptance rate of each merger project. The cutoff level is 0.5. The post-treatment event window ($0 \leq j \leq 4$) and the reference period ($j = -3$) are consistent with the event study specifications. MSE- and CER-optimal bandwidths are estimated at the municipality level. Standard errors clustered at the level of the merging partners and reported below the estimates, * p<0.1, ** p<0.05, *** p<0.01.

7 Conclusion

As in other federally-organized countries, municipal mergers are commonly implemented in Switzerland to meet increasing standards on the provision of public services and to realize economies of scale. This paper quantifies the effects of these mergers on municipal tax rates and expenditure.

We document that municipal mergers cause a large and persistent reduction of the municipal tax rate by around 6%. The effects tend to be larger for municipalities that have a small share in the population of the newly founded municipality, but smaller for larger merging partners.

On the expenditure side, we document a largely unchanged total spending per capita. However, we find a large reduction in administrative costs per capita. The composition of municipal expenditure thus changes. The savings in administrative expenditure per capita primarily fall on the smaller merging partners, while we observe no significant effect for larger municipalities. The finding is in line with the basic rationale for fostering municipal mergers.

Overall, the merger benefits seem to fall disproportionately on smaller municipalities. These municipalities fiscally benefit from higher expenditure levels, improved technical efficiency and lower tax rates. The fiscal benefit might be interpreted as a necessary compensation for the loss of political identity and the diluted influence of smaller merging municipalities in the new legislature.

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Tax and Expenditure Effects of Municipal Mergers

– Appendix –

Marko Köthenbürger and Christian Stettler

February 27, 2025

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A Additional Information on Data Construction

A.1 Control Variables

We use several data sets from the FSO spanning the years between 1996 and 2016 to conduct sensitivity tests and to construct heterogeneous municipality groups. This subsection summarizes the data, while the subsequent subsection provides a detailed description of the heterogeneity measures.

Population Data. First, we use data on the number of residents for the time period between 1990 to 2020. Data on the total number of residents are available at the municipality level of the compilation year. We draw on these data to construct our population heterogeneity measures. Moreover, the FSO provides data on the number of residents by gender and nationality at the municipality and district level of 2020. We draw on these data to construct additional variables on gender and nationality shares for our robustness checks. Summary statistics are provides in Panel A of Table A.1.

Business Census Data. Second, we draw on the Swiss Business Censuses conducted in 1995, 2001, 2005, 2008, and annually from 2011 to 2016 by the FSO. The census covers the universe of private and public establishments in Switzerland. The data provide information on the number of jobs (full time equivalents) and the exact geographical location (geographic coordinates) of all establishments in Switzerland. Until 2008, the census data were compiled trough mandatory surveys. From 2011 onward the FSO constructed the census from register data. Based on the censuses, we construct variables on total employment between 1996 and 2016 at the municipality and district level of 2020 for our robustness check. In addition, we construct measures on public sector and on service and industrial employment shares. We provide the summary statistics of all variables in Panel B of Table A.1.

Table A.1: Summary Statistics of Control Variables

	mean	sd	p10	p90	obs
A. Demographics					
Permanent Residents	3,128	10,639	279	6,267	38,262
Share male	0.499	0.018	0.480	0.517	38,262
Share foreigner	0.128	0.091	0.032	0.257	38,262
B. Labor Market					
Employment (in FTE)	1,430	8,636	51	2,494	38,262
Share public sector	0.100	0.087	0.029	0.184	38,262
Share industry sector	0.314	0.182	0.091	0.568	38,262
Share service sector	0.494	0.202	0.232	0.772	38,262

Notes: Panels A and B: Summary statistics for the municipalities of all cantons that experienced municipal merger during the available time period between 1996 and 2016.

A.2 Heterogeneity Measures

In this subsection we provide detailed information on the construction of the two measures that we use to test for heterogeneous merger effects.

Population Heterogeneity. First, we use data on the number of municipal residents to construct a measure on the heterogeneity in the merging partners' population. We define population heterogeneity by the population share of a merging place in the area of the later founded municipality in the first year of our observation window, 1991. Equivalently, we use population shares in the first years of the previously founded municipalities in case of sequential mergers. Subsequently, we use the constructed variable to divide the municipalities into three groups. The first tercile includes merging partner that account for 35.0% and more of the residents. The second tercile includes municipalities that account more than 11.5% and less than 35.0% of the residents. Finally, the third

tercile includes municipalities with $\leq 11.5\%$ or less of the residents.

Preference Heterogeneity. A special feature of the Swiss political system is its high degree of direct democracy, with citizens regularly voting on an a wide spectrum of issues. We exploit this feature by using federal referenda outcomes on the levels of taxes and public expenditure as defined by Eugster and Parchet (2019) as a measure for preference heterogeneity across merging partners.[29] More specifically, we define preference heterogeneity as the mean absolute difference in approval rates between pre-merger unit n and the area of all other merging partner for federal referenda between $j = -10$ and $j = -1$ on the levels of taxes and public expenditure as defined by Eugster and Parchet (2019). Formally, we define the difference in preferences of municipality n relative to its merging partners n' as

$$P_n = \frac{1}{v}\sum_{v} |y_{v,n} - y_{v,n'}|. \tag{4}$$

v is a referendum within the event time window $j = -10$ to $j = -1$ on the levels of taxes and public expenditure as defined by Eugster and Parchet (2019).[30] $y_{v,n}$ is the approval rate (yes-votes over total votes) on referendum v in municipality and $y_{v,n'}$ is the approval rate on referendum v in the area of the later merging partners n'. Municipal level data on the number of yes and no votes in federal referenda between 1981 and 2019 are publicly available from the Swiss Federal Statistical Office. Municipal level data with official attributes on the referenda are compiled and publicly made available by Swissvotes (2020).

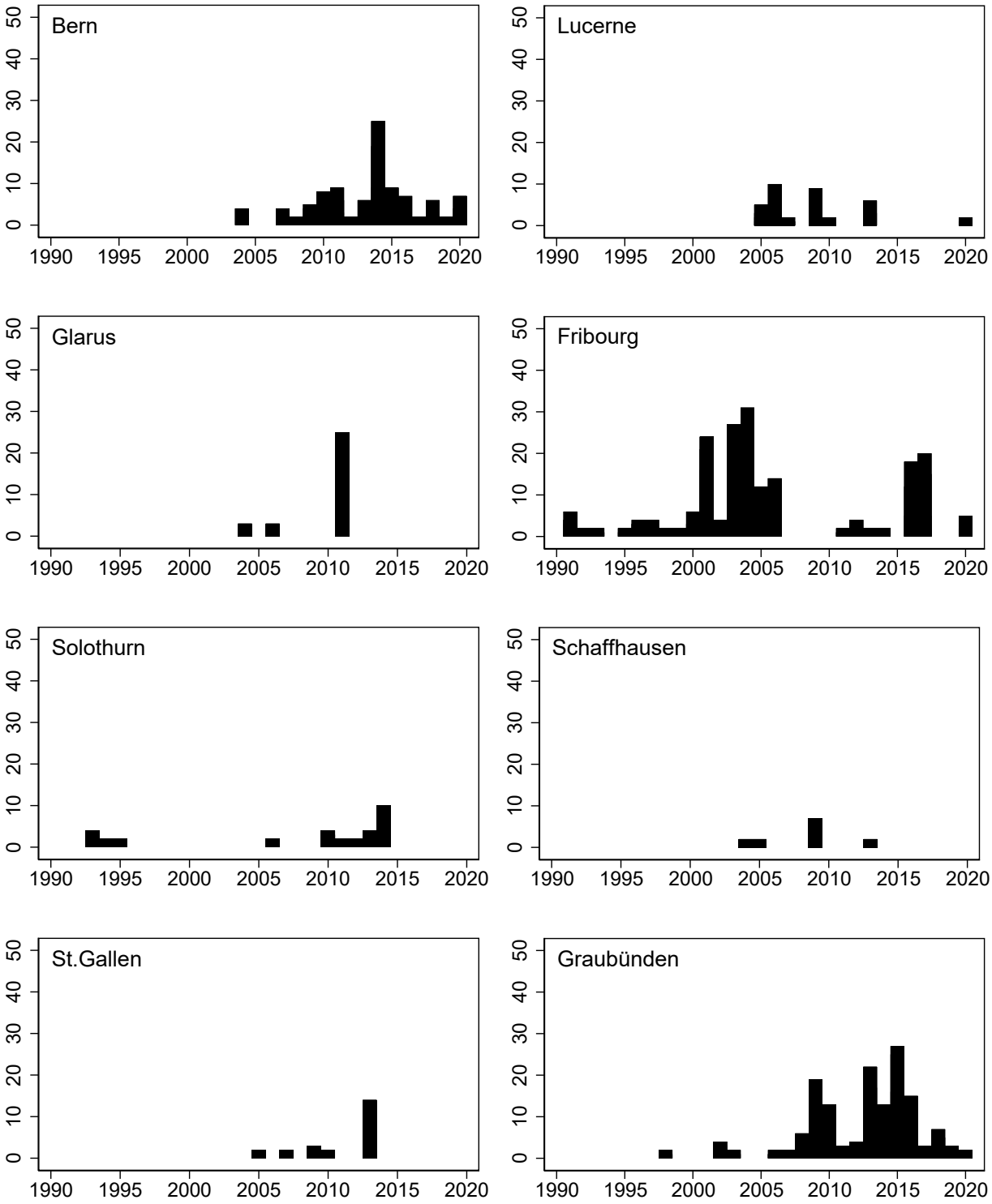
[29] Outcomes on specific referenda have been frequently used, most prominently in studies that exploit the Swiss language border to isolate cultural differences from institutions. Eugster and Parchet (2019), for instance, draw on outcomes of 37 federal referenda on tax subjects to show that tax competition impedes municipalities from setting the culturally preferred tax rate. Others use specific referenda outcomes to show different attitudes between French- and German-speaking voters towards various issues, such as working mothers (Steinhauer, 2018), elderly care (Gentili et al., 2017) or redistribution (Eugster et al., 2011).

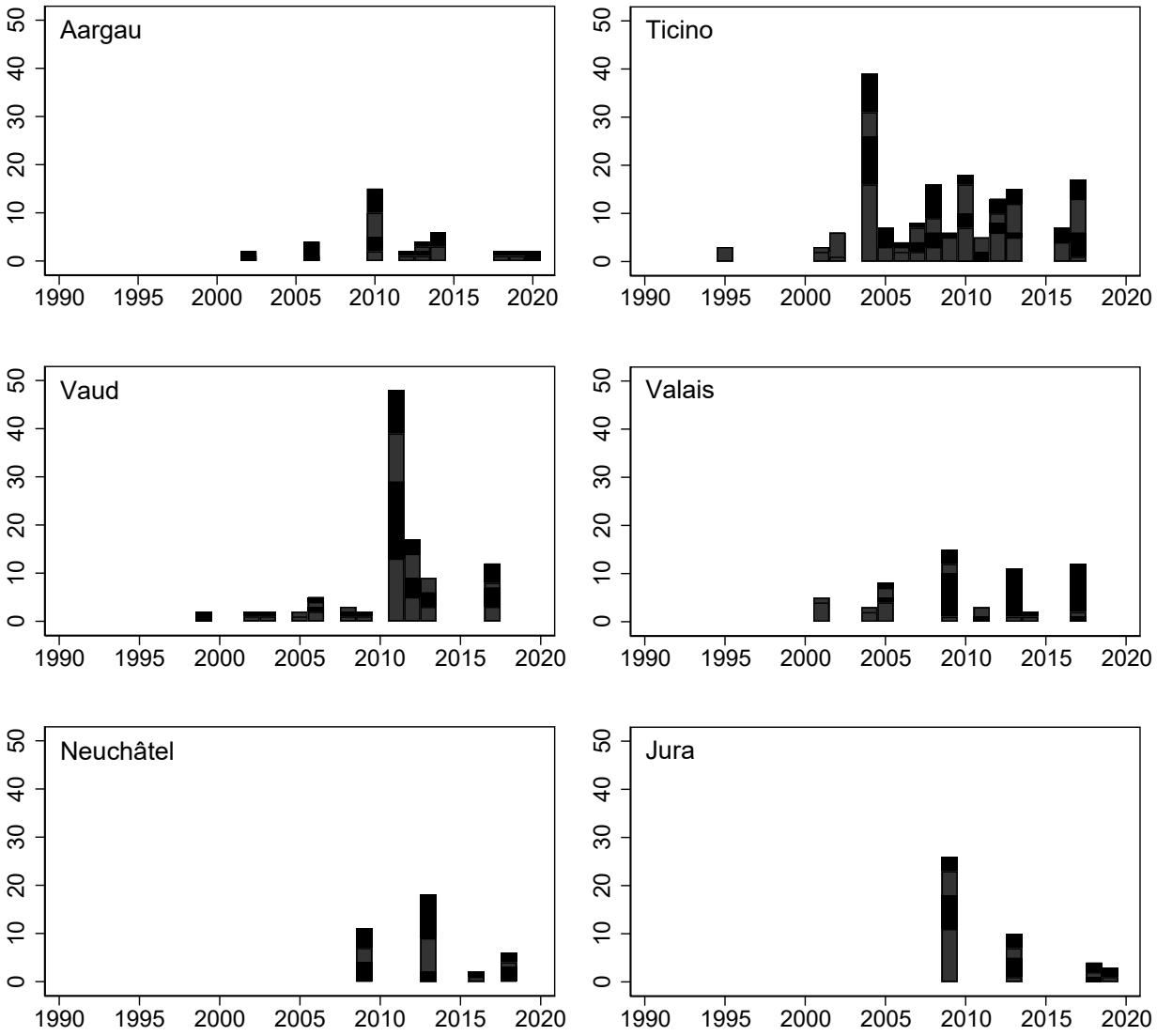
[30] We can only observe referenda outcomes at the level of existing municipalities. Hence, once a merger is conducted, $j =\geq 0$, we do not observe referenda outcomes across the areas of merging partners.

B Additional Descriptive Statistics

B.1 Distributions of Merger

Figure B.1: Number of Merging Municipalities by Canton and Year

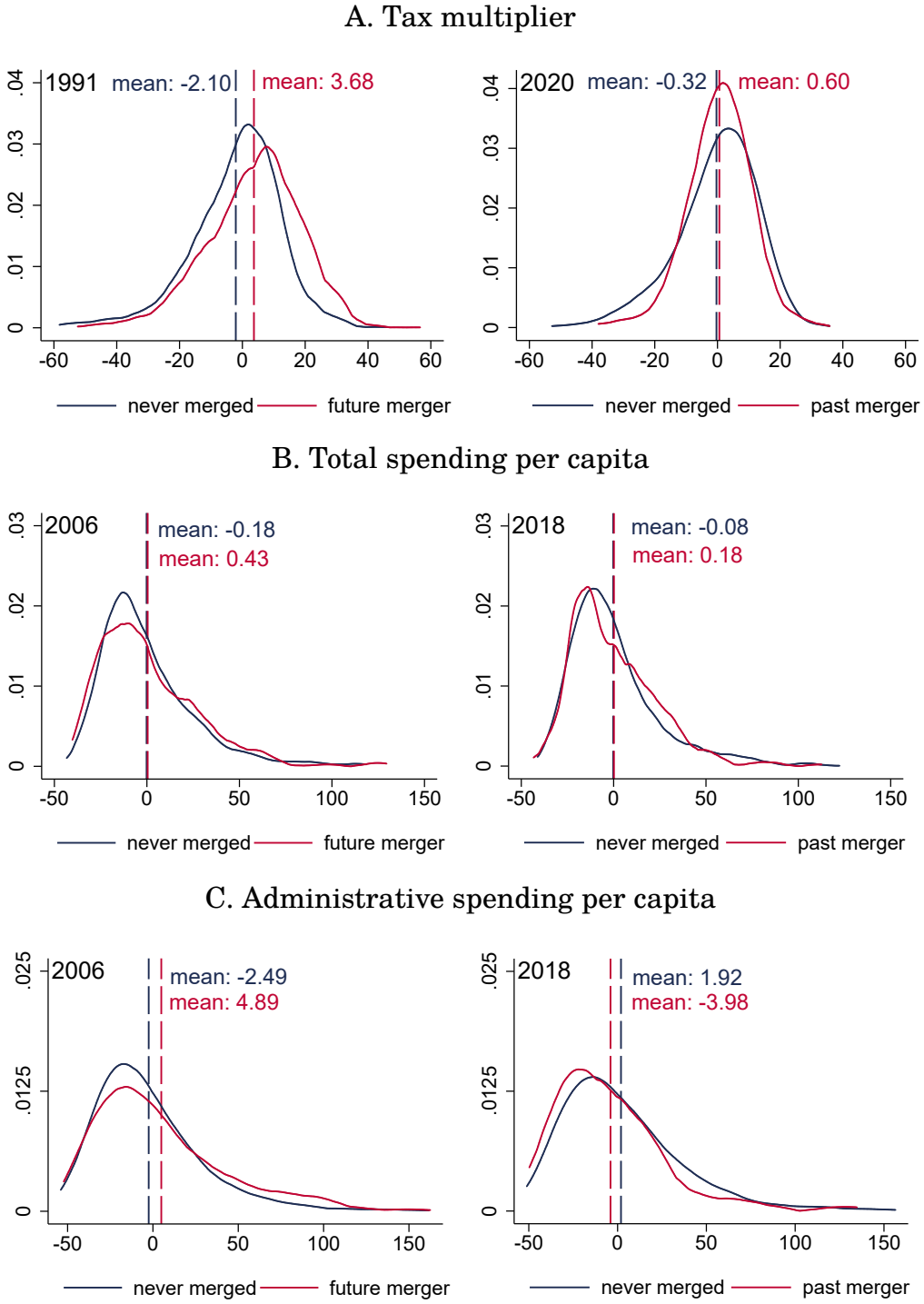




Notes: The figure presents the umber of merging municipalities by canton and year for the time period between 1990 and 2020.

B.2 Distribution of Outcome Variables

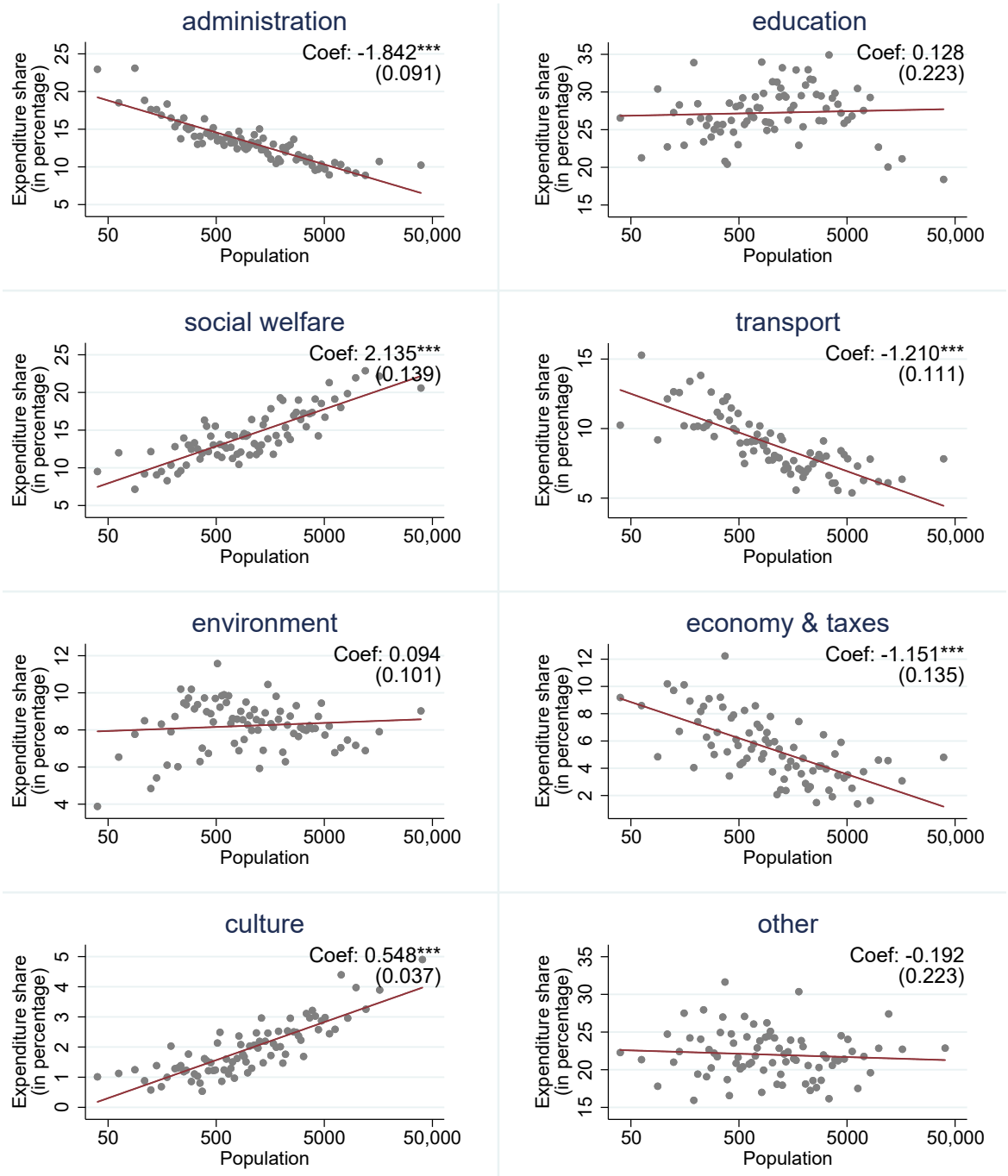
Figure B.2: Distributions around Cantonal Means



Notes: This figure provides density estimates for the deviation of municipal tax multipliers, total expenditure per capita, and administrative expenditure per capita from the respective cantonal mean (in percent) for municipalities that merged (in red) and for municipalities that never merged (in blue). All densities are estimated using the Epanechnikov kernel functions with a half-width of 5 percent (tax multiplier) and 10 percent (expenditure variables).

B.3 Spending Shares by Category

Figure B.3: Spending Shares by Category



Notes: The figures show the relationship between the log number of municipal residents and the share of different expenditure categories on total municipal expenditure. The figures is based on the accounting data of 2025 municipalities for the year 2006, the first year for which data on almost the universe of municipalities is available (see Section 4). The plots (binscatter) group the population into 81 equal-sized bins so that each of the dots represents the means of expenditure share and log population from 25 municipalities.

C DID: Additional Material

C.1 DID: Merger Effects on Control Variables

Table C.1: Effect on Population and Jobs

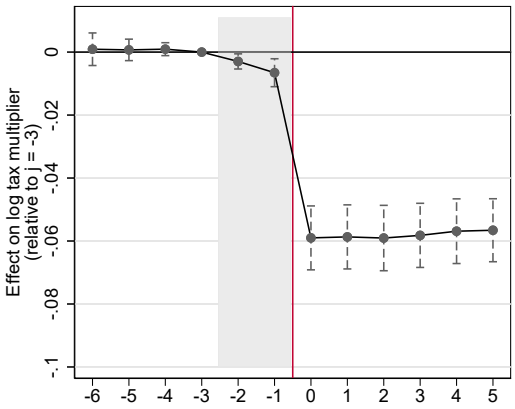
Dependent variable	Population (in logs)			Jobs (in logs)		
	(1)	(2)	(3)	(4)	(5)	(6)
Effect of merger ($j \geq 0$)	-0.012	-0.012	-0.001	-0.010	-0.008	0.002
	(0.009)	(0.007)	(0.007)	(0.014)	(0.014)	(0.016)
Municipality FE	✓	✓	✓	✓	✓	✓
Canton × year FE		✓			✓	
District × year FE			✓			✓
Observations	51341	51341	51197	47052	47052	46920

Notes: This table presents DiD estimates, $\hat{\alpha}$, from equation 1 on the effect of municipal mergers ($j \geq 0$) on the log number of jobs (columns 1 to 3) and the log number of residents (columns 4 to 6). Standard errors (in parentheses) are clustered at the post-merger observation level:
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

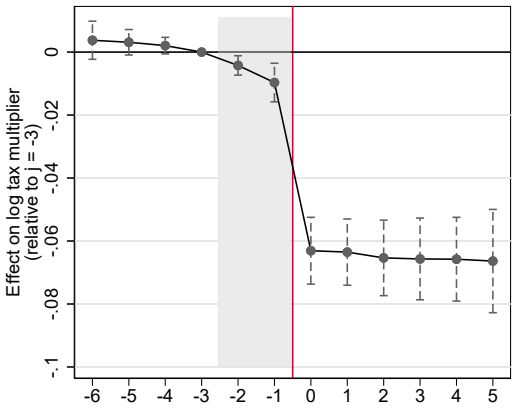
C.2 Clustered Standard Errors at District Level

Figure C.1: Event Studies with SE clustered at District Level

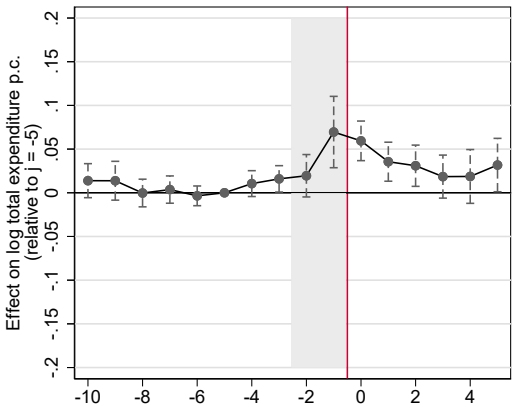
A. Effects on Tax Rates (incl. NT)



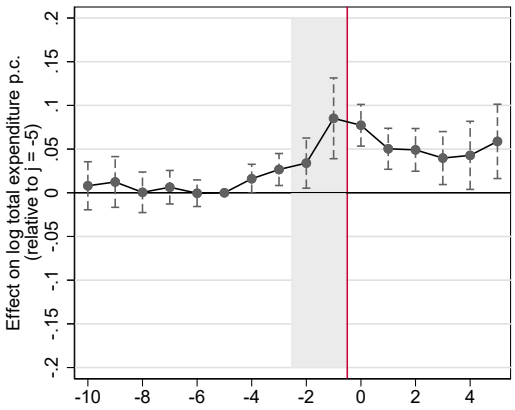
B. Effects on Tax Rates (excl. NT)



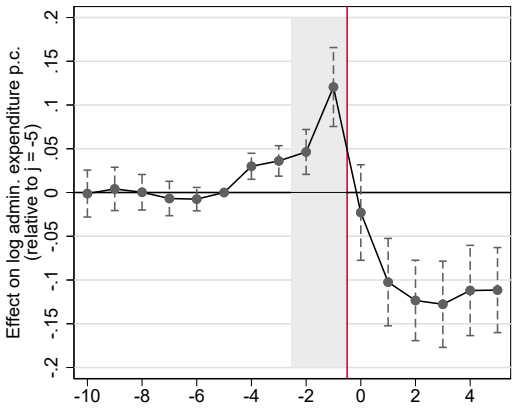
C. Effects on Total Spending (incl. NT)



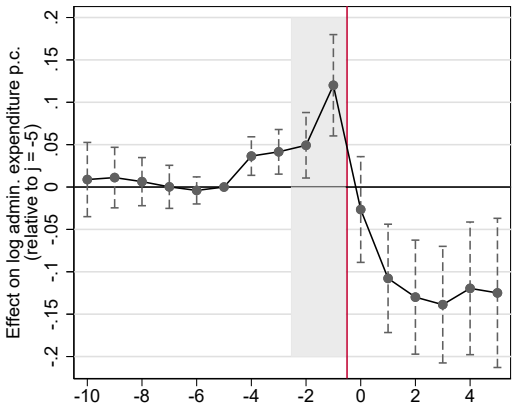
D. Effects on Total Spending (incl. NT)



E. Effects on Total Spending (incl. NT)



F. Effects on Total Spending (incl. NT)

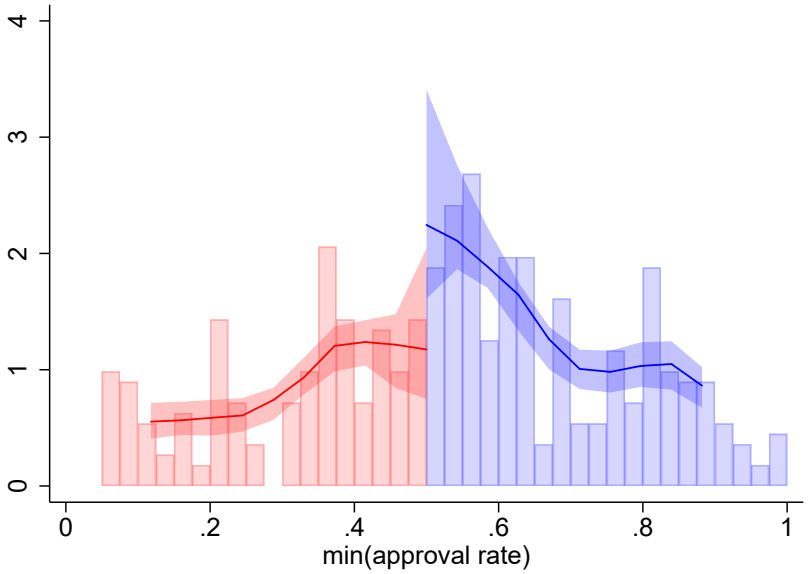


Notes: The two panels show event study estimates and the corresponding 95 percent confidence intervals for two specifications of equation 1. All specifications are identical with the ones from Figure 5 and Figure 10 except that standard errors are clustered at the district level. The abbreviations 'incl. NT' and 'excl. NT' denote 'including never treated' and 'excluding never treated', respectively.

D RDD: Additional Material

D.1 Distribution of Running Variable

Figure D.1: RDD Density Plot



Notes: The Figure plots the discontinuity in the densities of the running variable (McCrary (2008) manipulation testing) using the local polynomial density estimator proposed by Cattaneo et al. (2020) and the cutoff of 0.5. The density estimates are constructed using a first order local polynomial, the triangular kernel function, the proposed combination of MSE-optimal bandwidths and 95% confidence intervals. p-value of bias-corrected density test is 0.063. We compile data on the acceptance rates of proposed municipal mergers based on cantonal and federal registers. While these registers cover the universe of accepted mergers, some rejected projects may be missing due to non-reporting to cantonal or federal authorities.

D.2 Municipality Characteristics

Table D.1: Characteristics of Municipalities involved in Merger Projects

	Rejected				Accepted			
	mean	sd	med	N	mean	sd	med	N
Panel A: Bandwidth of 0.1								
Residents	2351	3203	1235	50	3029	7181	919	92
Employment (in FTE)	1161	3333	310	50	1353	4689	203	92
Legislative (assembly=1)	1	0	1	50	0.978	0.147	1	92
Panel B: Bandwidth of 0.2								
Residents	3090	4595	1424	108	2444	5725	966	158
Employment (in FTE)	1326	2834	450	108	1024	3669	203	158
Legislative (assembly=1)	1	0	1	108	0.987	0.112	1	158
Panel C: Bandwidth of 0.5								
Residents	2478	3827	1237	175	2313	4907	752	272
Employment (in FTE)	1048	2318	302	175	1002	3179	158	272
Legislative (assembly=1)	1	0	1	175	0.989	0.105	1	272

Notes: The table provides summary statistics on the municipalities (at the pre-merger structure) involved in accepted and rejected merger projects for different bandwidths around the cutoff of 0.5 and the cantons of Zurich, Bern, Lucerne, Fribourg and Aargau.

D.3 Large Bandwidths

Table D.2: Large Bandwidths

	Bandwidth of 0.25			Bandwidth of 0.5		
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: Tax rate (polynomial of order 0)						
RD in tax rate (log)	-0.070***	-0.070***	-0.064***	-0.057***	-0.059***	-0.052***
	(0.011)	(0.011)	(0.011)	(0.010)	(0.010)	(0.009)
Panel B: Tax rate (polynomial of order 1)						
RD in tax rate (log)	-0.079***	-0.074***	-0.088***	-0.080***	-0.081***	-0.075***
	(0.017)	(0.018)	(0.016)	(0.014)	(0.014)	(0.014)
Panel C: Tax rate (polynomial of order 2)						
RD in tax rate (log)	-0.034	-0.034	-0.050**	-0.093***	-0.086***	-0.095***
	(0.026)	(0.025)	(0.024)	(0.019)	(0.019)	(0.020)
Panel D: Total expenditure per capita: (polynomial of order 0)						
RD in total exp. (log)	-0.004	-0.000	-0.017	0.002	0.002	-0.000
	(0.027)	(0.028)	(0.025)	(0.022)	(0.022)	(0.021)
Panel E: Total expenditure per capita: (polynomial of order 1)						
RD in total exp. (log)	0.035	0.033	0.047	-0.003	-0.000	0.009
	(0.052)	(0.055)	(0.050)	(0.038)	(0.039)	(0.035)
Panel F: Total expenditure per capita: (polynomial of order 2)						
RD in total exp. (log)	0.019	0.023	0.005	0.016	0.023	-0.021
	(0.083)	(0.087)	(0.075)	(0.056)	(0.058)	(0.053)
Panel G: Administrative expenditure per capita: (polynomial of order 0)						
RD in admin. exp. (log)	-0.215***	-0.212***	-0.217***	-0.214***	-0.213***	-0.218***
	(0.032)	(0.033)	(0.031)	(0.027)	(0.027)	(0.025)
Panel H: Administrative expenditure per capita: (polynomial of order 1)						
RD in admin. exp. (log)	-0.199***	-0.190***	-0.203***	-0.211***	-0.209***	-0.207***
	(0.055)	(0.056)	(0.055)	(0.043)	(0.044)	(0.042)
Panel I: Administrative expenditure per capita: (polynomial of order 2)						
RD in admin. exp. (log)	-0.148*	-0.123	-0.171**	-0.201***	-0.193***	-0.217***
	(0.081)	(0.083)	(0.077)	(0.060)	(0.060)	(0.059)
Kernel	Epanech.	Triangle	Uniform	Epanech.	Triangle	Uniform

Notes: The table provides RD regression estimates with long bandwidths. Otherwise all specifications are identical to the ones presented in Table 5 and Table 8. The running variable is the voting result (yes-share) of the candidate place with the lowest acceptance rate of each merger project. The cutoff level is 0.5. Standard errors clustered at the level of the merging partners and reported below the estimates, * p<0.1, ** p<0.05, *** p<0.01.