Tax Effects of Amalgamations: Evidence from Swiss Municipalities*

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PRELIMINARY DRAFT

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Abstract

Municipal mergers are one of the changes in municipal politics that feature prominently in many federally-organized countries. These changes are expected to trigger important economic and fiscal effects. In this paper we analyze how municipal amalgamation influences the distribution of tax bases and, related to it, the choice of tax rates at the municipal level. We also look at tax spillover effects on neighbours of amalgamated municipalities. We use a dataset on 2497 Swiss municipalities, among which 252 are the outcome of mergers, over 1973-2012. We find evidence that neighbouring municipalities experience an increase in their tax rates as well as a decrease in their tax base after an amalgamation takes place.

JEL-Classification: H11; H71; R51; R12;

Keywords: Municipal amalgamations, local public finance, tax competition

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1 Introduction

Municipal mergers are one of the changes in municipal politics that feature prominently in many federally-organized countries. For instance, the number of municipalities in West-Germany went down from over 24175 to 8506 over the time period 1952 to 1990. After reunification, the number of municipalities continued to decrease from then 16127 to 11091 over the time period 1991 to 2015. Similar trends can be observed in Switzerland where the number of municipalities was reduced from 3203 in 1850 to 2352 in 2014 where a significant number of municipal mergers took place only recently. Different motivations are regularly discussed for why municipal mergers are (un)desirable. They range from issues of public service provision, where a critical population size ensures the realization of economies of scale in the provision of public services, to strategic issues of spatial fiscal competition and to political considerations of how a larger electorate undermines political accountability and participation in the political process. See Jordahl and Liang (2010), Lassen and Serritslew (2011) and Janeba and Osterloh (2013), among others. From an empirical perspective the issue of how municipality mergers affect public finances at the local level is not well researched. While many studies provide evidence on the effect of municipality amalgamation on the expenditure side, very little is known about how amalgamation affects the revenue side of the municipal budget. Part of the reason might be that, in order to meaningfully analyze the issue, fiscal decentralization should not only be limited to the expenditure side (as in many federally-organized countries), but should also extend to the revenue side. Not too many fiscal constitutions allow for a fully decentralized choice of tax rates on fiscally important tax bases. An exception in this respect is Switzerland where as of 2012 roughly 20 percent of total tax revenues are levied at the municipal level. The municipal tax autonomy applies to tax rates on income, wealth and capital.

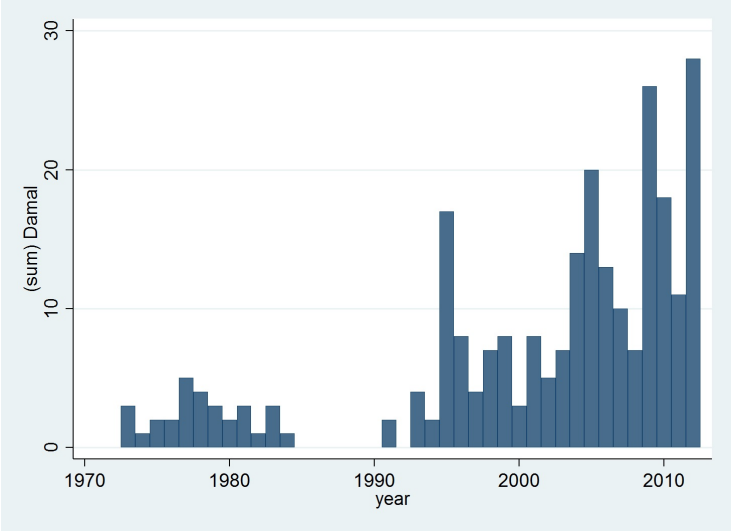
In this paper we analyze how municipal amalgamation influences the choice of tax rates at the municipal level and, related to it, the distribution of tax bases. We also assess whether amalgamations generate tax spillover effects on their neighbours. In order to explore our research questions we use a dataset on 2495 Swiss municipalities, among which 252 are the outcome of mergers, over 1973-2012. As for spillover effects of amalgamations on the neighbouring municipalities, we find a positive effect on tax rates as well as a negative effect on the tax base.

2 Data and empirical strategy

2.1 Amalgamation of Municipalities in Switzerland

In order to explore our research questions we use a dataset on 2495 Swiss municipalities over 1973-2012. This dataset contains data on the personal income tax base and tax rate at the municipal level. It also contains socio-economic control variables. In order to construct the dataset, we carefully identified the point in time when some municipalities have amalgamated. From that point in time we systematically aggregated backwards the tax data and the control variables of those municipalities that merged so that the new amalgamated municipality can be virtually observed prior to the amalgamation year and over our whole sample period. Over the whole period we observe 252 municipalities that have been created out of the amalgamation of two or more municipalities.

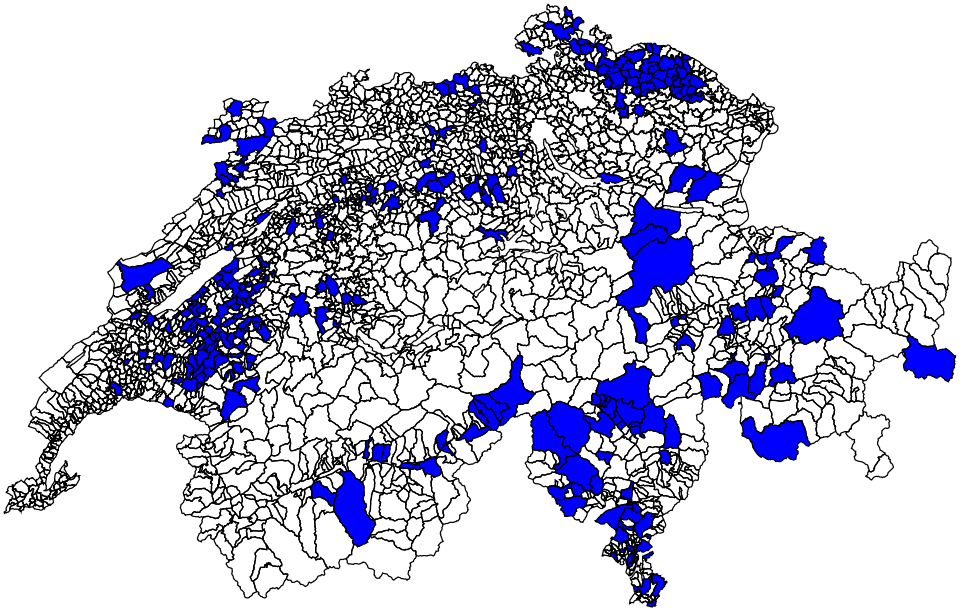
Figure 1: Number of Amalgamations per Year



Our identification strategy will exploit the variation both in space and time of the occurence of amalgamations in Switzerland. Figure 1 reports the number of amalgamations observed in each year of our sample. After a first and moderate wave of amalgamations from the mid 70's to the mid 80's, a more intense period started in the nineties until now. Although the distribution of the number of amalgamations is skewed towards the present, it is staggered enough to control for year specific confounding factors. In addition to the time dispersion of amalgamated municipalities, our dataset also allows us to exploit the fact that mergers of Swiss municipalities turn out to be spatially scattered. Figure 2 maps the borders of Swiss municipalities as of the 1st of January 2012 and emphasizes in blue those municipalities that are the outcome of the amalgamation of two or more municipalities since 1973. Although some regions seem to experience a more intense activity than others in terms of municipal amalgamations, amalgamated municipalities are still fairly

scattered in space. This feature can be empirically exploited to construct control groups using different spatial criteria such as contiguity or distance.

Figure 2: Amalgamated Municipalities as of end 2011



2.2 Data

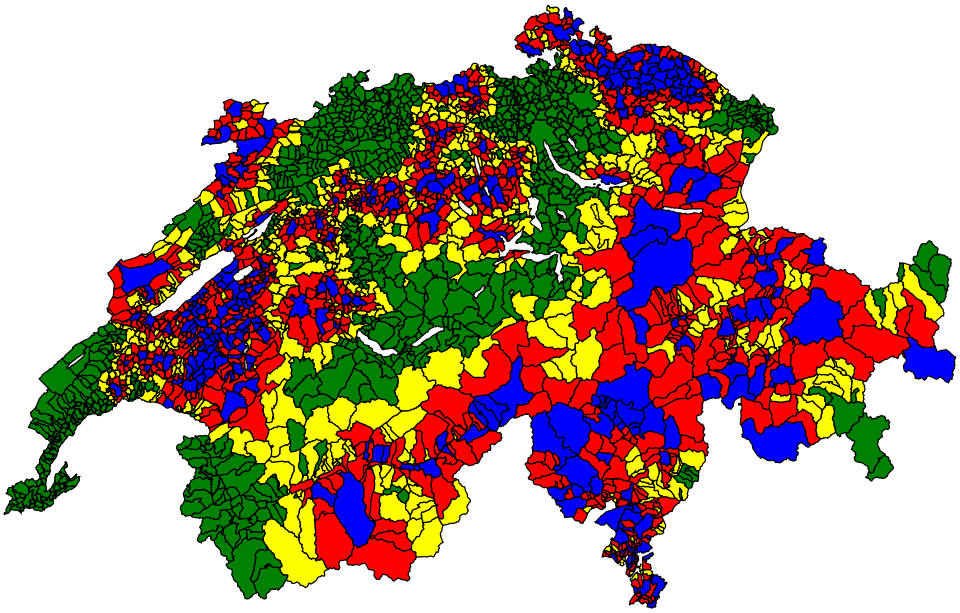
This paper focuses on the tax effects of amalgamations. Therefore our main outcome variables will be the tax rates and the tax base at the municipal level in Switzerland. As a measure of tax rates, we will use effective tax rates for each municipality as computed by Parchet (2014). These tax rates correspond to the total tax burden (municipal, cantonal and federal) for certain categories of taxpayers. In the analysis that follows we will use the effective tax rate for a married couple without children and an annual income of 100'000 CHF.

Another important outcome variable is the tax base. To measure the tax base we use the personal taxable income of the federal income tax (Source : Federal Tax Administration). Since the municipalities and the federal state share the same tax base, this indicator is a good measure of the municipal tax base. Furthermore it has the advantage of offering an homogeneous definition of the tax base across all municipalities allowing us for direct comparisons across municipalities.

We finally control for socio economic differences across municipalities using data from the census (Source : Federal Statistical Office). The census has been performed every ten years. We use the years 1970, 1980, 1990 and 2000 in order to construct socio-economic control variables at the municipality level.

2.3 Empirical Strategy

Figure 3: Empirical strategy - illustration



To identify the effects of amalgamations on amalgamated municipalities and on their neighbours, we construct control groups based on contiguity criteria. The map reported in Figure 3 illustrates our empirical strategy. As in Figure 2, the borders correspond to the municipal borders as of the 1st of January 2012. The municipalities in blue are outcome of mergers. The municipalities in red are those non-amalgamated municipalities that share a common border with at least one amalgamated municipality. The yellow municipalities are those municipalities sharing a border with at least one neighbour of an amalgamated municipality. These yellow municipalities are excluded from our potential control group since they are most likely also affected by the spillover effects of amalgamations. Finally, the group of the municipalities in green is being used to construct control groups for amalgamated municipalities as well as for their neighbours. To construct these control groups, we proceed through propensity score matching. Using propensity score matching has two advantages. First, it prevents us from comparing municipalities that are very different in terms of population size or socio-economic structure thereby improving the precision of our estimates. Second, while the decision to merge is clearly exogenous to the neighbouring municipalities this may not be the case for the amalgamating municipalities. Using propensity score matching allows us to compare municipalities having similar probabilities of amalgamating thereby simulating the conditions of a random experiment.

3 Tax spillover effects on neighbours

In this section we propose to identify the tax spillover effects of amalgamated municipalities on their neighbours. These neighbouring municipalities are highlighted in red in Figure 3. Table 1 reports the average values of our two outcome variables and the socio-economic variables. The second column reports the mean value for the municipalities neighbouring an amalgamated one. The third column reports the mean value for those municipalities - green in Figure 3 - that are neither a neighbour of an amalgamated municipality nor a neighbour of a neighbour. One can see that these groups seem very different on average in particular in terms of population size or the share of foreigners in the population. The last column shows how these differences can be reduced through matching by selecting those municipalities that are the most similar to the neighbours. The next section explains in more details the matching procedure.

Table 1: Summary Statistics 1973-2012

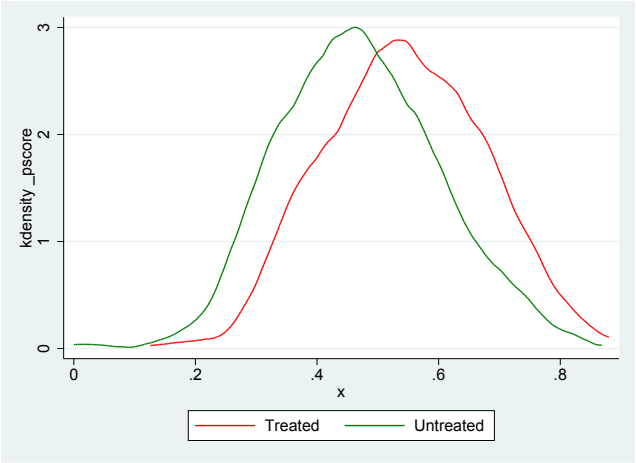
	All	**Neighbours** (Treated)	Green	**Matched** (Control)
Tax rate (%)	14.81	15.02	14.35	14.83
Tax base (CHF)	47178	44229	53306	49256
Population	2710	1687	3845	1728
Foreigners	10.29	9.06	12.32	8.83
High education	8.32	7.67	9.60	8.32
No Education	2.28	2.23	2.28	2.24
Employment	48.85	48.41	49.67	48.89
Old	13.00	13.58	12.06	12.97
Young	28.14	28.10	28.03	28.40
Industry	34.08	33.30	34.28	33.33
Service	51.00	49.24	54.09	50.01
Unemployment rate	1.52	1.48	1.57	1.45

3.1 Propensity Score Matching

Propensity score matching allows one to compare two or more observational units having similar predicted probabilities of being treated - in the current case of becoming the neighbour of an amalgamated municipality. This predicted probability of treatment is called the propensity score. I compute the propensity score using the socio-economic characteristics from the 1970 census which has been collected prior to our period of analysis. Figure 4 shows the kernel density of the propensity score for the treated and untreated. The densities of the neighbours (treated) and the control municipalities overlap substantially and most treated and untreated are located on the common support which provides us with good conditions to perform matching.

We perform a one-to-one nearest neighbour matching procedure and get around 800 observations in each group. Table 2 reports the average for each of the socio-economic

Figure 4: Kernel Density of Propensity Score



characteristic that we used for matching. These statistics are computed for the census data in year 1970. The first column shows the average for the treated group and the second column shows the average for the control group as constructed through the matching procedure. The third column shows the remaining bias between the two groups and the fourth column reports the extent to which the bias has been reduced compared to the unmatched data. We can see that the bias has been substantially reduced for all characteristics and that the match between the two groups is good. The only exception is the share of young people in the population of which bias increased after matching. Nonetheless the bias was already fairly small before matching and remained so after matching (1.9% in absolute value) in spite of the increase. Test statistics in the two remaining columns show that the remaining biases are statistically insignificant. These balancing properties show that matching allowed us to construct a control group comparable to the neighbours of amalgamated municipalities. We are going to use this control group to perform the subsequent econometric analysis.

3.2 Graphical Evidence

Before turning to our econometric analysis and results, we first provide some preliminary graphical evidence about the effects of amalgamations on the neighbours' tax rate and tax base.

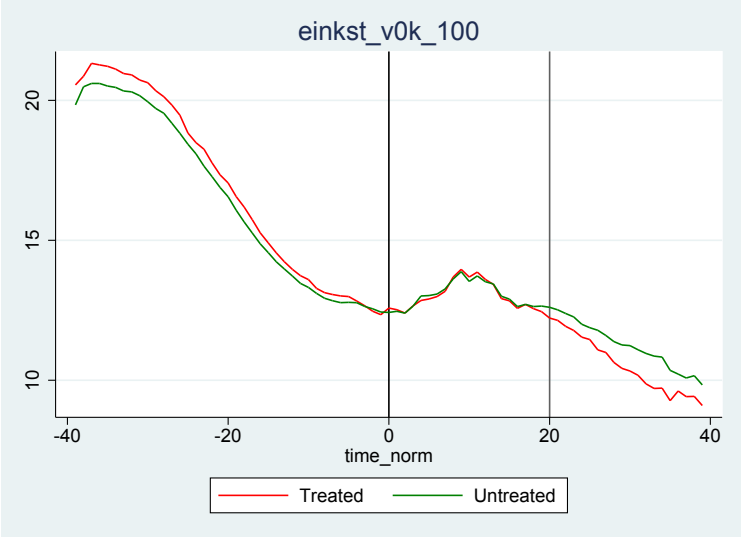
Graph 5 shows the evolution of the tax rate over time for our treated and our control group as constructed through matching. The time axis is normalized at the time when a neighbouring municipality first amalgamated. This graph suggests that neighbouring municipalities have been increasing their tax rate after they became a neighbour of an amalgamated municipality. The graph also suggests that our control group has been reacting to amalgamations as well. Therefore, shall we identify an effect in the econometric analysis, we will consider this effect on tax rates as a lower bound.

Table 2: Balancing properties of the observables used for matching

	Mean Treated	Mean Control	Bias in %	Reduction of bias in %	t-stat	p-value
Population	1516	1438	0.6	96.5	0.43	0.665
Foreigners*	8.81	8.78	0.4	99.1	0.08	0.936
With high education*	6.98	6.80	4.5	69.6	0.95	0.343
Without education*	0.26	0.25	1.4	79.8	0.36	0.719
Employed*	45.37	45.08	5.6	52.8	1.1	0.273
Old*	11.71	11.89	-4.6	86.2	-0.9	0.37
Young*	33.76	33.86	-1.9	-96.9	-0.37	0.714
Working in industry*	43.04	43.24	-1.2	94.4	-0.25	0.805
Working in services*	29.99	30.28	-2.2	94.3	-0.48	0.632
Unemployment rate	0.16	0.16	-0.1	92.2	-0.02	0.983

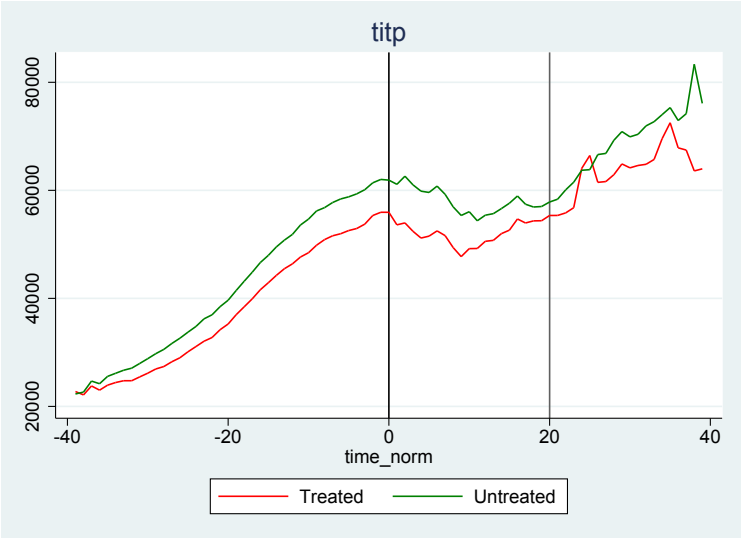
*Share of the total popualtion in %

Figure 5: Evolution of Tax Rates



Graph 6 shows the evolution of the tax base over time for our treated and our control group as constructed through matching. As for tax rates, it seems that both groups reacted to amalgamations. However, the tax base of direct neighbours (red line) seems to have experienced a more negative reaction than the municipalities included in the control group, suggesting that the effect of amalgamated municipalities on their neighbours' tax base has been negative.

Figure 6: Evolution of Tax Bases



3.3 Econometric results

In order to estimate the effect of amalgamations on neighbouring municipalities, we estimate the following econometric model :

$$\Delta y_{it} = \theta Namal_{it} + \beta \Delta X_{it} + \alpha_i + \gamma_t + u_{it} \tag{1}$$

, where Δ denotes the pairwise difference between the treated and the control group. $Namal_{it}$ is the treatment variable. It takes value 1 in the years during which a non amalgamated municipality had a common border with at least one amalgamated municipality and zero otherwise. α_i are pair fixed effects, γ_t are time fixed effects and X_{it} are the socio-economic characteristics .

3.3.1 Tax rates

Table 3 reports regression results for the personal income tax rate. The dependent variable is the tax rate measured by the total tax burden for a married couple without children with an income of 100'000 CHF. Columns (1) to (4) report results from OLS regressions. Columns (5) to (7) report results from panel regressions (within estimator). We can see in column (6) and (7) a positive and significant effect whenever time and pair fixed effects are being included. These results confirm that tax rates of neighbours of amalgamated municipalities tend to increase after the amalgamation took place.

3.3.2 Tax base

Table 4 reports regression results for the personal income tax base. The dependent variable is the total taxable income per taxpayer in each municipality. Columns (1) to (3) report

Table 3: Tax Rates

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Namal	-0.0103	-0.00682	-0.0103	-0.00685	0.00888	0.0330**	0.0329**
	(0.00814)	(0.0102)	(0.00813)	(0.0102)	(0.00985)	(0.0145)	(0.0145)
Pair FE	No	No	No	No	Yes	Yes	Yes
Controls	No	No	Yes	Yes	No	No	Yes
Time FE	No	Yes	No	Yes	No	Yes	Yes
Groups	824.00	824.00	824.00	824.00	824.00	824.00	824.00
Ftest	1.59	14.70	2.28	12.19	0.37	0.00	0.00
Observations	29847	29847	29844	29844	29847	29847	29844

Standard errors in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

results from OLS regressions. Columns (4) to (6) report results from panel regressions (within estimator). Whenever we include time and pair fixed effects, we find a negative and statistically significant effect as reported in columns (5) and (6). The coefficient means that the taxbase per taxpayer grew by approximately 230 CHF per taxpayer less on average compared to the control group after the amalgamation took place. This result is also consistent with the idea that the tax base of neighbours negatively reacted to the increase in the tax rate as identified in Table 3.

Table 4: Tax Base

	(1)	(2)	(3)	(4)	(5)	(6)
Namal	14.20	-88.64	7.041	36.85	-195.7*	-232.3*
	(56.57)	(84.69)	(58.03)	(117.6)	(112.1)	(120.5)
Pair FE	No	No	No	Yes	Yes	Yes
Controls	No	No	Yes	No	No	Yes
Time FE	No	Yes	No	No	Yes	Yes
Groups	826.00	826.00	824.00	826.00	826.00	824.00
Ftest	0.06	13.2	1.79	0.75	0.00	0.00
Observations	32208	32208	29844	32208	32208	29844

Standard errors in parentheses

* $p < .10$, ** $p < .05$, *** $p < .01$

4 Tax effects on amalgamated municipalities

...coming soon

5 Discussion

We look at the tax spillover effects of amalgamations on the neighbouring municipalities and we find a positive effect on tax rates as well as a negative effect on the tax base. These preliminary empirical findings are consistent with several possible mechanisms explaining the effects of amalgamations. First, amalgamations reduce the number of municipalities while increasing their average size. This change in the structure of local governments may decrease the degree of tax competition and let the equilibrium tax rates increase. The tax base is being reduced as a reaction to this general increase in tax rates. Second, amalgamations may also generate migration outflows from the neighbours to the amalgamated municipalities. These outflows impact the tax base of neighbours negatively and municipalities need to adjust their tax rates upwards in order to balance their budget. Note that these explanations are provisional and further analyses and robustness checks are necessary to discriminate between these possible mechanisms.

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