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Do municipal mergers reduce costs?
Evidence from a German federal state

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Abstract

We study the fiscal consequences of municipal mergers by making use of a large-scale merger reform in the German federal state of Brandenburg. In addition to being the first evaluation of an East-German merger reform, this study contributes to the literature by exploring the fiscal consequences of both compulsory and (semi-) voluntary municipal mergers within the same institutional setting. Using a difference-in-difference design with municipality-level panel data over 1998-2005, we find substantial and immediate reductions in total, administrative, and current expenditures after compulsory mergers. Voluntary mergers, on the other hand, have smaller and less robust effects.

Keywords: Municipal mergers, economies of scale, voluntary and compulsory mergers

JEL codes: H11, H72, H77, R53

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1 Introduction

Many industrialized countries have embarked on large-scale municipal merger reforms in the last few decades (Fox and Gurley, 2006). Policy makers typically initiated these reforms in the belief that larger municipal units can exploit economies of scale in public service provision and thereby reduce costs.[1] Whether mergers entail economies of scale and lower expenditures, however, is unclear. Some studies suggest insignificant effects or even diseconomies of scale after mergers (Moisio and Uusitalo, 2013; Lüchinger and Stutzer, 2002; Allers and Geertsema, 2014), while others show substantial expenditure reductions (Blom-Hansen et al., 2014; Hansen et al., 2014; Reingewertz, 2012).

Existing studies vary mainly along two dimensions. First, they vary in the country, or more specifically in the institutional setting, that is being studied. Second, studies vary according to the type of the merger process, i. e. whether municipalities had some say in whether and with whom to merge (voluntary mergers) or whether mergers were designed and enforced by the central government (compulsory mergers).

In this paper, we revisit the question of how mergers affect municipal expenditures. Our setting covers municipalities in the German State of Brandenburg over the period 1998-2005. More specifically, Brandenburg merged 1317 municipalities into 264 larger units during the 2001-2003 period in the context of a major merger reform, while leaving 157 municipalities unaffected. This opens up a natural experiment with which we can identify the causal effect of mergers on a number of municipal expenditure items using difference-in-difference (DD) regressions.

One advantage of our setting over the existing quasi-experimental literature is that municipal mergers in Brandenburg were staggered. The state government of Brandenburg decided

[1] From a normative perspective, there are a number of additional advantages to larger municipalities, such as the possibility to provide a wider range of public services and goods (Oates, 1972), the ability to internalize externalities (Eichenberger and Frey, 2006), and an improved resilience to macroeconomic shocks due to resource pooling (Hinnerich, 2009).

in late 2000 to reduce the number of municipalities from 2001 onward. Following this decision, municipalities were allowed to choose when and with whom to merge until late 2003. In this sense, mergers were voluntary during this initial period. In late 2003, however, the state government passed a law that enforced mergers of those municipalities that were supposed to merge but had not yet done so, bringing the merger reform to an end.[2] Brandenburg therefore provides a setting with both compulsory and, to some degree, voluntary mergers within the same institutional context. The previous literature, on the other hand, either relies exclusively on big bang type of reforms where municipalities were merged according to the central government's design at the same date (e. g. , Reingewertz (2012)) or exclusively on voluntary mergers (e. g. , Lüchinger and Stutzer (2002)).

Our first result is that mergers result in economies of scale for total expenditures. Already in 2004, one year after the conclusion of the merger reform in Brandenburg, expenditures are lower in merged municipalities than in the pre-reform period. The negative effect persists to the second year. Second, we analyze different expenditure items. Here, we find that current and administrative expenditures decline after the conclusion of the reform, but not staff expenditures. Third, we establish that the cost savings are mostly due to enforced mergers. While voluntary mergers, too, have a negative effect on expenditures in some regressions, these effects are noticeably smaller than for compulsory mergers, suggesting municipalities that merge voluntarily experience only minor cost savings.

We also explore whether the declining expenditures in merged municipalities are the result of lower public service provision rather than a consequence of cost savings, i. e. we analyze whether municipal service provision changes as a result of mergers. We find suggestive evidence that there were no service cuts. Therefore, the cost savings seem to be due to larger economies of scales in the merged municipalities.

[2] We discuss the selection criteria for compulsory mergers further below.

There are a few concerns regarding the validity of the DD design given the characteristics of our setting. First, due to data constraints, the post-treatment period in our dataset lasts only two years while any cost-savings may take time to accumulate.[3] We are, however, able to detect immediate cost-reductions. Second, the state government did not randomly choose municipalities for mergers. Municipalities may have been chosen for mergers based on expected future fiscal developments. Selection into treatment is generally a minor concern, however, because the selection criteria for mergers set out by the state government did not refer to any fiscal variables. A more serious concern is self-selection into voluntary mergers. It is possible that those municipalities which decided to merge voluntarily expected worse fiscal developments and were fiscally weaker. We show, however, that the main results remain robust if we control for observable time-varying indicators for the fiscal stance of municipalities. Finally, there are a few additional concerns such as special grants allocated to municipalities that merged voluntarily and possible common pool incentives that may have led to expansions in expenditures in the immediate pre-merger period. We address such concerns in robustness tests and show that the results remain robust.

This paper adds to a relatively small quasi-experimental empirical literature on how fiscal variables evolve after mergers.[4] Allers and Geertsema (2014), Moisio and Uusitalo (2013), and Lüchinger and Stutzer (2002) analyze voluntary municipal mergers in the Netherlands, Finland, and Switzerland, respectively. These studies find little evidence that economies of scale increase due to mergers. As indicated above, the results for compulsory mergers, as e. g. in Denmark or Israel, seem to be different. Specifically, Blom-Hansen et al. (2014) and Hansen et al. (2014) find for a Danish merger reform in 2007 that fiscal outcomes improve.

[3] We do not analyze further post-reform years because municipalities in Brandenburg switched from the cameralistic accounting system to a new accounting system (*Doppik* – double bookkeeping) in 2007 and adjustments in preparation of this switch may have been made already in 2006.

[4] A related literature studies how fiscal variables evolve before mergers, for example Jordahl and Liang (2010) and Hinnerich (2009).

Reingewertz (2012) finds that the Israeli merger reform of 2003 reduced total expenditures by bout 8% in the amalgamated municipalities compared to non-amalgamated municipalities.

To our knowledge, Fritz (2011) is the only previous quasi-experimental study that explores the fiscal effects of mergers with German data. He focuses on mergers in the West German state of Baden-Wuerttemberg in 1975 and finds that mergers increase municipal debt and total expenditures.[5] In contrast, our paper is the first attempt to evaluate the fiscal consequences of an Eastern German merger reform. Moreover, it provides the first comparison in the literature of scale effects between voluntary and forced mergers within the same institutional context.[6]

The remainder of this paper is structured as follows. The next section discusses the theoretical link between municipal mergers and scale economies. Section 3 provides some institutional details about local public finance in Germany and the merger reform in Brandenburg. In Section 4, we discuss the empirical approach and the data. Section 5 collects the main results. We explore differences in the fiscal effects of voluntary and compulsory mergers in Section 6. Section 7 studies whether mergers entail service cuts. Finally, Section 8 concludes.

[5]There exists also an empirical literature for Germany (as well as for other countries) that does not rely on quasi-experimental designs, for example Blume and Blume (2007) who offer a cross-sectional analysis of the fiscal consequences of mergers in West-Germany.

[6]Another related paper is Bruns and Schuhmann (2013). These authors, too, study the merger reform in Brandenburg. Their research question is whether voluntary mergers took place according to political considerations. They thus explore the political determinants but not the fiscal consequences of Brandenburg's merger reform.

2 Municipal mergers, scale economies, and common pool problems

2.1 Reasons for economies of scale

The main reason why municipal mergers are advocated is that they are believed to entail economies of scale. Scale economies can emerge after mergers for several reasons. Larger municipalities may be able to produce a given output with lower average unit costs. Declining average costs of production for a given level of municipal services may emerge due to more specialization in larger localities. That is, it is plausible that small municipalities are not able to efficiently provide certain public goods because of a lack of professionalization. In addition, larger municipalities have more bargaining power vis-à-vis externals (for e.g. private suppliers of inputs) and can reduce purchasing prices (Dollery and Fleming, 2006). Duplication of certain services can also be avoided, which would reduce fixed expenditures while keeping service levels constant (Pitlik and Wirth, 2012).

2.2 Reasons for diseconomies of scale

Even though mergers are often initiated to harvest economies of scale, they may in fact entail diseconomies. Unit costs of production might rise after some municipal size due to higher coordination and transaction costs (Coase, 1937). In addition, voters may voice demands for new public goods once a municipality surpasses a certain size, which would call for a bigger, more diversified and specialized administration (Brecht, 1932). Municipal size may also increase informational asymmetries between public officials on the local level. First, bureaucrats may find it easier to expand their budgets above an efficient level and increase slack as politicians and voters are less able to control the activities of the administration (Niskanen, 1968; Wyckoff, 1990). Second, politicians, too, may free-ride on their informa-

tional advantage over their voters and try to capture rents (Oates, 2005). The larger an administrative entity, the more difficult it is for voters to control politicians. For example, if there are fewer municipalities, residents may find it harder to compare the local tax and local public goods bundle in their municipality with bundles in other municipalities. This effect may diminish yard-stick competition and enable leviathan policy makers to expand expenditures (Besley and Case, 1995).

2.3 Common Pool Problems in pre-merger budgets

Policy makers are typically interested in economies of scale that unfold in the aftermath of mergers. But opportunistic pre-merger behavior may lower the intended post-merger economic benefits and therefore needs to be mentioned, even if we are primarily interested in the post-reform effects of mergers in this paper. Opportunistic behavior on pre-merger budgets may occur if municipalities, anticipating that they will be merged, attempt to free-ride on the debt or the tax base of the expected post-reform municipality. This behavior may lead to pre-merger common pool problems.

There is some evidence, primarily from Scandinavian countries, that municipalities engage in such opportunistic pre-merger behavior, especially in the year immediately before the merger. Opportunistic behavior has been previously found for expenditures (Hansen, 2014), debt and assets (Jordahl and Liang, 2010; Hinnerich, 2009), or budget overruns (Blom-Hansen, 2010).

3 Institutional background

3.1 Local governance structure in Germany

Germany has a complex federal structure of governance, but consists mainly of three governmental tiers: in addition to the national government, there were 16 federal states and 11 292 municipalities at the end of 2011 (Statistisches Bundesamt, 2013). The units of analysis here are the municipalities in the East German federal state of Brandenburg. Article 28 II of the German constitution (*Grundgesetz*) guarantees all municipalities the right to run their own affairs. No further details are codified, and hence municipalities fulfill services like sewage disposal or fire safety to different degrees, but are obliged to assume several core tasks, such as civil register's office services, according to instructions from the state government. Generally, German municipalities have, besides significant responsibilities at the expenditure side of the budget, also considerable revenue autonomy, including revenue sources like user charges, several taxes like the trade tax (*Gewerbesteuer*) or property taxes (*Grundsteuer*) as well as remunerations for benefits and services (Zimmermann, 1999). In summary, municipalities in Germany are important and multipurpose economic actors.[7]

3.2 Municipal merger reform in Brandenburg

3.2.1 Reasons, aims and process of the reform

In order to achieve a more efficient local government structure, many West-German states implemented large-scale merger reforms in the 1960s and 1970s. No comparable reforms were enacted in the German Democratic Republic (GDR) as the country was highly unitary. Therefore, subnational governments, and in particular the municipalities, were presumably considered to be too unimportant to warrant the effort of large-scale merger reforms. After

[7]For a more comprehensive review of the German federal system, see Zimmermann (1999).

German reunification, however, the administrative structure of West-Germany was adopted by the newly formed Eastern States and municipalities became important pillars of public administration. Given the absence of merger reforms, however, Eastern municipalities tended to be very small. Therefore, attempts were made to reduce the number and increase the size of municipalities in the Eastern States.

In Brandenburg, the Ministry of Interior is in charge of local governments. The ministry's policy was always supportive to mergers, both on the municipality and district level. Despite the installation of municipal associations in 1992 and the reduction of rural districts in 1993 from 38 to 14, state officials continued to diagnose a chronic lack of administrative capacity and efficiency (Landtag Brandenburg, 2012). In particular, 58.2% of the municipalities in Brandenburg had less than 500 residents, and especially these very small rural municipalities have been perceived to fulfill their public service obligations neither sufficiently nor efficiently (Ministerium des Innern Brandenburg, 2011).

For such small municipalities, municipal mergers were seen as an instrument to achieve cost savings.[8] Mergers were expected, in particular, to achieve higher efficiency in terms of fiscal and administrative capacities (Landtag Brandenburg, 2000).[9] Immediately after the state elections at the end of 1999, the new state government therefore agreed on a comprehensive merger reform. Subsequently, the state parliament instructed the government to suggest a concept for a reform by mid-2000. The state government then proposed a concept called "guidelines for the development of rural structures" (*Leitlinien der Landesregierung für die Entwicklung der Gemeindestruktur im Land Brandenburg*) in July 2000, which was passed in September 2000 by the state parliament.[10]

[8] An unsuccessful initiative in support of voluntary mergers was launched in the beginning of 1998 (Landtag Brandenburg, 1998). The few resulting voluntary mergers by this act and their effects are addressed in the robustness checks of Section 5. Particularly, we obtain similar results regardless of whether the prior mergers are considered in the analysis or not.

[9] Another aim of the reform was to ensure that enough candidates would be available to contest elections for local government positions (Ministerium des Innern Brandenburg, 2001).

[10] The timeline of the reform is sketched in Figure A.1 in the Appendix.

The guidelines stipulated that after the reform, municipalities should have no less than 5000 inhabitants. In cases where it was not possible to create new independent municipalities, existing municipalities were expected to organize within a municipal association. In these cases, individual municipalities belonging to an association should not have less than 500 inhabitants. Associations themselves should have no less than 5000 inhabitants and encompass 3 to 6 municipalities. The travel distance to the seat of the administration of the association should also not be larger than 20km. The guidelines also spelled out further criteria, for example that district and existing municipal association boundaries should be respected in a municipal merger, i. e. mergers across districts or associations were discouraged, but exceptions were possible under certain conditions (Landtag Brandenburg, 2000).

Following the publishing of the guidelines, a voluntary merger phase was initiated from the beginning of 2001 until March 2002. Municipalities that merged voluntarily could chose with whom and when to merge. Voluntary mergers took place in the form of a contract between the merging municipalities, which had to be accepted by the local councils of all involved municipalities (and for municipality with fewer than 5000 inhabitants additionally by a referendum). All assets, debts and administrative workers of amalgamating pre-reform municipalities were to be taken over by the respective post-reform municipality.

Voluntary mergers, even if accepted by the council (and possibly by a referendum), were subject to the final approval of the state interior ministry. Approval was generally conditioned on whether the newly created municipalities fulfilled the criteria spelled out in the guidelines.[11] To support voluntary mergers, a "municipal reform law" (*Gemeindereformgesetz*) was passed in March 2001 (Ministerium des Innern Brandenburg, 2001). The latter provided a financial incentive scheme for municipal mergers within the voluntary time period

[11] However, according to the state government, voluntary mergers could be denied if, for example, a particular merger would make it impossible for other municipalities to fulfill the guidelines after their mergers, or if there were "obviously" better partners for mergers available.

with a maximum premium of 2.5 million Euros per newly created municipality from the state government.

On March 2003, the state government passed six "laws of reorganization" (*Neugliederungsgesetze*) to finally force all those municipalities that did not fulfill the criteria spelled out in the guidelines to merge (Landtag Brandenburg, 2003). The compulsory mergers hence took place on the basis of laws rather than contracts. While the laws on compulsory mergers were drafted, municipalities could still agree on voluntary mergers. If the mergers were admissible under the guidelines, they were approved and the draft of the law was changed accordingly. The remaining mergers became effective by 26th October 2003 and the municipal merger reform was finally put to an end.

In general, municipalities that merged during the merger reform did not satisfy these criteria while those that remained intact did satisfy them. Nevertheless, the reform and its implementation were extremely controversial. Legal challenges against the compulsory mergers were mounted at the end of reform, resulting in 255 cases at the state's constitutional court (Verfassungsgericht Brandenburg , 2006). The main argument of the complaints were based on the municipal right for local autonomy. However, except for two formal mistakes, no revisions to the reform were made until the end of the lawsuits in 2006 (Verfasssungsgericht Brandenburg (VGB), 2006; LDS, 2005).[12]

3.2.2 Descriptive statistics on municipal mergers

The merger reform reduced the number of municipalities substantially, from 1479 down to 421. Mergers occurred also before the reform, but the reform increased the numbers of completed mergers drastically (Figure 1). The number of municipalities remained largely stable after the end of the reform.[13] During the reform, 1317 municipalities merged to 264

[12] According to Verfassungsgericht Brandenburg (2006) most trials started in mid-2003.

[13] Only two further mergers took place after the end of the reform (Amt für Statistik Berlin-Brandenburg, 2013).

larger units, with the merged units encompassing from 2 up to 22 pre-reform municipalities. 98 of these mergers were compulsory while 166 were voluntary. 157 municipalities were left unaffected. The share of small jurisdictions with less than 500 inhabitants declined from 58.2% in 1999 to 1.4% of all municipalities in 2004. Average municipal population size rose from 1759 in 1999 to 6099 inhabitants at the end of 2004. Figure 2 reports maps of pre- and post-reform municipal boundaries (i. e. in 1999 and 2005).

4 Empirical framework and data

4.1 Difference-in-difference model

To establish whether mergers lead to expenditure reductions, we implement a difference-in-difference (DD) design in a regression framework. More specifically, we estimate the following model:

$$y_{it} = \alpha_i + \gamma_t + \beta(Amalg * Post)_{it} + \epsilon_{it} \tag{1}$$

where y_{it} is one of four expenditure items for municipality i and year t (total expenditures per capita, staff expenditures per capita, administrative expenditures per capita, and current expenditures per capita). The treatment indicator is an interaction variable between a dummy indicating amalgamated municipalities, *Amalg*, and a dummy indicating the post-election period, *Post*. The dummy *Amalg* is set to 1 for all amalgamated municipalities. In the baseline regressions, the dummy *Post* is set to 1 for all years from 2004 onwards and to 0 for all the years before. ϵ_{it} denotes the error term. To account for heteroscedasticity and autocorrelation, we always report results based on robust and clustered standard errors (Bertrand et al., 2004). Standard errors are clustered at the municipal level.

The main identifying assumption is that treated and control municipalities would have had parallel trends in expenditures in the absence of treatment (Angrist and Pischke, 2009).

While we explore the validity of this assumption graphically further below, it is a plausible one in our setting as all municipalities are part of the same state. Moreover, assignment of compulsory mergers were based on variables that are time-constant and not directly related to fiscal developments, notably population size and geographical or administrative characteristics. Thus, any differences in trends of fiscal variables are likely to be minor during the sample period. As discussed previously, the parallel trends assumption may be more problematic for voluntary mergers, as municipalities may have chosen to merge because they expected unfavorable fiscal developments. However, municipalities that did not merge voluntarily would have been forced to merge by 2003 anyway. Hence, self-selection into treatment is not a major concern when analyzing the fiscal effects of mergers vs. non-mergers. Self-selection into merging voluntarily is a more serious problem when analyzing differences in the fiscal effects of compulsory vs. voluntary mergers. We therefore discuss this issue in more detail further below.

4.2 Data

4.3 Variables

Table A.1 in the Appendix describes the outcome and explanatory variables. For expenditures as well as for several control variables we use administrative data from the state statistical office (*Statistisches Landesamt Berlin-Brandenburg*, SBB). All budget figures are based on yearly realized municipal accounts. Monetary units are deflated by the consumer price index and are expressed in constant Euros with the base year 2005.

4.4 Units of observation

To estimate Equation 1, we use a panel of municipalities of the federal state Brandenburg for the years 1998–2005. All variables for these municipalities have been aggregate to post-

reform boundaries by the state statistical office.[14] Therefore, budgetary outcomes for merged units before the treatment are the sum of all respective pre-reform municipalities. The final analysis considers 258 post-reform municipalities that were part of municipal mergers (treatment group)[15] and 153 municipalities that were unaffected from boundary changes (control group). This sample is smaller than the full universe of 421 post-reform municipalities (264 merged and 157 non-merged) since we drop ten municipalities for various reasons.[16]

4.5 Treatment status

Mergers are an ongoing process, but we require a clear cut definition of a treatment date for our analysis. We assume in the baseline regressions that the post-reform period starts in 2004 as this is the first year after the completion of the merger reform. Voluntary mergers occur before the end of the reform in October 2003, i. e. in 2001 and 2002 (Figure 1). However, the occurrence of mergers before 2004 does not invalidate our estimation strategy below, but allows us to interpret the baseline estimates for the expenditure reductions in merged municipalities as lower bounds. In subsequent regressions, however, we allow the treatment to set in already in 2001.

There are also other reasons for the interpretation of the treatment effect as a lower bound. First, we only analyze two post-reform years, but one would assume economies of scale to increase over time. Second, municipalities that merged voluntarily received additional

[14] Thus, we follow much the previous literature which uses data aggregated to post-reform boundaries, e. g. Reingewertz (2012). An alternative would be to disaggregate fiscal variables to pre-reform municipalities, but the state statistical office did not provide such data to us.

[15] Note that we do not distinguish whether boundary changes occurred either in form of mergers between equals or in terms of incorporations of several smaller units by a larger municipality.

[16] First, the district-free (*kreisfrei*) cities Frankfurt/Oder, Potsdam, Brandenburg an der Havel and Cottbus have a different administrative status than other municipalities. As their status as district-free suggests, they carry out both municipal and district-related tasks. As one cannot compare district-free with district-affiliated municipalities, we exclude the four district free cities from the sample. We also drop four municipalities which experienced boundary changes after the official reform end in October 2003: Königs-Wusterhausen, Heiligengrabe, Neuhausen/Spree and Spremberg (LDS, 2005). Finally, the municipalities of Hohensaaten and Haidemühl are excluded as no budgetary data at the level of the 2005 boundaries is available.

grants. If some of these grants were spent in the post-merger period, we may under-estimate any substantive expenditures cuts given that we analyze a short post-treatment window. However, we account for this concern by controlling in a robustness test for grant receipts and total revenues.[17] Finally, numerous constitutional complaints were ongoing until 2006. The affected municipalities are likely to spend less effort in restructuring the local administration system toward a more efficient structure. This might be the case because of their uncertainty of success at the state's constitutional court. Hence, these municipalities may experience fewer economies of scale.

5 Results

5.1 Graphical evidence

To gain a first impression of the effect of mergers, we illustrate graphically how the outcome variables have evolved over the period 1998–2005. Figure 3 traces mean total, staff, administrative, and current expenditures per capita in treatment and control municipalities over time.

First, the plots show that mean total expenditures for merged municipalities have been consistently higher than for their non-merged counterparts, which suggests that smaller administrative units had higher costs, presumably because they were unable to fully exploit scale economies. This gap has lowered somewhat in the course of the reform. In particular, expenditures of merged municipalities drop more sharply than of non-merged ones in 2004, i. e. in the first post-reform year. This graphical evidence suggests that the mergers led to cost savings.

[17] Note that we capture grants in support of voluntary amalgamations only to the extent they were booked into the current budget and not into the capital budget. However, any grants booked into the capital budget are included in the total revenues variable.

Second, the plots allow us to evaluate the crucial identifying assumption of the difference-in-difference design, i. e. that of parallel trends in treatment and control groups. While, as argued above, it seems reasonable to make this assumption in our setting, it would be reassuring to explicitly confirm its validity. Figure 3 shows that pre-treatment trends were roughly similar in treatment and control groups. However, there seem to be some divergences for total, administrative, and current expenditures in 2001. In this year, both expenditure items increase for treated municipalities more steeply than for control municipalities. This may be, as discussed in Section 2.3, due to attempts by municipalities selected for mergers to exploit the post-merger common pool. Note that this observation does not invalidate our DD design, as any divergences in trends in the post-2000 period can be related to the merger reform. However, it suggests that the onset of treatment may have to be defined before 2004, i. e. the official end of the reform. We explore this issue in more detail in a robustness test. In any case, the plots show that the gap in expenditures between treated and control municipalities has narrowed considerably between 1998 and 2005.

5.2 Baseline results

Table 1 shows the results of estimating Equation 1. The estimates confirm the graphical evidence and suggest that mergers significantly reduce total expenditures per capita. The treatment effect is -81 Euros per capita and significant. Exploring the various expenditure categories, we find that the effect is mostly driven by lower current expenditures, which decline by -63 Euros per capita. Some reductions in administrative expenditures, about -19 Euros per capita, are also observable. Staff expenditures, on the other hand, display no reductions. Persistence in the level of staff expenditures is to be expected as employment contracts of pre-reform municipalities were taken over by the respective post-reform units

and hence could not be adjusted in the short-run. Overall, these results suggest that mergers entail substantial economies of scale.[18]

5.3 Robustness tests

5.3.1 Control variables

Our first robustness test is to include a set of control variables X_{it} in Equation 1 to control for time-varying observable municipal characteristics that are possibly correlated with treatment status and expenditures. As mentioned above, municipalities were not randomly selected for mergers but according to observable characteristics, in particular population size. If there are systematic differences in the evolution of such municipal characteristics between municipalities marked for mergers and the other municipalities, and if these characteristics affect fiscal outcomes, our previous estimates may be biased. Similarly, if the grants in support of voluntary mergers have persistent effects on expenditures, we may underestimate any substantive cuts in expenditures.

We include various time-varying controls that cover both fiscal, demographic, and political characteristics of municipalities. First, we include total revenues per capita and an indicator for fiscal pressure to capture the fiscal stance of municipalities.[19] As demographic variables, we include population size, population density, share of above 65 year olds. To capture economic conditions, we include the share of income tax revenues that accrues to a municipality.[20] As political variable, we include left-wing seat share in the local council. To

[18]To evaluate the size of the effect, compare the estimates to e. g. average total expenditures per capita during the sample period as reported in Table A.4 in the appendix.

[19]Fiscal pressure is an indicator defined in the cameralistic accounting system (this accounting system was employed in Brandenburg during the sample period). It is defined, in a nutshell, as primary surplus net of debt repayments and accrued liabilities.

[20]Municipalities are entitled to a fixed fraction of all income tax revenues collected within their administrative boundaries. As the income tax rate is constant throughout the federation (municipalities have no autonomy to change rates or bases), the municipal income tax share is entirely determined by the value of the base, which will evolve according to economic conditions.

account for any non-linear relationship between expenditures per capita and population size, we add the squared value of population size. Some of these control variables are arguably not exogenous, but it would nonetheless be reassuring if the results for the treatment variable remains unaffected.

The results are reported in Table 2 and are almost identical to those in Table 1 for total, staff, and administrative expenditures. We find that total expenditures per capita decline by about -80 Euros per capita and administrative expenditures by about -20 Euros per capita. Staff expenditures, as above, hardly decline. For current expenditures, the treatment effect is somewhat larger than in the baseline estimates, i. e. about -89 Euros per capita, but it continues to be in the same order of magnitude as in the baseline regressions. Overall, we conclude that the results are robust to the inclusion of observable covariates.

5.3.2 Placebo regressions

As another check for the validity of the common trend assumption, we estimate placebo treatment effects for years 1999 and 2000 after restricting the sample to the 1998-2003 period.[21] Assuming no pre-existing trends in the outcomes, we expect significantly smaller treatment effects in these placebo regressions. The results are reported in Table 3. We indeed find no significant negative treatment effect for either outcome variable when we set the treatment date to 1999 or 2000.

5.3.3 Different control groups

Some mergers took place prior to the onset and after the completion of the official merger reform (Figure 1). In the regressions, the affected municipalities are classified as part of the control group (together with to those municipalities which have never been merged). This approach may lead to some bias, for example if municipalities that merged in the pre-reform

[21] There were only few mergers in 1999 and 2000. In 2000, in particular, there was only one completed merger, i. e. the municipality of Teichland (see Figure 1).

period experienced some delayed cost savings. Hence, we estimate another robustness test where the control group only consists of municipalities that have not been merged since 1875; municipalities that merged prior to the merger reform or after its completion are dropped. The year 1875 is chosen as the cutoff because official records start in this year.

Table 4 shows the regressions where the control group is restricted to the subgroup mentioned above. We find that the results are largely in line with the baseline results in both magnitude and significance. The mergers before and after the merger reform do not have a substantive effect on the baseline results.

5.3.4 Functional form assumptions

Another concern with the baseline results is the choice of the functional form for the dependent variables. The expenditure variables are included in per capita terms and the estimates are interpreted accordingly. This may be problematic, for example because outliers may have substantial influence on the coefficient estimates. Alternatively, normalization by dividing with population size may lead to bias if there is substantial in- or out-migration following the merger reforms.

To explore the robustness of the estimates to the choice of the functional form, we estimate regressions where we use log and the gross value of each expenditure item as dependent variable. The results are reported in Table 5. We find that the results do not differ qualitatively from the baseline results. From the models with log expenditures as dependent variable, we can conclude that mergers lead to a decrease in total expenditures by about 6%, a decrease in administrative expenditures by about 4%, and a decrease in current expenditures by about 8%. Similarly, the models with the expenditures in levels as dependent variable suggest that mergers have on average a negative effect of about -850,000 Euros on total expenditures, -180,000 Euros on administrative expenditures, and -670,000 Euros on current expenditures.

6 Voluntary and compulsory mergers

6.1 Different treatment effects for voluntary and compulsory mergers

Much of the previous literature indicates that the type of mergers, i. e. whether they were voluntary or compulsory, matters for how they affect fiscal outcomes. However, as discussed above, the available evidence on compulsory and voluntary mergers is from different countries, and it is unclear whether any differences in fiscal outcomes are due to country-specific institutional features or due to inherent differences between compulsory and voluntary mergers. One advantage of our setting is that we can explore within the same institutional context whether voluntary mergers have different treatment effects than compulsory ones.

In Table 6 we report regression results from a variant of Equation 1 where we estimate separate treatment effects for voluntary and compulsory mergers. We obtain significant treatment effects only for compulsory mergers. While compulsory mergers lead to a statistically significant reduction of total expenditures by -197 Euros per capita, voluntary mergers have only an insignificant effect of 14 Euros per capita. Similarly, compulsory mergers have large negative effects on administrative and current expenditures while voluntary mergers are insignificant. Overall, it appears that only compulsory mergers are associated with scale economies.

6.2 Different treatment effects across types of mergers and years

A question that is related to whether voluntary and compulsory mergers have different fiscal effects is how treatment effects vary over time. Do the expenditure cuts after compulsory mergers increase over time? Are some expenditure cuts already observable in 2003, where municipalities undergoing voluntary mergers may have witnessed some cost reductions? Do

municipalities try to exploit the post-merger common pools by increasing expenditures before the mergers as suggested by Figure 3. We explore these questions by estimating a specification that allows the treatment effect of voluntary and compulsory mergers to vary by year from 2001 to 2005.

We indeed find a significantly positive treatment effects for voluntary mergers in 2001 for total and current expenditures. From 2002 until 2004 the effect is mostly negative and significant for administrative and current expenditures. In 2005, however, the estimated treatments effect are insignificant and have a positive coefficient for some expenditure items. It seems that municipalities which underwent voluntary reforms have attempted to expand expenditures immediately after the announcement of the reform. In contrast, while we observe some expenditure cuts in this more flexible specification for the post-merger period, they are small and do not persist.

We also find a significant positive treatment effect on total expenditures for compulsory mergers in 2001. The effect continues to be positive and large in 2002, but becomes insignificant. Similar patters are observable for current expenditures, even though the magnitude of the coefficient is smaller. Thus, municipalities that underwent compulsory mergers, too, seem to have attempted to exploit the post-merger common pool, arguably even more than municipalities that merged voluntarily.

The sign of the coefficient for total expenidtures reverses from 2004 onward. In 2004 and 2005, the treatment effect is large and significantly negative for total, administrative, and current expenditures. Thus, once the mergers were concluded, municipalities that underwent compulsory mergers experienced significant and persistent expenditure cuts, confirming the previous findings.

Overall, it seems that both municipalities subject to voluntary and compulsory mergers expanded their expenditures immediately prior to the mergers, which explains the steeper

increase in total expenditures observed for the treatment group in Figure 3.[22] Second, there were some cost savings after voluntary mergers, in particular with respect to current and administrative expenditures, but that they were smaller and less persistent than for compulsory mergers. Thus, the average treatment effects estimated in the baseline regressions were mostly due to compulsory mergers.

One reason why treatment effects seem lower for voluntary mergers might be that municipalities that merge voluntarily choose partners such that they only barely fulfill the criteria set out by the state government regarding minimum population of post-merger municipalities. More specifically, we find that the size of municipalities that merged voluntarily is substantially smaller than of municipalities that were subject to compulsory mergers after the merger. The difference in 2001, when evaluated for post-reform boundaries, is about 3650 inhabitants and statistically significant according to the t-tests reported in Table A.2 in the appendix. Results are similar for 2005. Thus, municipalities that merged voluntarily may still be too small to experience significant scale economies.

Second, municipalities that merged voluntarily seem to be also somewhat weaker fiscally. In 2000, average revenues per capita are about 125 Euros per capita lower while grant receipts are about 25 Euros per capita and fiscal pressure is about 13 Euros per capita higher. These differences are statistically significant according tot the t-tests reported in Table A.2. Another reason why observed economies of scale are smaller could therefore be that municipalities that merged voluntarily are a bad selection within the group of all merged municipalities.

[22] It is also possible that the pre-merger expansion of expenditures may be due to transition costs. However, this argument is unlikely to explain the observed patterns. For example, this explanation is inconsistent with the observation that expenditures increase for compulsory mergers already in 2001, shortly after the announcement of the reform, while the mergers were completed only in 2003.

Third, as noted above, municipalities that merged voluntarily received extra grants. If these grants were used to expand expenditures and if these expenditures had persistent effects, we may obtain estimates for voluntary mergers that are biased upwards.

We can test whether any differences in the characteristics of those municipalities that merged voluntarily and those that were merged forcibly are driving the results by reestimating the models in Table 7 after including time-varying control variables considered above. The results from such models are reported in Table A.3 in the appendix. While they provide somewhat more consistent evidence than the models without control variables that municipalities which merged voluntarily experienced some cost savings, the main conclusion from Table 7 – that forced mergers have substantially larger expenditure effects than voluntary ones – remains robust.

The differences in the expenditure effects of forced and voluntary mergers do not seem to be, at least not primarily, due to differences in municipal characteristics or additional grant receipts during voluntary mergers. Rather, voluntary and compulsory mergers seem to affect the ability of local policy makers to maintain pre-existing levels of expenditures. One possibility, in line with the coalition-forming literature, is that policy makers may find it easier to form coalitions in favor of avoiding spending cuts if they merge voluntarily by choosing their partners strategically (Bruns and Schuhmann, 2013; Weese, 2014). Such coalitions may be harder to form when mergers are enforced from above.

7 Do service levels change because of mergers?

A concern regarding the previous estimates is that expenditure cuts as a result of mergers are not due to scale economies but due to declining service output or quality. While it is not clear why mergers should induce municipalities to reduce services, it is important to

explore this issue to confirm that mergers indeed lead to lower expenditures because of scale economies and not because of service cuts.

Unfortunately, it is difficult to measure quantity or quality of local public goods. Output quantity is hard to measure comprehensively as municipal tasks are manifold and often carried out by various administrative units (Büttner et al., 2009). For the same reason, it is difficult to evaluate changes in service quality accurately.

We therefore explore possible changes in service provision due to mergers indirectly by using births and inter-municipal migrations. If local public goods provision declined as a result of mergers, one would expect the birth rates to shrink as a result of a lower attractiveness of the municipality. This is a possibility because one important municipal service, especially in Eastern Germany, is the provision of child daycare facilities. Incoming migration, in contrast, captures Tiebout's idea that inhabitants sort themselves into a relatively preferred locality (Lüchinger and Stutzer, 2002). Reingewertz (2012) uses similar measures as proxies for service quality[23] when evaluating the Israeli merger reform of 2003.

We explore the effect of mergers on births and migration in Table 8. We do not observe any significant reform-induced changes in these service proxies. While only circumstantial as birth rates and immigration are imperfect measures of service quality, these pieces of evidence provide suggestive evidence that the reductions in expenditures are indeed due to scale economies of larger administrative units rather than due to cuts in municipal services.

8 Conclusion

This paper explores the impact of municipal mergers in the German federal state of Brandenburg on municipal expenditure levels. Difference-in-difference estimations with a panel of municipalities in Brandenburg for the years of 1998–2005 show that total, administrative,

[23] However, he uses more proxies, such as average class size and housing constructions. Unfortunately, such measures are not available to us.

and current expenditures decline after mergers. These reductions are mainly due to compulsory mergers. Voluntary mergers have smaller and less robust effects. We also provide suggestive evidence that the expenditure reductions are not due to cuts in municipal services.

One concern with the results is the short post-treatment period. Our sample might be too short to uncover long-term effects. Our results are therefore likely lower bounds. Such underestimation of the true treatment effects may be particularly important with respect to staff expenditures. Due to the long-term nature of employment contracts, it might take some time before any treatment effects can be observed for this expenditure item. On the other hand, it is remarkable that substantial scale economies emerge already within one year after compulsory mergers for total, current, and administrative expenditures.

With respect to external validity, our results arguably carry over to other East-German States given the similarities between them and Brandenburg. Despite socio-economic differences between East and West Germany, our results should also be relevant for the western states given that local budgeting and merger processes are quite similar. International comparisons are more difficult as the organization of the subnational government tier varies significantly even between industrialized countries. However, the fact that our results for the expenditure effects of compulsory mergers are in line with findings from Denmark or Israel indicates that the results presented here can be transferred to other developed countries.

One avenue for future research on fiscal outcomes of merger reforms is to explore in more detail why compulsory mergers seem to be more effective than voluntary ones. While we have offered one explanation further above – i. e. that municipalities strategically choose partners such that they can avoid spending cuts when they merge voluntarily– a more detailed analysis of this issue would be welcome.

Overall, our findings suggest that policy makers should make further use of the instrument of (compulsory) mergers to harvest scale effects and reduce administrative costs. On the other hand, one should not neglect the non-monetary costs of mergers, such as less local

democracy. Whether mergers are overall beneficial should, therefore, be decided on a case-by-case basis.

9 Acknowledgments

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Table 1: Treatment effects on total expenditures per capita, FE models, municipalities in Brandenburg, 1998–2005, baseline regressions

	(I) Total expenditures	(II) Staff expenditures	(III) Administrative expenditures	(IV) Current expenditures
Amalgamation	-81.233**	-1.977	-18.675***	-63.377**
	(38.529)	(3.742)	(5.571)	(28.208)
Municipalities FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Control variables	No	No	No	No
Municipalities	411	411	411	411
Observations	3288	3288	3288	3288
F	4.425	0.278	11.187	5.025

Notes Stars indicate significance levels at 10% (*), 5% (**) and 1%(***). Standard errors are reported in parentheses. All models with cluster and heteroscedasticity robust standard errors. The unit of clustering is the municipality.

Table 2: Treatment effects on various expenditures per capita, FE models, municipalities in Brandenburg, 1998–2005, with control variables

	(I) Total expenditures	(II) Staff expenditures	(III) Administrative expenditures	(IV) Current expenditures
Amalgamation	-79.584***	-2.533	-20.408***	-88.994***
	(24.284)	(3.903)	(5.781)	(12.389)
Population	-0.054**	0.009*	0.008	-0.005
	(0.027)	(0.006)	(0.007)	(0.017)
Population^2	0.000*	-0.000***	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Population density	-0.191	0.087	-0.029	0.035
	(0.187)	(0.069)	(0.077)	(0.144)
Old	-0.679	0.143	-0.135	-0.344
	(0.589)	(0.120)	(0.142)	(0.350)
Total revenues p.c.	0.204	0.006	0.012	0.042
	(0.154)	(0.004)	(0.008)	(0.028)
Grants p.c.	-0.040	0.005	0.015	0.151*
	(0.222)	(0.021)	(0.032)	(0.085)
Income tax share p.c.	0.542	0.202	0.083	0.410
	(0.644)	(0.130)	(0.120)	(0.313)
Fiscal pressure p.c.	0.176	0.000	-0.005	-0.034**
	(0.112)	(0.003)	(0.006)	(0.015)
Left	0.037	0.117	0.152	0.480*
	(0.461)	(0.073)	(0.115)	(0.264)
Municipalities FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Municipalities	411	411	411	411
Observations	2996	2996	2996	2996
F	4.290	2.988	1.820	7.357

Notes Stars indicate significance levels at 10% (*), 5% (**) and 1%(***). Standard errors are reported in parentheses. All models with cluster and heteroscedasticity robust standard errors. The unit of clustering is the municipality.

Table 3: Placebo treatment effects on various expenditures per capita, FE models, municipalities in Brandenburg, 1998–2003

	(I) Total expenditures	(II) Staff expenditures	(III) Administrative expenditures	(IV) Current expenditures
1999				
Amalgamation × 1999	45.477	-0.744	1.094	7.916
	(34.534)	(3.627)	(5.032)	(11.929)
2000				
Amalgamation × 2000	16.081	-4.911	-2.715	0.573
	(29.930)	(3.814)	(5.340)	(10.236)
Municipalities FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Control variables	No	No	No	No
Municipalities	411	411	411	411
Observations	2466	2466	2466	2466

Notes This table presents placebo regressions where the treatment is set to being in 1999 (upper panel), 2000 (middle panel), and 2001 (lower panel). Stars indicate significance levels at 10% (*), 5% (**) and 1%(***). Standard errors are reported in parentheses. All models with cluster and heteroscedasticity robust standard errors. The unit of clustering is the municipality.

Table 4: Treatment effects on total expenditures per capita, FE models, municipalities in Brandenburg, 1998–2005, regressions with municipalities that were not merged since 1875

	Total expenditures	Staff expenditures	Administrative expenditures	Current expenditures
	(I)	(II)	(III)	(IV)
Amalgamation	-71.439*	-2.878	-20.907***	-66.130**
	(43.146)	(4.888)	(6.730)	(29.012)
Municipalities FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Control variables	Yes	Yes	Yes	Yes
Municipalities	339	339	339	339
Observations	2712	2712	2712	2712
F	2.726	0.345	9.598	5.167

Notes Stars indicate significance levels at 10% (*), 5% (**) and 1%(***). Standard errors are reported in parentheses. All models with cluster and heteroscedasticity robust standard errors. The unit of clustering is the municipality.

Table 5: Treatment effects on total expenditures per capita, FE models, municipalities in Brandenburg, 1998–2005, functional form assumptions: log and level models

	(I) Total expenditures	(II) Staff expenditures	(III) Administrative expenditures	(IV) Current expenditures
Log dependent variable				
Amalgamation	-0.062***	-0.046	-0.044*	-0.075***
	(0.021)	(0.033)	(0.025)	(0.015)
Level dependent variable				
Amalgamation	-8.5e+05***	-1.3e+03	-1.8e+05***	-6.7e+05***
	(2.8e+05)	(3.7e+04)	(6.0e+04)	(1.8e+05)
Municipalities FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Control variables	No	No	No	No
Municipalities	411	411	411	411
Observations	3288	3288	3288	3288

Notes Stars indicate significance levels at 10% (*), 5% (**) and 1%(***). Standard errors are reported in parentheses. All models with cluster and heteroscedasticity robust standard errors. The unit of clustering is the municipality.

Table 6: Separate treatment effects for voluntary and forced mergers on various expenditures per capita, FE models, municipalities in Brandenburg, 1998–2005

	Total expenditures	Staff expenditures	Administrative expenditures	Current expenditures
	(I)	(II)	(III)	(IV)
Voluntary mergers	-13.650	-2.862	-7.227	-3.924
	(50.976)	(4.197)	(5.740)	(40.909)
Compulsory mergers	-197.190***	-0.459	-38.318***	-165.385***
	(35.922)	(4.457)	(8.663)	(21.763)
Municipalities FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Control variables	No	No	No	No
Municipalities	411	411	411	411
Observations	3288	3288	3288	3288
F	15.896	0.267	9.735	28.939

Notes Stars indicate significance levels at 10% (*), 5% (**) and 1%(***). Standard errors are reported in parentheses. All models with cluster and heteroscedasticity robust standard errors. The unit of clustering is the municipality.

Table 7: Separate yearly treatment effects for voluntary and forced mergers on various expenditures per capita, FE models, municipalities in Brandenburg, 1998–2005

	Total expenditures	Staff expenditures	Administrative expenditures	Current expenditures
	(I)	(II)	(III)	(IV)
Voluntary × 2001	64.548*	-4.078	3.914	25.724**
	(33.658)	(3.583)	(6.492)	(11.106)
Voluntary × 2002	8.820	-7.666*	-18.627***	-26.039*
	(46.418)	(4.496)	(7.133)	(15.601)
Voluntary × 2003	-42.680	-8.338	-14.140*	-25.559
	(46.262)	(5.110)	(7.617)	(16.584)
Voluntary × 2004	-19.429	-5.891	-15.835**	-43.886***
	(41.007)	(5.592)	(7.689)	(16.152)
Voluntary × 2005	2.357	-6.527	-8.237	27.412
	(88.691)	(6.157)	(7.549)	(79.049)
Compulsory × 2001	72.517**	-3.130	4.437	10.292
	(36.177)	(4.388)	(6.751)	(13.400)
Compulsory × 2002	81.719	0.813	2.136	25.129
	(50.178)	(5.015)	(7.416)	(15.771)
Compulsory × 2003	17.263	1.481	6.866	28.086*
	(48.296)	(5.653)	(8.611)	(15.913)
Compulsory × 2004	-135.134***	2.461	-35.439***	-138.136***
	(44.656)	(5.987)	(9.975)	(23.092)
Compulsory × 2005	-202.080***	-3.659	-36.717***	-171.466***
	(43.982)	(6.764)	(10.168)	(25.456)
Municipalities FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Control variables	No	No	No	No
Municipalities	411	411	411	411
Observations	3288	3288	3288	3288
F	5.527	1.860	4.823	11.995

Notes Stars indicate significance levels at 10% (*), 5% (**) and 1%(***). Standard errors are reported in parentheses. All models with cluster and heteroscedasticity robust standard errors. The unit of clustering is the municipality.

Table 8: Treatment effects on service provision, FE models, municipalities in Brandenburg, 1998–2005

	(I) Births	(II) Immigration
Amalgamation	-0.212	3.736
	(0.173)	(21.251)
Municipalities FE	Yes	Yes
Year FE	Yes	Yes
Control variables	No	No
Municipalities	411	411
Observations	3283	3288
F	1.501	0.031

Notes Stars indicate significance levels at 10% (*), 5% (**) and 1%(***). Standard errors are reported in parentheses. All models with cluster and heteroscedasticity robust standard errors. The unit of clustering is the municipality.

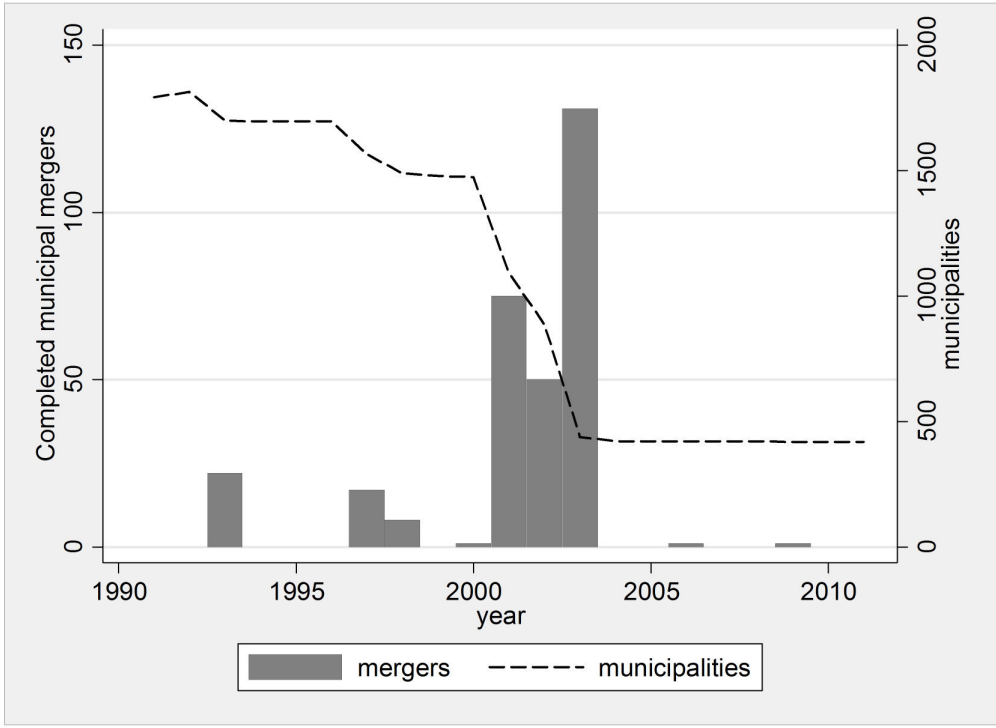
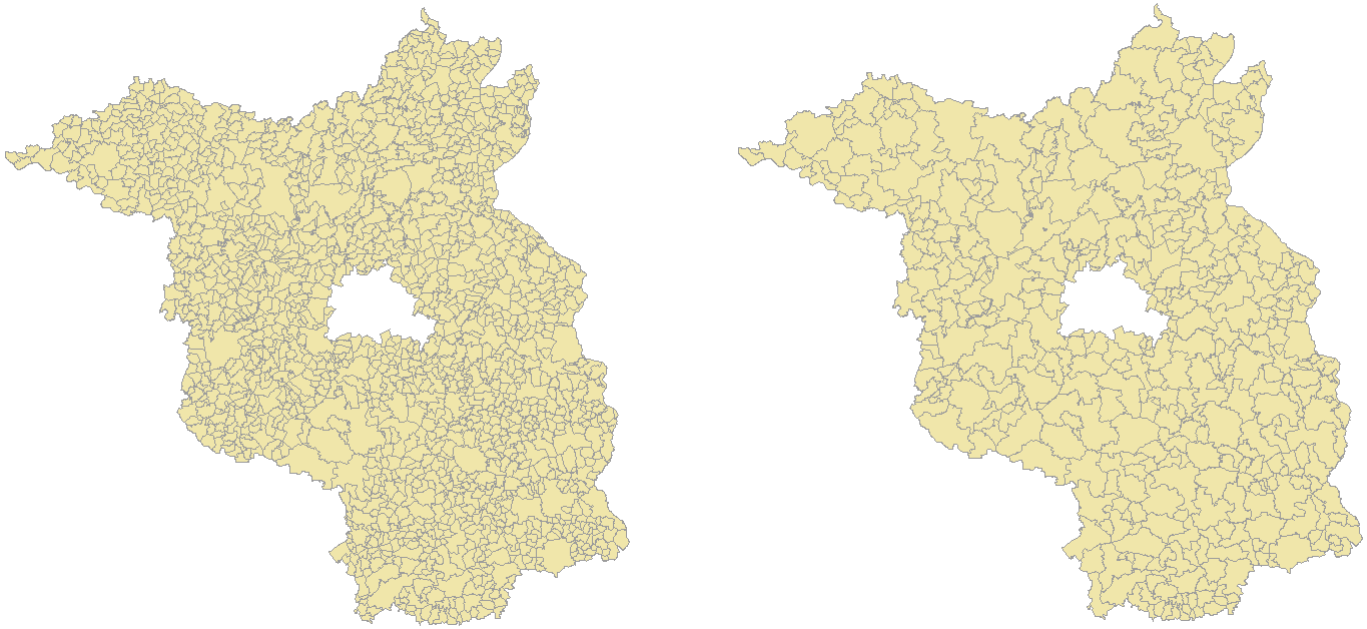


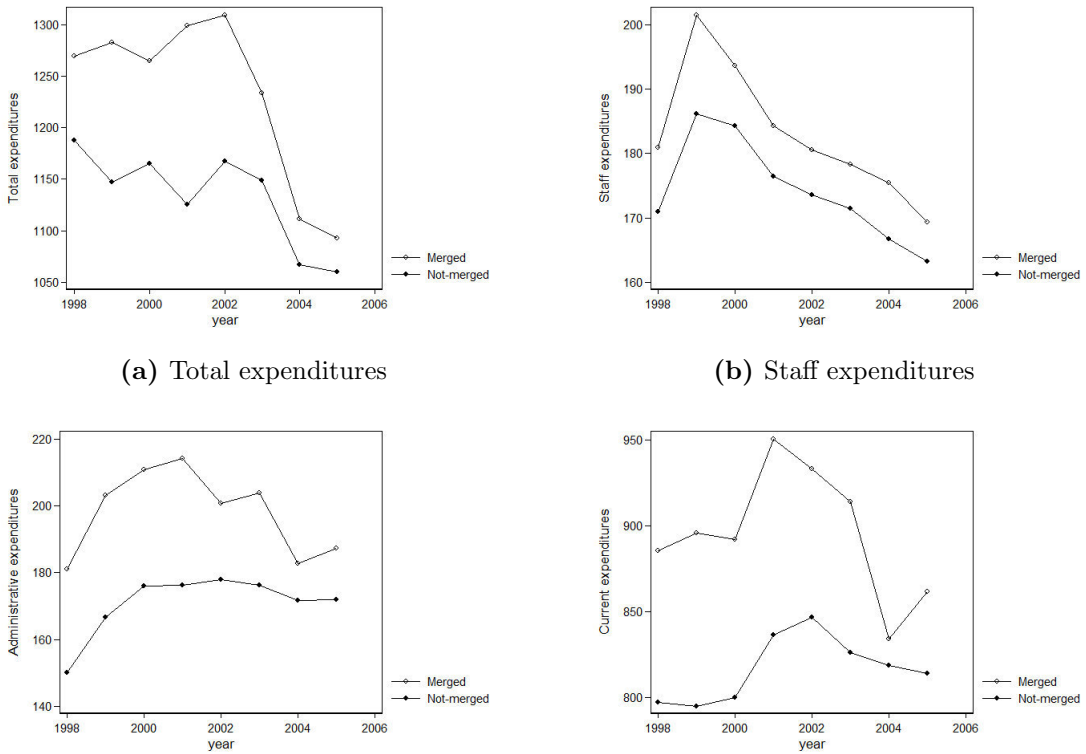
Figure 1: Number of municipalities and completed mergers over time.
Source: SBB (2013) and SDL (2005). All numbers use end of year dates and include district-free cities.



(a) Municipal boundaries in 1999

(b) Municipal boundaries in 2005

Figure 2: Municipal boundaries in Brandenburg in 1999 and 2005.



(a) Total expenditures

(b) Staff expenditures

(c) Administrative expenditures

(d) Current expenditures

Figure 3: Mean expenditures per capita by group status, 1998-2005 in constant 2005 Euros.
The figure shows the mean of expenditures items (per capita, in constant 2005 Euros) in all municipalities (solid line), amalgamated municipalities (dashed line) and non-amalgamated municipalities (dotted line) for the period 1998-2005.

Table A.1: Definition and source of variables

Label	Description	Source
Amalgamation	Dummy=1 if municipality was amalgamated in the context of the 2001-2003 amalgamation reform & if Year $\geq$ 2004	Own calculations based on LDS (2006)
Total expenditures pc	Total expenditures are the sum of current and capital expenditure account divided by population (minus special financial operations)	Own calculations based on SBB
Staff expenditures pc	Staff expenditures divided by population (minus special financial operations)	Own calculations based on SBB
Administrative expenditures pc	Administrative expenditures measure materially administrative and operating expenses divided by population (minus special financial operations)	Own calculations based on SBB
Current expenditures pc	Current expenditures divided by population minus special financial operations and payments of the German social code 2 (SGB II)	Own calculations based on SBB
Population	Number of inhabitants of a municipality	SBB
Population density	Number of inhabitants divided by the total municipal area	Own calculations based on SBB
Old	Share of population above 65 years per 1000 inhabitants	SBB
Total revenues pc	Total revenues per capita divided by population (minus special financial operations and payments of the German social code 2)	Own calculations based on SBB
Income tax share pc	Municipal share of federal income tax revenue (proxy for local income) divided by population	Own calculations based on SBB
Grants	Unconditional grants from the federal state divided by population	Own calculations based on SBB
Fiscal pressure p.c.	primary surplus net of debt repayments and accrued liabilities (indicator for fiscal stance in cameralistic accounting system)	Own calculations based on SBB
Left	Number of socialist seats, i.e. SPD & PDS/Die Linke, as a percentage of the overall number of seats of local councils	Own calculations based on SBB
Births	Number of live births per 1000 inhabitants	Own calculations based on SBB
Immigration	Number of immigrants per 1000 inhabitants	Own calculations based on SBB

Note: All variables are based on the territorial state of 31th December 2005 or are adjusted to that territorial state where such data have not been available. Budgetary variables are adjustment for special financial operations as well as social transfers according to social code 2 (SGB II) if such information is available. Social transfer adjustments are necessary because of i) new municipal responsibilities by the introduction of the SGB II in 2005, ii) the absence of any municipal discretion regarding social transfers and iii) the fact that social transfer payments are due to exogenous factors rather than changes in local politics. Exact account numbers are available from the authors. All economic variables are set to their real values by deflating the respective nominal values by the consumer price index with the base year 2005.

Table A.2: Difference in municipal characteristics of voluntary vs. compulsory mergers after end of merger reform

	Differences in 2000			Differences in 2005		
	Compulsory, Mean (SD)	Voluntary, Mean (SD)	Diff. t-stat (p-value)	Compulsory, Mean (SD)	Voluntary, Mean (SD)	Diff. t-stat (p-value)
Population	7448.263	3809.945	4.495	7403.126	3756.595	4.523
	(6833.765)	(5918.864)	(0.000)	(6755.540)	(5930.659)	(0.000)
Population density	78.115	51.492	2.820	79.883	51.581	2.689
	(76.460)	(71.133)	(0.005)	(85.811)	(78.965)	(0.008)
Old	232.283	236.777	-1.093	258.755	254.624	0.960
	(32.224)	(31.615)	(0.275)	(36.345)	(31.451)	(0.338)
Total revenues p.c.	1375.927	1250.995	2.161	1209.335	1197.908	0.127
	(352.063)	(494.991)	(0.032)	(415.203)	(817.371)	(0.899)
Grants p.c.	316.465	339.957	-3.034	298.722	305.970	-1.122
	(68.046)	(54.756)	(0.003)	(55.416)	(46.015)	(0.263)
Income tax share p.c.	71.541	62.282	4.755	84.490	71.881	4.459
	(14.243)	(15.555)	(0.000)	(21.476)	(22.154)	(0.000)
Fiscal pressure p.c.	-0.054	13.186	-0.542	-2.159	-57.740	1.308
	(140.771)	(212.269)	(0.588)	(88.960)	(408.274)	(0.192)
Left	24.619	15.781	3.966	23.987	21.016	1.123
	(17.370)	(17.200)	(0.000)	(20.413)	(20.554)	(0.263)

This table compares differences in post-treatment covariates (in 2005) between municipalities that were voluntarily and forcibly merged.

Table A.3: Separate yearly treatment effects for voluntary and forced mergers on various expenditures per capita, FE models, municipalities in Brandenburg, 1998–2005

	(I) Total expenditures	(II) Staff expenditures	(III) Administrative expenditures	(IV) Current expenditures
Voluntary × 2001	55.083*	-3.099	3.389	26.408**
	(28.822)	(3.633)	(6.482)	(10.828)
Voluntary × 2002	-36.618	0.701	-25.973**	-62.764*
	(46.781)	(5.135)	(12.117)	(32.682)
Voluntary × 2003	-63.922	-6.974	-13.058*	-30.308*
	(39.208)	(5.064)	(7.229)	(15.977)
Voluntary × 2004	-11.603	-5.556	-15.782**	-45.786***
	(32.828)	(5.589)	(7.479)	(15.951)
Voluntary × 2005	-43.318	-4.979	-8.029	-36.932**
	(31.142)	(6.194)	(7.480)	(16.123)
Compulsory × 2001	61.147*	-3.021	3.555	11.293
	(31.631)	(4.444)	(6.778)	(13.056)
Compulsory × 2002	58.381	3.715	2.692	27.823
	(49.770)	(5.037)	(9.548)	(18.981)
Compulsory × 2003	-2.765	1.212	6.501	20.776
	(41.014)	(5.602)	(8.509)	(15.152)
Compulsory × 2004	-129.179***	1.520	-35.743***	-149.299***
	(39.921)	(5.865)	(9.851)	(20.163)
Compulsory × 2005	-172.959***	-4.270	-36.338***	-171.100***
	(38.887)	(6.542)	(10.024)	(22.021)
Population	-0.052*	0.009	0.008	-0.001
	(0.028)	(0.006)	(0.007)	(0.017)
Population density	-0.187	0.086	-0.034	0.028
	(0.190)	(0.070)	(0.078)	(0.137)
Population^2	0.000*	-0.000**	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Old	-0.453	0.125	-0.096	-0.110
	(0.613)	(0.123)	(0.146)	(0.362)
Total revenues p.c.	0.202	0.006	0.012*	0.040
	(0.151)	(0.004)	(0.007)	(0.026)
Grants p.c.	-0.005	0.005	0.021	0.175**
	(0.220)	(0.021)	(0.032)	(0.081)
Income tax share p.c.	0.571	0.200	0.093	0.448
	(0.639)	(0.131)	(0.122)	(0.312)
Fiscal pressure p.c.	0.174	0.000	-0.005	-0.035**
	(0.111)	(0.003)	(0.006)	(0.014)
Left	-0.120	0.119	0.115	0.331
	(0.450)	(0.073)	(0.112)	(0.245)
Municipalities FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Municipalities	411	411	411	411
Observations	2996	2996	2996	2996
F	6.333	2.724	2.519	8.305

Notes Stars indicate significance levels at 10% (*), 5% (**) and 1%(***). Standard errors are reported in parentheses. All models with cluster and heteroscedasticity robust standard errors. The unit of clustering is the municipality.

Table A.4: Summary statistics

Variable		Mean	Std.	Min.	Max.	Obs.
Amalgamation	overall	0.628	0.483	0.000	1.000	3288
	between		0.484	0.000	1.000	411
	within		0.000	0.628	0.628	8.000
Total expenditures	overall					
	between	1196.020	456.775	515.206	13377.520	3288
	within		302.227	618.549	2984.065	411
			342.778	-526.456	12242.040	8.000
Staff expenditures	overall					
	between	179.687	112.088	8.094	616.708	3288
	within		108.377	12.410	454.434	411
			29.038	21.548	616.104	8.000
Administrative expenditures	overall					
	between	187.908	98.481	21.433	1029.404	3288
	within		86.811	30.081	551.292	411
			46.673	-43.263	913.874	8.000
Current expenditures	overall					
	between	866.367	307.433	432.544	13104.300	3288
	within		204.936	500.155	2211.268	411
			229.359	-828.646	11759.400	8.000
Population	overall					
	between	5138.034	7202.792	402.000	46250.000	3288
	within		7197.497	419.375	43668.500	411
			431.942	-306.216	10452.410	8.000
Population density	overall					
	between	111.749	219.219	8.650	2144.980	3288
	within		218.665	9.184	2072.640	411
			18.557	-371.031	423.589	8.000
Grants p.c.	overall					
	between	307.848	87.430	0.000	580.526	2996
	within		54.640	49.871	438.632	411
			68.977	-34.985	515.991	7.290
Total revenues p.c.	overall					
	between	1233.866	586.934	370.150	23642.040	3288
	within		360.613	643.661	4976.894	411
			463.386	-3089.355	19899.010	8.000
Old	overall					
	between	241.640	36.349	94.073	388.803	3288
	within		32.899	125.372	333.244	411
			15.532	163.532	320.448	8.000
Income tax share p.c.	overall					
	between	69.570	20.018	15.411	157.852	3288
	within		17.316	33.089	121.856	411
			10.075	2.976	125.896	8.000
Fiscal pressure p.c.	overall					
	between	6.063	250.610	-8170.937	2863.112	3288
	within		103.505	-1147.583	350.241	411
			228.287	-7139.103	2521.724	8.000
Left	overall					
	between	23.472	22.179	0.000	100.000	3288
	within		19.303	0.000	92.500	411
			10.959	-34.863	76.257	8.000
Births	overall					
	between	6.521	2.414	0.000	28.700	3283
	within		1.350	2.988	12.901	411
			2.003	-0.837	26.638	7.988
Immigration	overall					
	between	312.689	547.766	4.000	9570.000	3288
	within		505.578	12.250	3681.375	411
			212.093	-2003.436	7099.564	8.000

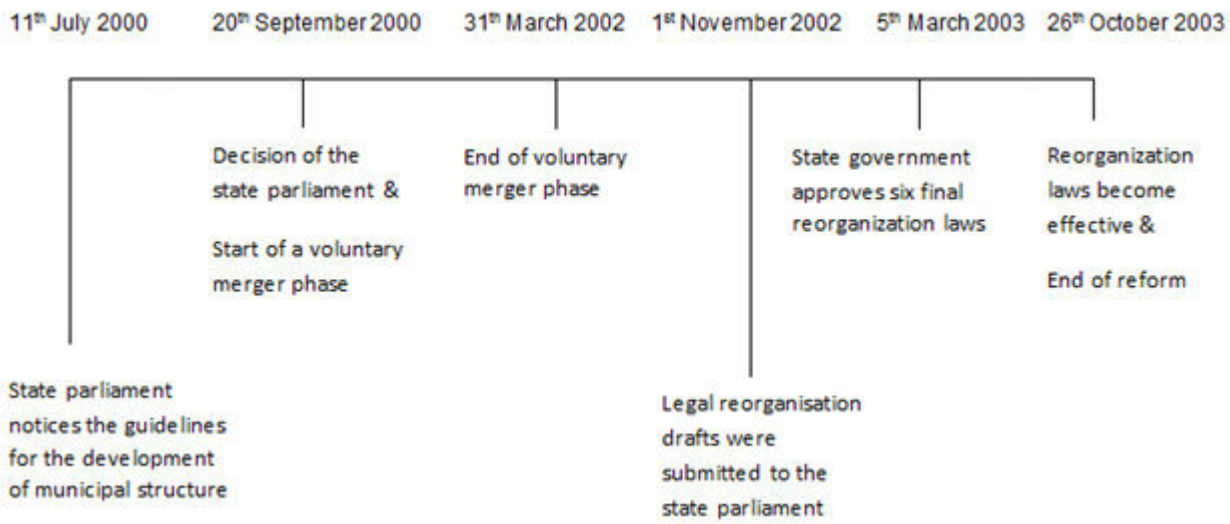


Figure A.1: Timeline of the merger reform.