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## Do mergers of large local governments reduce expenditures? Evidence from Germany using the synthetic control method

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Do mergers of large local governments  
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Evidence from Germany using the synthetic control method

Felix Roesel

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## Do mergers of large local governments reduce expenditures? – Evidence from Germany using the synthetic control method\*

### Abstract

States merge small and medium sized municipalities to achieve economies of scale. Little is known to which extent mergers of large local governments reduce expenditures. I use the synthetic control method to identify the effect of mergers of county-sized administrations in Germany (districts) on public expenditures. In 2008, the German state of Saxony reduced the number of districts from 22 to 10. Average district population increased substantially from 113,000 to 290,000 inhabitants. I construct a “Synthetic Saxony” serving as counterfactual to real Saxony from districts of ten other German states that did not merge districts for years. The results do neither show that district mergers reduce total expenditures per capita, nor expenditures in main expenditure categories such as social care, education or administration. There seems to be no scale effects in jurisdictions of more than 100,000 inhabitants.

JEL Code: H11, H72, H77, R51.

Keywords: Municipal mergers; local government; expenditures; synthetic control method.

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## 1. Introduction

For decades, states merge small and medium sized municipalities to achieve economies of scale in expenditures (Fox and Gurley 2006, Holzer et al. 2009, Bird and Slack 2013). The empirical evidence however is at least mixed. Reingewertz (2012), Blom-Hansen et al. (2014), and Hansen et al. (2014) document that expenditures of merged municipalities in Israel and Denmark decreased. By contrast, Lüchinger and Stutzer (2002) and Fritz (2013) show that merged municipalities in Switzerland and South Germany increased expenditures. Moision and Uusitalo (2013) and Allers and Geertsema (2016) do not find any significant effect of municipal reforms on public expenditures in Finland and in the Netherlands. Blesse and Baskaran (2016) do neither find effects of voluntary nor of compulsory mergers on overall, administrative and personnel expenditures in merged East German municipalities.<sup>1</sup>

Against the background of the evidence on consolidations of small entities, little is known to which extent mergers of large local governments affect public expenditures. However, politicians debate in many countries whether to merge county-sized administrations, for example, in Germany, the United States, Austria, or Ireland.<sup>2</sup> I examine the effects of mergers of large local governments covering more than 100,000 inhabitants on average. In 2008, the state government of the German state of Saxony reduced the number of districts (upper-level local governments) from 22 to 10 (see Figure 1). The average population of Saxon districts increased substantially

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<sup>1</sup> Blesse and Baskaran (2016) however show that compulsory municipal mergers reduced administrative expenditures, which however are only a minor share of overall municipal expenditures.

<sup>2</sup> See, e.g., Germany: Thüringer Allgemeine, “Thüringen und Brandenburg prüfen Kooperation beim Umsetzen der Verwaltungs- und Gebietsreform”, 15.07.2016. US: NBC15.com, “Lawmaker Wants to Merge Counties To Save Money”, 07.08.2007, <http://www.nbc15.com/home/headlines/9018942.html>. The State, “EXCLUSIVE: Merging Columbia, Richland County getting serious consideration”, <http://www.thestate.com/news/local/article90107087.html>, 16.07.2016. Austria: Der Standard, “Zusammenlegung der Bezirkshauptmannschaften startet”, 05.07.2016, <http://derstandard.at/2000040461646/BH-Zusammenlegung-der-Verwaltung-startet>. Ireland: Irish Examiner, “Defiant Aidan O’Shea adamant weaker counties should amalgamate”, <http://www.irishexaminer.com/sport/gaa/football/defiant-aidan-oshea-adamant-weaker-counties-should-amalgamate-378399.html>, 27.01.2016.

from around 113,000 to 290,000 inhabitants. Because all Saxon districts were affected, I use the synthetic control method and construct a synthetic counterpart to Saxony as a whole. Districts of ten other German states which did not merge districts for years constitute the donor pool. The results do neither show that mergers of large local governments reduce total expenditures per capita, nor expenditures in main expenditure categories such as social care, education or administration. These findings are in line with anecdotal evidence on the Saxon merger reform reporting that “great expectations changed into great disillusion”.<sup>3</sup>

[Figure 1 about here]

Scholars did not yet examine scale effects in expenditures of large local governments by exploiting a merger reform.<sup>4</sup> Prior studies investigate small entities such as municipalities. German districts, by contrast, have a population of around 190,000 inhabitants on average which roughly corresponds with the US county level. I confirm considerations of previous studies and surveys that suspect no further gains in efficiency in large local governments (Holzer et al. 2009). The results of this study do not show that there are any economies of scale in local governments beyond a population size of around 100,000 inhabitants. This finding holds true for total expenditures but also for expenditures in all main functions of German districts (administration including public order and safety, social care, and education).

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<sup>3</sup> Translation by the author. Original in German language: “Die Erwartungen waren groß, heute ist es die Ernüchterung.” See RBB online, So lief die Kreisgebietsreform in Sachsen, 24.02.16, <http://www.rbb-online.de/politik/beitrag/2016/02/landkreisreform-sachsen.html>. Similar disenchantments are reported for the state of Mecklenburg-West Pomerania which experienced large-scale district mergers in 2011: “Even five years after the reform, reductions of costs have not been realized.” (Translation by the author. Original in German language: “Auch fünf Jahre später ist die Reform noch immer eine große Baustelle: Die erhofften Einsparungen lassen auf sich warten.”). See RBB online, So lief die Kreisgebietsreform in Mecklenburg-Vorpommern, 24.02.16, <http://www.rbb-online.de/politik/beitrag/2016/02/landkreisreform-mecklenburg-vorpommern.html>.

<sup>4</sup> There are studies on consolidations of special-purpose entities such as school districts. For the seminal work see Brasington (1999). Further evidence is provided, e.g., by Duncombe and Yinger (2007), and Knight and Gordon (2008).

Prior studies usually compare merged and unchanged local governments within a difference-in-differences setup. I abstract from micro-level data and apply the synthetic control method to state-level aggregates. The synthetic control method is a powerful tool to evaluate policy reforms if the number of treated units is small, and only aggregated outcomes are observable (see also Abadie et al. 2015). I show that the method is superior to difference-in-differences estimations, when the common trend assumption seems to be violated (see also Kreif et al. 2016). Only a small number of studies in public finance employed the synthetic control method (e.g., Mukherji and Mukhopadhyay 2011, Koehler and König 2015, Falkenhall et al. 2015, Green et al. 2016).<sup>5</sup> As the most related study, Hämäläinen and Moisio (2015) use the synthetic control method to evaluate the implementation of a second layer of local government in one region in Finland while other regions do not change institutions. Hämäläinen and Moisio (2015) do neither report cost savings nor increases in expenditures, which is also in line with the results of this study.

## **2. Institutional background**

### *2.1 Districts in Germany*

Germany has a federal system with two layers of state government (national level, state level) and two layers of local government (districts, municipalities). The about 10,000 German municipalities (*Gemeinden*) are responsible for local public services such as public safety and order, waste disposal or cultural institutions and can set their own tax rates on property and local business. The 295 districts (*Landkreise*) constitute the upper-level local governments and roughly correspond with US counties in terms of population. Districts are mainly responsible

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<sup>5</sup> Most public economics studies using the synthetic control method evaluate regulations of tobacco (Abadie et al. 2010, Bharadwaj et al. 2014) and alcohol (Marcus and Siedler 2015).

for social care (youth and social welfare, accommodation costs of long-term unemployed), public safety and order, economic development, public transport, and parts of education. The functions of districts, however, differ across German states to some extent. In addition to the 295 more rural districts, about 107 large cities (*kreisfreie Städte*) exercise functions and municipal functions as one. I exclude large cities from the analysis because these municipalities are not comparable to districts in terms of functions and expenditures.

German local governments can spend and borrow on their own behalf but are regulated by fiscal supervisors of the federal states (Roesel 2016). In 2013, total expenditures of German districts amounted to 34 billion Euros (around 620 Euro per capita). This was about 25% of overall local government expenditures in Germany (large cities excluded). Social care was the most important expenditure category of districts, followed by administrative expenditures including public safety and order. Social and administrative expenditures account for about two third of total gross expenditures of German districts. Districts do not hold own tax competences. To finance expenditures, districts levy contributions from the municipalities, receive transfers from the states, and borrow. Contributions from municipalities are linked to fiscal capacity, and are substantial (for details see Baskaran 2014). In 2013, the share of municipalities' fiscal capacity transferred to the district level (i.e., the contribution rate) varied between 30% and 70% across federal states.

## 2.2 *District mergers 2008 in Saxony*

In Germany, the number of municipalities decrease year by year due to voluntary and compulsory mergers. District mergers, by contrast, are rare. There have been waves of district mergers in West Germany in the 1970s, and in East Germany in the 1990s after re-unification (see Figure 2). In 1994, the state of Saxony reduced the number of districts from 48 to 28. There were also 6 large cities which exercise district and municipal functions as one. In 1996, further district

mergers (and one demerger) led to a number of 22 districts and 7 large cities in Saxony. The third wave of district mergers in Saxony in 2008 yielded 10 districts and 3 large cities. The states of Saxony-Anhalt and Mecklenburg-West Pomerania notwithstanding, Saxony was the sole German state that merged districts between 1998 and 2014.<sup>6</sup>

[Figure 2 about here]

In late 2004, the state government of Saxony started a reform process in order to improve state and local administration (for details see Saxon Ministry of the Interior 2007). An expert commission was set up, and this commission advised to decrease the number of districts and large cities. In December 2005, the state government published key issues of the administration reform. The explicitly stated main targets were to cut back bureaucracy, to get the administration closer to the people, and to reduce administrative costs. In late 2006, a first draft of the reform act was presented and submitted to the state parliament in May 2007. The draft included a proposal for district mergers. The state government conjectured that the “new formation of districts will come with substantial cost reductions.”<sup>7</sup> In January 2008, the state parliament enacted the reform. There was some uncertainty regarding the ultimate entry into force until the Saxon Constitutional Court rejected complaints of merged cities and districts in summer 2008. By August 01, 2008, the number of Saxon districts decreased from 22 to 10, and the number of large cities decreased from 7 to 3 (see Figure 1).

The 2008 district mergers were part of a general reform of state and local government administration (see Saxon Ministry of the Interior 2008). The reform included the re-assignment of functions from the state level to local governments and state agencies. Most relevantly, parts of

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<sup>6</sup> The district mergers in Saxony-Anhalt in 2007 and in Mecklenburg-West Pomerania in 2011 came with substantial shifts of functions. I exclude Saxony-Anhalt and Mecklenburg-West Pomerania from the analysis further on.

<sup>7</sup> Translation by the author. Original in German language: „Durch die Neubildung der Landkreise ergeben sich so erhebliche Einsparungsmöglichkeiten.“ (Saxon Ministry of the Interior 2007, pp. 27).



public services such as road construction, and surveying and mapping were assigned to the districts. Mergers however do not touch administrative functions of districts. As the sole exception, some functions in environmental administration were assigned from the state level to the district level.<sup>8</sup> I address the shifts of functions in three different ways. First, the extent of administrative re-assigned functions is small. Staff of re-assigned functions other than public services and environmental administration account only for less than 1% of total post-merger staff of Saxon districts.<sup>9</sup> Therefore, results should not be driven by shifts of functions. Second, throughout the whole period of interest, all states including Saxony carried out (minor) shifts of functions between different layers of government. Most importantly, the main donor pool state, Thuringia, also shifted the environmental administration to the district level in 2008. I assume that there is no systematical difference between the donor pool units and Saxony in terms of decentralization and centralization. Thus, the synthetic control method should also capture the continuous re-assignment of functions. Third, for robustness exercises, I will investigate expenditure categories where I can rule out any that shifts of functions in the course of the 2008 mergers (e.g., social care, administration, education).

### **3. Empirical strategy**

#### *3.1 Identification*

I employ the synthetic control method developed by Abadie and Gardeazabal (2003) and Abadie et al. (2010, 2015). The basic idea of this method is to construct a synthetic counterfactual for a treated unit by matching on the pre-treatment trend of the outcome variable of interest.

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<sup>8</sup> This includes some former state-level tasks in environmental core administration (*Umweltfach- und Umweltvollzugsaufgaben*), land consolidation (*Flurneuordnung/Flurbereinigung*) and parts of forest administration (*hoheitlichen Forstaufgaben*).

<sup>9</sup> Total Saxon district staff was 14,401 after the reform. Transferred staff from the state level to the district level accounts for 3,416 employees. Thereof, about 70 % were employed in public services, 25 % in environmental administration, and 5 % in other administrative branches. See Saxon Court of Auditors (2009).

The identifying assumption is that a treated unit would have evolved in the same manner as a pre-treatment close-fitting synthetic counterpart in the absence of the treatment. The counterfactual is a simple weighted average of untreated control units from a proper donor pool. The weights are derived in such a way that the pre-treatment outcome of the treated unit and the outcome of the counterfactual fits best. Technically, the pre-treatment Root Mean Square Percentage Error (*RMSPE*) of the observed outcome and the counterfactual pre-treatment outcome is minimized:

$$\min RMSPE_i = \min \sqrt{\sum_{t=1}^T \left[ \frac{(y_{it} - \hat{y}_{it})^2}{T} \right]} \quad (1)$$

where  $y_{it}$  is the observed outcome of unit  $i$  in pre-treatment period  $t$ .  $\hat{y}_{it}$  is the counterfactual outcome of  $i$  in period  $t$ , given by a weighted average of untreated units from the donor pool:

$$\hat{y}_{it} = \sum_{j \neq i} w_j y_j, \text{ with } \sum w_j = 1 \quad (2)$$

The counterfactual weights  $w$  sum up to unity and are chosen in the way that the *RMSPE* is minimized. Further (cross-sectional) matching predictors can be used to improve the comparability of the counterfactual and the treated unit (for details see Abadie et al. 2015). The results from the synthetic control method provide a causal interpretation if the synthetic counterfactual sufficiently follows the pre-treatment trend of the treated unit, further pre-treatment predictors match well, no further reforms were enacted, and the donor pool units were not affected by the treatment. In these assumptions are met, the method captures institutional as well as other unobservable differences.<sup>10</sup>

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<sup>10</sup> Abadie et al. (2015, p. 498) put it in a nutshell: “Only units that are alike in both observed and unobserved determinants of the outcome variable as well as in the effect of those determinants on the outcome variable should produce similar trajectories of the outcome variable over extended periods of time. Once it has been established that the unit representing the case of interest and the synthetic control unit have similar behavior over extended

The 2008 district merger reform in Saxony is an excellent case in this point. First, average district population in Saxony increased from about 113,000 to 290,000 inhabitants. This is a drastic change in average population. Mergers however affected all Saxon districts; a within-state counterfactual of merged districts is missing. Therefore, I rely on variation in district expenditures across German states. If mergers come with decreases in expenditures, also state-level aggregates should reflect cost reductions. Mean district population remain constant in ten other German states because there were no district mergers.<sup>11</sup> I construct a synthetic counterpart to the aggregate of Saxon districts.

Second, the selection of Saxon districts as the treatment unit was exogenous to considerable extent. After the 2004 state elections, the Conservatives party (CDU) and the Social democrats (SPD) formed a coalition. Neither the CDU nor the SPD addressed the issue of district mergers in their election manifestos and campaigns. Moreover, newspapers report that both parties agreed in the coalition negotiations *not* to merge districts.<sup>12</sup> Also the official coalition agreement does not include an explicit statement on district mergers. The issue of mergers entered the debate not before experts were commissioned to investigate the optimal size of Saxon districts in late 2004. However, neither 2004 expenditures per capita, the average district size, nor the number of districts predict the decision to merge districts in Saxony (see Table 1). Saxony ranked fourth out of the eleven sample states in terms of district expenditures per capita.<sup>13</sup> Three other German sample states had an average district size which fairly corresponds with the Saxon

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periods of time prior to the intervention, a discrepancy in the outcome variable following the intervention is interpreted as produced by the intervention itself.”

<sup>11</sup> As single exceptions, the cities of Hannover (Lower Saxony) and Aachen (North Rhine-Westphalia) were merged to the surrounding districts in 2001 and 2009. The unique status of the formed “city districts” however bridges district and city features and should not harm the results at all.

<sup>12</sup> See, e.g., *Dresdner Neueste Nachrichten*, 28.10.2004, “Koalition will auf Kreisreform verzichten”.

<sup>13</sup> Note that the German states assigned different functions to districts.

level of 116,000 inhabitants per district in 2004 (Rhineland-Palatinate: 127,000; Bavaria: 126,000; Thuringia: 105,000).

[Table 1 about here]

Third, Saxon district mergers in 2008 do not come with a substantial re-assignment of functions in administration. Being the exception, some functions in the environmental administration were assigned from the state to the district level. This changes however should not drive the results. I investigate important expenditure categories other than environmental administration for robustness exercises.

Fourth, district mergers in one state are also unlikely to have an impact on other states. There are also no reasons to believe that potential spill-overs in expenditures changed after the reform – compared to the pre-merger period.

Fifth, I can show that there is a synthetic counterpart that fits the pre-reform trend in expenditures of Saxon districts well (see Section 4.1 below).

In conclusion, the synthetic control method is well suited to study the effect of the 2008 district mergers in Saxony on expenditures. I construct “Synthetic Saxony” by adjusting pre-reform (1998–2007) real-term district expenditures per capita of the donor pool states to Saxon figures. I use further predictors for the period 2005–2007 which may affect district expenditures. Most importantly, I use the average population per district as the scale variable of interest. I further include GDP per capita, and the state-level price level (2013 = 1.00) to capture differences in wealth and prices. GDP per capita also reflects the potential tax base.<sup>14</sup> Local government budgets in Germany mainly target young people (e.g., social and child care, education). I therefore

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<sup>14</sup> Note that districts basically do not levy taxes. Contributions from municipalities and transfers from the state government, however, are considerably determined by the regional tax base.

include the young age dependency ratio as the population younger than 20 years by the working age population (21 to 65 years). The unemployment rate<sup>15</sup> and voter turnout in national elections reflect socio-economic conditions and social capital that may also drive public expenditures. “Synthetic Saxony” should neither differ from pre-merger Saxony in terms of expenditures per capita nor in the number of inhabitants and other predictors to draw a strong causal interpretation.

### 3.2 Data

I use state-level aggregates of district expenditures in Germany, which I obtained from the Statistical Office of Germany upon request.<sup>16</sup> Additional information on population, elections, unemployment and GDP are collected from publications of the Statistical Office of Germany. Monetary data are deflated using the state-level GDP deflator (base year: 2013). I restrict data to the period from 1998 to 2013 because last district mergers in other sample states than Saxony came into force in January 1998, and large-scale migration from the Balkans and the Arab world toward Germany started in 2014 which heavily affected district expenditures. I compute district expenditures per capita as the sum of district expenditures within a state divided by the population living in districts of this state.

Large cities which execute municipal and district functions as one are excluded from all figures. These cities are not comparable to districts in terms of institutions and functions. I also exclude districts of the states of Saxony-Anhalt and Mecklenburg-West Pomerania because these two states enacted district mergers in 2007 and in 2011. The remaining 11 German states include

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<sup>15</sup> I use the share of unemployed of the working age population (21 to 65 years).

<sup>16</sup> To make figures comparable, I use gross expenditures (*Bereinigte Ausgaben*). Note that expenditures of the four categories do not sum up to total expenditures because gross expenditures do not account for several clearings.

Saxony as the treated unit.<sup>17</sup> Figure 3 gives an impression of the dataset: state aggregates of districts in 10 German states constitute the donor pool, the aggregate of Saxon districts is the treated unit.

[Figure 3 about here]

## 4. Results

### 4.1 Baseline

A “Synthetic Saxony” composed of 70% of the state of Thuringia, 22% Brandenburg, and 8% Saarland fits the Saxon pre-treatment trend in total district expenditures and further predictors best. On average, Saxony as well as “Synthetic Saxony” has total district expenditures of around 720 Euro per capita between 1998 and 2007, the unweighted sample mean (without Saxony) was 545 Euro per capita (see Table 2). Average district population, GDP per capita, the price level, young age dependency ratio, and voter turnout in the 2005 national election fits also well (lower panel of Table 2). The unemployment rate in “Synthetic Saxony” is somewhat smaller (10.7%) than in real Saxony (12.2%). The fitting procedures for the four main expenditure categories yield also comparable synthetic control units (see Section 4.2 later on). The donor pool weights for these expenditure categories are shown in Table 3.

[Table 2 about here]

“Synthetic Saxony” fits real Saxony also from a time series perspective. Figure 4, lower figure, shows that “Synthetic Saxony” (black dashed line) fairly reproduces the Saxon trend in district expenditures (solid black line) until 2008. Solid gray lines represent individual donor pool

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<sup>17</sup> The 11 sample states are: Baden-Württemberg, Bavaria, Brandenburg, Hesse, Lower Saxony, North Rhine-Westphalia, Rhineland-Palatinate, Saarland, Schleswig-Holstein, Thuringia – and Saxony as the treated unit. The states of Berlin, Hamburg, and Bremen are city states without districts.

states. Real-term district expenditures of both, Saxony as well as its synthetic counterpart increase from around 700 Euro per capita in 1998 to roughly about 800 Euro per capita in 2007. Expenditures increase sharply in 2005 when accommodation costs of long-term unemployed were assigned to the districts in the course of a federal labor market reform. This reform however affects all German states simultaneously.

[Figure 4 about here]

Table 2, center panel, columns (1) and (2)) shows that the mean of district expenditures in Saxony after the reform (807 Euro per capita) were hardly lower than the average synthetic counterpart expenditures of 817 Euro per capita (about -1%). Excluding the year 2013 yields identical expenditures of 814 Euros per capita in both “Synthetic” and real Saxony. Against pre-reform expectations, the results thus do not indicate that district mergers result in cost reductions – at least in the first five years after the reform. These findings are in line with anecdotal evidence on the Saxon merger reform reporting that “great expectations changed into great disillusion”. In a similar vein, observers of the 2011 district mergers in another German state, Mecklenburg-West Pomerania, observers state that “even five years after the reform, reductions of costs have not been realized.”<sup>18</sup>

The absence of cost savings had far-reaching implications for public finances of districts and municipalities in Saxony. Expecting cost reductions, the state government cut transfers to the districts after 2008. Because expenditures did not come down as expected, districts raised substantially higher contributions from the municipalities to compensate transfer cuts. Between 2000 and 2007, the contribution rates (share of municipal revenues transferred to the districts) in Saxony and “Synthetic Saxony” increased almost equally by 13% and 12%. After Saxon

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<sup>18</sup> See footnote 3 above. In Mecklenburg-West Pomerania, a substantial shifts of functions in the course of mergers does not allow any empirical analysis.

district mergers (2009–2013), the contribution rate in “Synthetic Saxony” went up by 11%, but by 18% in real Saxony. Furthermore, Saxon districts issued debt to finance expenditures. Outstanding debt of Saxon districts increased by 4% between 2009 and 2013 whereas debt decreased before mergers (2002–2007: -14%). At the same time, debt decreased in “Synthetic Saxony” between 2009 and 2013 by -9% (before mergers: +4%). These developments leads the state government to withdraw cuts and to re-raise district transfers for the period after 2017.

#### 4.2 Robustness

The synthetic control method does not allow to draw inferences. Therefore, I conduct different robustness tests. First, I study whether results are driven by certain donor pool units. Figure 5 presents the results of a leave-one-out procedure. The black lines reproduce the baseline results, gray thin lines show the synthetic control results when one of the ten states was dropped from the donor pool. The graphs derived by this procedure hardly differ from the baseline configuration. As the sole exception, the leave-out of the main donor pool state, Thuringia, yields somewhat *lower* counterfactual expenditures between 2009 and 2011 which however convert to the overall trend in 2012/2013. Post-merger expenditures of “Synthetic Saxony” are therefore at least as high as in real Saxony. The results are robust to the exclusion of a certain donor pool state.

[Figure 5 about here]

Second, I examine whether results hold for the main expenditure categories of districts in Saxony. Figure 6 shows separate synthetic control method results for expenditures for a) administration including public safety and order, b) social care, c) education, and d) economic development, public transport, and environmental administration. Categories a) to c) were not affected by a re-assignment of functions, the pre-treatment trends of Saxon districts are captured



well by the synthetic counterfactuals in these categories. Category d) includes all functions which are subject to shifts in the course of the administration reform (public services, environmental administration). The increase in expenditures for economic development, public transport, and environmental administration in Saxon districts from 2007 to 2008 reflects the re-assignment of functions (Figure 6, d)). This leads also to somewhat higher post-merger expenditures in Saxony (176 Euro per capita) compared to “Synthetic Saxony” (151 Euro per capita) (see Table 2). In the following, I will refer to categories only that were not affected by a re-assignment of functions (categories a) to c)).

[Figure 6 about here]

On average, expenditures for administration amounted to around 140 Euro per capita in Saxony as well as in “Synthetic Saxony” before the 2008 mergers (Table 2, column (4)). Administrative expenditures which are a main target of district mergers however also hardly differ after the reform; Saxony exhibits mean expenditures of 158 Euro per capita, the counterfactual predicts 157 Euro per capita in the absence of the reform. Expenditures for education do also differ to only small extent: the pre-reform difference between Saxony (103 Euro per capita) and “Synthetic Saxony” (108 Euro) was 5 Euro per capita. After the reform, the difference is at 6 Euro per capita (93–87 Euro). Figure 6 may imply some cost reductions in Saxony after 2011. This, however, might also be a result of extensive school reforms in many states and of substantially lower birth rates in Saxony after re-unification.

Social expenditures as the quantitatively most important expenditure category in Saxon districts decrease by around 3% or 14 Euro per capita compared to the predicted counterfactual (see Table 2, column (4)). However, deviations in the pre-reform trend of Saxony and “Synthetic Saxony” in 2004 and 2007 may question whether the results for social expenditures are robust

to the chosen method. Therefore, I compare synthetic control method results to OLS estimates of a simple difference-in-differences specification with year and state fixed effects:

$$y_{it} = \alpha_i + \beta_1 Post-Mergers + \beta_2 (Treat \times Post-Mergers) + \delta_t + \varepsilon_{it} \quad (3)$$

$y_{it}$  denotes expenditures per capita which is the dependent variable. *Post-Mergers* is a dummy variable which equals one for the period after 2008 and zero otherwise. *Treat* is a dummy for Saxony, but cancels out because state fixed effects are included. The coefficient of interest,  $\beta_2$ , measures the merger effect. The equation includes state fixed effects ( $\alpha_i$ ) and year fixed effects ( $\delta_t$ ).  $\varepsilon_{it}$  is the error term. I exclude the reforming year 2008. I estimate the baseline difference-in-differences model with standard errors robust to heteroskedasticity (Huber-White sandwich standard errors – see Huber 1967, White 1980).

Difference-in-differences estimates for total expenditures, and for expenditures for social care fairly reproduce synthetic control method results (see Table 4, columns (1) and (3)). The coefficient for (*Treat* × *Post-Mergers*) does not turn out to be statistically significant in these specifications. This underpins the non-findings from the synthetic control method.

[Table 4 about here]

Results for expenditures for administration, education, and development, transport and environment (columns (2), (4), and (5)) however differ across methods. For example, difference-in-differences estimates imply a reduction in expenditures for administration of about 10 Euro per capita whereas the synthetic control group method suggests an increase in administrative expenditures of about 2 Euro per capita (see Table 4, column (2)). Similar pattern can be found for education expenditures and, to some extent, for expenditures for development, transport and environment. In all three cases, however, the deviation is basically caused by a violation of the

common trend assumption of the difference-in-differences method. The lower panel of Table 4 shows the growth rate of pre-reform district expenditures in Saxony, of “Synthetic Saxony”, and of the donor pool average. In the case of administrative expenditures, expenditures per capita decreased by 8% between 1998 and 2007 in Saxony but increased by 11% on donor pool average. In “Synthetic Saxony”, by contrast, administrative expenditures per capita decreased by 8% like in real Saxony. Thus, there seems to be no common trends in administrative expenditures of the donor pool average and Saxony. The same applies to education expenditures and to expenditures for development, transport and environment where difference-in-differences and synthetic control group results deviate. I conclude that the synthetic control method delivers at least similar results to the difference-in-differences method if the common trend assumption is met (total expenditures, expenditures for social care).<sup>19</sup> In these cases, I do not find a significant effect of mergers on expenditures. If pre-reform trends vary, the synthetic control group method is more reliable (Kreif et al. 2016). In these cases, the difference between synthetic control group method predicted expenditures and realized expenditures, i.e., the reform effect, is fairly small for administrative expenditures (2.32 Euro per capita) and education expenditures (-1.56 Euro per capita). Altogether, results do neither indicate effects of district mergers on total expenditures nor on expenditures any main function.

Finally, one may suspect that the amalgamation of four former large cities to their surrounding districts may bias fiscal outcomes after the reform.<sup>20</sup> I restrict the dataset to districts which are *not* merged to a large city in 2008.<sup>21</sup> Figure 7 shows that the results do not differ from the baseline setup. Quite the contrary, the fit of real and counterfactual Saxony is even closer after

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<sup>19</sup> The study of Becker et al. (2015) is also an excellent case in this point.

<sup>20</sup> The cities of Görlitz, Hoyerswerda, Plauen, and Zwickau were merged to the surrounding districts. After 2008, only the cities of Chemnitz, Dresden, and Leipzig constitute a district of their own.

<sup>21</sup> These are Erzgebirgskreis, Leipzig (Landkreis), Meißen, Mittelsachsen, Nordsachsen, Sächsische Schweiz-Osterzgebirge.

2006. Thus, no effects on expenditures can be identified even in this homogenous subsample. Mergers of large cities therefore do not drive the results.

[Figure 7 about here]

## 5. Conclusion

I use the synthetic control method to identify the effect of mergers of county-sized administrations on public expenditures. The results of this study do not show that mergers of large local governments covering about 100,000 inhabitants result in scale effects. The findings neither indicate decreases in total expenditures, nor in main expenditure categories. Given the substantial political costs of mergers, e.g., decreases in voter turnout (Fritz and Feld 2015), reductions in satisfaction with the local government (Hansen 2015), or common pool problems (Hinnerich 2009, Saarimaa and Tukiainen 2015), net benefits of local government mergers seem to be at least very low.<sup>22</sup> The results of Ems (2016) indicate that political participation in Saxon district councils after the 2008 mergers suffers to some extent from increased time-consuming travel costs and complexity. Further research should elaborate on the effects of local government mergers on political participation.<sup>23</sup>

The results of this study, however, do not allow drawing conclusions regarding efficiency. If merged districts were able generate more output using the same inputs (expenditures), gains in

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<sup>22</sup> Voluntary mergers, by contrast, may suffer from an inefficient mapping due to competition avoiding politicians. See Hyytinen et al. (2014). Other studies discuss the effects of mergers on growth (Kauder 2016), or on public debt (Jordahl and Liang 2010).

<sup>23</sup> Some simple facts indicate a decrease in political participation. In the homogenous subsample of Saxon districts that were not merged to large cities, there were 1.9 candidates per 1,000 eligible voters running for the district council in 2004, and 2.1 (2008) and 2.0 candidates per 1,000 eligible voters (2014) after the mergers. Given the trend in unmerged districts in the main donor pool state, Thuringia, (2004: 1.6, 2009: 1.9, 2014: 1.9), we however would have expected 2.2 and 2.3 candidates in the 2008 and 2014 council elections in Saxon districts which is larger than the realized 2.1 and 2.0 candidates.

efficiency would have been achieved. However, a concept of measuring local government output which would allow an efficiency analysis is still missing. As a second drawback, the results of this study cannot be applied to other levels of local government such as municipalities. Municipalities differ from districts in functions, size and administrative capabilities. Furthermore, municipal mergers often come with adjustments of intergovernmental transfers and a decentralization of functions. Hence, further efforts should be undertaken to separate the effect of mergers on fiscal outcomes from other elements of local government reforms. Third, data constraints do not allow to take a long-term perspective. Future research may elaborate on the long-term effects of local government mergers on expenditures, quality of services, and political economy outcomes.

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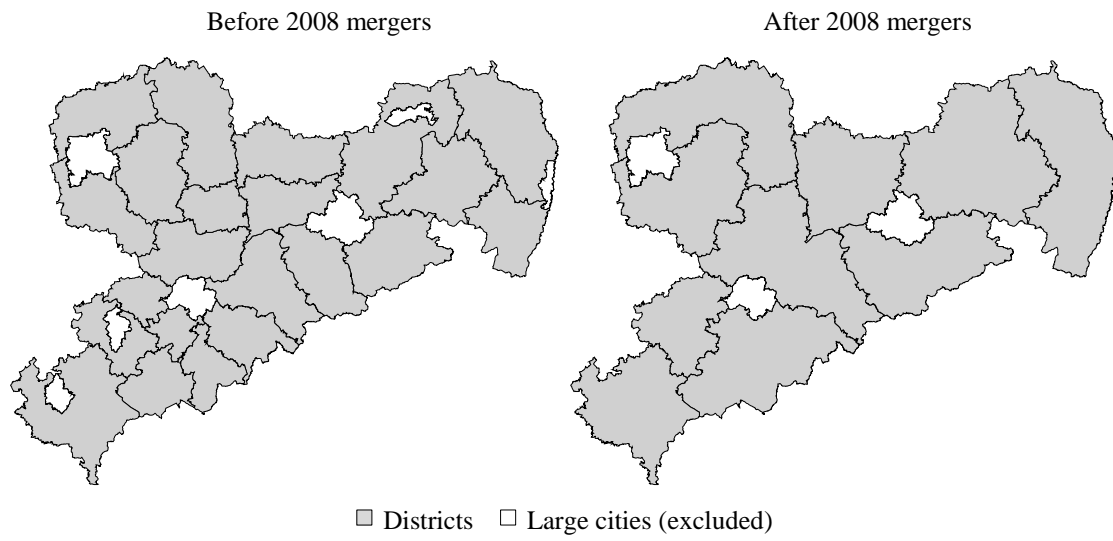
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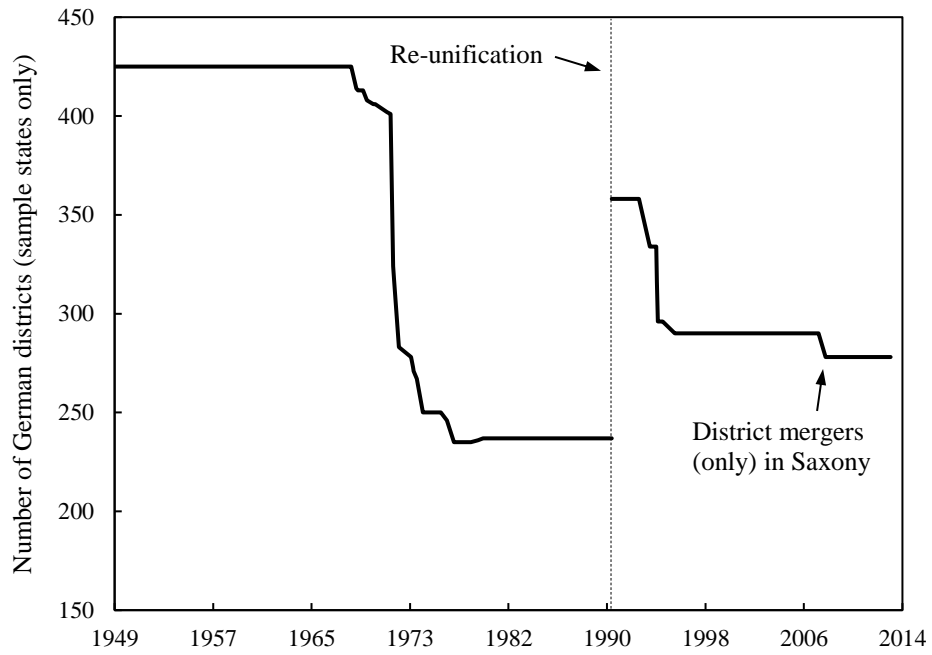
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FIGURE 1. DISTRICTS OF SAXONY



*Notes:* The maps show the districts of the German state of Saxony before and after the 2008 mergers (gray). Large cities (white) constitute districts of their own and are excluded from the analysis.

FIGURE 2. NUMBER OF DISTRICTS IN GERMANY



*Notes:* The figure shows the number of districts in Germany (1949–1990: West Germany only, states of Mecklenburg-West Pomerania and Sachsen-Anhalt excluded).

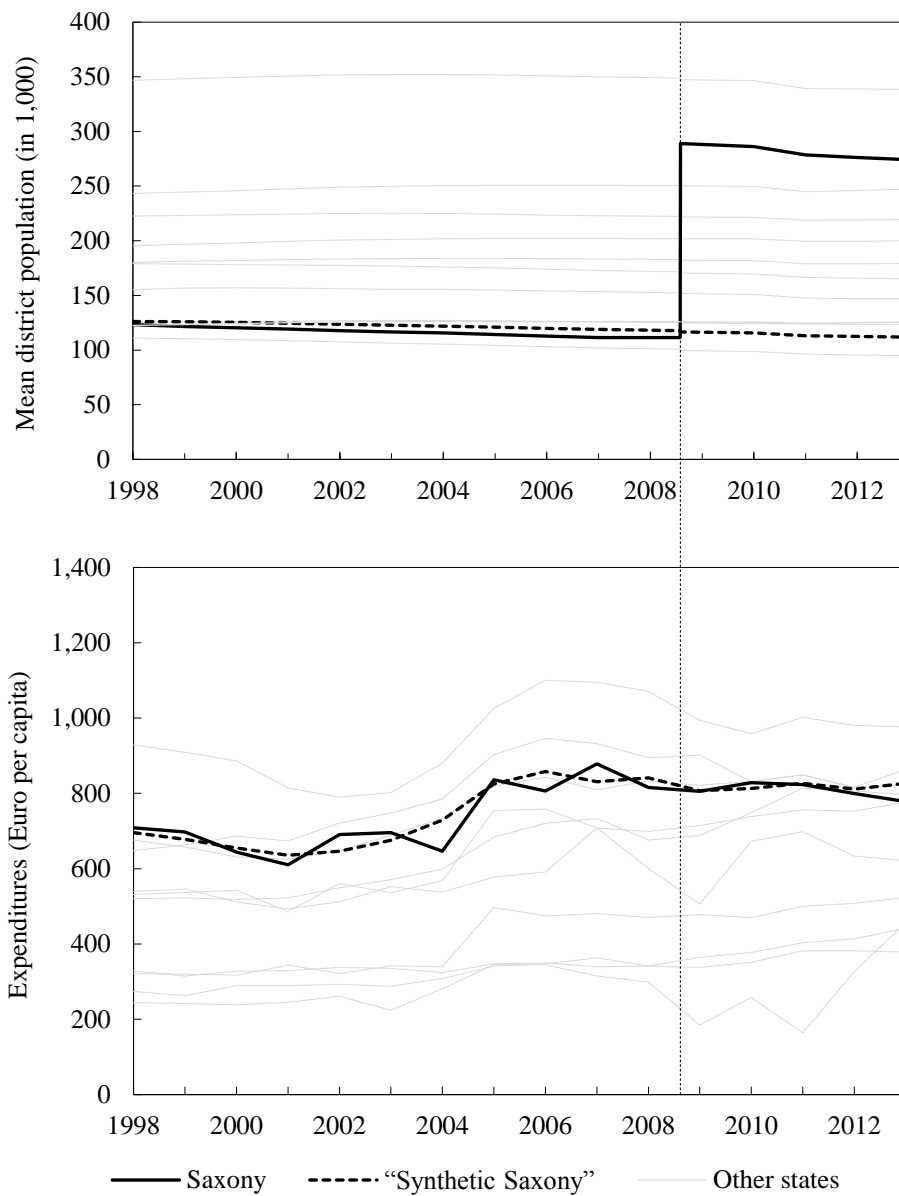
FIGURE 3. VISUALIZATION OF DONOR POOL AND TREATED UNIT



□ Donor pool ( $n = 10$ ) ■ Treated unit (Saxony,  $n = 1$ ) □ Large cities (excluded)

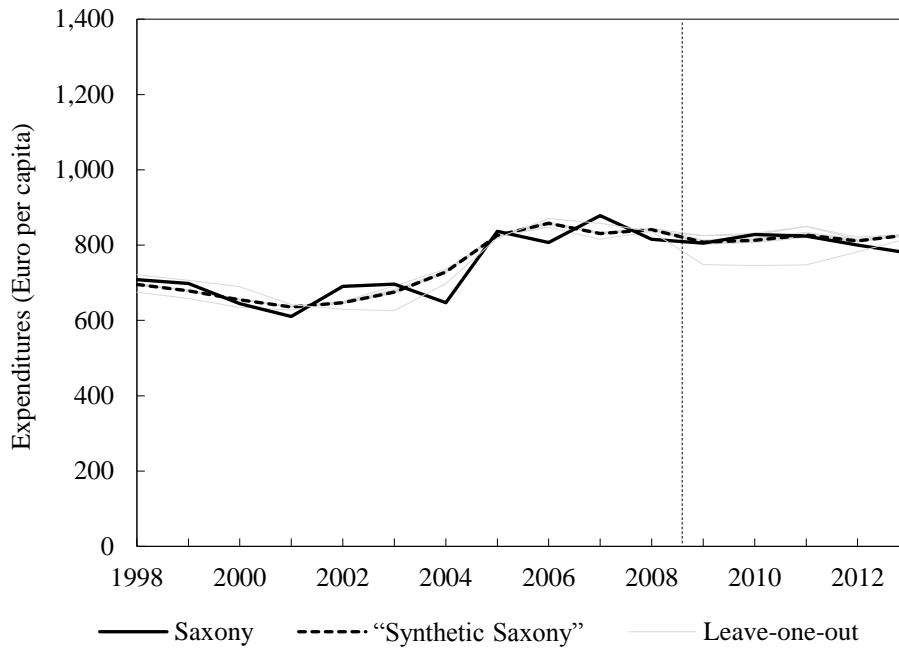
*Notes:* The map shows the 10 donor pool units in light gray (state-level aggregates of districts, large cities excluded), and Saxon districts as the treated unit (dark gray). \*) States of Mecklenburg-West Pomerania and Sachsen-Anhalt excluded.

FIGURE 4. EFFECT OF DISTRICT MERGERS ON TOTAL EXPENDITURES



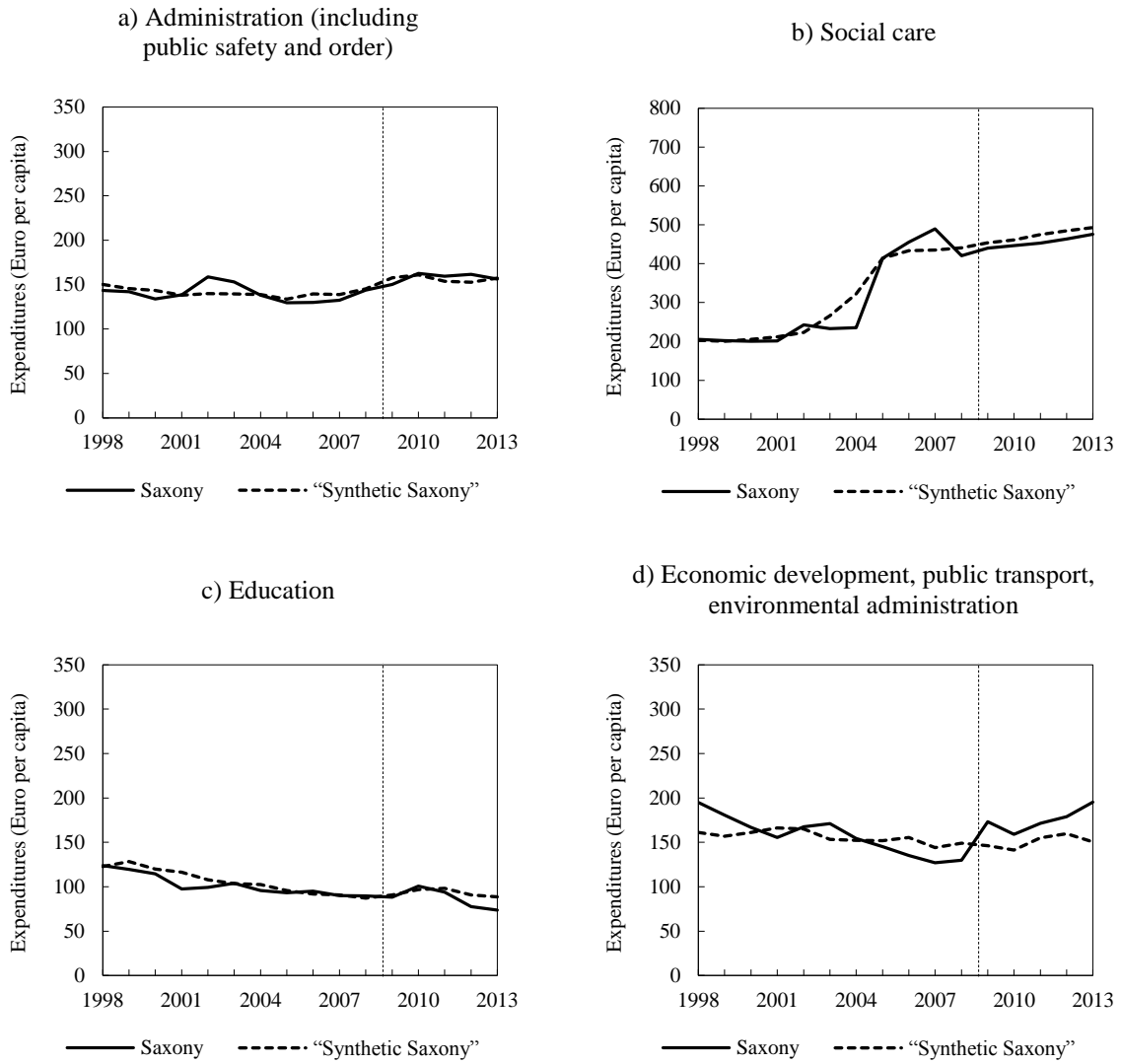
Notes: The upper figure shows the mean district population of districts in Saxony (black solid line), in the 10 German states (light gray), and in "Synthetic Saxony" (dashed black line) that is composed from these 10 states. Similarly, the lower figure shows per-capita expenditures. The vertical line depicts the district mergers in Saxony in August 2008. For the composition of "Synthetic Saxony" see Table 3.

FIGURE 5. LEAVE-ONE-OUT PROCEDURE



Notes: The figure per-capita expenditures of two main expenditure categories in Saxony (solid line) and "Synthetic Saxony" (dashed line). Gray lines show synthetic control method results, each excluding one state from the donor pool.

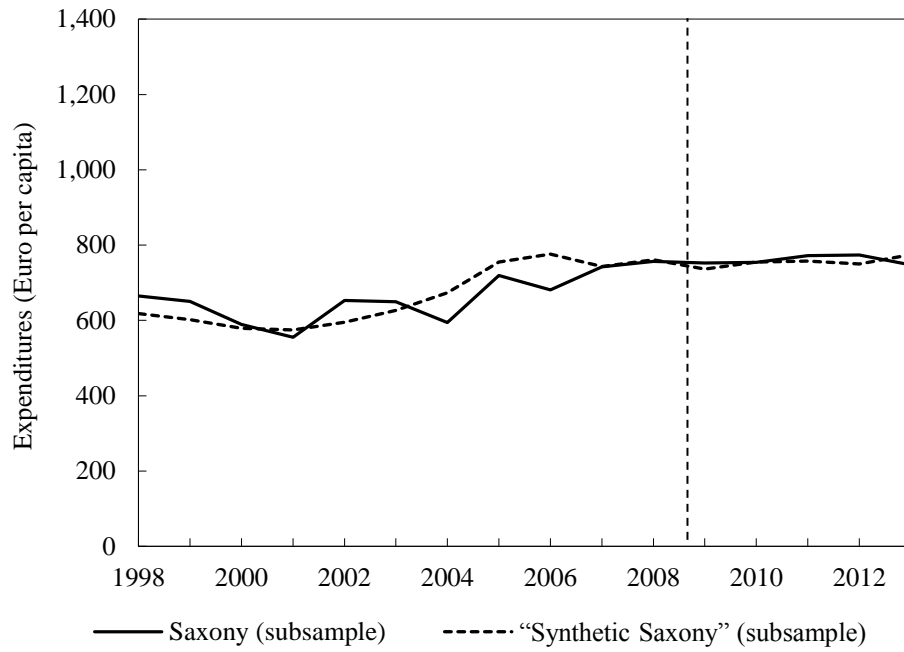
FIGURE 6. EXPENDITURES BY CATEGORIES



*Notes:* The figure shows per-capita expenditures of the four main expenditure categories in Saxony and “Synthetic Saxony”. Note the different scale of social expenditures. The vertical lines depict the 2008 district mergers in Saxony in August 2008. For the composition of “Synthetic Saxony” see Table 3.



FIGURE 7. SUBSAMPLE (NON-CITY MERGERS ONLY)



*Notes:* The figure shows synthetic control method results for Saxon districts which were *not* merged to a large neighboring city (Erzgebirgskreis, Leipzig (Landkreis), Meißen, Mittelsachsen, Nordsachsen, Sächsische Schweiz-Osterzgebirge). "Synthetic Saxony" consists of 86.6 % Thuringia, and 13.4 % Saarland.

TABLE 1. PROBIT ESTIMATIONS ON PROBABILITY OF DISTRICT MERGERS

	<i>Decision on district mergers in 2004 (yes=1)</i>			
	(1)	(2)	(3)	(4)
<i>Expenditures per capita 2004</i>	0.002 (0.003)			-0.008 (0.039)
<i>Population per district 2004</i>		-0.000 (0.000)		-0.000 (0.000)
<i>Number of districts 2004</i>			-0.012 (0.041)	-0.061 (0.195)
Constant	-2.360 (2.020)	4.324 (7.108)	-1.049 (1.080)	16.506 (61.279)
Obs.	11	11	11	11
Pseudo-R <sup>2</sup>	0.05	0.35	0.01	0.39

*Notes:* The table shows probit estimations for the probability of a decision on district mergers in 2004. The dependent variable is dummy which equals one for Saxony and zero otherwise. Significance levels (Robust standard errors in brackets): \*\*\* 0.01, \*\* 0.05, \* 0.10.

TABLE 2. DESCRIPTIVES

	<i>Saxony</i>	<i>“Synthetic Saxony”</i>	<i>Full sample (without Saxony)</i>	<i>Ratio Saxony/ “Synthetic Saxony”</i>
	(1)	(2)	(3)	(4)
<b>Before mergers (1998–2007)</b>				
<i>Total expenditures</i>	722	723	545	100%
<i>Administration (incl. public safety)</i>	140	141	89	99%
<i>Social care</i>	288	291	381	99%
<i>Education</i>	103	108	116	96%
<i>Development, transport, environment</i>	160	160	100	100%
<b>After mergers (2009–2013)</b>				
<i>Total expenditures</i>	807	817	635	99%
<i>Administration (incl. public safety)</i>	158	157	117	101%
<i>Social care</i>	456	473	563	96%
<i>Education</i>	87	93	134	93%
<i>Development, transport, environment</i>	176	151	108	117%
<b>Predictors<sup>a</sup></b>				
<i>Population per district (2005–2007)</i>	112,889	119,896	189,454	94%
<i>GDP per capita (2005–2007)</i>	20,630	20,455	26,075	101%
<i>Price level (2005–2007)</i>	0.90	0.90	0.91	100%
<i>Young age dependency ratio (2007)</i>	21.2	21.0	28.0	101%
<i>Unemployment rate (2007)</i>	12.2	10.7	6.7	114%
<i>Voter turnout national election (2005)</i>	76.3	75.7	78.5	101%

*Notes:* Expenditures: Euro per capita in 2013 constant prices, GDP per capita: Euro per capita in 2013 constant prices. For the composition of “Synthetic Saxony” see Table 3. a) Predictors of donor pool weights for total expenditures.

TABLE 3. DONOR POOL WEIGHTS

	<i>Expenditure categories</i>				
	<i>Total expenditures</i>	<i>Administration (incl. public safety)</i>	<i>Social care</i>	<i>Education</i>	<i>Development, transport, environment</i>
	(1)	(2)	(3)	(4)	(5)
Baden-Württemberg	0	0	0	0	0
Bavaria	0	0	0.181	0	0
Brandenburg	0.216	0.399	0	0.645	0.684
Hesse	0	0	0	0	0
Lower Saxony	0	0	0	0	0
North Rhine-Westphalia	0	0	0	0.355	0
Rhineland-Palatinate	0	0	0	0	0
Saarland	0.081	0	0	0	0.051
Schleswig-Holstein	0	0	0	0	0
Thuringia	0.703	0.601	0.819	0	0.265

*Notes:* The table shows the donor pool weights for the “Synthetic Saxony” in terms of total expenditures, administrative expenditures and social expenditures.

TABLE 4. DIFFERENCE-IN-DIFFERENCES ESTIMATIONS

	<i>Total expenditures</i>	<i>Expenditure categories</i>			
		<i>Administration (incl. public safety)</i>	<i>Social care</i>	<i>Education</i>	<i>Development, transport, environment</i>
	(1)	(2)	(3)	(4)	(5)
Synthetic control group					
<i>Pre-Post-Reform difference</i>	-8.57	2.32	-14.28	-1.56	25.57
Difference-in-differences ( <i>Treat × Post-Mergers</i> )	-4.83 (20.54)	-9.69** (4.15)	-13.90 (25.99)	-33.88*** (10.55)	7.38* (3.98)
<i>Year fixed effects</i>	Yes	Yes	Yes	Yes	Yes
<i>State fixed effects</i>	Yes	Yes	Yes	Yes	Yes
<i>States</i>	11	11	11	11	11
<i>Obs.</i>	165	165	165	165	165
<i>Within R<sup>2</sup></i>	0.69	0.74	0.82	0.21	0.19
Pre-merger growth (1998–2007)					
<i>Saxony</i>	24%	-8%	138%	-27%	-35%
<i>“Synthetic Saxony”</i>	19%	-8%	115%	-26%	-11%
<i>Donor pool average</i>	29%	11%	52%	1%	5%

*Notes:* The table compares results from difference-in-differences estimations (left-hand side) to synthetic control method results (right-hand side). Synthetic control method results are derived from Table 2 as the difference in before-after merger differences of Saxony and “Synthetic Saxony”. The dependent variable is district expenditures per capita. Significance levels (Robust standard errors in brackets): \*\*\* 0.01, \*\* 0.05, \* 0.10.

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