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Artem Korzhenevych
Sebastian Langer

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The Flypaper Effect in Germany: An East-West Comparison

Artem Korzhenevych
Technische Universität Dresden
Leibniz Institute of Ecological Urban and Regional Development

Sebastian Langer[†]
Technische Universität Dresden
Leibniz Institute of Ecological Urban and Regional Development

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Abstract

We investigate the effect of general-purpose transfers on different expenditure categories and tax rates in the municipalities of Saxony (eastern Germany) and North Rhine-Westphalia (western Germany). Findings from the panel data analysis suggest the existence of the "flypaper effect" – municipalities use transfers to increase expenditures but do not reduce taxes. For most expenditure subcategories the estimated coefficients are alike, suggesting similarity of spending priorities in the two federal states despite the differences in the transfer dependency. Targeted support of eastern municipalities could potentially explain few identified differences in the spending behavior.

JEL classification: H21; H70; H71; H72; H77

Keywords: Flypaper Effect; Local Government Expenditure; Transfers to Municipalities; Local Taxation

[†]Corresponding author. Faculty of Business and Economics, Dresden University of Technology and Leibniz Institute of Ecological Urban and Regional Development (IOER), Weberplatz 1, 01217 Dresden, Germany. E-mail: s.langer@ioer.de

1. INTRODUCTION

In Germany, equalization transfers from higher-level budgets (“*Zuweisungen”*) play an important role as a source of revenue for municipal budgets. They are designed to cover the gap between the financial needs of the municipalities and their own tax revenues. The goals are, on the one hand, to help the municipalities provide an adequate level of public goods and on the other, to smooth regional disparities (Rosenfeld, 2010). The main type of transfer from higher-level budgets is the so-called non-matching or general-purpose transfer. These transfers have a lump-sum character and are allocated on the basis of a formula that compares fiscal need and fiscal capacity.

This type of financial support for municipalities exists in many countries. The economic effects of such transfers have been extensively studied both theoretically and empirically. According to median voter theory, the effect on local government expenditures from changes in lump-sum intergovernmental transfers and from changes in private incomes should be equal (Bradford and Oates, 1971a/ b). That means that depending on the income elasticity of the median voter, local governments should forward transfers to local taxpayers by lowering tax rates and increasing expenditure on the enhancement of public services and goods. In empirical terms, however, many authors find that compared to a rise in revenue from other sources there is a stronger increase in public spending in response to a rise in lump-sum intergovernmental transfers. This is the so-called “flypaper effect” (Oates, 1988, p. 77).[1] The theoretical implication is that political agents conceal the lump-sum character of transfers and use the money to extend their budgets instead of refunding it to taxpayers (Dollery and Worthington, 1996).

Many studies, e.g. Dollery and Worthington (1995); Knight (2002); Logan (1986); Grossman (1990) support the existence of the flypaper effect. However, several authors (e.g. Hines and Thaler, 1995; Hamilton, 1983) doubt its existence and criticize misguided empirical procedures (matching and non-matching transfers mixed up together) or errors in statistical modeling (endogeneity not considered). According to Becker (1991), the flypaper effect is sensitive to the specification of the expenditure equations and the modeling of transfers to municipalities. She argues that potential endogeneity of

[1] The flypaper effect was initially examined in studies by Oates (1979), Gramlich et al. (1973), and Courant et al. (1979).

transfers could inflate the estimate of the spending response and suggests correcting for this. Other authors, such as Knight (2002) for US highway aid transfers and Gordon (2004) for US school district aid transfers, find that the flypaper effect disappears altogether after accounting for endogeneity with instrumental variables. On the other hand, in their quasi-experimental studies examining the effect of non-matching transfers on local fiscal policy, Baskaran (2016) for Germany, Allers and Vermeulen (2016) for the Netherlands, and Dahlberg et al. (2008) for Sweden find evidence for the existence of a flypaper effect (after accounting for endogeneity). The contradictory nature of these findings provides us with the motivation for a careful empirical investigation based on detailed German data.

We examine the effect of transfers on eight municipal expenditure subcategories and the total expenditures, as well as on property tax, and business tax multipliers. The analysis is performed for two German federal states: Saxony (east) and North-Rhine Westphalia (NRW, west). The questions we ask are: Can a flypaper effect be identified for total expenditures of the municipalities and eight expenditure subcategories? If so, which expenditure subcategories are influenced to a higher degree? Are there differences between the estimates from two federal states characterized by different municipal revenue structures? In the flypaper literature on Germany,[2] analysis by expenditure category at a sufficiently detailed level and the attempt at an east-west comparison are both novel. Our study is most closely related to the study by Baskaran (2016) on Hesse. However, municipal transfers in Hesse are subject to special rules that do not exist in other German federal states. In addition, we do not limit the estimations to a particular type of municipalities. Accordingly, we believe that our findings are more readily transferable to other federal states and can claim greater overall validity.

The paper is organized as follows: Section 2 addresses the German fiscal equalization scheme and the particularities of NRW and Saxony. The data is described in Section 3. Section 4 specifies the empirical model. After that, Section 5 presents our results for the two federal states and discusses subsequent robustness checks. Section 6 concludes.

[2] Moisio (2002) has also analyzed the flypaper effect at a municipal level in Finland.

2. FISCAL EQUALIZATION SCHEMES AND INSTITUTIONAL BACKGROUND IN NRW AND SAXONY

Germany's basic constitutional law gives each municipality the right to handle local matters as it sees fit (Article 28 (2) constitutional law). This so-called "autonomy of usage" is designed to encourage flexibility and ensure efficient expenditure planning. On the other hand, federal states and municipalities do not have comprehensive autonomy of revenue collection since tax revenue potential varies widely across the country and autonomous collection would contradict the basic principle of "equal living conditions" (Article 72 (2) and Article 106 (3) constitutional law). Accordingly, the federation imposes income tax, value-added tax, and most excise taxes and tolls; the federal states impose vehicle and wealth taxes; and the municipalities mainly impose business and property taxes (Rudzio, 2003). Business tax is a tax on the profits made by commercial enterprises. Property tax is levied on the possession of land and property. Other minor municipal taxes include tourist charges, entertainment tax, dog tax etc. The municipalities decide on the level of the tax multipliers that have a direct impact on the amount of their business and property tax revenues. The multiplier is determined annually in the municipal budget statutes and represents a given percentage by which the basic federal rate is multiplied. The lowest rate for business-tax multipliers per municipality is determined by the federation at a 200 % threshold. A summary of the statistics on the levels of these tax multipliers is provided in Table 7 in the Appendix. In comparison with other German states, both Saxony and NRW have high tax-multipliers (Goerl et al., 2013, p. 125).

In addition to the taxes that municipalities raise themselves, they receive a share of the income tax and value-added tax revenue collected higher up (as mentioned before). On top of that, most municipalities receive transfers representing a significant source of revenue for them. These transfers are of two major kinds: (a) non-matching transfers ("*allgemeine Zuweisungen"*), where the recipient municipality has full power of disposal, and (b) matching transfers ("*zweckgebundene Zuweisungen"*), where the transfer authority has an influence on the use of the funds in question. Non-matching transfers divide into transfers estimated according to the formalized tax system (*formula-based transfers, "Schlüsselzuweisungen"*) and transfers estimated per capita or in accordance with other disposal criteria (*need-based transfers, "Bedarfszuweisungen"*). Matching transfers are divided in investment transfers and transfers for present purposes (Tanzmann, 2012).

Due to differences in fiscal capacity ("*Steuerkraft"*) and fiscal need ("*Finanzbedarf"*), municipal tasks cannot be assured equally throughout all municipalities on the sole basis of their own revenues. The purpose common to all formula-based equalization schemes is to offset the gap between fiscal need and fiscal capacity. In all German federal states they function in much the same way. In general, a preliminary fixed total amount is made available for distribution to municipalities and to cities with county status. It is adjusted every year depending on the revenues of the federal state. In both our federal states around 85 % of all funds are allocated via formula-based transfers. 80% of these transfers are allocated to municipalities and cities with county status, the rest goes to higher-order authorities (Goerl et al., 2013).

One important aspect of the institutional background is the way different-sized municipalities are treated. To calculate the fiscal need of a municipality its population is multiplied by a weighting factor that depends on the population bracket a municipality belongs to.[3] This is designed to account for the increasing fiscal expenditure for every additional citizen and the increasing costs for the provision of public goods and services (so-called *"Einwohnerveredelung"*). In NRW and Saxony, intermediate weighting factors are calculated for municipalities with population sizes between the staggered levels. In other words, an increase in the population size of the municipality within a given bracket leads to an equivalent increase in the weighting factor. This is a difference from the practice of stepwise weighting in Hesse described in Baskaran (2016). In addition, both states (NRW and Saxony) consider the number of students attending school when they calculate the amount of transfers. Population size and school students are then multiplied by a basic amount ("*Grundbetrag"*) to determine the fiscal need.[4]

There are a few minor differences between the transfer schemes in Saxony and NRW. They do not however seriously affect our analysis. One initial difference is the additional matching formula-based transfers for investment purposes paid to Saxon municipalities only. Their purpose is to bridge the infrastructural gap in eastern Germany.[5] These transfers constitute 8% of the total formula-based transfers

[3] In Saxony there are 6 such brackets: up to 1,500 inhabitants; 4,000; 7,500; 15,000; 35,000; above 100,000.
[4] Both fiscal equalization laws are available from: Ministry of Internal Affairs and Municipal Issues North Rhine-Westphalia (2013); Saxon State Ministry of Finance (2013).
[5] An overview of the equalization scheme and the total transfer scheme in Saxony is available from Saxon State Ministry of Finance, http://www.finanzen.sachsen.de/1216.html.

in Saxony and are in fact "matching" (i.e. linked to a specific spending purpose). This is why in the German regional statistics (Genesis database) they are added to other matching transfers.

The compensation rate is a second difference between Saxony and NRW. In Saxony it amounts to 75 %, in NRW to 90 %. This means that if fiscal need is higher than fiscal capacity 75 % or 90 % of the difference, respectively, is made up for. If the fiscal need of a municipality is lower than its fiscal capacity it is classified as "abundant." This applies to only a few municipalities in our sample, particularly in NRW.[6]

3. DATA ON MUNICIPAL REVENUES AND EXPENDITURES

The investigation is performed using a dataset on all municipalities in the German federal states of North Rhine-Westphalia (NRW) and Saxony. In our sample, NRW consists of 396 and Saxony of 430 municipalities for the investigation period 2009-2013. Accordingly, the final sample contains 1980 observations in NRW and 2150 observations in Saxony. The data collected cover municipal expenditures, revenues (taxes and transfers), population and other indicators of relevance. The data were obtained from the statistical databases "Genesis online" of the two states. The selection of the sample is motivated by the availability of detailed data on the structure of municipal revenue sources and municipal expenditures. We also focus on NRW and Saxony for reasons of size (NRW is the most highly populated state in all Germany and Saxony the most highly populated state in eastern Germany, see Table 1), comparability of expenditure subcategories, and because the relevant part of the transfer allocation schemes in both states are representative in the German context.

We normalized all monetary values using the consumer price index of the year 2010.

[6] In a separate estimation in the section on robustness we restrict the sample to non-abundant municipalities.

TABLE 1

FACTS ON NRW AND SAXONY (2009-2013)

Indicator	**NRW**	**Saxony**
GDP in € per capita	30,795 (2009); 34,777 (2013)	21,877 (2009); 25,825 (2013)
Unemployment rates in %	8.9 (2009), 8.3 (2013)	12.9 (2009), 9.4 (2013)
Population	17,872,763 (2009), 17,571,856 (2013)	4,168,732 (2009), 4,046,385 (2013)
Beneficiary status in the German fiscal equalization scheme in the period 2009-2013	2010-2013	2009-2013

Source: Genesis online

Table 1 shows how selected facts compare in the two states. The GDP per capita of NRW is just above the German average of 34,219 € per capita in 2013. GDP per capita in Saxony is considerably lower. Both were beneficiary states within the German fiscal equalization scheme for most of the investigation period.

One of the most important sources of regional economic inequality in Germany is still the former division of the country. Recent research (Vollmer et al., 2013; Colavecchio et al., 2011) suggests that the spatial disparities in income and economic activity between former "eastern" and "western" German federal states remain large. Furthermore, there is a clear difference between the two parts in terms of the structure of the municipal revenue sources. Generally speaking, eastern municipalities are much more dependent on equalization transfers and grants, and they collect less tax revenue per capita than western municipalities.

Kernel density estimators for total tax revenues per capita and total transfer revenues per capita in the municipalities of Saxony and NRW are shown in the Appendix Figure 3. They reflect the typical east-west divide in municipal revenue structure. Further details on the composition of revenue can be found in Table 2.

TABLE 2

STATE SIZE OF MUNICIPAL REVENUE CATEGORIES IN NRW AND SAXONY (2009-2013)

Revenue category	**NRW**	**Saxony**
Business tax	19-21 %	12-16 %
Property tax	6 %	5 %
Income tax	12-13 %	7-10 %
Other general municipal taxes	1-2 %	1-2 %
Formula-based transfers	12 %	19-22 %
Investment transfers	3-5 %	8-12 %
Transfers and grants for present purposes	4-5 %	7-9 %
Other general transfers	2-3 %	1 %
Other revenue sources	33-41 %	23-40 %

Source: own calculations based on Genesis online

In NRW, two major revenue sources are the share on municipal business- and income tax. In Saxony, by contrast, formula-based transfers are the major revenue category, followed by business tax and investment transfers. Despite the lower compensation rate (75% vs. 90%), transfers represent a larger share of revenue in Saxony. This pattern repeats itself when we look at per capita revenues (Table 7 in the Appendix). Other revenue sources are shares of value-added tax, fees, levies, loans, and other transfers. Formula-based transfers per capita are almost 30 % higher in Saxony. These differences may have an impact on the existence and the magnitude of a possible flypaper effect.

It transpires, however, that as far as the structure of their expenditures is concerned, only slight differences exist between the municipalities in NRW and Saxony. The public spending shares in Table 3 indicate that administration expenditure represents the major subcategory in both federal states, followed by the social services and infrastructure (TIC) subcategory. As we can see from this table, the expenditure subcategories in NRW and Saxony are similar in size. A detailed description of the expenditure subcategories can be found in the Appendix (see Table 8).

In terms of per capita levels, however, the differences between the two states are more pronounced (Table 7 in the Appendix). Per capita administrative expenditures are about one third lower in Saxony. On the other hand, business development expenses per capita are three times lower in NRW.

TABLE 3

AVERAGE SIZE OF MUNICIPAL EXPENDITURE SUBCATEGORIES IN NRW AND SAXONY FOR YEARS 2009-2013

Expenditure subcategory	**NRW**	**Saxony**
Transport, infrastructure, and construction (TIC) expenditures	13 %	13-14 %
Administration expenditures	44-46 %	37-39 %
Business development	1-2 %	3-6 %
Public-facility expenditures	4-5 %	4 %
Culture/ sports	4-5 %	7 %
Health system	1 %	1 %
Social services	23-26 %	23-27 %
Education	6-7 %	6-7%

Source: own calculations based on Genesis online

4. EMPIRICAL STRATEGY

4.1 Instrumental variables (estimation)

To test for the existence of the flypaper effect we need to estimate the relationship between non-matching transfers and public spending on the one hand and between non-matching transfers and municipally set tax rates on the other. Per capita total expenditures, expenditures in different subcategories, and the tax rates are dependent variables in the respective regressions. The key explanatory variable is always the value of the non-matching transfers (per capita). The flypaper effect exists if the value of the corresponding coefficient is statistically significant and positive in the expenditure regressions and non-negative in the tax-rate regressions (see Baskaran, 2016).

For the estimations we employ a two-stage least squares method with instrumental variables, applied to a panel dataset. The motivation for this choice is the endogeneity problem known from previous literature. In particular, the size of the non-matching transfers may be non-random and related to unobserved attributes of the municipalities. Our identification strategy is based on utilizing the parameters used to determine the fiscal need of the municipalities (which was explained in Section 2). The instruments for transfers per capita are thus absolute population size and number of school students (per capita) because both are major factors for the calculation of a municipality's fiscal need. Based on the underlying assumption there is no direct impact of the instruments on the per capita expenditures. It is plausible to assume that the absolute population size has no direct impact on the per capita expenditures. It is also reasonable to assume school students per capita not to have a direct impact on the expenditures per capita except on the education expenditures. For the regression of education expenses, we assume school students per capita not to be a valid instrument. Here we use the unemployment rate as an instrument instead (higher unemployment rate correlated with low fiscal capacity and thus higher transfers).

Another way of accounting for unobserved characteristics of the municipalities would be to include municipal fixed effects in the regressions. One limitation of fixed-effects models is that the effects of variables with minor within-group variation or none at all cannot be reliably estimated. In addition, including fixed effects in the panel estimation with a small number of periods reduces efficiency

(Wooldridge, 2002). Comparing the within-variance of the relevant regressors with their between-variance is an indicator for the power of the fixed effects model. The larger the within-variance, the better the performance of the fixed effects model will be (Plümper and Troeger, 2007). Table 9 in the Appendix indicates total, between, and within standard deviations for the key variables. We conclude that the within-variation of transfers and expenditures is rather small and hence do not include fixed effects in the estimation.[7]

In the first stage, the transfer per capita variable is decomposed into a component explained by the instruments and a problematic component v_{it}. The first stage is specified as follows:

$$TR_{it} = \alpha_0 + \alpha_1 POP_{it} + \alpha_2 SS_{it} + \boldsymbol{a} \cdot \boldsymbol{X} + v_{it}, \text{ where} \quad (1)$$

TR_{it}= non-matching transfers per capita of municipality *i* in year *t*;

POP_{it}= population size of municipality *i* in year *t* (used as an instrument);

SS_{it}= school students per capita of municipality *i* in year *t* (used as an instrument);

X = vector of other explanatory variables.

In the key estimates section we generate two specifications per federal state: reduced regressions and basic regressions. In the reduced regression, the only additional explanatory variables are the lagged dependent variables and the year dummies. The lagged dependent variable is used to capture the long-term effects of transfers. Though a lagged dependent variable is normally endogenous, in this case it will not bias the estimation of the effect of transfers because their identification is based on exogenous instruments.

The reduced regressions gives us first indications of the effect of transfers on expenditures. In the basic regression additional control variables are used to reduce bias and improve efficiency: age group shares of inhabitants below 20 years and above 65 years old, population density, and new debt per capita. Since certain expenditures in the municipalities may differ depending on the proportion of young, middle-

[7] For completeness, however, we include results for the pooled OLS estimation, a fixed effects regression, and single-year OLS regressions in Appendix Table 14. Results show no explanatory power of the instruments in the first stage. We thus rely thenceforward on pooled IV estimations, as Dahlberg et al. (2008) and Baskaran (2016) also do in most estimations.

aged, and old people, we control for the age composition of the population. Population density is designed to capture higher expenditures, notably in the larger towns. To test for possible fiscal restrictions influencing expenditures, we include the size of municipal loans/ debts as an additional control.

Further fiscal and political factors may also influence municipality spending and are controlled for in the robustness section (see Section 5.2).

In the second stage, the fitted values of $\widehat{TR}$ from the first stage are used instead of the problematic (endogenous) value of *TR*. The second stage is specified as follows:

$$y_{it} = \beta_0 + \beta_1 \widehat{TR}_{it} + \boldsymbol{b} \cdot \boldsymbol{X} + u_{it}, \text{ where} \quad (2)$$

y_{it}= either expenditures per capita (total and subcategories) or business tax multiplier or property tax multiplier.

We are mainly interested in the coefficients for transfers. From the estimations we hope to draw conclusions relating to flypaper effects and particularly to the expenditure subcategories in which this effect occurs in the two federal states.

4.2 Data restrictions

Before turning to the estimation itself, we report on some data problems. First, we had to get rid of a few outliers. Specifically, we dropped all municipalities with more than 500,000 inhabitants (large cities according to the BBSR definition[8]), because most receive a disproportionate amount of transfers due to higher weighting factors when determining fiscal needs (see Figure 1). This applies to all estimations. In effect, four cities in NRW and two in Saxony were deleted from the sample.[9]

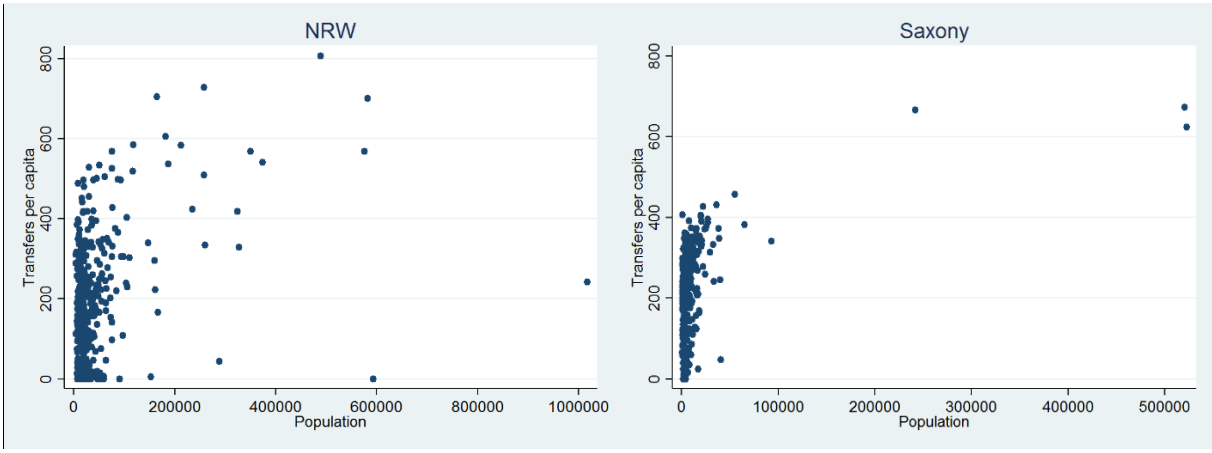
In addition, the sample in the estimations varies due to missing values. They reduce the sample to the tune of some 380 data points per federal state (10% of the sample).

[8] Bundesinstitut für Bau-, Stadt- und Raumforschung (BBSR): Laufende Stadtbeobachtung – Raumabgrenzungen, http://www.bbsr.bund.de/BBSR/DE/Raumbeobachtung/Raumabgrenzungen/StadtGemeindetyp/StadtGemeindetyp_node.html.

[9] We varied this threshold to 100,000. The main results as discussed in the results section are confirmed.

FIGURE 1

TRANSFERS PER CAPITA AGAINST POPULATION SIZE IN NRW AND SAXONY IN YEARS AVERAGE OF 2009-2013



Note: Figures show per-capita transfers against population size. Source: own calculations.

5. RESULTS

5.1 Key estimates

The results of the second-stage IV estimations for total expenditure and eight expenditure subcategories in the federal states NRW and Saxony for municipalities with fewer than 500,000 inhabitants are presented in Table 4 and Table 5 below. Table 6 presents the IV estimations for the tax multipliers in NRW and Saxony.[10] These tables do not include first-stage results. Extended first-stage results are reported in Table 10, 11, 12 of the Appendix. We report heteroscedasticity-robust and autocorrelation-robust standard errors.

We now analyze first stage results. As can be seen from the significance of the corresponding coefficients in the first stages (see Table 10, 11, 12), both instruments are strong predictors of transfers per capita. In addition, we report a number of diagnostics to check the validity of the IV estimates. A high F-statistic in the first stage is an indicator of a high correlation between the instruments and the endogenous variable (transfers). As a rule of thumb specified by Staiger and Stock (1997), F-values above 10 suggest strong instruments. This threshold is exceeded by all first-stage IV regressions. Thus,

[10] The IV regression is estimated using the Stata package IVREG2 by Baum et al. (2010).

F-statistics in each of the IV regressions show joint statistical significance for the instruments in the first stage.

We also report the p-value of the Sargan-Hansen test to show the validity of the over-identifying restrictions. The joint null hypothesis is that the instruments are valid and hence uncorrelated with the error term as well as correctly excluded (Baum et al., 2003). The Hansen's J test statistics p-value indicates that in most IV estimations the null hypothesis cannot be rejected at the 10 % level. We therefore consider the instruments to be strong and valid.

We now turn to the second stage results of the reduced regressions and the basic regressions. Table 4 and Table 5 report a significant effect of transfers on total municipal expenditures both in NRW and in Saxony. The coefficients in both states are close to each other, which is a little surprising because even though the main features of the transfer allocation systems are similar, the states' revenue structures and transfer dependencies are quite different, as we have seen. The coefficients in both cases are not significantly different from unity. These first results confirm the findings of Baskaran (2016) for Hesse (impact of transfers on total expenditures in the range of 70-90 cents). The coefficients of the other variables included are not relevant for the determination of the flypaper effect and thus not discussed here.

In Table 6 we examine the effect of transfers on the two tax multipliers set by the municipalities. The estimations are again executed with lagged dependent variables and year dummies in all cases, as well as additional control variables as indicated. The second-stage estimates suggest a positive and statistically significant impact of transfers on the tax multipliers in both states. Thus tax multipliers do not decrease with higher transfers. Instead, some even increase slightly, at least the property tax multipliers. The coefficients are however very low. We conclude there is either no, or only a very small, positive effect of transfers on the tax multipliers.

Our results point to a significant and strong effect of transfers on total spending. Furthermore, we find no negative effect of transfers on the tax rates, which means that taxes stay at the same level or even slightly increase. These findings indicate the existence of the flypaper effect in the municipalities of NRW and Saxony.

Next we investigate the effect of transfers on different expenditure subcategories. In NRW, the transfer coefficients for all subcategories are positive and significant at the 10 % level, except for administration and education expenditures. This is still the case after adding further covariates (see Table 4). The largest significant coefficients are found for social services and infrastructure expenditures, suggesting about 10 to 20 cents spent for every extra euro from transfers.

The estimates for Saxony are less stable (see also the robustness analysis). In the basic model, there are only four expenditure subcategories with positive and significant transfer coefficients (see Table 5). These subcategories are public facilities, culture/ sports, social services and education. The largest significant coefficients in the range of 10 to 20 cents are found for social services (as in NRW), culture/sports and education. Business development has a negative coefficient, it is however insignificant in the basic model.

The most striking differences between the estimates for NRW and Saxony are (a) the insignificance of transfer coefficients for infrastructure and business development expenditures in Saxony, and (b) the insignificance of the transfer coefficient for education expenditures in NRW. As far as infrastructure and business development expenditures are concerned, the reason may be that Saxony, as noted in section 2, receives additional matching formula-based transfers for investment purposes plus substantial supplementary transfers for eastern federal states due to the former division. Thus, non-matching formula-based transfers affect these expenditure subcategories in Saxony to a lesser extent. NRW, by contrast, has to do without such targeted support for these types of municipal expenditure. This is, in fact, the background for the criticism of the solidarity pact voiced by the western federal states (Haseloff et al., 2015).

Education is mostly financed at state level. Only local schools and minor research expenditures are financed at the municipal level. The significant effect of transfers on education expenditures in Saxony contrasts with the non-significant coefficient in NRW. There may be various reasons for this. First, unlike NRW, where schools are often also funded at a state or district level, Saxon municipalities are usually the maintainers of public schools. Second, and more importantly, the two states have different approaches to the consideration of the number of school students in the fiscal equalization formulas

from which transfers are calculated. NRW gives different weighting factors to full-time and part-time school students. In Saxony, school students are weighted according to the type of school they attend (primary school students are weighted higher than high school students, etc.) and multiplied by a factor that takes account of material and maintenance costs. Accordingly, formula-based transfers in Saxony are more strongly influenced by the number of students than formula-based transfers in NRW. This also has a more direct effect on education expenditures.

Interestingly, the subcategory with the largest per capita expenses - administration - does not depend on transfers in either state. These findings are comparable with the results come up with by Weicher (1972), Grossman (1990), and Moiso (2002), whose analyses of the flypaper effect are partly category-specific. Formula-based transfers are thus used to increase spending on infrastructure, construction, culture, and sport rather than for administrative expenses.

In general, examining the flypaper effect in different expenditure subcategories produces interesting results. In both states, municipalities spend a large share of lump-sum transfers to offset social service expenditures. NRW's transfer use focuses on TIC expenditures, while Saxony uses them intensively for spending on culture/ sports and education.

The next subsection is given over to robustness checks.

TABLE 4

SECOND-STAGE IV REGRESSION RESULTS FOR EXPENDITURES IN NRW

***Dependent Variable*:**	**Total Exp.**	**TIC**	**Admin.**	**Pub. Facilities**	**Bus. devel.**	**Culture/Sport**	**Health**	**Social Serv.**	**Education**
NRW	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Reduced model:									
Transfers per capita	**0.769*** **	**0.102*** **	0.084	**0.069*** **	**0.031** **	**0.081*** **	**0.024*** **	**0.228*** **	0.006
	(0.1659)	**(0.032)**	(0.0754)	**(0.0154)**	**(0.013)**	**(0.0154)**	**(0.0079)**	**(0.0788)**	(0.0055)
N	1568	1568	1568	1568	1568	1568	1568	1568	1568
F	476.3	261.2	156.2	318.3	39.2	252.9	37	2040.2	372.3
First-stage diagnostic									
Weak-Instruments Test (F-statistic)	55.7	56.7	59.7	50.7	57.8	76.5	56.3	19.4	233.3
Over-Identification Test (Hansen J, p-value)	0.282	0.407	0.584	0.318	0.102	0.136	0.529	0.946	0.642
Basic model:									
Transfers per capita	**0.657** **	**0.165** **	-0.121	**0.051*** **	**0.0627** **	**0.093*** **	**0.026*** **	**0.152***	0.015
	(0.2594)	**(0.065)**	(0.1594)	**(0.0193)**	**(0.027)**	**(0.0238)**	**(0.0083)**	**(0.08)**	(0.0111)
N	1503	1503	1503	1503	1503	1503	1503	1503	1503
F	318.4	156.6	113.5	280.4	26.8	134	20.1	1558.4	200.7
First-stage diagnostic									
Weak-Instruments Test (F-statistic)	22.7	17.3	16.6	17.2	18.4	26	61.3	12.3	190.7
Over-Identification Test (Hansen J, p-value)	0.057	0.703	0.491	0.15	0.189	0.188	0.488	0.229	0.281

Note: Heteroscedasticity-robust and autocorrelation-robust standard errors in parentheses: * p<0.1, ** p<0.05, *** p<0.01

2SLS regressions—variables excluded from second stage: population size, school students per capita (unemployment per capita for education expenditures).

TABLE 5

SECOND-STAGE IV REGRESSION RESULTS FOR EXPENDITURES IN SAXONY

***Dependent Variable*:**	**Total Exp.**	**TIC**	**Admin.**	**Pub. Facilities**	**Bus devel.**	**Culture/Sport**	**Health**	**Social Serv.**	**Education**
Saxony	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Reduced model:									
Transfers per capita	**0.718****	**0.105***	**0.344****	**0.043****	**-0.127****	**0.178*****	0.00001	0.049	**0.204*****
	(0.2219)	**(0.0604)**	**(0.129)**	**(0.0213)**	**(0.056)**	**(0.0398)**	(0.0168)	(0.0423)	**(0.0492)**
N	1712	1712	1712	1712	1712	1712	1712	1712	1700
F	168.1	81.6	68.27	46.99	66.98	88.85	11.72	112.65	54.04
First-stage diagnostic									
Weak-Instruments Test (F-statistic)	154.5	134.1	139.8	137.6	133.96	144.34	137.6	175.34	144.7
Over-Identification Test (Hansen J, p-value)	0.765	0.62	0.52	0.142	0.117	0.058	0.208	0.087	0.753
Basic model:									
Transfers per capita	**0.772*****	0.026	0.19	**0.081*****	-0.066	**0.137*****	0.007	**0.127****	**0.198*****
	(0.2782)	(0.0717)	(0.172)	**(0.0251)**	(0.0671)	**(0.0418)**	(0.0229)	**(0.0571)**	**(0.0554)**
N	1631	1631	1631	1631	1631	1631	1631	1631	1628
F	93.27	50.37	44.5	29.75	44.58	79.16	5.94	97.1	36.04
First-stage diagnostic									
Weak-Instruments Test (F-statistic)	92.4	80.6	78.9	109.1	82.36	88.69	84.29	100.21	120.5
Over-Identification Test (Hansen J, p-value)	0.674	0.404	0.285	0.148	0.04	0.07	0.092	0.115	0.395

Note: Heteroscedasticity-robust and autocorrelation-robust standard errors in parentheses: * p<0.1, ** p<0.05, *** p<0.01

2SLS regressions—variables excluded from second stage: population size, school students per capita (unemployment per capita for education expenditures).

TABLE 6

SECOND-STAGE IV REGRESSION RESULTS FOR TAX MULTIPLIERS IN NRW AND SAXONY

	NRW				**Saxony**			
Model:	**Reduced**		**Basic**		**Reduced**		**Basic**	
***Dependent Variable*:**	**Property Tax**	**Business Tax**	**Property Tax**	**Business Tax**	**Property Tax**	**Business Tax**	**Property Tax**	**Business Tax**
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Transfers per capita	**0.049*** **	**0.014*** **	0.044	0.011	**0.029*** **	0.004	**0.037*** **	0.0003
	(0.0186)	**(0.0053)**	(0.0294)	(0.0102)	**(0.0107)**	(0.00292)	**(0.0137)**	(0.0037)
Control Variables	No	No	Yes	Yes	No	No	Yes	Yes
N	1568	1568	1503	1503	1712	1712	1631	1631
F	554.6	2069.8	289.2	1253.1	1326.5	1680.4	821	946.3
First stage diagnostic								
Weak-Instruments Test (F-statistic)	22.8	34.5	11.1	17	111.7	110	74.5	74.7
Over-Identification Test (Hansen J, p-value)	0.474	0.264	0.289	0.895	0.055	0.364	0.045	0.269

Note: Heteroscedasticity-robust and autocorrelation-robust standard errors in parentheses: * p<0.1, ** p<0.05, *** p<0.01

2SLS regressions—variables excluded from second stage: population size, school students per capita (unemployment per capita for education expenditures).

5.2 Robustness checks

In this section we perform a number of robustness checks to explore whether the core results are stable. We build on the basic model and add further control variables or vary the sample.

First, we include other revenue variables in the regression, such as accumulated tax revenues and other transfers (transfers for present purposes and investment transfers), because they may also have an impact on expenditure in the municipalities. To a large extent, tax revenue can explain spending. Other transfers are bound to a specific spending purpose (matching transfers) and may be granted to redress the balance in favor of municipalities with low formula-based transfers. These variables are not exogenous because to some extent at least they are connected to the determination of the formula-based transfers. Multicollinearity problems, however, should not be an issue due to the low correlation of these additional regressors to the formula-based transfers.

The results of the estimation are given in the "All Tax" column of Table 13 in the Appendix. First of all, the basic estimations are confirmed in their predictions. There is a significant and positive effect of the transfers on total spending and several expenditure subcategories and either no effect or even a slightly positive effect of transfers on the tax multipliers. As in the basic estimations, total expenditure coefficients are not significantly different from 1. In NRW those effects are found in the same expenditure subcategories as in the basic estimations. In Saxony, the social services category is no longer significant, all other subcategories are roughly on the same level. As we have noted, the estimates of the additional variables included are probably biased because taxes and transfers are not fully exogenous.

As a second check, we remove the abundant municipalities (municipalities with a high tax capacity that receive low transfers) because they could potentially distort the basic results. In NRW, 60 municipalities are abundant and thus dropped out of the estimation, in Saxony there are 23 such municipalities.

The estimations are presented in the "Not Abundant" column of Table 13. As is to be expected, the expenditure coefficients in both states become larger, although this increase is not statistically significant. This suggests that an increase in transfers per capita by 1 euro increases expenditures per capita by around 1 euro.

Thirdly, we add political variables: (1) the number of council seats per capita, and (2) a CDU-dummy indicating whether the Christian Democratic Party is part of the government. Due to data availability, this test is conducted for Saxony only. These variables are potentially endogenous (if a certain party or a certain size of council influences fiscal capacity, etc.), but they may also be related to spending behavior as a result of different political attitudes. Council size has a potential impact on expenses; council seats per capita in a parliament are related to the political influence of the residents in the municipality. The purpose of the CDU-dummy is to find out whether the party governing a municipality is important. It is conceivable that CDU-governed municipalities may have been given special treatment because both at state and federal level the CDU was the governing party for the entire sample period (in a coalition with the market-liberal FDP). Accordingly, it is possible that central-level governments may have preferences for the specific political characteristics of municipalities and that this will affect their spending behavior.[11]

The estimations for Saxony are presented in the "CDU+Seats" column of Table 13. The coefficient of the effect of transfers on the total expenditures is larger than in the basic model, but again the difference is not statistically significant.

As a fourth robustness check of the basic estimations, we pool our samples for NRW and Saxony to analyze whether the former discrete flypaper effect still exists in the pooled constellation. The pooled sample estimates are reported in the column "Pooled" in Table 13. They are very similar to the basic estimations, though slightly larger. The effect of transfers on administration expenditures is the only coefficient that is not significant. Overall, this pooled estimation confirms the earlier separate estimations.

In all four robustness checks in this section, the main thrust of the results of the basic model is confirmed. We thus interpret the basic estimations of the flypaper effect as robust.

6. CONCLUSION

In line with many investigations in the empirical literature, we find robust evidence for the existence of a flypaper effect in the expenditures of the municipalities in the German federal states NRW and Saxony. In both these states, we find that higher formula-based transfers increase local expenditures but do not reduce

[11] Also described in Dahlberg et al. (2008).

taxes. Possible endogeneity problems are handled by applying the instrumental variables method, where indicators operative in the determination of fiscal needs and thus influential on the level of formula-based transfers are used as instruments. The instrumental variables employed are reported to be valid and relevant. The fact that the independent results point in a similar direction for both states indicates that the evidence for the existence of the flypaper effect is not confined to these two states alone and could potentially be generalized to most other German federal states.

As Inman (2008) puts it, "once viewed as anomaly, the flypaper effect should now be seen as a reality of fiscal politics". Studying the way transfers are spent then gives useful information about citizen preferences for local public goods (ibid.).

In this regard, our basic model results show that there are two important similarities between the spending behavior of the municipalities in NRW and Saxony. First, in both cases we cannot identify a significant impact of transfers on general administrative expenditures. That may be a positive finding, suggesting that the municipalities do not use the lump-sum transfers just in order to increase the administrative staff. Second, the coefficients for several expenditure subcategories, such as public facilities, culture/sports, and social services are very close in the two federal states. That could be a sign either of similar public preferences or of similar spending priorities of the municipalities (municipal duties), despite large differences in overall transfer dependency.

A substantial difference in the estimates for the education expenditures in the two federal states could be due to important differences in the structure of schools and in the weighting of school students as discussed above. More important, from our point of view, are differences regarding the infrastructure and business development expenditures. The estimates suggest that lump-sum transfers have an impact on these two expenditure categories in NRW, but not in Saxony. Without further research, it is not possible to definitely connect this result to differences in public preferences or other factors. Still, it is important to note that eastern federal states receive targeted support for these types of expenditures under the framework of the solidarity pact. This could be a reason why the lump-sum transfers are not used to fund such expenditures in Saxony.

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Appendix

TABLE 7 - *SUMMARY STATISTICS*

	NRW						Saxony					
	Obs	Weighted mean	Mean	Std Dev	Min	Max	Obs	Weighted mean	Mean	Std Dev	Min	Max
Expenditures												
Total expenditure p.c.	1980	**2527.9**	**1971.4**	485.9	1056.5	4925.2	2150	**2036.1**	**1624.8**	539.3	700.4	8834.5
TIC p.c.	1980	**329.1**	**276.9**	131.7	0.3	1085.7	2150	**279.7**	**239.4**	158.4	18.2	2215.9
Administration p.c.	1980	**1143.6**	**1104.5**	272.2	515.9	3703.2	2150	**771.2**	**723.4**	312.8	168.1	4331.6
Business development p.c.	1980	**38.1**	**30.1**	42.5	0	487.7	2150	**108.8**	**128.9**	214.6	0	6737
Public facility p.c.	1980	**101.8**	**69.1**	43.1	3.9	330.4	2150	**81.9**	**67.7**	64.4	4.5	1022
Culture/ Sports p.c.	1980	**107.5**	**63.4**	43.9	0	356.5	2150	**143.8**	**65.2**	75	0	912.6
Health p.c.	1980	**19.3**	**12.9**	8.9	0	262.5	2150	**21.1**	**6.8**	36.7	0	990.5
Social services p.c.	1980	**622.3**	**263.6**	257.8	8	1819.8	2150	**495.6**	**299**	112.0	0	1453.6
Education p.c.	1980	**166.2**	**151.1**	70.1	13.6	569.4	2150	**133.7**	**94.3**	113.5	0	2300.5
Revenues												
Formula-based Transfers p.c.	1980	**298.3**	**194.8**	161.6	-38.7	930.7	2150	**384.4**	**222.6**	92.5	2.8	723.4
All tax revenue p.c.	1980	**1061.2**	**931**	323.5	308.3	6355.8	2136	**615.6**	**489.7**	240.3	90.1	3645.5
All non-tax revenue p.c.	1980	**1469.3**	**1038.7**	416.8	283.5	3707.8	2150	**1434.6**	**1134.4**	433.9	202.8	6359.6
Tax multipliers												
Property tax multiplier, %	1980		**419.2**	56.7	240	825	2150		**397.9**	35.6	300	650
Business tax multiplier, %	1980		**424.1**	26.3	300	520	2150		**385.9**	19.8	275	490
Other Indicators												
Debt level p.c.	1906	**2297.8**	**1496.9**	1245.9	0	8580	2078	**739.6**	**631.4**	465.5	0.00	3756
New debts p.c.	1899	**60.3**	**82.38**	208.89	-1559.65	2190.24	2057	**-11.8**	**-5.85**	125.04	-1434	1847
% Age 0-20	1980		0.2	0.02	0.16	0.28	2136		0.15	0.02	0.06	0.22
% Age 20-65	1980		0.59	0.02	0.52	0.66	2136		0.60	0.03	0.51	0.70
% Age 65+	1980		0.20	0.02	0.12	0.31	2136		0.24	0.03	0.15	0.34
Population	1980		45086	87617	4089	1036253	2136		9396	37919	355	531562
Population density	1980		504.3	532.8	43	3221	2150		193.9	222.3	0.00	1784
School students p.c.	1980		0.12	0.04	0.03	0.26	2150		0.06	0.04	0	0.28
Unemployment rate p.c.	1980		0.03	0.01	0.01	0.07	2133		0.05	0.02	0.01	0.15

Notes: Statistics for pooled observations 2009-2013. Monetary values in euro, prices of 2010.

TABLE 8

THE EXPENDITURE SUBCATEGORIES IN NRW AND SAXONY

Expenditure subcategory	**NRW**	**Saxony**
Transport, infrastructure, construction (TIC)	Spatial planning and development, geo-information, construction and property regulation, housing-construction funding, electricity, gas, water, district heat supply, waste management, sewage disposal, municipal-roads, district-roads, state-roads, federal-roads, road cleaning, parking facilities, public transport, other passenger and goods transport, ports	Spatial planning and measurement, construction regulation and administration, housing-construction funding, housing-care, housing-enterprises, municipal-roads, district-roads, state-roads, federal roads, road cleaning and lighting, provisions for stationary traffic, water supply and flow
Administration	Administration management and service, statistics and elections, regulatory affairs, funeral and cemetery services, taxes, general transfers and general levies, general financial economy	Administration management and service, municipal authorities, auditing, general financial economy, special offices of the general administration, administration provision, police, public order, defense burden sharing, funeral services, taxes, general transfers and general levies, handling of recent years
Business development	General institutions and companies, business development, tourism	Markets, slaughter houses, stockyards, auxiliary systems of the administration, tourism, other receivables for economy and transportation, management of commercial enterprises, utility companies, transport companies, business development companies, agriculture and forestry companies, other business companies, general property, special property
Public facilities	Fire protection, emergency services, large-scale emergencies, disaster control, public green areas, nature and rural conservation, agriculture and forestry, environmental measures, immission protection, landscaping, public waters, water supply plants, monument conservation and care	Fire protection, disaster control, nature conservation, public green areas, monument conservation and care, other public institutions, agriculture and forestry
Culture/ Sport	Museums, exhibitions, zoological and botanical gardens, theater, public music culture, music schools, adult education center, libraries, other adult education, cultural education, national education, clerical affairs	Management of cultural affairs, museums, exhibitions, preservation of the cultural heritage, cultural education, national education, clerical affairs, funding of sports, sports facilities, bathing establishments
Health	Health administration, hospitals, health care, recreational facility, spas and bath houses	Health administration, hospitals, health care, recreational facilities, spas and bath houses

Social services	Primary care, basic social benefits, benefits for asylum seekers, social facilities, war victim welfare, benefits under the Federal Pensions Act, benefits for severely disabled persons, funding of welfare carriers, benefits for living, inclusion of disabled persons, help with care, advances on maintenance payments, assistance services, funding for returnees and political prisoners, other social services, funding for children, youth work, services for young people and families	Administration of social affairs, social welfare according to law, Act on Benefits for Asylum Seekers, social facilities, war victim welfare, facilities of the youth welfare system, funding of welfare carriers, other social services, social affairs
Education	Primary schools, secondary schools, combined primary and secondary schools, high schools, comprehensive schools, vocational schools, special schools, other formal school tasks, science and research	School administration, primary schools, secondary schools, high schools, vocational schools, general special schools, comprehensive schools, other formal school tasks, science and research

Source: Genesis online.

TABLE 9

BETWEEN- AND WITHIN-VARIATION OF KEY VARIABLES

		NRW			Saxony		
Variable		**Mean**	**Std. Dev.**	**Obs.**	**Mean**	**Std. Dev.**	**Obs.**
Transfers p.c.	overall	194.84	161.58	N = 1980	222.64	106.64	N = 2150
	between		149.52	n = 396		98.48	n = 430
	within		61.61	T = 5		41.14	T = 5
Expenditures p.c.	overall	1971.42	485.89	N = 1980	1624.78	539.33	N = 2150
	between		455.3	n = 396		441.52	n = 430
	within		170.9	T = 5		310.32	T = 5
Property tax multiplier	overall	419.24	56.69	N = 1980	397.95	35.58	N = 2150
	between		45.09	n = 396		33.75	n = 430
	within		34.41	T = 5		11.36	T = 5
Business tax multiplier	overall	424.13	26.32	N = 1980	385.91	19.79	N = 2150
	between		24.22	n = 396		18.85	n = 430
	within		10.38	T = 5		6.07	T = 5
Population share under 20	overall	.20	.019	N = 1980	.15	.02	N = 2136
	between		.02	n = 396		.02	n = 430
	within		.005	T = 5		.01	T = 4.97
Population share over 65	overall	.20	.02	N = 1980	.24	.04	N = 2136
	between		.02	n = 396		.03	n = 430
	within		.003	T = 5		.01	T = 4.97
Population density	overall	504.26	532.76	N = 1980	195.79	222	N = 2150
	between		532.73	n = 396		222.1	n = 430
	within		24.62	T = 5		7.36	T = 5
New debts p.c.	overall	82.38	208.9	N = 1899	-5.85	125.04	N = 2057
	between		121.23	n = 386		49.57	n = 420
	within		169.9	T = 4.92		114.9	T = 4.9
All tax revenue p.c.	overall	931.03	323.5	N = 1980	489.7	240.3	N = 2150
	between		278.6	n = 396		214.46	n = 430
	within		164.9	T = 5		108.8	T = 5
All non-tax revenue p.c.	overall	1038.67	416.82	N = 1980	1134.42	433.86	N = 2150
	between		382.3	n = 396		331.36	n = 430
	within		166.97	T = 5		280.43	T = 5

TABLE 10

FIRST-STAGE RESULTS OF THE KEY ESTIMATIONS FOR NRW (2009-2013)

First-stage results:	**Total Exp.**	**TIC**	**Admin.**	**Pub. Facilities**	**Bus. devel.**	**Culture/Sport**	**Health**	**Social Serv.**	**Education**
Dependent Variable: **Transfers per capita**									
Reduced model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
NRW									
Population size	**0.0006*** **	**0.0006*** **	**0.0007*** **	**0.0006*** **	**0.0006*** **	**0.0007*** **	**0.0006*** **	**0.0002** **	**0.0004*** **
	(0.0001)	**(0.0001)**	**(0.0001)**	**(0.0002)**	**(0.0001)**	**(0.0001)**	**(0.0001)**	**(0.0001)**	**(0.0001)**
School students pc	**166.4***	**192.9****	**183.2****	**182.5****	**183****	**194.3****	**186.2****	85.7	
	(88.6)	**(88.9)**	**(87.7)**	**(88.3)**	**(88.1)**	**(88.5)**	**(87)**	(89.1)	
Unemployment rate pc									**6972.8*** **
									(366.9)
N	1568	1568	1568	1568	1568	1568	1568	1568	1568
F	498.8	254.7	144.1	384.2	31.96	302.9	51.82	2303.9	294.2
Basic model:									
Population size	**0.0003** **	**0.0003** **	**0.0002** **	**0.0003** **	**0.0003** **	**0.0003** **	**0.0006*** **	0.0002	**0.0007*** **
	(0.0001)	**(0.0001)**	**(0.0001)**	**(0.0001)**	**(0.0001)**	**(0.0001)**	**(0.0001)**	(0.0001)	**(0.0001)**
School students pc	**158.6***	139.5	**143.8***	133.3	133.2	**164.8***	**178.2***	62.9	
	(92)	(91.9)	**(90)**	(91.6)	(91.7)	**(93)**	**(92.2)**	(92.1)	
Unemployment rate pc									**8246.6*** **
									(399.4)
N	1503	1503	1503	1503	1503	1503	1503	1503	1503
F	317.5	164.3	96.20	307.8	25.07	167.2	28.90	1622.2	179.3

TABLE 11

FIRST-STAGE RESULTS OF THE KEY ESTIMATIONS FOR SAXONY (2009-2013)

First stage results:	**Total Exp.**	**TIC**	**Admin.**	**Pub. Facilities**	**Bus. devel.**	**Culture/Sport**	**Health**	**Social Serv.**	**Education**
Dependent Variable: **Transfers per capita**									
Reduced model:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Saxony									
Population size	**0.0025*** **	**0.0023*** **	**0.0024*** **	**0.0022*** **	**0.0022*** **	**0.0024*** **	**0.0022*** **	**0.0025*** **	**0.002*** **
	(0.0002)	**(0.0002)**	**(0.0002)**	**(0.0002)**	**(0.0002)**	**(0.0002)**	**(0.0002)**	**(0.0002)**	**(0.0001)**
School students pc	**750.6*** **	**691.1*** **	**733.9*** **	**658.7*** **	**658.8*** **	**709.2*** **	**665.5*** **	**617.5*** **	
	(52.1)	**(52.8)**	**(51.7)**	**(53.1)**	**(53.3)**	**(53.3)**	**(53.5)**	**(53.7)**	
Unemployment rate pc									**1740.3*** **
									(151.8)
N	1712	1712	1712	1712	1712	1712	1712	1712	1700
F	143.8	81.89	68.98	42.74	73.38	120.6	13.09	111.3	59.14
Basic model:									
Population size	**0.0025*** **	**0.0022*** **	**0.0022*** **	**0.0023*** **	**0.0022*** **	**0.0024*** **	**0.0022*** **	**0.0026*** **	**0.002*** **
	(0.0002)	**(0.0002)**	**(0.0002)**	**(0.0002)**	**(0.0002)**	**(0.0002)**	**(0.0002)**	**(0.0002)**	**(0.0001)**
School students pc	**641.7*** **	**574.6*** **	**612.9*** **	**558.7*** **	**554.4*** **	**595.2*** **	**665.5*** **	**558.4*** **	
	(57.7)	**(58.2)**	**(57.6)**	**(58.9)**	**(59)**	**(58.7)**	**(53.5)**	**(58.8)**	
Unemployment rate pc									**1768.3*** **
									(154.3)
N	1631	1631	1631	1631	1631	1631	1631	1631	1628
F	78.81	48.38	39.76	32.34	47.65	90.90	7.386	89.37	35.36

TABLE 12

FIRST-STAGE RESULTS OF TAXES IN THE KEY ESTIMATIONS IN NRW AND SAXONY (2009-2013)

	NRW				Saxony			
First stage results:	**Property Tax**	**Business Tax**	**Property Tax**	**Business Tax**	**Property Tax**	**Business Tax**	**Property Tax**	**Business Tax**
***Dependent Variable*: Transfers per capita**								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Population size	**0.0003*** **	**0.0004*** **	0.0002	**0.0003** **	**0.002*** **	**0.002*** **	**0.0021*** **	**0.002*** **
	(0.0001)	**(0.0001)**	(0.0001)	**(0.0001)**	**(0.0002)**	**(0.0002)**	**(0.0001)**	**(0.0001)**
School students pc	**199.4** **	**174.7** **	128	93.1	**653*** **	**638.1*** **	**565.8*** **	**547.8*** **
	(86.5)	**(87.2)**	(90.7)	(91)	**(53.5)**	**(53.4)**	**(58.8)**	**(58.4)**
Unemployment rate pc								
Lagged dependent variable	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Control variables	No	No	Yes	Yes	No	No	Yes	Yes
N	1568	1568	1503	1503	1712	1712	1631	1631
F	557.5	2086.6	290.1	1117.7	1289.5	1941.4	813.2	1053.7

TABLE 13

ROBUSTNESS CHECKS (SECOND-STAGE RESULTS)

Dependent Variable	**Basic estimation**		**"All Tax"**		**"Not Abundant"**		**"CDU+Seats"**	**"Pooled"**
	NRW	**Saxony**	**NRW**	**Saxony**	**NRW**	**Saxony**	**Saxony**	**NRW & Saxony**
Total Expenditure	**0.657****	**0.772*****	**1.185*****	**0.589*****	**1.282*****	**1.117*****	**0.991*****	**1.125*****
	(0.2594)	**(0.2782)**	**(0.288)**	**(0.222)**	**(0.460)**	**(0.312)**	**(0.33)**	**(0.258)**
Wald Test (p-value) H_0= coefficient not signif. different from 1	0.186	0.412	0.52	0.065	0.54	0.708	0.977	0.627
TIC	**0.165****	0.026	**0.134****	-0.033	**0.225****	0.045	0.085	**0.227*****
	(0.065)	(0.0717)	**(0.061)**	(0.068)	**(0.096)**	(0.082)	(0.085)	**(0.059)**
Administration	-0.12	0.19	-0.237	-0.106	-0.053	0.127	0.154	-0.097
	(0.1594)	(0.172)	(0.184)	(0.154)	(0.223)	(0.163)	(0.179)	(0.084)
Public facilities	**0.051*****	**0.081*****	**0.048*****	**0.086*****	**0.063****	**0.115*****	**0.124*****	**0.122*****
	(0.0193)	**(0.0251)**	**(0.018)**	**(0.023)**	**(0.027)**	**(0.036)**	**(0.041)**	**(0.026)**
Business development	**0.0627****	-0.066	**0.059****	-0.145	**0.097****	-0.018	0.041	**0.062****
	(0.027)	(0.0671)	**(0.029)**	(0.110)	**(0.041)**	(0.06)	(0.067)	**(0.028)**
Culture/Sport	**0.093*****	**0.137*****	**0.115*****	**0.119****	**0.143*****	**0.162*****	**0.175*****	**0.137*****
	(0.0238)	**(0.0418)**	**(0.025)**	**(0.046)**	**(0.038)**	**(0.041)**	**(0.05)**	**(0.033)**
Health	**0.026*****	0.007	**0.027*****	-0.013	**0.033*****	-0.011	0.045	**0.05*****
	(0.0083)	(0.0229)	**(0.007)**	(0.034)	**(0.009)**	(0.025)	(0.042)	**(0.015)**
Social Services	**0.152***	**0.127****	**0.239*****	0.092	0.138	**0.138****	**0.144****	**0.22*****
	(0.08)	**(0.0571)**	**(0.09)**	(0.056)	(0.107)	**(0.069)**	**(0.068)**	**(0.071)**
Education	0.015	**0.198*****	0.014	**0.167*****	0.011	**0.236*****	**0.146****	**0.065****
	(0.0111)	**(0.0554)**	(0.014)	**(0.056)**	(0.016)	**(0.067)**	**(0.062)**	**(0.026)**
Property Tax	0.044	**0.037*****	0.043	**0.034*****	0.03	**0.037*****	**0.041****	**0.061*****
	(0.0294)	**(0.0137)**	(0.03)	**(0.016)**	(0.039)	**(0.017)**	**(0.019)**	**(0.022)**
Business Tax	0.011	0.0003	0.012	-0.001	0.005	-0.001	0.001	**0.014***
	(0.0102)	(0.0037)	(0.013)	(0.003)	(0.011)	(0.004)	(0.004)	**(0.008)**

Note: Heteroscedasticity-robust and autocorrelation-robust standard errors in parentheses: * p<0.1, ** p<0.05, *** p<0.01

2SLS regressions—variables excluded from second stage are the following: population size, school students per capita (unemployment per capita for education expenditures).

TABLE 14

POOLED OLS AND FIXED EFFECTS INSTRUMENTAL VARIABLE REGRESSIONS

Dependent Variable: **Total Expenditure**	**Pooled OLS**	**Fixed Effects**	**OLS 2013**	**OLS 2012**	**OLS 2011**	**OLS 2010**
	(1)	(2)	(3)	(4)	(5)	(6)
NRW						
Transfers per capita	**0.768*** **	1.866	**0.737** **	**0.579*** **	**0.962*** **	**0.775*** **
	(0.161)	(3.077)	**(0.291)**	**(0.326)**	**(0.364)**	**(0.278)**
N	1568	1568	392	392	392	392
F	498.8	5.5	401.8	369.9	394.4	261.8
Saxony						
Transfers per capita	**0.718*** **	-2.53	**1.16** **	0.471	-0.024	**0.661*** **
	(0.236)	(2.38)	**(0.333)**	(0.422)	(0.638)	**(0.241)**
N	1712	1712	428	428	428	428
F	143.8	33.5	46.1	88.2	61.4	158.7

Note: Heteroscedasticity-robust standard errors in parentheses: * p<0.1, ** p<0.05, *** p<0.01

2SLS regressions—variables excluded from second stage are the following: population size, school students per capita (unemployment per capita for education expenditures).

FIGURE 2

PER CAPITA LEVELS OF TOTAL TRANSFERS IN THE MUNICIPALITIES OF NRW AND SAXONY (2013) – IN MUNICIPAL BOUNDARIES

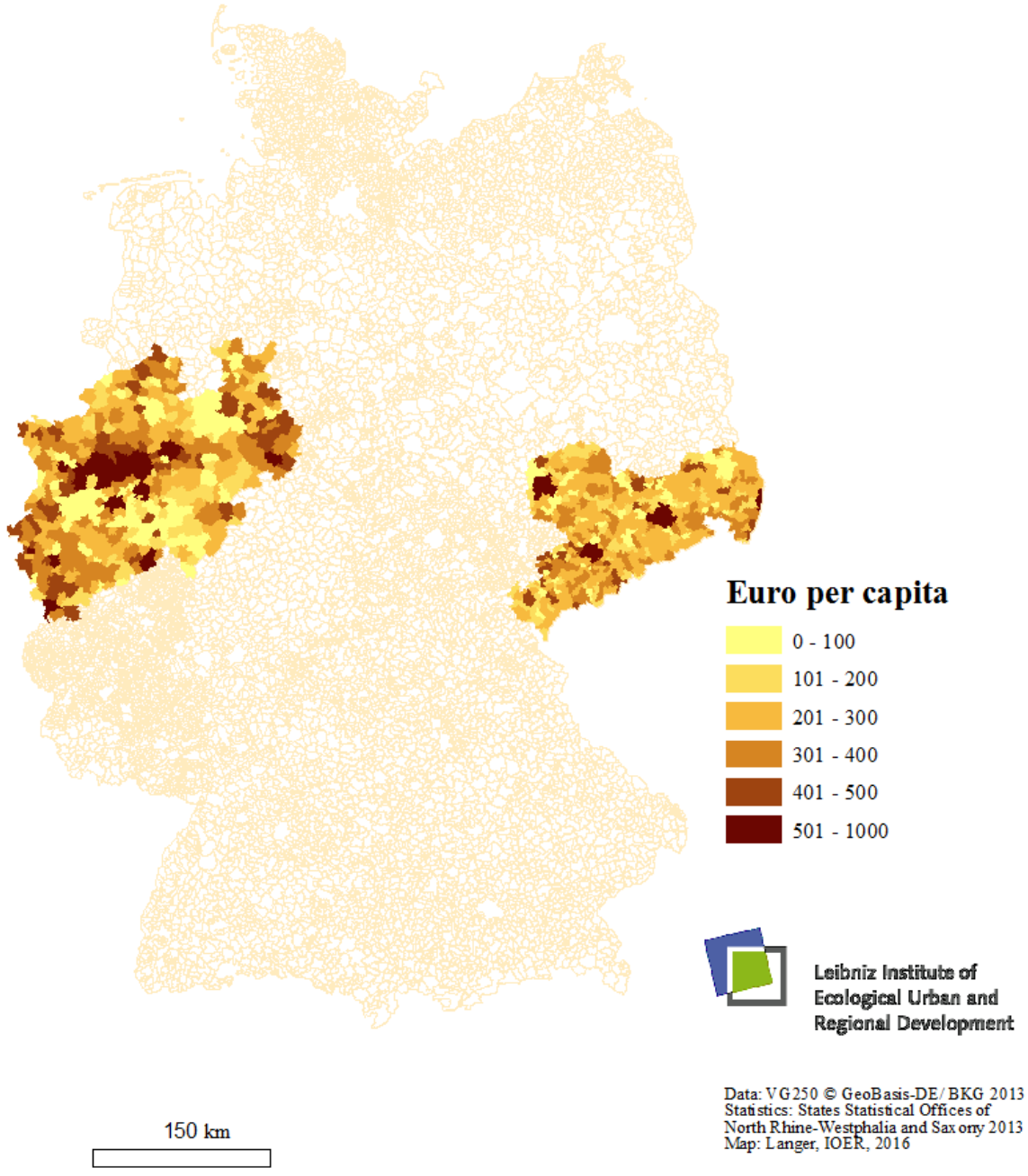
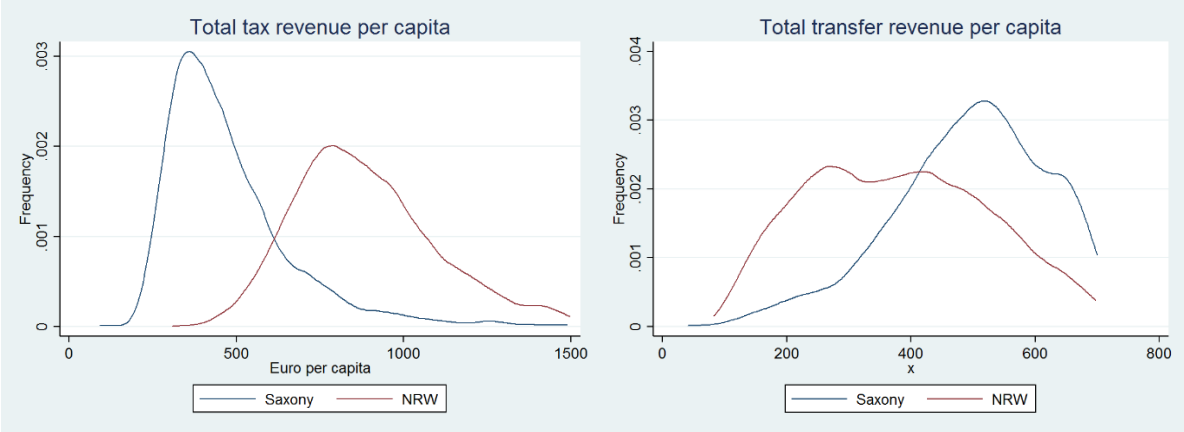


FIGURE 3

DISTRIBUTION OF REVENUE COMPONENTS (2013)



Note: Figures show kernel density estimations for total tax revenues per capita and total transfers per capita in the municipalities of Saxony and NRW. Source: own calculation.