

The Bavarian Municipal Fiscal Equalization Scheme: Emphasis on Equity Rather than Efficiency

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Abstract

Employing the approach of Albouy (2012), this paper evaluates the efficiency and equity of the municipal fiscal equalization scheme in the federal state of Bavaria in Germany. Calculating a measure reflecting the internalization of fiscal and real externalities by state grants, we conduct a regression analysis on variables describing efficiency and equity criteria. Because the fiscal equalization scheme redistributes revenues toward regions with low realized incomes and a larger population share of low productivity residents, the scheme satisfies certain equity criteria. However, the fiscal equalization scheme likely does not internalize local public good externalities and, therefore, hampers spatial efficiency.

JEL Classification: H7, J61, R1

Keywords: municipal fiscal equalization scheme, spatial efficiency, equity, source-based and residence-based taxes, local public expenditure

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1 Introduction

Ever since the debate over fiscal equalization and its effects started in the 1950s (Buchanan, 1950, 1951, 1952; Scott, 1950, 1952; Jenkins, 1951), the economic forces responsible for unequal regional economic development within countries has not disappeared. The trend of urbanization and the corresponding centralization of economic activity and labor are increasingly shaping the allocation of firms and households in many countries. Furthermore, especially in Germany, the number and extent of responsibilities assigned from the federal government to lower-level governments have not declined, but instead grown. These developments have led to varying endowments of regions, which can translate in substantially differing public services and inequality across regions. In countries such as Australia, Belgium, Canada, Germany, and Switzerland, this inequality at the sub-national level has been counteracted through the application of fiscal equalization schemes as an instrument of fiscal policy. The precise design and extent of equalization schemes varies, but most countries use a method for calculating the budget a lower-level government needs to ensure the supply of an average amount of public services, and then increasing its budget up to this level.

These measures may reduce spatial inequality, but they greatly interfere with local government budgets and may induce inefficiency (Scott, 1950). Most of the risks of fiscal equalization have been already discussed in the literature and can be broadly categorized as concerns regarding 1) efficiency, and 2) equity. Fiscal equalization can lead to inefficiency in several ways, in particular, could the location decisions of households get distorted. This distortion happens if equalization payments act as subsidies for living in poorer areas with lower marginal labor productivities; such subsidies would which lead to people being stuck in unproductive areas, causing national productivity to remain non-optimized. Furthermore, the equity-enhancing effect of fiscal equalization payments can be considered questionable. It may be a misconception that individuals with fewer capabilities and worse earning prospects - or, respectively, the communities in need - gain from this fiscal policy. Additionally, equalization payments may soften budget constraints and reduce the fiscal discipline of sub-national governments.

To evaluate the efficiency and equity of existing fiscal equalization schemes, a general economic model is needed that is sufficiently lean to be taken to the data. To empirically assess the effects of fiscal equalization schemes on efficiency and equity, Albouy (2012) developed a model with heterogeneous households who are mobile across jurisdictions, heterogeneous in terms of productivity and quality of life, which provide local public goods. Albouy showed that an efficiency-enhancing effect of fiscal equalization can be assumed if public-good externalities exist and payments are positively correlated with public expenditures. He also argued that equity-enhancing transfers should target regions with low earnings potential, low realized income, and higher costs of providing public goods. Applying this model to the Canadian equalization scheme at the provincial level, Albouy concluded that fiscal equalization in Canada was neither efficient nor equitable. This strong negative result immediately raises the question of external validity. Is Canada just an exception or rather a model case? Are other fiscal equalization schemes and in particular fiscal equalization schemes at lower government levels similarly inefficient and unfair?

This paper uses a case study to test the generalizability of Albouy's results. We apply his model to German fiscal equalization policy because it is a pronounced example of fiscal equalization schemes. Germany not only equalizes the per-capita tax revenue of its states (Länder), but also requires states to ensure all of their municipalities (Gemeinden) have the capacity to offer at least an average supply of public services; all this occurs through a local government level fiscal equalization scheme. The specific design of these schemes differs depending on state legislation. In the federal state of Bavaria, municipalities, counties (Kreise), independent cities (kreisfreie Städte), and districts (Regierungsbezirke) can benefit from equalization payments. At the local level, fiscal equalization is of great importance since local-level governments only have a few income sources, and particularly counties and districts are even unable to collect taxes on their own. Therefore, equalization grants represent a great share of the financial budget of these governments. We have chosen the Bavarian municipal equalization scheme, which also covers counties and districts, because Bavaria is a large German state with a wide range of local govern-

ments that are heterogeneous with regard to population density, economic strength, and public infrastructure. In addition, in 2013 the obligation to secure equal living conditions in the whole federal state of Bavaria was included in the Bavarian constitution via referendum. Given that fiscal equalization is a primary instrument for ensuring equal living conditions throughout the state, especially in rural Bavarian areas, the municipal fiscal equalization scheme is of great importance for its citizens.

To evaluate the equity and efficiency of the Bavarian municipal fiscal equalization scheme, we calculate the measurable net fiscal benefit (MNFB), which represents the incentives for movement of the residents. We are able to show that the MNFB is directed toward regions with low-productivity residents and directed away from regions with high realized incomes, which indicates the fulfillment of various equity goals. However, the MNFB shows a negative correlation with per-capita local government expenditures, which indicates that the fiscal equalization scheme does not appropriately internalize local-public good externalities. Therefore, we conclude that the Bavarian municipal fiscal equalization scheme of the federal state of Bavaria can be characterized as equity enhancing yet efficiency hampering. Taking into consideration that the state government is legally obligated by the Bavarian Constitution to secure equal living and working conditions in all urban and rural areas throughout Bavaria, and yet is not equally strongly bounded to the efficiency objective, it is probably not surprising that the municipal fiscal equalization scheme secures equity rather than efficiency. *If the efficiency concern became crucial, the state government would shift more funds to economically striving regions. However, this could lead to controversies as the efficiency argument is not apparent to the ordinary voter. Additionally, economically and politically strong regions may also object redistribution of funds towards weaker regions. The existing equity enhancing effect could be fortified if the redistributive scheme included variables regarding the population with a low earning potential.*

The paper is organized as follows. Section 2 describes the institutional framework of the Bavarian municipal fiscal equalization scheme. Section 3 summarizes Albouy's model, highlights the main characteristics of an efficiency- and equity-improving fiscal

equalization scheme, and discusses the relationship of the model with the existing literature. Section 4 calculates MNFB, and Section 5 analyzes whether or not the Bavarian municipal fiscal equalization scheme can be considered efficiency- and equity-improving. Section 6 briefly concludes.

2 The Bavarian municipal fiscal equalization scheme

In Germany, two fiscal equalization schemes exist: 1) the federal fiscal equalization scheme, and 2) the state specific municipal fiscal equalization schemes, which are separated from the federal scheme. The federal fiscal equalization scheme is concerned with the financial equalization and tax revenue distribution among the federal states and across the levels of the federal government. It is through this scheme that shared tax revenues are distributed, state tax revenues are equalized across federal states, and various federal grants are provided. Besides participating in the federal equalization scheme, the states also attempt to equalize the financial capacity of their municipalities, counties (including independent cities), and districts through municipal fiscal equalization schemes. Because of the sovereignty of German federal states, the conceptualization of those schemes differs from state to state. The Bavarian municipal fiscal equalization scheme is constituted by the Fiscal Equalization Act (Finanzausgleichsgesetz)¹, and aims to support the Bavarian local governments in supplying a minimum degree of public service that is independent of their endowment, and ensures an appropriate distribution of financial resources over the hierarchy of the local governments that corresponds to their responsibilities. This hierarchy includes municipalities, counties and independent cities, and districts (Bayerisches Staatsministerium der Finanzen, für Landesentwicklung und Heimat, 2016).

¹We refer to the latest version of the Fiscal Equalization Act, which was last amended by § 4 Art. 1, 2, 3, 4, 5, 6, 10b, 13e, 23a, 24 Fiscal Equalization Amending Act 2016 of December 22, 2015, and has been in effect since January 1, 2016 (GVBL. p. 473).

Table 1:

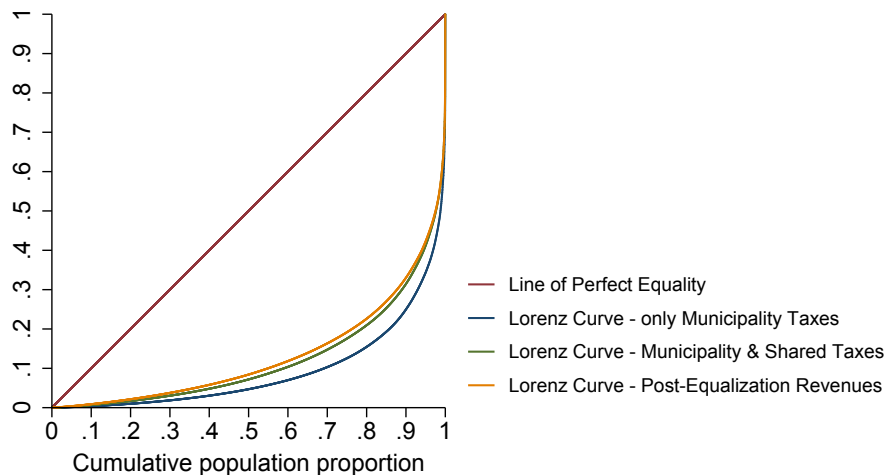
Income Sources in %³

administrative form	uncond. grant	cond. grant	other grants	taxes
counties (urban)	13.83	0.02	86.05	0.11
counties (rural)	19.37	0.22	80.39	0.02
independent cities (urban)	8.93	0.09	22.52	68.46
independent cities (rural)	11.39	0.16	21.15	67.30
municipalities (urban)	6.35	0.09	16.96	76.60
municipalities (rural)	17.81	0.26	20.12	61.80

Bavarian municipalities have various revenue sources. They obtain their revenues from local taxes (which are levied for instance on business income and real property), financial contributions for supplying public services, fees, and from their own economic activities. Additionally, they receive shares of the federal income tax and federal sales tax. Equalization grants are another component of the municipal finances, and can be funded through revenue-sharing schemes (Steuerverbände) or can be directly paid by the state (Bayerisches Staatsministerium der Finanzen, für Landesentwicklung und Heimat, 2016). Since the administrative mechanisms for financing grants are not part of our analysis, we do not discuss this issue in detail; however, the reader should bear in mind that all grants are financed through state or federal revenues. Equalization grants to municipalities can be split up into different categories.

³The characterization of counties and independent cities as urban or rural originates from the Federal Institute for Research on Building, Urban Affairs and Spatial Development county type settlement structure demarcation (Bundesinstitut für Bau-, Stadt- und Raumforschung im Bundesamt für Bauwesen und Raumordnung, 2016). Urban areas include urban counties and independent cities with at least 100,000 inhabitants. Municipalities are characterized as rural or urban in association with their respective county.

Figure 1:
Lorenz Curves



Unconditional formula-based grants (Schlüsselzuweisungen) are the most important grants. The exact amount each municipality receives as an unconditional formula-based grant depends on their imputed expenses and fiscal capacity. Imputed expenses are determined assuming all municipalities face the same average costs in supplying public services. Adjustments are made for the number of residents, the financial burden of unemployment benefits, the level of government, and additional tasks (e.g., financing child care facilities); some additional adjustments in the case of structural weaknesses are also possible. Since service supply is assessed at average costs, high-cost municipalities cannot fully finance services through these grants and municipalities with low-cost service supply are not punished for their cost awareness. Just as the imputed expenses may not precisely match the true municipal expenses, the measure of revenues may also not reflect the exact level of collected revenues. The imputed revenues are calculated by multiplying the tax bases by a tax rate based on an average collection rate⁴; no distinction is made between source- or residence-based taxes. If the imputed expenses exceed the estimated financial capac-

⁴Municipalities are free to set the collection rate for the real property taxes A and B as well as for the local business tax, which act as multiplier of the common basic tax rate. Using the average collection rate prevents incentives for setting low collection rates. Therefore, no municipality with a high collection rate is punished and no municipality with low collection rates is illegitimately privileged.

ity of the municipality, then the deficit will be balanced to a percentage that has been defined ahead of time, depending on the fiscal capacity of the state. No municipality is punished for earning revenues that are above their imputed expenses, but municipalities with insufficient funds are supported. Municipalities can additionally receive conditional grants (Bedarfszuweisungen), these are only provided upon request and may be repayable. Nevertheless, for most Bavarian municipalities that face financial challenges due to structural weakness or an extraordinary burden associated with fulfilling responsibilities, the conditional grant is quite substantial. In addition to these two main forms of equalization grants, a variety of smaller general grants exists that are not constrained to a specific use. These grants are very specific to the endowment and need of the specific municipality; a more in-depth look is provided in Section 4, where we calculate the state grant differential. Grants that are conditional on a special use also exists, but are not closely examined in this paper⁵. Depending on the hierarchy level, local governments have different income sources. Since counties do not raise taxes in Germany, their income depends primarily on the unconditional grant and on other grants, which includes the county levy on member municipalities. This levy alone funds 65.1% of the urban counties' income and 57.5% of the rural counties' income. Independent cities earn most of their income through taxes, as do municipalities. On average, less densely populated regions earn less tax revenue and receive larger grants in relation to their total income. For municipalities, taxes are most important, followed by the unconditional formula-based grant and other grants (at approximately the same proportion). Since tax revenue can fluctuate wildly and may, especially for very small municipalities, depend on a single company, the income from unconditional grants is designed to secure sufficient funds even in economically unsteady times. *Additionally, the fiscal equalization scheme also reduces the level of inequality in the distribution of funds across Bavarian counties and independent cities, as the Lorenz curves for the distribution of financial revenues over the Bavarian municipalities before and after equalization in Figure 1 show. The Gini coefficient of the financial capacity*

⁵Extensive and detailed specification of the conditions of the different possible kinds of grants and their possible position in municipal financial records in the Bavarian fiscal scheme can be found in the General Ministerial Gazette (Allgemeines Ministerialblatt - AllMBL), No. 11 /1988, p. 433.

including only municipality taxes is 0.82, after the inclusion of shared taxes it shrinks to 0.76 and when including the conditional and unconditional formula-based grants of the equalization scheme the Gini reaches a coefficient of 0.74. As the Gini coefficients and the Lorenz curve show, the equalization scheme reduces the inequality of financial resources. Still, the graphs are exemplary for one year, but we take this as a hint, that the Bavarian municipal fiscal equalization scheme may reduce financial inequality across regions. Besides the reduction of the inequality in the distribution of funds and since local governments in Bavaria earn such a great share of their income through grants, the question of whether or not these grants are distributed fairly and efficiently is highly relevant.

3 Efficiency- and equity-improving fiscal equalization schemes

Our empirical analysis refers to a theoretical model developed by Albouy (2012) *that demonstrates how the spatial efficiency of households location choice can be ensured by allocating state transfers between regions accordingly. It relies on the standard fiscal federalism literature* (Flatters et al., 1974; Stiglitz, 1977; Boadway and Flatters, 1982; Wildasin, 1980) *and on the literature on regional differences in productivity and quality of life* (Rosen, 1979; Roback, 1982). Here, we summarize the main features of this model only verbally; Albouy (2012) provides a more detailed mathematical description of the model.

His model considers a given number of regions within one country and two tiers of government. We call the lower governmental tier ‘local government’ and the upper tier level ‘state government’. The following assumptions are made. Households are perfectly mobile across regions. Their utility depends on a tradeable private good, a non-tradeable private good, a non-tradeable publicly provided good (which may be subject to congestion), and region-specific exogenous levels of consumption amenities. *Households are heterogeneous. They may have different skills and their tastes for private consumption bundles and publicly provided goods may differ.* Productivity in the private and public sectors varies across

regions. All final goods are produced from land, labor, and capital. Factor markets and output markets are perfectly competitive. Factors are fully mobile within each region. Land is immobile across regions, whereas capital is fully mobile across regions, but the state supply of capital is fixed. Each household supplies one unit of labor and owns capital and land independent of where the household resides. The type-specific local wage varies across regions, and serves to compensate workers for differences in costs-of-living, amenities, and publicly provided goods. Local governments levy linear source-based taxes on land and capital and residence-based taxes on income from wages, rents, and interest. Local governments allocate local publicly provided goods efficiently. To finance a pure state public good and transfers to households, the state government also levies residence-based taxes on income.

Conditions that characterize efficient levels of population, production, and consumption across regions, combined with market conditions, allow us to determine Pareto efficient region-household-type-specific transfer levels. Households are located efficiently if the net-output of each type of household (i.e., the marginal productivity of labor in tradable goods minus the per-capita resource cost of private and public consumption) is independent of the location. *To achieve spatial efficiency*, the optimal state transfer to a household of a particular type that is living in a particular region *should be* equal to the sum of a household-type-specific location-independent lump-sum transfer and grants that account for real and fiscal externalities. These grants should account for (a) the public good externality (i.e., the net externality of the local (partially) public good that inhabitants of the respective region receive when a migrant arrives), (b) the state-wage-tax externality (i.e., the state wage tax that the household pays in this region relative to the state average of the respective household type), and (c) residence-based taxes paid by the household in this region in excess of per-capita public expenditures. *This implies that* the region-household-type-specific net fiscal benefit (NFB) *can be* defined as the region-household-type-specific state transfer minus the sum of the state wage differential, the residence-based taxes in excess of per-capita public expenditures and the public good externality. *To have no location decision distorting effect*, the NFB should be equal to the

household-type-specific location-independent lump-sum transfer and, therefore, should be location independent.⁶

Using region-household-type-specific NFBs, the aggregate (per-capita) region-specific NFB can be calculated by adding population-weighted region-household-type-specific NFBs together. Using budget constraints and equilibrium conditions, it turns out that the aggregate NFB is⁷

$$\begin{aligned} \text{NFB} = & \text{state grant differential} \\ & + \text{state tax deficit} \\ & + \text{source-based revenue differential} \\ & - \text{public good externality differential.} \end{aligned}$$

The state tax deficit is the difference between the average state tax on wages in the entire state and the respective region, whereas the source-base revenue differential is source-based-tax revenue in the region under consideration in excess of the state average. The state grant differential refers to the average per-capita amount of state grants relative to the state average. The NFB is larger than zero if the municipality receives higher grants than the average municipality, if residents pay relative low wage taxes due to a below average wage level, if source-based tax revenues are above average and/or if the local-public good externality is below average. To ensure spatial efficiency, the (per-capita) region-specific NFB must be equal to the population-weighted average of location-independent household-type-specific transfers. Hence, the NFB should exceed zero only if above average many needy households live in the respective region. Otherwise, comparatively high state grants should exactly neutralize excessive state tax payments, below average source-based revenue, and above average local-public good externality.

Because public good externalities are not observable, Albouy (2012) introduces the concept of MNFB, which is applicable at the regional level also and which is defined as

⁶Note that transfers to households are location independent, but may differ across household types.

⁷Because, for each region, the local government's budget constraint requires that local public good expenditure equals the sum of residence- and source-based tax revenue, residence-based taxes and public expenditure do not show up in this formula. Following Albouy (2012), we normalize each component of the NFB and the population-weighted average of the location-independent household-type-specific transfers to have a population average of zero. Therefore, the label "differential" is introduced.

the (average) region-specific NFB plus the public good externality differential. Therefore, the MNFB is

$$\begin{aligned}
 \text{MNFB} &= \text{NFB} + \text{public good externality differential} \\
 &= \text{state grant differential} \\
 &\quad + \text{state tax deficit} \\
 &\quad + \text{source-based revenue differential}.
 \end{aligned}$$

Spatial efficiency requires that the MNFB is equal to the sum of the public good externality differential and the population-weighted average of location-independent household-type-specific *transfer*. If the publicly provided good were a pure private good, then the public good externality would vanish and the MNFB should *only* be equal to the population-weighted average of location-independent household-type-specific *transfers*. Hence, to improve efficiency, the MNFB should be positively related to local government expenditures (and, therefore, public good externalities) if the public good were not perfectly rival. According to the model, there is no other efficiency reason for MNFBs to deviate from zero.

A state government that maximizes a standard social welfare function is not only concerned with efficiency, but also pursues equity objectives through redistribution from more able to less able individuals. To improve equity, the MNFB should be positively correlated with the number of needy households and the location-independent magnitude of needs per household. According to Albouy (2012), equity goals may imply directing funds toward households with low earnings potential (i.e., low income regardless of where they live), and households with low realized income adjusted for cost-of living, which is particularly appropriate when real income differences are caused by unequal earnings potential and not by differing amenity levels. *Alternatively, the government may be concerned with specific egalitarianism rather than standard utilitarian welfare, which let the government focus on certain specific scarce goods and services. According to this view, equity is improved if funds are directed toward regions where public services are costlier to offer, provided that local governments indeed spend marginal funds on services that are important per se from a specific egalitarianism point of view (for categorical equity,*

see Tobin, 1970).

Under optimal conditions both efficiency and equity could be achieved. In the empirical analysis, we examine efficiency and equity of the mechanism separately that is we analyze one at a time whether the MNFB is positively correlated with local government expenditures and with the number and neediness of needy households.

The proposed mechanism does not explicitly account for local costs, since upper-level government transfers are allowed to offset location distortions caused by higher upper-level-tax burdens in higher-wage areas (Albouy, 2009; Hochman and Pines, 1993; Ladd and Yinger, 1994; Oakland, 1994).

Moreover, in line with most of the literature, this approach implies that local source-based revenues need to be taxed away and redistributed nationally unless source-based taxes fund services to inputs they are levied on (e.g., Usher, 1977; Boadway and Flatters, 1982). With perfect sorting, which implies that all residents in each region pay the same tax, as in the model of Tiebout (1961), residence-based taxes should be perfectly linked to local benefits, leaving no room for equalization payments. Without perfect sorting, households have an incentive to move to areas with richer household types, so as to benefit from larger contributions to local public services. By taxing the poor and subsidizing the rich, the efficient transfer scheme offsets these incentives. However, on average the corrective interregional transfer that turns residence-based taxes into benefit taxes should be zero. Interregional transfers would only be non-zero if additional restrictions like limitations on redistribution across household types would apply (Buchanan, 1950; Boadway and Flatters, 1982). Although state grants are actually made to local governments, the framework presented here assumes that they are made to households. Hence, existing fiscal equalization schemes are much coarser instruments for redistribution and probably too limited to eliminate all potentially distortive location incentives.

Furthermore, in addition to the normative approach to fiscal equalization employed in this paper, another more positive approach has emerged. According to Oates (2005), the so-called second-generation literature accounts for: 1) the self-interests of political agents including budget maximization objectives and reelection considerations, an approach orig-

inating from public choice theory; and 2) the incomplete and asymmetric information of the different actors, which results in non-optimal policy outcomes that are not captured by this paper.⁸

4 Empirical implementation

Since larger cities function as of both municipalities and counties, and given that data at the municipal level are insufficiently available, the spatial units of our analysis are the 96 counties and independent cities that are given the status of county in the state of Bavaria. Hence, any unit at the lower level of government comprises the municipalities and the county, and the upper level of government comprises the state of Bavaria and the federal government. ⁹As derived in the preceding section, the MNFB can be calculated as the sum of the state grant differential, the state tax deficit, and the source-based revenue differential. All three are calculated using county-level data for the years 2004-2011. Data are obtained by the Bavarian State Office for Statistics (Bayerisches Landesamt für Statistik), the Federal Statistical Office and the Statistical Offices of the Länder (Statistische Ämter des Bundes und der Länder), and the Federal Institute for Research on Building, Urban Affairs and Spatial Development (Bundesinstitut für Bau-, Stadt- und Raumforschung).¹⁰ All data regarding expenditures and grants are taken from the annual financial statistics of municipalities for the years 2004-2011 of the Bavarian State Office

⁸For example, analyzing the incentive for possible rent seeking, Buettner (2006) studies the incentive effect of fiscal equalization schemes, assuming jurisdictions will have an incentive for setting tax rates higher and for increasing local public service supply, since transfers and fiscal capacity are directly linked. Similar results are obtained by Smart (2007) and Barette et al. (2002). Concerning the incentive of fiscal equalization under yardstick competition, Koethenbuerger (2002) analyzes the incentive effect of an equalization scheme where regions compete on local capital taxes, which influence the entitlement payments. He concludes that capital taxes increase and the equalization scheme corrects for the capital tax inefficiencies; these capital tax inefficiencies may be a result of the of tax base mobility. Weingast (2009) adds as another possible incentive effect of fiscal equalization, namely diminished accountability of the jurisdictions making financial decisions, since the equalization grants acts as a major part of their funds. Possible results are excessive spending on public services or support unproductive local companies without the need for raised taxes, inefficient and non-innovation local governments, reduced effort to invest in economic growth and simultaneously spending more on equity concerns.

⁹We do not consider explicitly fiscal flows between the state and the federal levels of government.

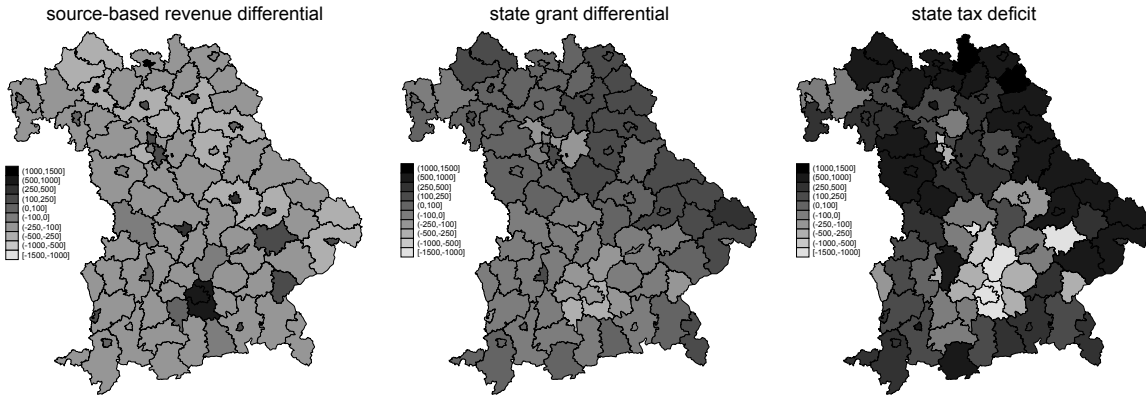
¹⁰We use employment data, firm-level data, rent and housing data from the statistical offices of the German states, gross wages, minor employment and qualification data, as well as quoted rents from the Federal Institute for Research on Building, Urban Affairs and Spatial Development. Population data are taken from the Bavarian State Office for Statistics.

for Statistics.

We calculate the state grant differential, which includes the unconditional formula-based grants, conditional grants, general levies, grants for ongoing purposes, unconditional other grants, as well as other general grants that can be used for any purpose. We include all intergovernmental grants that are associated with a fiscal flow into the respective region, with the exception of grants that can be considered as a fee for providing a specific service to other regions. German municipalities not only receive grants but also pay grants directed to counties and districts (less often to the federal level or the state level), since counties and districts have zero or insufficient tax revenue sources of their own. Taking all above mentioned forms of grants into consideration, the magnitude and distribution of the state grant differential is nevertheless mainly driven by the unconditional formula-based grants, as shown in Table 8 in the Appendix.¹¹ Given that municipalities pay and receive grants, the in- and outgoing payments are offset and aggregated at the county level. The state grant differential of each county is calculated as the deviation from the average net grants per capita. On average, counties show higher per capita values for the different grant differentials; compared to independent cities, they receive 50 € per capita more grants than the average. State grants clearly differ between rural and urban regions: urban counties receive on average 98 € less than the average, while rural counties receive 68 € more. This trend reverses when looking at independent cities: urban cities receive 27 € more grants per capita than average and rural cities receive 41 € less. A possible cause may be the number of inhabitants that are included in state calculations and distribution of the grants.

¹¹Since the calculation is at the county level, levies paid by municipalities to their respective counties and the county's income from those levies are both included. Both fiscal flows should balance out on the county level, but since the charges are often estimated beforehand based on the expenditures of the county government in the ongoing fiscal period, additional payments in the following period are sometimes necessary. Therefore, levies may not cancel out when only one time period is examined, but they certainly should in the long run.

Figure 2:
Distribution of MNFB Components



To calculate the source-based tax revenue differential for Bavarian counties, we define source-based taxes as taxes that are independent of the residence of the tax payer. As Albouy (2012), p. 831 put it: “[...] source-based revenues benefit local residents, who may not pay them.” Therefore, we include the real property tax for agriculture and forestry, the real property tax for developed land and buildings, the local business income tax adjusted by the business income tax levy (which is paid by the municipalities to their respective state and the federal level). The tax on secondary residence, and 80% of the municipality share of the county revenues from the federal value added tax are characterized as source-based taxes.¹² The differential is calculated as the deviation from the average of source-based tax revenues per capita. Regarding the distribution of the source-based tax revenue differential, independent cities earn on average 160 € more per capita, whereas counties earn 170 € less than the average per capita, but regardless of the administrative form of the local government, both earn less if the city or county is considered rural.

According to Albouy (2012), the state tax deficit is the tax paid by a resident in a specific region in relation to the state average. Therefore, if the state tax burden is high because of high wages and the tax deficit is thus negative, *ceteris paribus* workers will move to areas with a positive state tax deficit to lower their tax burden due to lower

¹²Since the revenues from the real property transfer tax and other taxes could not be classified beyond doubt, we summed those revenues and classified half as source-based tax revenues and half as residence-based tax revenues.

wages, but will still face the same spending level. People will move toward areas with low wages and low labor productivity, which should be counteracted by the redistributive grants.

Figure 3:
Distribution of MNFB

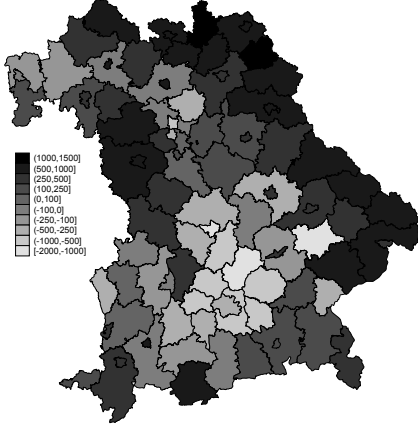
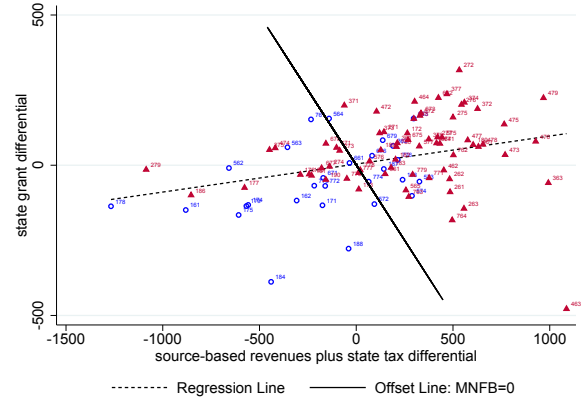


Figure 4:
*Grants Relative to State Tax Deficit
Plus Source-Based Revenues (Per Capita)*



We estimate the influence of county-specific characteristics on worker's wages, controlling for the composition of the workforce and population in the county, for the years 2004-2011. The estimation function is

$$\bar{w}_t^j = \bar{X}_t^j \beta + \mu^j + \nu_t + \varepsilon_t^j, \quad (1)$$

where $\bar{w}_t^j$ is the logarithm of gross average county wages, ν_t is a year-fixed effect, and ε_t^j is the error term. μ^j , the county-fixed effect, is our variable of interest. It measures the county-specific influence on wages. The vector of county characteristics $\bar{X}_t^j$ includes the shares of people employed in agriculture, forestry and fishery; production; construction; trade; finances and services, with the reference category set to the manufacturing sector. The proportion of female residents, foreigners, residents under the age of 25 and over the age of 65, as well as marginally employed persons are included. We also include the proportion of employed residents who are: without any qualification (which we characterize as missing of any vocational training), with a university degree, and part-time employees. Additionally, we include the proportion of people employed in very small, small,

and medium firms, with the reference category set to people employed in large firms.¹³ We predict the average gross wage for 2004-2011, depending on the regional influence μ^j , and correct for the income of commuters whose wages are derived in one region but who are taxed in their county of residence. We use these results to calculate the mean average tax rate of the average gross wage by applying the formula of the state income tax (Bundesministerium der Finanzen, 2014) on the predicted county wage as a proxy for the mean county wage.¹⁴ Using the average tax rate of each county, the overall wage level, and the local wage level estimates, we calculate the per capita income tax burden in each county, and then subtract it from the state wide per-capita income tax burden. Munich is a well-known high wage area, and has the largest negative state tax deficit; other regions with high wages are mostly driven by industry clusters, like Erlangen-Nuremberg or Dingolfing-Landau. The regions with the highest positive state tax deficits are the northern and eastern Bavarian counties, which are known to have weak economic bases.

Summing the per capita values of the state grant differential, the state tax deficit, and the source-based revenue differential, we calculate the per capita MNFB of each county. As Figures 2 and 3 show, the magnitude of the MNFB is mainly driven by the state tax deficit, and a tendency of large differences between metropolitan areas (e.g., Munich or Erlangen-Nuremberg) and less economically strong areas can be observed. While the economically strong areas show a highly negative MNFB, the weaker east counties of Bavaria have a higher per capita MFNB than average. Figure 4 shows the sum of source-based revenue differentials and the state tax deficit plotted against the state grant differentials. The space between the offsetting line and the markers indicate the magnitude of the MNFB.¹⁵ We can see that counties and independent cities characterized as urban (hollow circles) mainly have a negative MNFB and therefore lie to the left of the offsetting line. They show wide horizontal variance as a result of their extraordinarily high wages levels (e.g.,

¹³We used the sectoral classification from the Statistisches Bundesamt (2008). Firm measures on workforce categories include the systematization WZ2003 for 2004-2005 and WZ2008 for 2006-2011. Both differ slightly in the allocation of firms to categories, which we were not able to adjust for.

¹⁴We also include the income-related expenses deductible as a lump-sum of yearly earnings and the solidarity tax. Values and benchmarks for the calculation of the average tax rate are given in Bundesministerium der Finanzen (2014).

¹⁵Results for the specific counties and independent cities are shown in Appendix Tables 6 and 7.

Munich, ID 184; Freising, ID 178). Rural cities and counties lie largely to the right of the offset line; they have a positive MNFB and cluster more closely. Overall, the plot suggests that the state grants do not offset the fiscal benefits of source-based taxes and state taxes; this conclusion is also indicated by the positive slope of the regression line. Since the MNFB is not uniform across counties, migration distorting effects of the fiscal equalization scheme are possible. This can be justified as long as the MNFB internalizes local public-good externalities or serves some equity goal, as discussed in the next section.

5 Equity and efficiency analysis

As mentioned in section 3, fiscal equalization schemes that have a purely efficiency-enhancing effect should lead to a MNFB that is either uniform across counties or positively related to governmental expenditures. To test for efficiency, we regress the MNFB on local public expenditures – a rough proxy of public good externalities¹⁶ Since the MNFB and local public per capita expenditures are negatively correlated, the scheme likely can be characterized as efficiency-hampering rather than efficiency-enhancing.

Following the analyzed equity aims, an equity-enhancing fiscal equalization scheme should lead to a positive relationship of the MNFB with low average earnings potential, low realized income, or high cost of providing public goods. Regarding the first equity criterion, MNFB and, therefore, state grants should be directed toward people with low productivity. Since there is no possibility of directing state grants and funds directly to low-productivity households, we assume the equity aim is fulfilled if regions with a larger share of households with the mentioned characteristics are more heavily funded. We use workforce composition as indicators of productivity, namely the number of unskilled and highly skilled workers (i.e., the proportion of employed workers with a university degree per 1,000 employed people *and employed workers without any vocational qualification per 1,000 employed people*) and the share of individuals in need of long-term care.¹⁷ We

¹⁶ We additionally regressed on productive government expenditure including only expenditures on education, general public administration, public safety and law, hospitals, other health services and their administration, housing, transport sector, public institutions and utilities following the categorization of productive government expenditures from Pitlik and Schratzenstaller (2013), which confirmed our results.

¹⁷ The correlation between people in need of nursing care and unskilled workers is 0.51.

Table 2:

Regression Results of MNFB on Single Variables Related to Equity and Efficiency

	(1)	(2)	(3)	(4)	(5)	(6)
MNFB	b/se	b/se	b/se	b/se	b/se	b/se
less qualified	5.848** (1.903)					
highly qualified	-3.758*** (0.717)					
care recipients		56.650*** (5.930)				
realized income			-0.219*** (0.014)			
population density				-0.109*** (0.023)		
nominal wage					-0.202*** (0.018)	
public expenditures, total						-0.197** (0.063)
constant	-591.810 (356.163)	-1437.014*** (165.656)	108.264*** (27.312)	90.667 (62.699)	134.136*** (29.042)	643.315** (210.686)
R-sqrt	0.389	0.506	0.764	0.084	0.743	0.115
adj.R-sqrt	0.376	0.501	0.762	0.074	0.740	0.105
Ll	-707.418	-697.188	-661.755	-726.869	-665.907	-725.233
F	34.21	91.26	233.96	22.12	122.20	9.87
N	96	96	96	96	96	96

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

include the latter because providing informal long-term care heavily reduces the productivity of the caregivers. *Other indicators of wage and income quantiles would capture the share of low productivity population more precisely, unfortunately such indicators are not available for the German county-level.*¹⁸ The relationship of the MNFB and the indicators of low productivity exhibit the expected pattern.¹⁹ The correlation of MNFB and the number of low-skilled workers is significantly positive, while the MNFB is negatively related to the share of highly-skilled employees. Furthermore, the MNFB and the share of individuals in need of long-term care are significantly positively correlated. When we include the indicators for each equity criterion in one regression, the signs of these coefficients do not change, but the effect of the share of low-skilled loses statistical significance. Tables 2 and 3 summarize our respective regression results; Table 2 shows the indicators separately and Table 3 shows the joint equity goals.

¹⁸ Using the alternative indicator of people receiving housing allowance leads to also significant positive results. When we use people receiving social assistance, people receiving needs-based pension supplement in old age and in the event of reduced earning capacity or the share of the people eligible for social assistance following SGB-II on all inhabitants younger than 65 years, we find positive but not significant results. This may be due to the spatial concentration of the first two toward independent cities. Individuals who are eligible for social assistance are required to be incapacitated for work or to stay in a nursing home or being under the age of 15. Therefore the number of people receiving this social assistance are very small.

¹⁹ The results are stable if the category of highly-skilled employees is excluded. As we include unskilled and highly-skilled workers, workers with a vocational degree not obtaining a university degree are excluded.

Table 3:

Regression Results of MNFB on Combined Variables Measuring Equity

	(1)	(2)	(3)
MNFB	b/se	b/se	b/se
less qualified	1.895 (1.965)		
highly qualified	-2.222** (0.833)		
care recipients	42.413*** (7.315)		
realized income		-0.219*** (0.014)	
population density			0.112*** (0.022)
nominal wage			-0.242*** (0.015)
constant	-1167.939** (354.842)	108.264*** (27.312)	66.238* (27.542)
R-sqrt	0.570	0.764	0.803
adj.R-sqrt	0.556	0.762	0.799
Ll	-690.611	-661.755	-653.066
F	34.19	233.96	146.84
N	96	96	96

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

The measure of low realized-income controls for the possibility that in some (especially urban) regions prices for housing and other goods might be high, which might lead to low realized incomes relative to low-wage regions. Following Albouy (2012) and Albouy et al. (2013), we use an income measure that is deflated by a local cost-of-living index. The nominal income measure is the region-specific wage described in the previous section. The local cost-of-living index is computed by estimating housing cost differences times the expenditures share on housing (Albouy, 2016, p. 478). Housing cost differences are estimated from county-specific rents, controlling for different location-specific housing characteristics.²⁰ Regions with low realized incomes seem to be advantaged by the redistribution that occurs through state grants, because there is a highly significant negative relationship with the MNFB.

To assess the success of the equity aim of categorical equity, we regress the MNFB on measures of the cost of providing local public goods: population density and region-specific nominal wage levels. Categorical equity demands MNFB and, therefore, grants directed toward regions with lower population density and higher nominal wages. The MNFB and nominal wages are significantly negatively correlated, but the coefficient of

²⁰We use the logarithm of rents as the dependent variable, and regress it on following variables: average living space in dwellings, shares of houses with two flats and more than two flats (reference category is share of dwellings with one flat), shares of flats with one room, two rooms, etc. up to six rooms (reference category is share of flats with seven or more) and the share of new residence buildings.

population density changes its sign when we include the local nominal wage level in the set of right-hand side variables. Hence, evidence regarding categorical equity is inconsistent, which is somewhat surprising since equalization of the public good supply across regions – in particular for rural regions compared to urban counties – is at the heart of the public debate on fiscal equalization schemes in Germany. Our results still hold when we use the state grant differential as the independent variable (see Appendix Tables 4 and 5). Analyzing the effects on efficiency and equity solely for the single components of the MNFB shows that especially the state taxes as well as the state grants drive the inefficiency result, while the distribution of the source-based revenues fails in regard of all equity criteria.

In principle, alternative redistributive policies could increase the level of spatial efficiency; however, there are also obvious downsides. State wide redistribution of all source-based tax revenues enhances spatial efficiency, but violates the requirement of local governments' tax autonomy. Refunding diverging state wage tax payments, reducing grants for rural counties and expanding grants for urban counties most likely increases the level of spatial efficiency, but contradict equity objectives.

6 Concluding remarks

We employed the approach of Albouy (2012) to analyze the efficiency and equity of the municipal fiscal equalization scheme of the federal state of Bavaria in Germany. Many lower-level governments rely on funding from the local business income tax, a revenue source that is sensitive to economic trends and is often heavily dependent on a limited number of (large) firms. Therefore, equalization grants are a highly important and mostly steady share of the lower-level governments budgets. They ensure a minimum supply of public services and help the state government to meet the constitutional requirement of equal living conditions all over the federal state of Bavaria. Our results suggest that the Bavarian municipal fiscal equalization scheme satisfies some reasonable equity criteria, as it redistributes funding toward regions with low realized income and a larger share of low-productivity residents. This, however, can lead us to one policy advice which can

be derived from our result. As the Bavarian municipal fiscal equalization scheme is implemented to support in particular rural areas, there should be a greater emphasis on categorical equity while distributing funds. However, as the measurable net fiscal benefit is negatively correlated with local public expenditures, the municipal fiscal equalization scheme likely hampers efficiency and with that distorts migration decisions in a way as a subsidy to reside in economically weaker areas. *To increase efficiency governments would have the possibility to redistribute more funds toward economically striving regions, but may face some backlash when implementing those redistributive schemes as the efficiency argumentation is not apparent for the average voter. Additionally, economically strong regions may object a decrease in funds towards weaker regions, since in the administrative and political process regions depend on each others willingness to cooperate and compromise. Regarding the equity enhancing effect of the redistribution scheme, the existing effect could be fortified if the redistributive scheme would include variables regarding the population with a low earning potential.* We were not able to include the effects of the equalization payments between federal states and their impact on the downstream equalization on municipality level, thus future analyses should jointly consider the two levels of fiscal equalization as an unique German characteristic. Furthermore, we did not consider regional spillovers and agglomeration externalities, which probably strengthen the case for directing grants toward urban areas. However, an in-depth analysis of these issues is left for future research.

7 Appendix

Table 4:

Regression Results of State Grant Diff. on Single Variables Related to Equity and Efficiency

	(1)	(2)	(3)	(4)	(5)	(6)
state grant differential	b/se	b/se	b/se	b/se	b/se	b/se
less qualified	2.280*** (0.635)					
highly qualified	-0.838*** (0.229)					
care recipients		11.031*** (1.954)				
realized income			-0.034*** (0.009)			
population density				-0.020 (0.014)		
nominal wage					-0.032*** (0.008)	
public expenditures, total						-0.077*** (0.022)
constant	-292.672* (114.865)	-279.856*** (56.338)	16.471 (13.126)	16.234 (17.505)	21.339 (12.733)	251.203*** (68.667)
R-sqrt	0.467	0.274	0.255	0.039	0.270	0.249
adj.R-sqrt	0.455	0.266	0.247	0.028	0.262	0.241
Ll	-573.390	-588.223	-589.454	-601.673	-588.467	-589.819
F	22.63	31.88	14.86	1.86	16.46	12.78
N	96	96	96	96	96	96

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 5:

Regression Results of State Grant Diff. on Combined Variables Measuring Equity

	(1)	(2)	(3)
state grant differential	b/se	b/se	b/se
less qualified	1.937* (0.781)		
highly qualified	-0.705** (0.261)		
care recipients	3.673 (2.373)		
realized income		-0.034*** (0.009)	
population density			0.015 (0.017)
nominal wage			-0.037*** (0.010)
constant	-342.571** (112.902)	16.471 (13.126)	12.449 (13.936)
R-sqrt	0.486	0.255	0.285
adj.R-sqrt	0.469	0.247	0.269
Ll	-571.623	-589.454	-587.487
F	22.45	14.86	7.94
N	96	96	96

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 6:
Magnitude of MNFB and its Components (Counties)

	ID	MNFB	state tax deficit	state grant diff.	source-based rev. diff.
Wunsiedel i.Fichtelgebirge	479	1191.62	1193.54	223.96	-225.88
Kronach	476	1006.45	1130.06	79.11	-202.73
Hof	475	901.20	984.81	136.30	-219.91
Freyung-Grafenau	272	849.20	851.77	316.61	-319.19
Cham	372	814.66	851.87	187.75	-224.96
Coburg	473	803.94	949.06	34.62	-179.74
Neustadt a.d.Waldnaab	374	767.73	839.14	208.80	-280.21
Regen	276	745.65	743.26	201.71	-199.31
Lichtenfels	478	723.72	854.48	68.98	-199.74
Tirschenreuth	377	705.51	714.83	236.94	-246.26
Garmisch-Partenkirchen	180	672.41	769.21	68.07	-164.86
Kulmbach	477	659.61	764.63	83.49	-188.51
Passau	275	659.50	754.76	159.47	-254.73
Neustadt a.d.Aisch-Bad Windsheim	575	536.11	687.99	92.41	-244.30
Rottal-Inn	277	513.84	608.65	93.41	-188.23
Rhön-Grabfeld	673	507.42	586.09	172.80	-251.48
Ansbach	571	504.51	607.79	72.13	-175.42
Bad Kissingen	672	494.31	593.35	165.18	-264.21
Haßberge	674	488.42	646.08	73.55	-231.21
Schwandorf	376	461.15	550.64	86.50	-175.99
Straubing-Bogen	278	452.30	574.21	154.83	-276.74
Weißenburg-Gunzenhausen	577	388.83	569.18	63.00	-243.35
Berchtesgadener Land	172	370.95	454.48	106.68	-190.20
Kitzingen	675	352.70	382.17	84.72	-114.19
Aichach-Friedberg	771	334.29	589.80	-42.53	-212.98
Bayreuth	472	283.79	434.31	178.87	-329.39
Fürth	573	272.01	602.00	-54.49	-275.50
Oberallgäu	780	269.62	384.19	61.48	-176.04
Donau-Ries	779	260.35	365.43	-31.20	-73.88
Deggendorf	271	253.66	338.96	110.53	-195.83
Lindau (Bodensee)	776	232.14	386.21	17.94	-172.01
Neumarkt i.d.OPf.	373	227.63	331.04	106.99	-210.40
Miesbach	182	222.34	302.62	19.23	-99.50
Würzburg	679	220.23	345.60	83.39	-208.76
Nürnberg Land	574	186.20	458.60	-101.76	-101.76
Traunstein	189	177.38	249.37	50.51	-122.50
Mühlhldorf a.Inn	183	172.22	319.20	-7.98	-139.00
Amberg-Weizsach	371	137.58	233.05	199.09	-294.57
Rosenheim	187	129.98	317.47	-12.51	-174.98
Miltenberg	676	113.52	270.85	31.76	-189.09
Roth	576	82.79	306.76	13.63	-237.59
Günzburg	774	9.74	210.97	-54.66	-146.57
Unterallgäu	778	4.67	200.03	-16.10	-179.26
Ostallgäu	777	-13.11	152.15	-25.24	-140.02
Erlangen-Höchstadt	572	-35.70	220.58	-129.36	-126.93
Kelheim	273	-36.95	123.38	48.81	-209.14
Bamberg	471	-43.36	149.32	58.61	-251.29
Bad Tölz-Wolfratshausen	173	-67.06	235.29	-80.15	-222.20
Schweinfurt	678	-84.66	107.25	72.17	-264.08
Dillingen a.d.Donau	773	-92.95	105.09	-44.55	-153.49
Landshut	274	-142.21	-8.21	-4.12	-129.88
Main-Spessart	677	-188.69	-8.82	-9.51	-170.36
Weilheim-Schongau	190	-205.46	-38.29	-48.08	-119.09
Aschaffenburg	671	-213.19	-14.16	-42.14	-156.89
Augsburg	772	-229.34	49.35	-68.87	-209.82
Landsberg am Lech	181	-265.04	-43.02	-34.27	-187.76
Neuburg-Schrobenhausen	185	-273.15	-58.92	-29.92	-184.31
Neu-Ulm	775	-285.10	-102.45	-68.08	-114.57
Altötting	171	-308.00	-329.24	-133.35	154.58
Starnberg	188	-317.08	-93.46	-277.51	53.90
Eichstätt	176	-319.98	-72.51	-31.31	-216.16
Forchheim	474	-361.69	-90.23	57.19	-328.65
Regensburg	375	-397.00	-155.50	51.34	-292.84
Erding	177	-651.90	-428.52	-74.71	-148.67
Dachau	174	-690.40	-402.30	-132.11	-155.99
Fürstenfeldbruck	179	-703.81	-352.09	-135.81	-215.90
Ebersberg	175	-773.39	-447.09	-165.57	-160.73
München	184	-828.06	-1276.08	-388.05	836.07
Pfaffenhofen a.d.Ilm	186	-953.31	-681.98	-99.63	-171.70
Dingolfing-Landau	279	-1100.34	-1192.31	-14.61	106.58
Freising	178	-1404.16	-1229.62	-136.61	-37.93

Table 7:

Magnitude of MNFB and its Components (Independent Cities)

	ID	MNFB	state tax deficit	state grant diff.	source-based rev. diff.
Weiden i.d.OPf.	363	934.17	983.84	-58.72	9.05
Bamberg	461	693.16	502.96	61.75	128.45
Schweinfurt	662	649.09	-233.78	224.39	658.49
Coburg	463	608.53	5.56	-478.15	1081.12
Kaufbeuren	762	535.92	720.24	33.80	-218.12
Hof	464	513.63	395.35	211.88	-93.61
Würzburg	663	452.25	277.80	155.62	18.83
Passau	262	436.66	373.85	-46.00	108.80
Bayreuth	462	435.97	341.89	-16.56	110.64
Straubing	263	412.54	383.98	-144.22	172.78
Landshut	261	395.74	418.65	-89.19	66.28
Memmingen	764	313.09	375.88	-182.74	119.95
Amberg	361	286.26	320.36	73.95	-108.05
Regensburg	362	254.30	-218.58	64.20	408.68
Rosenheim	163	191.18	85.25	-48.26	154.20
Schwabach	565	173.65	370.40	-83.06	-113.69
Kempten (Allgäu)	763	166.71	210.07	-104.81	61.45
Ansbach	561	120.46	210.60	-28.98	-61.16
Nürnberg	564	14.93	-388.97	155.42	248.48
Aschaffenburg	661	-27.52	-101.25	7.45	66.28
Augsburg	761	-81.26	-284.90	152.48	51.15
Fürth	563	-295.72	-318.80	59.79	-36.72
München	162	-425.58	-1046.29	-117.53	738.24
Erlangen	562	-667.33	-818.51	-9.35	160.53
Ingolstadt	161	-1030.07	-1158.33	-149.02	277.27

Table 8:

Correlation of Grant Categories

	state grant diff.	uncond. grant diff.	cond. grant diff.
state grant differential	1		
uncond. grant differential	0.8685	1	
cond. grant differential	0.4481	0.4894	1
other grants differential	0.7806	0.3694	0.176

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