Efficiency of regional taxation in the presence of mandatory spending

Abstract

Initial differences in obligatory spending of local governments financed by regional taxes might lead to diverging economic activity. As a consequence, regional governments with high levels of obligatory spending cannot compete for workers and firms by lowering tax rates. They are trapped in a vicious cycle. We show empirically that shocks to mandatory spending of German cities do have a negative impact on their fiscal strength. Furthermore we build a spatial general equilibrium model in which a households location decision is affected by regional taxes. We can use the model to rationalize the effects of mandatory spending on the local tax base.

Keywords: Tax System, Tax Efficiency, Fiscal Federalism, Spatial General Equilibrium, Local Government Finance, Local Public Infrastructure

JEL classification: H21, H77, R51, R13, R53

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1 Introduction

Real world tax systems comprise nationwide and location-specific taxes. The purpose of these spatial tax dispersions is to foster higher efficiency in the provision of public goods. As spatial entities compete for economic activity, spatial tax dispersion incentivizes them to provide a specific level of public goods in the most efficient way. Consequentially, they may impose lower taxes to finance these provisions and attract more, and potentially more successful, economic agents into their region. Local governments will do so -usually- without considering that their gain in economic activity will lead to a decline in economic activity somewhere else, evoking a classic externality problem. This, however, points out that location specific taxes distort the spatial distribution of economic activity, potentially resulting in inefficient allocations. As taxes are usually not fully deductible, they alter marginal costs and therefore incentivize firms to optimize with respect to location-specific taxes. As a consequence, the region in which a firm is most efficient before taxes might differ from the region in which it can produce cheapest after taxes. From a workers point of view, extremely low taxes – for example on property – in one region might induce them to live in a less productive region than they would have in the absence of taxes. However, as already pointed out in the existing literature (see Fajgelbaum et al. 2018), it is worth noting that these distortions must not necessarily induce inefficiency. It might very well be the case that taxes properly align with underlying regional fundamentals and hence promote an efficient sorting pattern of economic agents.

Obligatory duties of local governments might amplify any distortions from the regional tax competition mechanism outlined above. These obligatory duties impose a lower bound of tax rates that have to be set by governments to cover their mandatory spending. As a thought experiment, imagine two regions being identical in every dimension, but one of them has a historically accumulated higher debt level and is therefore more constrained. Abstracting from the interest payment on debt, both regions need to generate the same amount of tax revenue to cover their expenses. Further assume that the optimal solution for both would be to set taxes such that revenues would exactly cover non-interest payments. In order to finance debt levels, the constrained region has to set a tax rate that is higher than its efficient tax rate. Therefore, tax rates in the constrained region will be higher and as a result firms and workers will emigrate to the unconstrained region. Consequentially, the unconstrained region generates higher tax revenues due to an increased number of
taxpayers. As a result, two identical regions differing only in their initial debt level - more generally, in their level of obligatory duties - will start to differ in terms of economic activity as well. If there exists a feedback loop from economic activity to fundamentals, this initial difference on the regional governments expenditure side will have persistent effects on the economic potential of these regions, potentially generating a vicious cycle for initially disadvantaged locations.

Varying degrees of fiscal autonomy for local governments can be observed around the world. For example Fajgelbaum et al. (2018) find that regional governments in Australia collect around 15% of total tax revenue, whereas the share in Canada is almost as high as 40%. Henkel, Seidel, and Suedekum (2018) find that the share of total tax revenue raised by municipal governments alone in Germany was 9% for the year 2010. However, Germany has a complex scheme of fiscal federalism where the majority of tax revenues, around 70% according to Henkel, Seidel, and Suedekum (2018), stems from taxes that are shared between regional governments and the federal state. Public good provision in this framework is similarly complex. Local governments are responsible for the provision of some public goods over which they have only limited control. For example part of social security payments to the long term unemployed like housing subsidies are payed for by local authorities. These payments are usually partially but not fully reimbursed by the federal government, e.g. in the case of housing subsidies for the federal governments will pay 30% of total payments back to the municipalities (Boettcher et al. 2019). This leads to a situation in which for some local governments spending from those shared public good provisions are higher then the revenue that they can directly control.

One example of payments at the municipal level is the provision of care for asylum seekers. While their asylum application is in progress asylum seekers in Germany are not free to choose their place of residence but are distributed over Germany by a pre-defined allocation mechanism. The infrastructure to provide for these asylum seekers has to be paid for by municipalities and they are only partially reimbursed by the federal governments for these payments. Hence, fluctuations in asylum seeker inflows seem like a natural starting point to look for external shocks to mandatory spending of municipal governments. This is what we do in our first empirical approach. There we look at the inflow of asylum seekers and recognized refugees to Germany from 2010-2017. The idea here is that asylum seekers do increase mandatory spending requirements of municipalities, whereas recognized refugees have access to the labor market and should therefore not place a higher burden on the municipalities. As recognized refugees are free to choose their residential location we need to employ a
shift share strategy following Dehos (2017) (based on Altonji and Card 1991, Bartik 1991) to predict their regional distribution. We do find indeed that an asylum seeker induced increase in local mandatory spending does reduce municipalities tax revenue power. As expected we do not find an effect of recognized refugees on mandatory duties (see table 3 in appendix A.1).

Our paper builds on recent advancements in spatial general equilibrium theory like Allen and Arkolakis (2014), Redding and Rossi-Hansberg (2017) or Behrens et al. (2017). These models have been used to analyze the effects of place based policies in a number of settings (e.g. Blouri and Ehrlich 2017, Henkel, Seidel, and Suedekum 2018, Fajgelbaum and Gaubert 2018). We (aspire to) add to this literature by introducing optimizing local governments.

The second strand of the literature that our empirical exercise contributes to is looking at the incidence of local taxation. In a typical international economics setup with mobile firms and an immobile labor force one would assume that workers bear the cost of local taxes (e.g. Fullerton and Metcalf 2002). However when looking at state business taxes in the US Suárez Serrato and Zidar (2016) find that firm owners bear a significant share of business taxes. The key assumption that drives this result is that firms are not equally productive everywhere and as a result are less mobile. In Germany Fuest, Peichl, and Siegloch (2018) also find that workers bear only about half the burden of municipal business taxes. Furthermore they show that this result is very heterogeneous by skill group, i.e. more mobile high skilled labor bears almost no cost of taxation and the effect is very concentrated on low skilled workers. Our paper relates to this literature by modeling a dependency of tax rate changes within a region over time.

The remainder of the paper is structured as follows: In section 2 we start to outline the model with government spending that is completely discretionary. Section 3 describes our data set and gives some background of the institutional setting that we exploit. Section 4 presents our empirical strategy and reduced form regression results and section 6 concludes.

2 Model with discretionary government spending

In the following section we incorporate a public sector into a simple regional general equilibrium model in the style of Redding (2016). In this simplest version govern-
ments do not optimize and face only a period budget constraint but no mandatory spending requirement. It serves as a benchmark for the more complex models we are planning to implement.

2.1 Workers

Workers consume an aggregated consumption good $C_i$, housing $H_i$ and a local public good $G_i$. They also have heterogeneous preferences over locations denoted by $b_i$. Wherever they work, they provide one unit of labor at the local wage rate $w_i$ on which they pay federal income taxes $\tau_w$. They also face a local property tax $\tau_{Pr}$.

Hence we can write down the workers optimization problem as

$$\max_{\{C_{i\omega}, H_{i\omega}\}} b_{i\omega} \left[ \left( \frac{C_{i\omega}}{\alpha} \right)^{\alpha} \left( \frac{H_{i\omega}}{1 - \alpha} \right)^{1 - \alpha} \right]^\beta_w \left( \frac{G_i}{L_i^w} \right)^{1 - \beta_w}$$

where $\omega$ denotes a specific worker, $L_i$ denotes the total number of workers in region $i$ and $\chi_w$ is a rivalry parameter for public goods provision. Workers maximize (1) subject to their budget constraint

$$P_i C_{i\omega} + (1 + \tau_{Pr}^i) R_i H_{i\omega} = (1 - \tau_w) w_i$$

and to the CES aggregation rule of the final good

$$C_{i\omega} = \left[ \sum_{n=1}^N \int_0^{M_n} c_{mi}(j)^{\frac{1}{\sigma}} dj \right]^{\frac{1}{\sigma-1}}$$

where $c_{mi}(j)$ denotes the demand for goods variety $j$ produced in region $n$, $M_n$ denotes the mass of firms producing in region $n$ and $\sigma$ is a parameter governing the elasticity of substitution between different varieties of the consumption good.

Solving this problem we get total demand for a given variety in region $i$ as

$$c_{mi}(j) = A_i p_{mi}(j)^{-\sigma}, \quad A_i \equiv \alpha (1 - \tau_w) w_i L_i P_i^{\sigma-1}$$

where we collect non-variety specific variables shifting demand in the term $A_i$ to
ease notation,¹ and
\[ P_i = \left[ \sum_{n=1}^{N} \int_{0}^{M_i} p_m(j)^{1-\sigma} \, dj \right]^{\frac{1}{1-\sigma}} \tag{5} \]
is the price index dual to (4).

From the Cobb Douglas structure of utility we get demand for housing and the aggregate consumption good as
\[ P_i C_i = \alpha (1 - \tau_w) w_i \tag{6} \]
\[ (1 + \tau_i^{Pr}) R_i H_i = (1 - \alpha) (1 - \tau_w) w_i \tag{7} \]
i.e. workers spend a fraction \( \alpha \) of their total income on consumption and a fraction \( 1 - \alpha \) on housing net of property tax.

**Worker location choice** Using equations (6) and (7) we can write workers indirect utility as
\[ V_{i\omega} = b_{i\omega} \left[ \frac{(1 - \tau_w) w_i}{P_i^{\alpha} [(1 + \tau_i^{Pr}) R_i]^{1-\alpha}} \right]^{\beta} \left[ \frac{G_i}{L_i^{\chi_w}} \right]^{1-\beta} \tag{8} \]
We assume that workers preferences for local amenities across regions are heterogeneous and given by \( b_{i\omega} \). We assume the preference shock to follow a Fréchet distribution with cdf \( G_i(b) = \exp \{-B_i b^{-\xi_{i\omega}}\} \).² Note that indirect utility is a monotone transformation of workers amenity preferences and again, to ease notation let us write indirect utility as \( V_{i\omega} = b_{i\omega} \Psi_i \). As a monotone transformation of Fréchet distributed variable is again Fréchet distributed we know that indirect utility has a CDF of the form \( G_i(V) = \exp \{-\Phi_i V^{-\xi_{i\omega}}\} \) with \( \Phi_i = B_i \Psi_i^{\xi_{i\omega}} \). So given wages, prices for housing and consumption, public good provision, taxes and total employment in each region, workers will draw an indirect utility for each location in the economy and then locate in the region that will provide the highest utility. As the maximum from repeated independent draws from a Fréchet distribution is again Fréchet distributed we get the probability that a worker will locate in region \( i \) as
\[ L_i = \frac{\Phi_i}{\sum_{j} \Phi_j} \tag{9} \]

¹Note that we assume each worker to supply exactly one unit of labor. So to get from the workers individual demand for the variety to total demand we simply multiply the individual demand by the mass of workers located in the respective region.

²We can easily extend this setting to allow knowledge spillover and crowding effects by defining \( b_{i\omega} = f(L_i, M_i) \xi_{i\omega} \), i.e. amenities are a function of the number of firms and workers located in the region and some idiosyncratic and Fréchet distributed preference shock \( \xi_{i\omega} \).
where we normalized the total number of workers in the economy to one.

2.2 Firms

Varieties are produced under monopolistic competition and increasing returns to scale using labor as the only input to production. Firms have to pay fixed labor cost $F$ and constant variable costs of $1/z_i$ labor units per output unit, where $z_i$ denotes the productivity in region $i$ that is common to all firms. So we can write the total labor input required to produce $q^j_i$ units of variety $j$ in region $i$ as

$$l^j_i = F + \frac{q^j_i}{z_i}.$$  

(10)

We assume that firms maximize profits and can enter the market at no cost. Therefore in equilibrium firms will make no profits, prices are set with a constant mark-up over marginal costs

$$p^j_{ni} = \left(\frac{\sigma}{\sigma - 1}\right) \frac{d_{ni}w_i}{z_i},$$

(11)

every firm will hire a constant amount of labor

$$l^j_i = \sigma F.$$  

(12)

and the share of goods that is produced in region $i$ and sold to region $n$ is given as:

$$\lambda_{in} = \frac{L_i \left(\frac{d_{ni}w_i}{z_i}\right)^{1-\sigma}}{\sum_k L_k \left(\frac{d_{nk}w_k}{z_k}\right)^{1-\sigma}}.$$  

(13)

2.3 Housing market

We assume land owners to be immobile and they supply housing according to the ad-hoc housing supply function

$$H^S_i = \tilde{H}_i \delta_i$$

(14)

where $\tilde{H}_i$ captures region specific housing fundamentals such as developable land availability or natural amenities, and $\delta$ denotes a housing supply elasticity.

Combining equation (14) with total housing demand from workers derived from (7)
yields the following market clearing condition for the residential housing market:

$$R_i = \left[ (1 - \alpha) \frac{(1 - \tau_w) w_i L_i}{(1 + \tau_i^{Pr}) H_i} \right]^{\frac{1}{1 + \tau_i}} \tag{15}$$

### 2.4 Governments

There are two layers of government, local and federal. The federal government collects labor income taxes and fully redistributes all revenues to the local governments. Local governments collect property taxes and receive transfers from the federal government. They use transfers and tax revenues to provide a public good $G_i$. All government budgets are assumed to be balanced at all times. Hence we can write the federal budget constraints as

$$\tau_w \sum_{i=1}^{N} L_i w_i = \sum_{i=1}^{N} T_i \quad \tag{16}$$

and the local governments budget constraint in region $i$ as

$$P_i G_i = \tau_i^{Pr} R_i^{\frac{1}{1 + \delta_i}} H_i + T_i \quad \tag{17}$$

For the moment we treat the transfer scheme $\{T_i^{fed}\}_{i=1}^{N}$ and all tax rates as exogenous. An assumption that we want to relax at a later point.

### 2.5 Equilibrium

We can characterize the equilibrium of our economy by a vector of the six variables $\{P_i, G_i, L_i, w_i, v_i, \lambda_{in}\}$ and the following equilibrium conditions. First good markets need to clear, so we have

$$w_i L_i = \sum_n \lambda_{in} w_n L_n. \quad \tag{18}$$

Location expenditures are given by equation (13), households locate according to (9), final goods prices

$$P_i^{1 - \sigma} = \frac{L_i \left( \frac{\sigma}{\sigma - 1} \frac{w_i}{z_i} \right)^{1 - \sigma}}{\sigma F} \lambda_{ii}, \quad \tag{19}$$

house prices as in equation (15) and government budget clearing as in section 2.4.
We can see from equation (9) that households location choice is driven by the property tax rate of a certain location relative to the tax rate of all other regions. Furthermore we can see after some reformulation, that in the case of perfectly inelastic housing supply (i.e. \( \delta = 0 \)) property taxes do not influence the location choice anymore. The second result appears because in this case the burden of taxation is entirely on landlords as they are the more inelastic side of the market.

3 Data and Descriptive Statistics

In our analysis we exploit county-level data between 2010 and 2018. We have data on local population, value added, business and property tax rates and revenues, federal transfers from income and revenue taxes and gross payments for asylum seekers for German counties\(^3\) from state statistical offices. In addition, we add data on labor market outcomes (number of unskilled/skilled/academic workers, unemployment) from the federal employment agency.

We first want to understand the spatial distribution of regional taxes in Germany. To do so figure 1 shows assessment rates for local business and property taxes for all German counties (for property taxes we exclude Berlin for better readability of the color scheme). Two features are worth highlighting from these maps. First cities seem to have higher tax rates then rural areas, as can be seen e.g. in Munich, Hamburg or Leipzig. Second, and this is the motivation of this paper, the old industrial and mining regions like the northern Ruhr area and parts of eastern Germany seem to have exceptionally high tax rates. Those regions are not particularly well of, so standard economic theory would suggest they should lower their taxes in order to attract economic activity.

\(^3\)The NUTS-3 level equivalent regional definition.
So far the link between current economic performance and tax rates is purely suggestive. To get a better sense, whether there is a relationship between those two variables figure 2 plots the unemployment benefit payments per capita against the assessment rate of local business taxes for all counties in Germany. Here we use UB payments per capita to proxy for economic performance of a region. The figure clearly shows that there seems to be at least some negative correlation between economic performance and the tax rate a regional government chooses.
Figure 2: Profit taxes and unemployment benefits

Notes: Regional profit taxes are determined as a base rate set by the federal government and a locally determined multiplier. The scale of the x-Axis is denoted in basis points of this multiplier, so a value of 300 means that the regional government is taxing profits of firms with three times the federal base rate. Unemployment benefits per capita are payments of local government to long term unemployed (Arbeitslosengeld II).

The link that we present so far is clearly purely descriptive in nature. In order to move closer towards an identifiable causal effect we need to find some exogenous shock to governments mandatory spending. Therefore, we use inflows of asylum seekers into German counties. This approach has two merits: First, according to German laws on asylum processes (§§45, 55, 56 AsylG), asylum seekers in contrast to recognized refugees are not allowed to move freely in Germany but must stay in an area to which state governments assign them to. Above that, they are assigned according to politically predefined rules, generating exogenous inflows of asylum seekers into counties. Hence, recognized refugees are excluded from our data and only asylum seekers where a final decision has not yet been reached are included. In addition, although costs are shared between different governmental levels, counties and municipalities are imperfectly reimbursed for their expenses in most states of Germany (Hummel and Thöne 2016). Consequently the regional governments have to bear some of the fiscal burden of an asylum seeker inflow. Therefore this increases their mandatory expenditures. As the location of asylum seekers cannot be controlled by municipalities this leads to exogenous variation in mandatory expenditures.

So far we are using 107 large cities which can set tax rates independently. This is due to massive territorial reforms of counties in general and for East-German counties in particular.
spending.

In order to check if these differences in mandatory spending have an impact on the fiscal situation of the county-free cities, we calculate tax revenue power for each of these cities. This measure is frequently used by statistical offices and weights the actual revenues from the different types of local taxes with a weighted assessment rate from all counties relative to the assessment rate of the observed city. Afterwards it adds up transfers to the city coming from income and value added taxation. Finally, it subtracts the cities trade tax levy (‘Gewerbesteuerumlage’). This measure allows a more precise comparison between counties with respect to their fiscal strength. Precisely, the calculation goes as follows:

\[
TRP_{ct} = TR^A_{ct} \frac{\bar{\theta}^A_t}{\theta^A_{ct}} + TR^B_{ct} \frac{\bar{\theta}^B_t}{\theta^B_{ct}} + TR^{Bus}_{ct} \frac{\bar{\theta}^{Bus}_t}{\theta^{Bus}_{ct}} + \phi^{Inc}_{ct} + \phi^{Value}_{ct} - \phi^{TTL}_{ct}
\]

where \(TRP_{ct}\) is the tax revenue power of county \(c\) in \(t\), \(TR^A_{ct}\), \(TR^B_{ct}\) and \(TR^{Bus}_{ct}\) are actually revenues of county \(c\) in \(t\) coming from property tax A, property tax B and the local business tax respectively. \(\bar{\theta}_t\) is the weighted assessment rate (of the respective taxes) of all counties analyzed in \(t\), whereas \(\theta_{ct}\) is county \(c\)’s individual assessment rate. \(\phi^{Inc}_{ct}\), \(\phi^{Value}_{ct}\) and \(\phi^{TTL}_{ct}\) are county \(c\)’s received share of the income tax revenue, the value added tax revenue and its trade tax levy respectively in period \(t\).

Table 1 shows descriptive statistics of the tax revenue power computed above, tax rates, mandatory expenditure, as well as county specific control variables that we will use in our empirical specification in section 4.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>(Std. Dev.)</th>
<th>Min.</th>
<th>Max.</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total labour</td>
<td>88190.287</td>
<td>(146713.85)</td>
<td>11450</td>
<td>1358864</td>
<td>963</td>
</tr>
<tr>
<td>Skilled Labour</td>
<td>41155.478</td>
<td>(65296.844)</td>
<td>632</td>
<td>614398</td>
<td>749</td>
</tr>
<tr>
<td>Unskilled Labour</td>
<td>16397.927</td>
<td>(30763.683)</td>
<td>788</td>
<td>511451</td>
<td>749</td>
</tr>
<tr>
<td>Total Inflows</td>
<td>15924.05</td>
<td>(25599.866)</td>
<td>1206</td>
<td>215588</td>
<td>856</td>
</tr>
<tr>
<td>Total Outflows</td>
<td>13855.419</td>
<td>(19529.712)</td>
<td>1542</td>
<td>161440</td>
<td>856</td>
</tr>
<tr>
<td>Prop. A Tax Rate (%)</td>
<td>308.808</td>
<td>(76.199)</td>
<td>150</td>
<td>690</td>
<td>856</td>
</tr>
<tr>
<td>Prop. B Tax Rate (%)</td>
<td>482.048</td>
<td>(91.816)</td>
<td>300</td>
<td>855</td>
<td>856</td>
</tr>
<tr>
<td>Business Tax Rate (%)</td>
<td>426.996</td>
<td>(41.119)</td>
<td>275</td>
<td>550</td>
<td>856</td>
</tr>
<tr>
<td>Total Population</td>
<td>242928.625</td>
<td>(406334.399)</td>
<td>33944</td>
<td>3613495</td>
<td>856</td>
</tr>
<tr>
<td>Gross Value Added</td>
<td>10293184.29</td>
<td>(17139224.357)</td>
<td>85944</td>
<td>117578608</td>
<td>749</td>
</tr>
<tr>
<td>Asylum Seeker</td>
<td>749.12</td>
<td>(1896.913)</td>
<td>0</td>
<td>30389</td>
<td>963</td>
</tr>
<tr>
<td>Unemployment Rate (%)</td>
<td>8.048</td>
<td>(2.761)</td>
<td>2.9</td>
<td>16.3</td>
<td>963</td>
</tr>
<tr>
<td>Tax Rev. Power</td>
<td>319788.148</td>
<td>(581541.812)</td>
<td>21754.529</td>
<td>4318809</td>
<td>856</td>
</tr>
<tr>
<td>Mand. Exp. Asylum Seeker (Tsd. Euro)</td>
<td>32725.167</td>
<td>(60809.409)</td>
<td>151.769</td>
<td>956368</td>
<td>806</td>
</tr>
<tr>
<td>Pop. Density</td>
<td>1385.642</td>
<td>(790.176)</td>
<td>309.225</td>
<td>4712.758</td>
<td>856</td>
</tr>
</tbody>
</table>

We see substantial spatial variation in local assessment rates as well as actual tax
revenues and tax revenue power, which are the most important outcome variables in our analysis. Additionally, the number of asylum seekers is varying substantially between counties, providing enough variation in the instrument that is going to be used in our analysis. It is worth noting, however, that mandatory spending on asylum seekers is just a small part of the mandatory duties of local governments. This is important to bear in mind when interpreting the empirical findings, as our identification strategy only allows us to identify local treatment effects.

4 Empirical Identification

As already outlined before, identification is based on finding exogenous variation in local mandatory spending in order to assess the fiscal strength of county-free cities in Germany. In this paper, we use the exogenous variation in refugees - namely of asylum seekers with open case - to instrument mandatory spending of local communities on refugees. As pointed out earlier, these costs are at least partly paid for on the local level and can thus cause problems to already financially struck communities.

In a first approach we use a multidimensional fixed effects model to regress the tax revenue power of observed cities on the instrumented mandatory spending, additionally controlling for labor market, economic and size characteristics. Adding county and year fixed effects purges our analysis from any general time trends and county-specific invariant influences. Therefore, our first estimation equation looks as follows:

$$ TRP_{ct} = \beta_1 M_{ct} + X_{ct}\beta_2 + \mu_c + \delta_t + \epsilon_{ct} \quad (20) $$

$$ M_{ct} = \gamma_1 A_{ct} + X_{ct}\gamma_2 + \mu_c + \delta_t + \nu_{ct} \quad (21) $$

where $M_{ct}$ is local mandatory spending on asylum seekers, $X_{ct}$ are controls on the level of county-free cities, $\mu_c$ and $\delta_t$ are county and time fixed effects. Equation 20 therefore displays the second stage of our IV regression, whereas equation 21 displays the first stage. This approach allows us to gain insights if the fiscal strength of counties is indeed influenced by its level of mandatory expenditures.

In a second step, we try to investigate differential effects for county-free cities with different socioeconomic characteristics. In this context, distinguishing between eco-
nomically strong and weak counties is of major importance as we expect the latter to have a more pronounced reaction to spending shocks. In order to do so, we introduce a dummy variable, indicating economically more successful regions based on their gross value added, their unemployment rate and debt levels. For each of those performance measures we define a successful region by being above the median in gross value added and below the median in unemployment rate or debt level.

In a next step we want to see whether an increase in mandatory spending does lead counties to raise their tax rates. To do so we use a model that is analogous to (20) where we look at the effect tax rates instead of tax revenue power.

\begin{align}
\theta_{ct}^{A,B,Bus} &= \beta_1 M_{ct} + X_{ct} \beta_2 + \mu_c + \delta_t + \epsilon_{ct} \\
M_{ct} &= \gamma_1 A_{ct} + X_{ct} \gamma_2 + \mu_c + \delta_t + \nu_{ct}
\end{align}

What is more, raising tax rates in economically already disadvantaged regions should induce the tax base to decline. That is it should lead to a reduction in the workforce and to a reduction in the number of firms. Following the insights of Fuest, Peichl, and Siegloch (2018), these effects might be dampened by the fact that firms might shift the local tax burden towards low skilled worker via wage reductions. Nevertheless, even a reduction in wages might further harm local communities as it reduces the share of income tax they are entitled to. It is therefore worth investigating the effect of local mandatory spending shocks on both outflows of people from these counties as well as on the share of income tax revenues they receive.

Finally, when investigating effects on population in- and outflows, we expect them again to be heterogeneous across counties. Whereas economically disadvantaged regions that have to raise assessment rates due to necessity might induce people to move away as these regions become increasingly unattractive, economically strong counties might see no effect at all because they offer a favorable social and economic environment where agglomeration forces might simply balance out the negative tax effects. Therefore, differentiating between these cities might again deliver interesting insights.
5 Results

To start our analysis, we first provide results on the effect of mandatory spending on the tax revenue power of county-free cities, capturing the general financial strength of these communities. Table 2 shows the results. In all specifications, we include county and year fixed effects. All variables are in logs, alleviating outlier problems and giving us elasticity interpretations. Specification (1) estimates plain OLS using only mandatory spending on refugees as the single variable and therefore illustrates correlation. The effect is positive and insignificant, but likely biased due to endogeneity issues. Therefore, specification (2) introduces instrumentation via assigned asylum seekers as explained in the data section. The effect already turns negative in its point estimate, but remains statistically insignificant. The following specifications add additional control variables that might bias our estimate of interest. In specification (3) we control for gross value added. Notice that in this estimation we just try to estimate an average effect on the financial strength of county-free cities. Naturally, regions that are economically well off will most likely also be fiscally and financially sound. As can be seen from the estimates, gross value added is expectedly positively contributing to the financial strength of communities.
Table 2: Effect of Mandatory Spending on Local Tax Revenue Power

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<thead>
<tr>
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<th>(1) log_Steuereinnahmekraft</th>
<th>(2) log_Steuereinnahmekraft</th>
<th>(3) log_Steuereinnahmekraft</th>
<th>(4) log_Steuereinnahmekraft</th>
<th>(5) log_Steuereinnahmekraft</th>
<th>(6) log_Steuereinnahmekraft</th>
</tr>
</thead>
<tbody>
<tr>
<td>ln(Asylum Spending)</td>
<td>0.010 (0.010)</td>
<td>-0.027 (0.030)</td>
<td>-0.061* (0.033)</td>
<td>-0.081** (0.040)</td>
<td>-0.081* (0.041)</td>
<td>-0.087** (0.043)</td>
</tr>
<tr>
<td>ln(Gross Value Added)</td>
<td></td>
<td></td>
<td>0.834*** (0.190)</td>
<td>0.907*** (0.200)</td>
<td>0.903*** (0.200)</td>
<td>0.877*** (0.202)</td>
</tr>
<tr>
<td>ln(Unskilled)</td>
<td>0.004 (0.020)</td>
<td></td>
<td></td>
<td>0.043 (0.073)</td>
<td></td>
<td>0.013 (0.080)</td>
</tr>
<tr>
<td>ln(Skilled)</td>
<td></td>
<td>0.040 (0.020)</td>
<td></td>
<td></td>
<td>0.014 (0.073)</td>
<td></td>
</tr>
<tr>
<td>ln(Pop.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.415 (0.292)</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Year FE</td>
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<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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</tr>
<tr>
<td>First Stage F</td>
<td>35.520 (0.352)</td>
<td>34.794 (0.348)</td>
<td>21.430 (0.214)</td>
<td>22.326 (0.223)</td>
<td>19.673 (0.200)</td>
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<td>✓</td>
<td>✓</td>
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<td>Obs.</td>
<td>806</td>
<td>805</td>
<td>698</td>
<td>509</td>
<td>509</td>
<td>509</td>
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*p < 0.1, **p < 0.05, ***p < 0.01
But what is more important, the effect of mandatory spending as captured by the spending to refugees instrumented by asylum seekers turns significant and is negatively influencing the financial strength. A 1% increase in mandatory spending is therefore associated with a 0.061% decrease in the tax revenue power on average. What seems to be a small effect might actually be economically substantial as fluctuations in spending are huge. The average of the mean mandatory spending by county is 35204.53 and the average mean deviation by county is 24226.57, making up for a 68.81% average change, scaling up the effect on the financial strength to a 4.19% reduction.

In specification (4) and (5) we additionally control for the number of unskilled and skilled workers respectively. This drives up the mandatory spending effect to a 0.081% reduction. Finally, in the last specification we additionally control for the population size of a county, again slightly increasing the negative effect to a 0.087% reduction.

These results suggest that increases in mandatory spending do have a negative effect on the tax revenue power of county-free cities on average and therefore impair their financial potency. It is, however, worth noting that due to the nature of instrumental variable approaches we are talking about a LATE, therefore estimating the effect on ’treated’ communities.

6 Conclusion

So far, we have shown that the financial potency of counties in Germany are negatively affected by increases in mandatory spending on average. It remains to be shown how this effect differs across different types of counties, especially paying attention to the difference between economically sound and disadvantaged counties. This result, however, still sheds light on important issues. First of all, burdening local regions with additional fiscal tasks seems to be detrimental for their fiscal situation on average. It therefore seems necessary to compensate regions for their additional expenses in order to secure a stable financial path. This seems to be in line with recent descriptive evidence that pointed out the tense situation of German municipalities with respect to their fiscal situation (Boettcher et al. 2019). It however remains to show in future versions of this paper that these effects differ across communities who have the economic and financial capabilities to finance additional expenses on their own vis-à-vis regions that struggle in doing so.
In addition, in future versions we want to elaborate whether the reduction in the financial power of counties is due to increases in their tax rates relative to competing regions or due to tax base responses or both. Therefore, we have to estimate effects on labor and firm movements across regions as well as on local assessment rates.
References


A. Appendix

A.1 Instrumentation with recognized refugees
Table 3: Effect of Mandatory Spending on Local Tax Revenue Power - Recognized Refugee Instrumentation

<table>
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<tr>
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<th>(1)</th>
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<th>(3)</th>
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<th>(5)</th>
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<tr>
<td></td>
<td>( \text{log}_{\text{gesamt ausgaben kreas}} ) b/se</td>
<td>( \text{log}_{\text{gesamt ausgaben kreas}} ) b/se</td>
<td>( \text{log}_{\text{gesamt ausgaben kreas}} ) b/se</td>
<td>( \text{log}_{\text{gesamt ausgaben kreas}} ) b/se</td>
<td>( \text{log}_{\text{gesamt ausgaben kreas}} ) b/se</td>
</tr>
<tr>
<td>ln(Refugees)</td>
<td>0.007</td>
<td>0.090</td>
<td>0.091</td>
<td>0.067</td>
<td>0.084</td>
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<td></td>
<td>(0.159)</td>
<td>(0.163)</td>
<td>(0.155)</td>
<td>(0.145)</td>
<td>(0.141)</td>
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<tr>
<td>ln(Gross Value Added)</td>
<td>2.511***</td>
<td>2.452***</td>
<td>2.474***</td>
<td>2.152***</td>
<td>2.152***</td>
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<tr>
<td></td>
<td>(0.567)</td>
<td>(0.615)</td>
<td>(0.616)</td>
<td>(0.561)</td>
<td>(0.561)</td>
</tr>
<tr>
<td>ln(Unskilled)</td>
<td>-0.047</td>
<td>-0.708</td>
<td>-0.906</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.159)</td>
<td>(0.578)</td>
<td>(0.554)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ln(Skilled)</td>
<td>-0.693</td>
<td>-0.861*</td>
<td></td>
<td></td>
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</tr>
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<td></td>
<td>(0.477)</td>
<td>(0.466)</td>
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<tr>
<td>ln(Pop.)</td>
<td>3.599*</td>
<td>3.599*</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>(1.883)</td>
<td>(1.883)</td>
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</tr>
</tbody>
</table>

County FE ✓ ✓ ✓ ✓ ✓
Year FE ✓ ✓ ✓ ✓ ✓
First Stage F ∙ ∙ ∙ ∙ ∙
IV ✓ ✓ ✓ ✓ ✓
Obs. 758 657 480 480 480

* p<0.1, ** p<0.05, *** p<0.01