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Do Local Governments Tax Homeowner Communities Differently?

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Do Local Governments Tax Homeowner Communities Differently?

Abstract

This paper investigates whether and how strongly the share of homeowners in a community affects residential property taxation by local governments. Different from renters, homeowners bear the full property tax burden irrespective of local market conditions, and the tax is more salient to them. “Homeowner communities” may hence oppose high property taxes in order to protect their housing wealth. Using granular spatial data from a complete housing inventory in the 2011 German Census and historical war damages as a source of exogenous variation in local homeownership, we provide empirical evidence that otherwise identical jurisdictions charge significantly lower property taxes when the share of homeowners in their population is higher. This result appears to be independent of local market conditions, which suggests tax salience as the key mechanism for this effect. We find strong positive spatial dependence in tax multipliers, indicative of property tax mimicking by local governments.

Keywords: Homeownership rate; public financing; residential property tax; spatial tax mimicking; yardstick competition.

JEL-Classification: D72, H20, H71, H72, H77

1 Introduction

Taxing housing wealth forms a main source of revenue for local governments.¹ Due to the immobility of real estate, property taxes are additionally associated with low excess burdens, which is why they are usually considered to score high from a tax efficiency perspective. Their actual efficiency, however, hinges critically upon the political economy of property taxation, i. e. on the decisions of how, whom and how much to tax within the local institutional context (Wilson, 2006). While property taxes are levied on both owner-occupiers and renters, their perception and true economic burden can differ substantially between these two groups of voters.²

According to the “home voter hypothesis” first coined by Fischel (2001), especially households who own their homes are expected to oppose high local property tax rates. Homeowners have strong incentives to promote high market values for the typically biggest item in their wealth portfolios. Recent research shows that the level and popularity of the property tax additionally depends on its salience (Brunner et al., 2015; Cabral and Hoxby, 2016). In many countries, including Germany, the property tax tends to be much more salient for homeowners than for renters.³ As a consequence, renters sometimes underlie the illusion of not paying property taxes at all, even if they do (Oates 2005). “Homeowner communities”, i.e. municipalities with large shares of households owning their homes, may therefore tend to tax property more lightly than otherwise comparable communities.

¹ Total revenue of German property tax type B (which is levied on non-agricultural property, including improvements to land) amounted to 12.8 billion EUR in 2015. This corresponds to approximately 330 euros per housing unit and to about one-sixth of total municipal tax revenue. The relative importance of property taxes is even much higher in Anglo-Saxon and also many European countries.

² In Germany, landlords are statutorily allowed to completely shift the property tax to their tenants on a pro-rata basis. Of course, local market conditions may preclude that property taxes are fully shifted forward onto renters in many locations in economic terms.

³ German homeowners annually receive a discrete property tax note directly from their municipality. For renters, the property tax amount usually appears among many other cost positions in the annual utilities statement, which they receive from their landlords. Other positions typically include insurance, waste collection, housekeeping, street-cleaning etc.

In this paper, we make use of a previously untapped and detailed data set to empirically investigate whether the share of homeowners in local housing markets affects the intensity of property taxation by local governments. A core element of our data set is a complete inventory of residential real estate in the 2011 German Census. For each individual housing unit, the inventory collected information about the type of owner and the current state of use. We aggregate this data to the level of municipalities, which typically rank between U.S. Census Tracts and U.S. Census Block Groups in terms of population. We subsequently merge it with local property tax multipliers and information from local fiscal accounts, income tax statistics, labor statistics, and federal elections. Our final data set covers 8,036 Western German municipalities and contains rich information on local fiscal conditions, socio-demographic characteristics, economic prosperity, and political tastes.⁴

One key contribution of our paper is a clear identification of causality running from local homeownership rates to property tax multipliers. To this end, our empirical analysis exploits two unique institutional circumstances of the German housing market: first, we exploit the missing link between the size of the local property tax base and actual housing market values in the design of the German property tax. This design guarantees that choosing the local tax multiplier is the only way by which local governments can influence their property tax revenue. Second, we make use of historical data on damages to German housing during the Second World War, which led to a large-scale provision of rental housing in towns and villages heavily affected by warfare. This natural experiment, which affected the spatial distribution homeownership independently of property tax multipliers, provides us with exogenous variation which we can exploit for causal inference about the homeowner effect.⁵

⁴ We do not include Eastern German municipalities due to data constraints on several important variables.

⁵ In stark contrast to many other industrialized countries, German municipal homeownership rates often lie below 50 per cent due to war-related housing destruction. See Voigtländer (2009) for further discussion.

Based on spatial autoregressive models, we simultaneously account for the possibility of strategic interdependence among municipalities' property tax choices.

In comparison to spatial interaction in tax rate choice (Brueckner and Saavedra, 2001; Allers and Elhorst, 2005; Lyytikäinen, 2012; and others), the role of property rights in driving local property tax rates has been subject to a very limited number of studies. Existing attempts have moreover been plagued by issues of identification and statistical control (see, e.g., Roche, 1986; Oates, 2005; Brunner et al., 2015). We contribute to this strand of literature by asking whether and how strongly the local rate of homeownership causally affects property taxation across a very large sample of local jurisdictions. By providing further evidence supportive of spatial dependence in municipal property tax multipliers, our study also contributes to the spatial interaction literature in property tax setting.

We approach the questions of a homeowner effect in the presence of strategic interaction in property tax rates along two dimensions. We first develop a yardstick competition model of local property taxation, which serves as basis for the formulation of three key research hypotheses. We subsequently test these hypotheses in an integrated spatial framework by linking local property tax multipliers to local proportions in owner-occupied housing units. We use an extensive set of possibly confounding variables in order to control for the role of local fiscal conditions, political tastes, and neighbourhood tax rates. In our identification strategy, we explicitly account for the endogeneity problem between property tax and the share of homeowners within a spatial instrumental variable setting.

Our results suggest that homeowner communities are indeed taxed differently compared to otherwise comparable communities. Depending on the exact specification, a hypothetical rise in a municipality's homeownership rate by ten percentage points would decrease the local property tax multiplier by an average direct effect of 2-3 points. This key result withstands controlling for spatial dependence in tax multipliers and endogeneity among

homeownership and property taxes. Calculating the average total effect from a hypothetical change in homeownership, we estimate that local tax multipliers would be on average 6-7 points lower if the homeownership rate would be ten percentage points higher across all 8,036 municipalities in the sample. Such a reduction in local multipliers would correspond to a 120-140 million euros loss in annual total tax revenue.

Our findings indicate that actual levels of residential property taxation may not be efficient in terms of social welfare. If homeowners manage to successfully oppose high property taxation relative to other sources of local fiscal revenue, property taxation will tend to be too low in high homeownership communities, while other local fees and taxes will tend to be too high. The latter effect could unfold adverse repercussions on the access to local public and quasi-public goods. The results also have practical implications for local policy makers in providing an evidence-based possibility to judge their actual tax multiplier choices against a benchmark.

The remainder of the paper is organized as follows: Section 2 reviews the current state of research concerning the political economy of property taxation and spatial property tax dependence, including a discussion of the concepts of home-voting and tax illusion. Section 3 links this review to a yardstick competition model of local property taxation, which serves to derive our key hypotheses to be tested. Section 4 introduces the data set and discusses our identification strategy. Section 5 presents the empirical results, while Section 6 concludes.

2 Home-Voting, Renting, and Spatial Property Tax Interaction

The idea that the behaviour of local voters ultimately determines residential property tax rates goes back to Tiebout (1956). While Tiebout's famous "vote with your feet" model still dispensed with political or voting behaviour, Fischel (2001) was among the first to articulate the hypothesis that among local voters, owner-occupiers ("home-voters") may be special with respect to their attitudes towards desired levels of local public spending and the

financing structure of local governments. According to his “home-voter hypothesis”, the level of property taxation would ultimately be driven by the desire of resident homeowners to maximize the values of their houses. Fischel’s hypothesis has been directly tested in the context of numerous local public referenda, usually with corroborating results (see, e.g., Dehring et al., 2008; Ahlfeldt and Maennig, 2015).

Rather than focusing solely on homeowners, subsequent papers have put stronger focus on the tastes and behavior of homeowners *and* renters. Particularly in the U.S., it has been observed that the larger the share of households renting their homes in a local jurisdiction, the higher the tendency of the local government to spend extensively on public services. In an influential paper, Oates (2005) focuses on mechanisms that lead renters to drive up local public expenditures in a jurisdiction (the so-called “renter effect”). Consistent with early research on the renter effect by Roche (1986), he finds that the positive association between the rental share and public spending is rooted in renters’ perception of public services being “not so costly”, rather than due to a higher demand for such services compared to homeowners. Fiscal illusion is thus a likely source of the renter effect. Due to the renter effect, any empirical model that explains local tax choices by homeownership must carefully control for the local level of public expenditure.

Brunner et al. (2015) recently discuss fiscal illusion as a possible explanation for the higher willingness of renters to support an increase in local property taxes to expand funding for public services. Using micro-level data of registered voters in California, the authors find that compared to homeowners, renters are 10-15% more likely to be inclined in favour of a property tax rather than a sales tax increase. Their estimation strategy controls for individual preferences towards public spending. Contradictory to the fiscal illusion hypothesis, however, their result is *not* driven by the voting behavior of renters: while renters are indifferent between a property tax and sales tax increase to finance additional spending, it is the

homeowners who strongly oppose a property tax increase relative to a sales tax increase. Importantly, the strong aversion against property tax increases is not associated with the relative tax burden faced by this group of residents. As a potential explanation for this finding, Brunner et al. (2015) refer to the more salient nature of property taxes for homeowners.

Cabral and Hoxby (2016) exploit cross-local variation in property tax escrow in order to investigate in more detail to what extent the salience of the property tax for homeowners affects its acceptance. According to their argument, the exact method by which the property tax is collected in U.S. local jurisdictions directly relates to its salience. Variation in tax collection leads to variation in salience over different jurisdictions and time that can be considered as random. To study the effect of salience, they make use of the fact that about half of homeowners with mortgages pay their property taxes through tax escrow, a payment method that converts the usually highly visible property tax into an indirect, difficult-to-compute tax that is typically collected through automatic methods. Their findings indicate that areas where property taxes are less salient witness higher tax rates and lower likelihoods of tax revolts, which they use as an indication of tax popularity.

A main shortcoming of existing studies on property tax rate choice in the presence of home-voting and differences in tax salience between groups of voters is that they do not account for spatial dependence that governs the interactions of renters, homeowners and local governments falling under a particular jurisdiction. There is ample evidence that local public spending and tax decisions are at least partially driven by spatial interactions among local governments. It therefore becomes central to disentangle spatial interactions from spatial patterns of housing tenure. So far, this strand of the literature appears surprisingly disconnected from the home-voting/tax salience literature.

Among the first to use spatial econometric methods to investigate property tax interaction among local governments are Brueckner and Saavedra (2001). In order to trace out the property tax reaction function of the representative community, they estimate a spatial lag model with data of a relatively small sample of cities in the Boston metropolitan area. They find significant spatial lag parameters that vary strongly in size.⁶ Their model is motivated by a tax competition approach with footloose, heterogeneous consumers and sorting. The authors still note that their results are observationally equivalent with a local-government version of the seminal yardstick competition framework by Besley and Case (1995). Within this alternative framework, residents are immobile and have homogeneous preferences, but use information about tax rates in neighboring jurisdictions to judge whether their own local government is inefficient and deserves to be voted out of office. Self-interested governments choose tax rates knowing that residents make such comparisons, such that strategic interaction among jurisdictions arises just as in a tax competition model.

Following the work of Brueckner and Saavedra (2001), an increasingly long list of studies has examined spatial property tax dependence in different countries with larger samples. Usually, these papers estimate spatial dependence parameters of about 0.4-0.6, equivalent with ten percentage point higher tax rates in neighbouring municipalities leading to a 4-6 points higher tax rate without accounting for feedback effects. A key goal has been to discriminate among tax and yardstick competition and as sources of property tax dependence. Bordignon et al. (2003) use data including detailed information about electoral behavior and tax setting in a sample of Italian cities. Their results show that local property tax rates are positively spatially autocorrelated among adjacent jurisdictions when the mayors run for re-election, while this correlation is absent either when mayors face a term limit or when backed by an overwhelming majority in the local council. Allers and Elhorst (2005) estimate both

⁶ Their spatial lag parameter estimates range from 0.16 to 0.70, depending on the form of the spatial weighting matrix. Obviously, a concise estimation is strongly limited by the small sample size.

spatial lag and error models to analyze property tax choice interaction by Dutch municipalities.⁷ As in Bordignon et al. (2003), interaction in property tax rates is less pronounced among municipalities governed by coalitions backed by large majorities, supporting yardstick competition. Fiva and Rattsø (2007) apply a spatial probit model to test whether the decision to have residential property tax in local communities in Norway depends on the observable past decisions of adjacent localities. Their results are also in line with yardstick competition explaining the distinct geographic pattern in local property taxation observed.

Two more recent studies deserve to be mentioned. Dubois and Paty (2010) use a panel of 104 local communities from 1989-2001 in order to test housing tax setting in France. They extend the analysis of yardstick competition by controlling for the impact of tax choices in locations that are not geographically close but comparable with respect to socio-economic characteristics. Their results suggest that voters sanction their incumbents when their own local housing tax is high relative to geographic neighbors, and reward them when similar cities in terms of demographic characteristics have high local taxes. Delgado et al. (2011) use a large sample of 2,713 Spanish municipalities and find evidence of tax mimicking behaviour with a spatial lag parameter of slightly over 0.4 for the property tax. In sum, the accumulated evidence strongly points towards existence of systematic spatial dependence in property tax choices and yardstick competition as the main driver of this dependence.⁸

⁷ Robust LM-tests, as proposed by Anselin et al. (1996), reject the spatial error versions of their model.

⁸ Some recent papers have advocated a quasi-experimental research design to identify strategic interaction in property tax setting. This line of research has argued that reduced-form spatial interaction models rely on comparatively strong assumptions that lead towards a tendency to overestimate the true amount of interaction. Lyytikäinen (2012) uses a reform of the statutory lower limits to property tax rates in Finland as a source of exogenous variation to estimate the response of municipalities to tax rates in neighbouring communities. He finds no evidence of systematic interdependencies in property tax rates. Baskaran (2014) exploits a reform of the fiscal equalization scheme in the German state of North Rhine-Westphalia, which exogenously caused local municipalities to increase their property and business tax rates, to identify tax mimicking by local governments in the neighbouring state of Lower Saxony. While traditional spatial lag regressions suggest immediate strategic interactions, a difference-in-difference analysis also points towards insignificant interaction in tax rates.

3 A Yardstick Competition Model of Local Property Taxation

Tiebout (1956) introduces the “voting-with-their-feet” mechanism where local governments compete for fully mobile consumers. The competing local governments provide a local public good at a random cost ϕ_i and tax a local property at a rate τ_i . Local governments seek to minimize the average cost of public good provision. In contrast, fully mobile consumers obtain utility from public good consumption and earn disutility from being taxed. Hence, households choose among the location which provides the highest overall utility. The model assumes no externalities and no spatial independence, so that in equilibrium it must hold that $\tau_i = f(\phi_i)$ with $\frac{d\tau_i}{d\phi_i}$. This leads to our first hypothesis:

Hypothesis 1 – Local Public Financing through Property Taxes: *More constrained fiscal conditions in a location go along with higher effective property tax rates.*

In reality, local jurisdictions are not isolated entities, but informational spillovers occur among neighboring jurisdictions (Besley and Case, 1995). The incumbent local governments aim at being re-elected. They provide a local public good of random cost ϕ_i , which is known to them and tax local property at a rate $\tau_i : P_{H,i}$. While “good” governments provide a public good at average cost, “bad” governments engage in rent-seeking. Immobile consumer-voters try to distinguish “good” from “bad” local governments and appraise incumbent’s relative performance to neighboring places. As a consequence they vote “bad” incumbents out of office. In equilibrium the yardstick competition emerges: $\tau_i = f(\phi_i, \bar{\tau}_i)$ with $\frac{d\tau_i}{d\phi_i}, \frac{d\tau_i}{d\bar{\tau}_i} > 0$,

from which the second hypothesis on spatial tax mimicking follows:

Hypothesis 2 – Spatial Tax Mimicking: *Local governments mimic each other in setting property tax rates: higher tax multipliers in neighboring local jurisdictions go along with higher tax multipliers in the own municipality, and vice versa.*

Poterba (1984, 1992) emphasizes the duality of housing as consumption and investment good, which allows us to study strategic setting of property tax in the context of the heterogeneous agents model. Under perfect asset market assumptions, the price of housing capital equals the PDV of its future service stream. In equilibrium, the per-period price of rental services equals the user costs of owning:

$$R(H_i) = P_{H,i}(\delta_i + \kappa_i + \tau_i(1-\theta)r - \pi_{H_i}), \quad (1)$$

with rent $R(H_i)$ and property price $P_{H,i}$, depreciation rate δ_i , maintenance costs κ_i , marginal tax rate θ , mortgage rate r , and appreciation rate of house price, π_{H_i} . Since property tax payment ($P\tau$) is capitalized, both owners and tenants fully bear the tax in this model. Under real world assumptions of limited tax shifting as well as “home voting” and “tax illusion” among tenants, tenants bear only incomplete parts of property tax burdens (Dusansky et al., 1981; Carroll and Yinger, 1994) and homeowner-voters oppose property taxes more strongly than tenants do (Fischel, 2001). According to Oates (2005), tenants also demand higher levels of public services. This leads us to our third hypothesis:

Hypothesis 3 – Homeowner Effect: *Effective property tax decreases with an increasing share of owner-occupied dwellings in a municipality.*

Homeowners possess the economic incentive to oppose high property taxes in order to protect their housing wealth (Fischel, 2001). Property taxes are also more salient to homeowners than renters (Oates 2005; Cabral and Hoxby, 2016), and homeowners bear the full burden of the property tax irrespective of local market conditions. Our main research hypotheses hence is that higher local shares of owner-occupying households prompt local governments to tax residential property more lightly, *ceteris paribus*. Differences in the strength of this hypothetical effect may arise across local jurisdictions from differences in the local incidence of the property tax between landlords and tenants. Statutorily, landlords can

fully shift running costs of property tax to tenants. They might yet fail to do so when the price elasticity of local demand for rental housing services is large. In our empirical analysis, we use local variation in the share of vacant non-single family housing. In doing so, we exploit variation in housing demand elasticity in order to investigate whether the size of a possible home voter effect differs between areas of high and low housing demand and therefore discriminate between the tax incidence and the tax salience channels.

4 Data and Estimation Methodology

4.1 Data

Property tax multipliers. In the German tax system, the property tax is levied at the municipal level, but according to the same principles country-wide. The annual tax burden for a property j of type k in a municipality m can be calculated as follows:

$$TAX_{j,k,m} = VAL_j^{ass} \cdot RATE_k \cdot MULT_m, \quad (2)$$

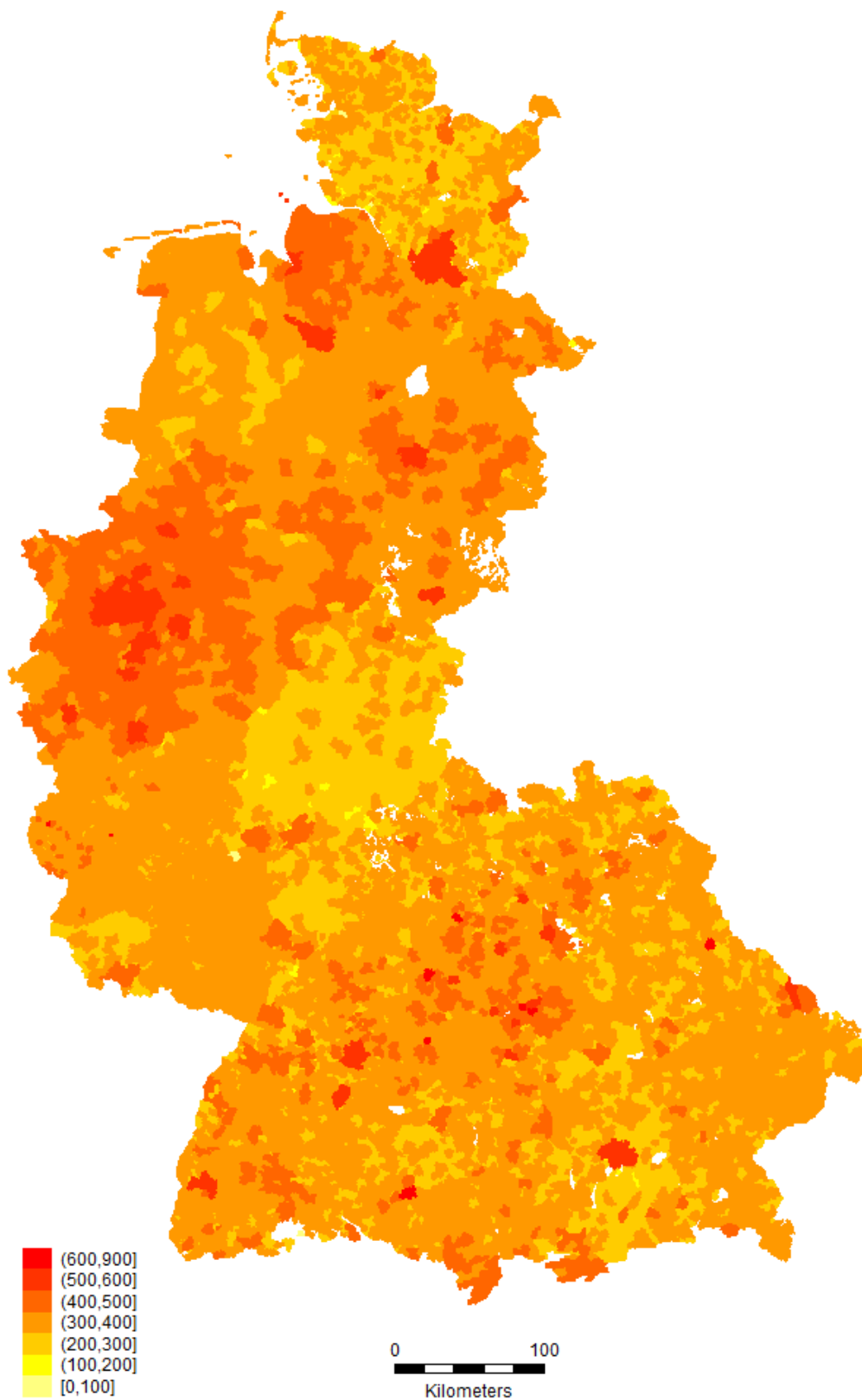
where TAX denotes the tax burden, VAL^{ass} the property-specific assessed value, $RATE$ a property-type-specific tax rate, and $MULT$ the local tax multiplier. The property-specific assessed values (“*Einheitswerte*”) are fixed by the local tax offices, using a methodology based on 1964 prices in West Germany and 1935 prices in East Germany. The assessed values are hence completely disconnected from current market conditions.⁹ The property-type-specific tax rates are ruled by federal law and uniform across the country.¹⁰ The local tax multiplier is consequently the only component of the effective tax rate that can be directly influenced by local governments, while all other components are exogenous.¹¹ As illustrated by Figure 1, local tax multipliers vary widely across municipalities.

⁹ See Box B1 in the Appendix for further institutional details on assessed values.

¹⁰ The house-type-specific tax rate is 2.6‰ for single-family houses until the first 38.356,89 euros of assessed value and 3.5‰ thereafter, 3.1‰ for two-family houses and 3.5 ‰ for all other non-agricultural properties.

¹¹ It could be argued that local governments could influence the size of the tax base by allowing more housing construction. However, new construction typically adds very little to the existing housing stock, such that the tax base is practically fixed even in the long run (i.e., periods far longer than a majors’ current period of power).

Figure 1: Property Tax Multipliers across German Municipalities.



This figure is based on data from the German Federal Statistical Office and shows the geographical distribution of property tax multipliers (% times 100) for 8,464 Western German municipalities in 2011.

Some local governments set the tax multiplier to zero, which is equivalent to exempting housing from wealth taxation. The maximum multiplier in 2011 is 900 per cent, more than twice the average of 335 per cent. As a result, residing in even fairly adjacent locations can lead to substantial differences in annual tax burdens: moving the ten kilometer distance from Dierfeld (a small municipality in Rhineland-Palatinate with the highest multiplier in the sample) to the adjacent municipality of Diefenbach would save a household owning a typical single-family house worth 80.000 euros of assessed value¹² a property tax payment of 1,500 euros annually. This amount translates into several ten-thousands of euros over the typical duration of a household in a home.

Homeownership rates. Data on municipality-level homeownership rates is obtained from the 2011 German Census. The Census encompassed a complete inventory of residential buildings and their housing units, containing detailed information on the type of owner (private individual, owners' association, housing company, cooperative, or other), property characteristics, and current use (owner-occupied, rented out, or vacant). We remove all seasonal and recreational dwellings, as well as dwellings used by diplomats and foreign armed forces. We subsequently compute shares of owner-occupied, rental and vacant houses at the municipal level. We restrict our sample to 8,036 Western German municipalities.¹³

Figure 2 illustrates the geographical distribution of municipal homeownership rates. The mean proportion of household owning their homes at the municipality level is 67 per cent with an enormous range, spanning from 20 to 100 per cent. High-homeownership jurisdictions cluster particularly in rural regions in the northwest, in Bavaria and southwestern Germany. Low-ownership municipalities are particularly concentrated in major metropolitan areas.

¹² Due to their considerable age, the assessed values used to compute the individual tax burden are much lower than contemporaneous property market values, which reduces the effective property tax rate.

¹³ Data on important possibly confounding fiscal variables, such as debt or public spending, is not available for Eastern German municipalities in time periods close to the Census year.

Figure 2: Homeownership Rates across German Municipalities.

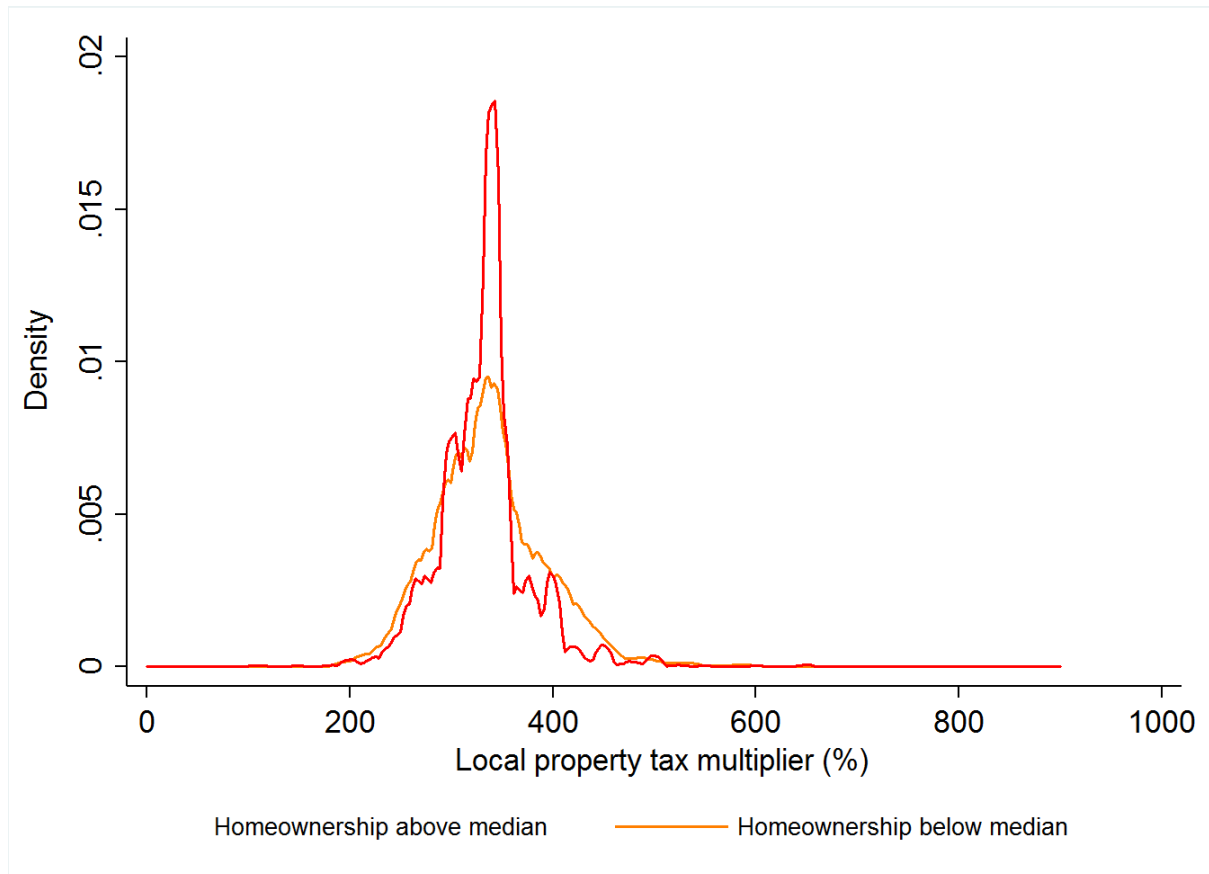


This figure is based on data from the 2011 Census and shows the geographical distribution of the proportion of owner-occupied housing units (in %) in 8,462 Western German municipalities in 2011.

Figure 3 shows Kernel estimates of the probability mass functions of local tax multipliers among “low” (below median) and “high” (above median) homeownership municipalities. The estimated density functions are apparently different, indicating a

concentration of probability mass at average multipliers among high homeownership locations in comparison to low homeownership ones, with considerable less concentration of probability mass towards the right end of the multiplier scale.

Figure 3: Density Distributions of Tax Multipliers



The figure is based on data from the Federal Statistical Office and shows Kernel estimates of the empirical density distribution of tax multipliers grouped by local proportions of owner-occupied housing. Property tax multiplier distributions are grouped by homeownership rate with above-median and below-median homeownership rate municipalities indicated in red and orange, respectively.

Fiscal Conditions. Local property tax rates critically depend on local fiscal conditions, which can in turn systematically differ with respect to the local share of homeownership. For example, homeowners may have different tastes with respect to the level of local public spending or with respect to local public debt levels. In order to account for the possibly confounding role of local fiscal circumstances, we include 2010 levels of local public spending and municipal debt per capita, as well as per capita fiscal revenues from the local

business tax and “vertical” transfers of federal income and sales tax revenue for the same year.¹⁴ We additionally control for the per-capita size of the local property tax base, which is practically exogenous to local governments due to the extreme durability of housing (Glaeser and Gyourko, 2005) and assessed tax values being completely uncoupled from market values.

Other Controls. As non-fiscal controls, we use population size, population size squared, population density, income (proxied by 2009 taxable income per capita) and socio-demographic structure (share of unemployed persons, share of population aged 10 years or under, and share of population aged 70 years or above). In order to account for heterogeneous political preferences among locations as another potentially confounding factor, we include local shares of valid votes for the three main left-oriented parties¹⁵ in the 2009 German Federal elections.¹⁶ We additionally include a set of dummy variables flagging municipalities with state or country borders and metro area municipalities with 100,000 inhabitants or more. We finally include a set of state dummy variables.

Table 1 shows key descriptive statistics on the included variables. In addition to the characteristic values of each variable’s univariate distribution, we report the respective Moran’s I statistics as an index of global spatial autocorrelation.¹⁷ Both local property tax multipliers and homeownership rates display considerable spatial dependence, as do almost all our controlling covariates. This holds particularly for debt and shares of left-wing votes.

¹⁴ In 2010, the entity of municipalities received 15% of the county-wide income tax and 2.2% of the country-wide sales tax revenue within the German vertical fiscal equalization scheme. The revenues were distributed to individual municipalities according to allocation formulae which account for, among other factors, local income tax and business tax revenue.

¹⁵ As left-oriented parties we include the Social Democratic Party (“*Sozialdemokratische Partei Deutschlands*“, SPD), the Green Party (“*Bündnis 90/Die Grünen*”) and the Socialist Party (“*Die Linke*”).

¹⁶ In the 2009 German Bundestag Election, every voter had two votes: a first to elect a local candidate (who can but must not necessarily be associated with a party), and a second vote to elect a party for seats in the German Bundestag. We use only the party-related second votes.

¹⁷ Each Moran’s I value is calculated using a 10-nearest-neighbor row-standardized spatial weighting matrix.

Table 1: Descriptive Statistics

| | Mean | S.D. | Min | Max | Moran's I |
|--|-------------|-------------|------------|------------|------------------|
| Tax multiplier (pct.) | 340.67 | 51.72 | 0 | 900 | 0.495 |
| Pct. owner-occupied (pct.) | 67.92 | 11.27 | 20.34 | 100 | 0.416 |
| Municipal spending p.c. (euros, 2010) | 1,245.50 | 5611.91 | -85.94 | 494,633.2 | 0.042 |
| Municipal debt p.c. (euros, 2010) | 1,396.06 | 867.95 | 27.00 | 8,068.00 | 0.838 |
| Revenue business tax p.c. (euros, 2010) | 271.37 | 4182.43 | -690.66 | 380,645.8 | 0.103 |
| Vertical income and sales tax transfers p.c. (euros, 2010) | 352.84 | 126.30 | 0 | 5,416.67 | 0.553 |
| Property tax base p.c. (euros 1000s) | 28.97 | 24.68 | 0 | 2,028.57 | 0.334 |
| Resident population | 8,464 | 7,599 | 11 | 1,348,335 | 0.160 |
| Population density (inh./km ²) | 20.59 | 29.04 | 0.27 | 432.63 | 0.523 |
| Taxable income p.c. (euros 1000s, 2009) | 15.04 | 3.84 | 0.62 | 100.64 | 0.467 |
| Unemployed (Pct.) | 3.12 | 1.89 | 0 | 80.48 | 0.300 |
| Persons aged 10 years or less (pct.) | 8.79 | 1.85 | 1.24 | 33.33 | 0.204 |
| Persons aged 70 years or more (pct.) | 14.88 | 3.22 | 5.23 | 42.86 | 0.310 |
| Votes for left-wing parties (pct., 2009) | 38.66 | 10.47 | 0 | 81.58 | 0.686 |
| State or country border (dummy) | 0.15 | - | 0 | 1 | - |
| Metro area (dummy) | 0.01 | - | 0 | 1 | - |
| State: Schleswig-Holstein (dummy) | 0.13 | - | 0 | 1 | - |
| State: Hamburg (dummy) | 0.00 | - | 0 | 1 | - |
| State: Bremen (dummy) | 0.00 | - | 0 | 1 | - |
| State: Lower Saxony (dummy) | 0.12 | - | 0 | 1 | - |
| State: Northrhine-Westfalia (dummy) | 0.05 | - | 0 | 1 | - |
| State: Hesse (dummy) | 0.05 | - | 0 | 1 | - |
| State: Rhineland-Palatinate (dummy) | 0.27 | - | 0 | 1 | - |
| State: Baden-Wurttemberg (dummy) | 0.13 | - | 0 | 1 | - |
| State: Bavaria (dummy) | 0.24 | - | 0 | 1 | - |
| State: Saarland (dummy) | 0.01 | - | 0 | 1 | - |

This table shows descriptive statistics for our variables. All values refer to the year 2011 except from indicated.

4.2 Estimation Strategy

We test our key hypotheses within a spatial framework of tax rate choice. We link local property tax multipliers to local homeownership rates, neighbours' tax multipliers and controls within a spatial lag model that allows for heteroskedastic disturbances:

$$\tau = \lambda W\tau + \beta \text{HOR} + X\Psi + \varepsilon \quad \text{with} \quad \varepsilon \sim (\mathbf{0}, \sigma_i^2 \mathbf{I}_i) \quad (3)$$

The dependent variable τ is an $N \times 1$ -vector of municipal property tax multipliers in 2011, measured in percent times 100. The tax multiplier in each jurisdiction is not influenced by the characteristics of this jurisdiction alone, but also by a weighted average of property tax multipliers in adjacent jurisdictions. The strength of this dependence is governed by the N -dimensional spatial weighting matrix W and the size of the spatial lag coefficient λ . HOR is an $N \times 1$ -vector of municipal homeownership rates; X is an $N \times k+1$ -matrix of fiscal and non-fiscal control variables, while β and Ψ pick up (vectors of) coefficients.

Revelli (2005) has argued that if unobserved shocks hit adjacent municipalities similarly, there still may remain spatial autocorrelation in the disturbance process of a spatial lag tax choice regression. To rule out this case, we test the disturbances of all spatial models for remaining spatial dependence in the error terms using Moran's I.¹⁸

Spatial Weighting Matrix. The choice set to specify a spatial weighting matrix ranges from different forms neighbourhood-based connectivity to distance-based connectivity, where weights are typically calculated as reflecting the inverse of physical distance. Alternatively, spatial weights can be based on socioeconomic distances (Dubois and Paty 2010)¹⁹, or on a combination of both. We base the choice of spatial weights on our theoretical model. Since resident voters plausibly compare their own localities with spatially adjacent

¹⁸ We additionally estimate a mixed-regressive spatial model that contains both a spatial lag in the dependent variable and a spatially autocorrelated error term. The mixed-regressive spatial model can be written as: $\tau = \lambda W\tau + \beta \text{HOR} + X\Psi + \varepsilon$ with $\varepsilon = \rho W\xi$, $\xi \sim (\mathbf{0}, \sigma^2 \mathbf{I}_m)$. The results of estimating this model, as well as further alternative specifications of spatial models, are reported in Table A1 in the Appendix.

¹⁹ Dubois and Paty (2010) argue that in yardstick competition, voters consider immediate neighbors and not directly adjacent municipalities of similar socio-demographic characteristics.

ones, we refer to the neighbourhood rather than the distance concept. We use three alternative row-standardized binary nearest-neighbour matrices which link all municipalities to their 10, 20, and 30 closest neighbours.

Unobserved Heterogeneity. A natural concern about estimating the spatial autoregressive model of Equation (3) with cross-sectional data is unobserved local heterogeneity. Even controlling extensively for fiscal and non-fiscal local circumstances will not guarantee that unobserved local factors that are correlated with local homeownership rates and tax levels remain uncontrolled. Since we lack historical data that would allow us establishing a panel dimension, we resort to including spatial lags in the covariates along with a spatial lag in the tax multiplier as a substitute to estimating a spatial unobserved effects model in an alternative specification. Pace and LeSage (2010) and Elhorst (2010) establish that the resulting class of spatial Durbin models (SDM)²⁰ are particularly well suited to capture unobserved local heterogeneity when the unobserved factors are spatially correlated.²¹

Endogeneity. Our identification strategy faces a potential endogeneity issue for the homeownership rate. Unobservable positive shocks to the local property tax rates could provide homeowners with an incentive to migrate to lower-tax locations, decreasing an area's homeownership and in turn increasing its tax rate. Such reverse causality would generate correlation among homeownership and the disturbances. Spatial lag models with additional endogenous regressors, in our case the municipal homeownership rate, can be estimated by using the generalized method of moments and instrumental variable estimation strategy proposed by Drukker et al. (2013), extending earlier work by Kelejian and Prucha (1998,

²⁰ The spatial Durbin model can be written as: $\tau = \lambda W\tau + \beta HOR + \gamma WHOR + X\Psi + WX\Omega + \varepsilon$ with $\varepsilon \sim (\mathbf{0}, \sigma_m^2 \mathbf{I}_m)$.

²¹ Only in the very special case that the dependent variable does not exhibit spatial dependence, and there are no spatially dependent omitted variables correlated with the included covariates, OLS and SDMs should yield similar parameter estimates.

1999).²² We consider instrument variables that we expect to be highly correlated with 2011 local homeownership, but independent of unobserved shocks to the local property tax rate.²³ As our two main instrument variables, we use measures of local housing destroyed or severely damaged by allied warfare during World War II, and local proportions of owner-occupied dwellings from a historical housing inventory compiled in the 1950 West German Census. Both variables are expected to be valid instruments, influencing contemporaneous local property tax multipliers only through the channel of affecting our causal variable of interest, contemporaneous homeownership. As described in detail by Voigtländer (2009), war-induced damages to local housing led to large-scale provision of rental housing in more heavily affected areas, especially in the first two decades following the war.²⁴ Since war-induced damages to local housing mainly followed a west-east pattern mimicking the direction of entry of Allied forces into Germany, and extended to both urban and rural locations, they can be seen as a natural experiment randomly affecting local homeownership rates conditional on the included covariates (Wolf and Galicia, 2015). Historical homeownership rates refer to the 1950 district level, which usually comprised dozens of individual municipalities.

Panel A of Figure 4 shows the distribution of housing damage rates at the level of 1950 historical districts. Panel B illustrates historical homeownership rates at the district level. The first-stage regression reveals that municipal homeownership rates today are still significantly lower in municipalities positioned in districts that suffered more war-related housing damages, or had lower historical homeownership rates (see Table A2 in the Appendix).

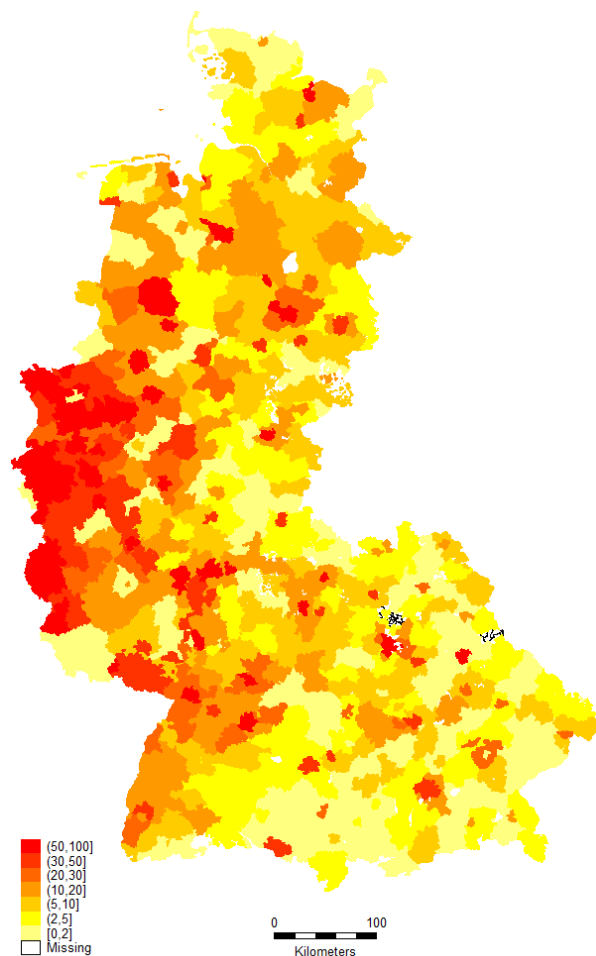
²² Kelejian and Prucha (1998, 1999) propose using the linearly independent columns of \mathbf{x} , $\mathbf{W}\mathbf{x}$, and $\mathbf{W}^2\mathbf{x}$ as instruments to solve the endogeneity problem between y and $\mathbf{W}y$.

²³ All other explanatory variables, apart from the spatially lagged tax multiplier, are treated as exogenous variables in this approach.

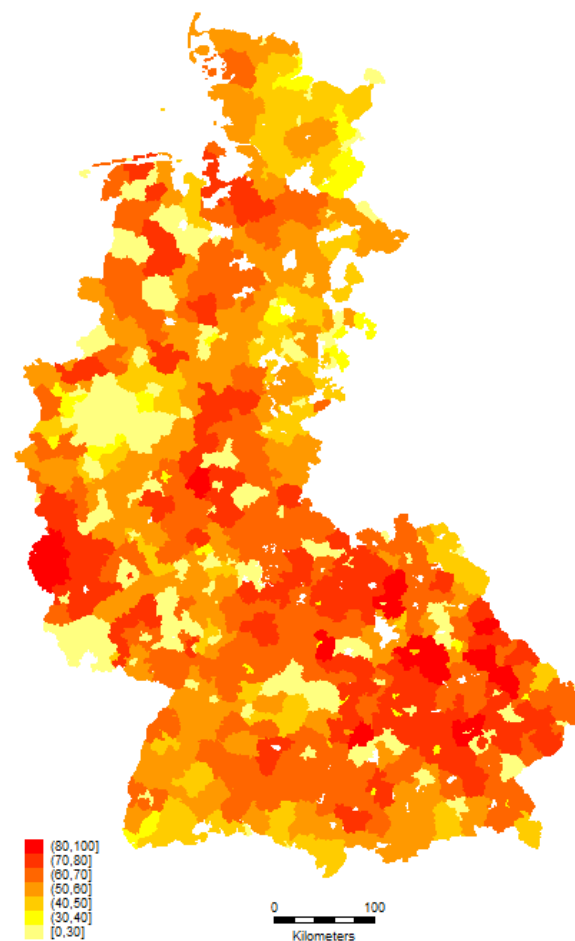
²⁴ On Western German territory, about 2.25 million dwellings were destroyed, reducing the housing stock by nearly 20 per cent in comparison to pre-war levels. A further 2-2.5 million dwellings were damaged. Estimates suggest that in 1950, there was still a shortage of more than 4.5 million homes. This shortage was heavily reduced until an estimated shortfall of 660,000 dwellings in 1962 (Voigtländer, 2009).

Figure 4: Housing Damages and Homeownership Rates across German Historical Districts

Panel A: WWII-induced Housing Damages



Panel B: Homeownership Rates



This figure is based on data from the 1950 German Census. Panel A shows the geographical distribution of housing damage rates (in %) for historical Western German districts in 1950. Panel B shows the geographical distribution of homeownership rates rates (in %) for historical Western German districts in 1950..

5 Empirical Results

Table 2 presents regression results from different versions of Equation (3). As a benchmark, we first estimate a non-spatial, non-instrumental variable version of the equation by OLS. This allows assessing the influence of spatial dependence and endogeneity against the simple OLS results. We subsequently report results for two different specifications of a spatial lag model. The first specification uses a 10-nearest-neighbor spatial contiguity matrix. The second one is based on a matrix that extends the connectivity to the first 20 neighbours of each municipality.²⁵ The fourth and fifth columns of the table show estimation results for two extended spatial versions of the model: first, a spatial Durbin model that includes spatially lagged covariates along with the spatially lagged tax multiplier, and secondly a spatial lag model treating local homeownership as endogenous, using 1950 war-induced housing damage and homeownership rates on the historical district level as instruments.²⁶

All models perform generally well in explaining the variation in municipal property tax rate choice. The coefficients estimated on local homeownership and both the fiscal and non-fiscal control variables turn out to be robust across the different specifications in terms of statistical and economic significance. Importantly, as indicated by highly significant spatial parameters and a large Moran's I of the OLS disturbances, OLS fails to properly account for the spatial interaction processes governing municipal tax rate choice. Depending on specification, the spatial lag parameter is estimated between 0.62 and 0.80 and is highly significant throughout.²⁷ Including spatially lagged covariates in the spatial Durbin model improves the goodness of fit remarkably, but does not alter the spatial dependence parameter considerably vis-à-vis the 10-nearest neighbor spatial lag specification. With a size of 0.8, the largest parameter is estimated for the spatial lag IV regression.

²⁵ Results based on 30-nearest-neighbours are reported in Table A1 in the Appendix.

²⁶ Both models again use the 10-nearest neighbour matrix.

²⁷ This result does not hinge upon the choice of the spatial weighting matrix. Increasing the number of neighbors from 10 to 20 changes the spatial lag parameter only slightly while goodness of fit decreases. Increasing the number of neighbors to 30 yields a larger dependence parameter with otherwise very similar results.

Table 2: OLS and Spatial Regression Results

| | OLS | SL Model (10 N.N.) | SL Model (20 N.N.) | SD Model (10 N.N.) | SL IV (10 N.N.) |
|-----------------------|-----------------------|-----------------------|-----------------------|------------------------|-----------------------|
| Constant | 317.296*** (8.863) | 130.555*** (9.492) | 105.997*** (9.937) | 116.938*** (15.648) | 82.114*** (18.822) |
| Pct. owner-occupied | -0.199*** (0.068) | -0.214*** (0.061) | -0.201*** (0.062) | -0.253*** (0.067) | -0.284** (0.144) |
| Spending p.c. | 0.002*** (0.001) | 0.001*** (0.000) | 0.001** (0.000) | 0.001** (0.001) | 0.001*** (0.000) |
| Debt p.c. | 0.003*** (0.001) | 0.001 (0.001) | 0.001 (0.001) | 0.003** (0.001) | 0.002*** (0.001) |
| Business tax p.c. | -0.012*** (0.002) | -0.013*** (0.002) | -0.013*** (0.002) | -0.014*** (0.002) | -0.013*** (0.001) |
| Income/VAT p.c. | -0.082*** (0.010) | -0.054*** (0.010) | -0.052*** (0.010) | -0.049*** (0.002) | -0.057*** (0.10) |
| Tax base p.c. | -0.129* (0.068) | -0.025 (0.056) | -0.027 (0.055) | 0.021 (0.059) | -0.071 (0.064) |
| Population (1000s) | 0.545*** (0.089) | 0.468*** (0.092) | 0.475*** (0.096) | 0.470*** (0.088) | 0.454*** (0.096) |
| Population^2 | -0.000*** (0.000) | -0.000*** (0.000) | -0.000*** (0.000) | -0.000*** (0.000) | -0.000*** (0.000) |
| Population dens. | 0.089*** (0.027) | 0.076*** (0.026) | 0.072*** (0.026) | 0.198*** (0.030) | 0.067** (0.029) |
| Income p.c. (1000s) | -0.332 (0.238) | -0.261 (0.236) | -0.215 (0.234) | -0.227 (0.251) | -0.224 (0.235) |
| Pct. unemployed | 0.255 (0.238) | 0.513** (0.238) | 0.535** (0.247) | 0.559** (0.264) | 0.378 (0.253) |
| Pct. <10 years | -0.013 (0.299) | 0.216 (0.256) | 0.230 (0.247) | 0.153 (0.254) | 0.172 (0.274) |
| Pct. >70 years | 0.552*** (0.177) | 0.421*** (0.151) | 0.419*** (0.062) | 0.363** (0.159) | 0.421*** (0.162) |
| Pct. left-wing votes | 0.231*** (0.055) | 0.165*** (0.047) | 0.166*** (0.048) | 0.281*** (0.065) | 0.149*** (0.050) |
| D border (nat./state) | 1.693 (1.285) | 2.593** (1.165) | 2.353** (1.184) | 5.747*** (1.565) | 2.513** (1.233) |
| D pop>100,000 | 4.216 (13.467) | 4.444 (14.138) | 4.753 (14.330) | 3.804 (13.861) | 5.667 (14.409) |
| State dummies | Yes | Yes | Yes | Yes | Yes |
| λ | - | 0.615*** (0.017) | 0.691*** (0.019) | 0.668*** (0.017) | 0.800** (0.034) |
| Spatial lagged cov. | - | - | - | Yes | - |
| Wald test:lag cov=0 | - | - | - | 418.53*** | - |
| # obs. | 8,036 | 8,036 | 8,036 | 8,036 | 8,036 |
| R^2 | 0.385 | | | | |
| Squared corr. coeff. | | 0.359 | 0.349 | 0.398 | |
| Moran's I error term | 0.317 | 0.014 | 0.061 | -0.017 | 0.104 |

This table shows regression results for five different specifications of the tax rate choice model. The dependent variable is the 2011 municipal property tax multiplier in percent times 100. ***, ** and * denote statistical significance at the 1, 5, and 10% levels. HAC-robust standard errors are reported in parentheses. SL indicates the spatial lag model, SD the spatial Durbin model, SL IV the spatial lag instrumental variable model. N.N. denotes the number of nearest neighbors used in the definition of the spatial weighting matrix.

The local homeownership share carries the expected negative sign and is statistically significant at the five per cent level or better in each specification. The controls capturing local fiscal conditions tend to be highly significant and carry plausible signs: higher per capita spending and debt levels are associated with higher property tax multipliers, reflecting higher financing needs. The negative and strongly significant coefficients on per capita revenues out of local business taxes and vertical transfers of income and value added taxes strengthen the impression that the model captures local governments' budget constraints quite well. Both higher revenues from business taxes and higher transfers relax the municipal budget constraint, *ceteris paribus*. The size of the property tax base is found to be insignificant in the majority of specifications.

Concerning the role of socio-demographic structure and political tastes in municipal property tax rate choice, the evidence is again in line with expectations, albeit some coefficients lack statistical significance. We find higher tax multipliers in larger and more densely populated municipalities (with decreasing margins in population), more unemployment, higher shares of elderly persons, and more left-oriented political preferences. Municipalities at state or federal borders tend to charge higher multipliers, whereas we find no separate effect for localities with populations of 100,000 or more.²⁸

The coefficients estimated on our main variable of interest are always statistically significant and negative, ranging between -0.199 in the OLS specification to an estimate of -0.284 for the first-round (or direct) effect in the spatial IV specification. While caution is warranted for direct comparisons of coefficients estimated in linear non-spatial versus simultaneous spatial models, the evidence clearly shows that higher shares of homeowners in local populations are indeed associated with systematically lower property tax levels. This

²⁸ All specifications include the full set of (unreported) state dummies that are highly significant in every specification, indicating considerable differences in average property tax levels across states that remain unexplained by the remaining covariates. This finding is explained by the multi-tier structure of public finances in Germany, which renders public financial conditions very heterogeneous on state-level and makes average multiplier levels highly dependent on the state considered.

key result survives an instrumental variable estimation based on exogenous variation in the contemporaneous ownership share derived from long-lagged housing damage and ownership shares at the superordinate district level, indicating that the correlation that we observe in the data lends itself to a causal interpretation.

Concerning the economic significance of the effect, we first refer to the direct effect interpretation of a change in the ownership rate on the tax rate in a certain municipality itself. Shutting down any indirect effects of tax changes emanating from multi-channel feedback that plays out through the system of spatially dependent jurisdictions, a ten percentage point rise in the local homeownership would reduce the local property tax multiplier by 2-3 percentage points on average. For a typical single-family house worth 80,000 euros of assessed value, this direct effect would be equivalent to a roughly one per cent decrease in the annual tax burden when evaluated at the sample mean multiplier of 340 points. While this is an economically small effect for the individual household, it is important to remember that municipalities typically consist of several thousands of homes.

Due to the strong spatial dependence in municipal property tax multipliers, the estimated direct effect of a change in homeownership in some municipality on the local multiplier does not capture the full or total effect of this change. Since the adjacent jurisdictions react to the resulting change in their neighboring municipality's tax rate with altering their own multiplier, so will do their neighbors, and so on. The steady-state equilibrium size of these indirect effects depends on the size of the spatial dependence parameter and the shape of the spatial weighting matrix.²⁹ Following the total effect to an observation viewpoint pioneered by LeSage and Pace (2009), we calculate the average total impact on the tax multiplier of a locality m from a global ten percentage point rise in local

²⁹ See (LeSage and Pace 2009 for a formal exposition of calculating average direct, indirect and total effects.

homeownership shares across the entire sample.³⁰ In the spatial lag model with 10 nearest neighbors, the average total effect is -5.6, more than twice as much as the average direct effect of -2.1. Using the estimates from the 10-nearest-neighbors spatial Durbin model, the total effect even becomes -7.1.³¹ The resulting reduction in local multipliers of 6-7 points would correspond to a hypothetical annual loss of 120-140 million euros in total property tax revenue after aggregating over all municipalities in the sample.

5.3 Discriminating among Tax Incidence and Tax Salience as Possible Channels

A natural candidate potentially challenging the claim that differences in property tax salience drives our key result lies in cross-locational differences in property tax incidence between landlords and renters. Homeowners bear the full property tax burden irrespective of local market conditions, but the incidence for rented housing depends on the relative price elasticities of rental housing demand and supply. In jurisdictions where demand for rental housing is considerably price elastic, the main portion of property tax burdens in economic terms will remain with the landlords. Renters are meanwhile expected to bear the main portion in strong housing demand, “landlord-friendly” markets. The partition of local housing into owner-occupied and rental should therefore be less influential for property taxes levels in the latter case, because every resident household is expected to fully bear the tax.

We test this proposition empirically by replacing the local homeownership share with two separate interaction terms: we interact local homeownership rates with two mutually exclusive dummy variables flagging municipalities in the highest quartile of the housing vacancy rate distribution (“high vacancy areas”) and the lower three quartiles of the same distribution (“low vacancy areas”). Instead of using the median, we decide to split the sample at the 75th percentile of the non-single family housing vacancy rate because the distribution is

³⁰ The actual homeownership rate exceeded 90 percent in 111 communities in 2011 (1.4 per cent of the sample). The resulting error can be considered negligible.

³¹ Compared to the direct effect, this is a disproportional increase vis-à-vis the spatial lag model that can be explained by the larger estimate for the spatial lag parameter.

heavily right-skewed.³² If differences in property tax salience are indeed driving the main result we find in our data, we would expect homeownership rates to depress property tax multipliers about equally strong in jurisdictions with strong and weak rental housing demand.

Table 3 shows that the homeownership rate coefficients for the two subsamples of high- vs. low-vacancy municipalities are always very close to one another, independent of the specification is considered.³³ The null hypothesis that the two coefficients be equal can indeed never be rejected at common significance levels for all tested models. The same quantitative home-voter effect is thus present in the sample distribution of local property tax multipliers independent of the local level of rental vacancy, which can serve as an adequate proxy for the local price elasticity of rental housing demand. Our key result thus appears to hold regardless of the actual incidence of property taxes between renters and landlords. We think this supports the view that a higher visibility of the property tax for homeowners is likely to be a main mechanism driving our results.

Table 3: OLS and Spatial Regression Results for HOR-Vacancy Interaction Term

| | OLS | SL Model (10 N.N.) | SL Model (20 N.N.) | SD Model (10 N.N.) | SL IV (10 N.N.) |
|--|------------|-------------------------------|-------------------------------|-------------------------------|----------------------------|
| Pct. owner-occupied | -0.195** | -0.210*** | -0.196*** | -0.248*** | -0.284** |
| *D_high_vacancy | (0.068) | (0.061) | (0.061) | (0.067) | (0.144) |
| Pct. owner-occupied | -0.208** | -0.224*** | -0.213*** | -0.259*** | -0.286* |
| *D_low_vacancy | (0.070) | (0.063) | (0.063)) | (0.069) | (0.153) |
| p-value of test on equal coefficients | 0.368 | 0.281 | 0.180 | 0.389 | 0.969 |

This table shows parsimonious regression results for five different specifications of the tax rate choice model using interaction terms between the local homeownership rate and a dummy variable signaling high and low rental housing vacancy areas. The dependent variable is the municipal property tax multiplier in percent times 100. ***, ** and * denote statistical significance at the 1, 5, and 10% levels. HAC-robust standard errors are reported in parentheses. SL indicates the spatial lag model, SD the spatial Durbin model, SL IV the spatial lag instrumental variable model. N.N. denotes the number of nearest neighbors used in the definition of the spatial weighting matrix.

³² The 75th percentile is 8 per cent vacancy, while median vacancy is 5.6 per cent, a still fairly usual vacancy rate (see Figure A1 in the Appendix). Importantly, mean homeownership rates in high- and low-vacancy areas are similar (66 vs. 72 per cent).

³³ The remaining coefficients are very similar to those estimated in the previous models and are not reported. For full results of the vacancy split regressions, see Table A3 in the Appendix.

6 Conclusions

In efficient property markets, contract arrangements governing the partition of property rights in local housing should not make any difference for how strongly housing is taxed. This holds as long as landlords are statutorily allowed to pass on property taxes to their tenants. A growing body of empirical evidence suggests, however, that homeowners oppose property taxation much more than renters do. Homeowners possess strong incentives to shield their housing wealth against taxation. They also bear the full burden of the property tax independent on local market conditions. Finally, they experience a stronger tax salience than renters. This leads towards a case for a political economy of property taxation.

Based on data for over 8,000 German local jurisdictions, this paper has presented representative and large-scale empirical evidence in favor of a home-voter effect in local property taxation: property is taxed more lightly in municipalities with high proportions of owner-occupied housing. Using regression estimates derived from spatial econometric models that account for spatial interdependence in municipal tax multiplier choices, we are able to gauge the average total effect from a hypothetical change in homeownership on property tax revenue. We estimate that local tax multipliers would be on average 6-7 points lower if the homeownership rate would be ten percentage points higher across all 8,036 municipalities in the sample. Such a reduction in local multipliers would correspond to an annual 120-140 million euros loss in total tax revenue. This effect withstands the inclusion of a battery of potentially confounding factors, the consideration of spatial dependence in municipal property tax rate choice, and the correction for potential bias arising from endogeneity of the homeownership share.

Interacting local homeownership rates with an indicator of vacant rental housing suggests that our key result exists *even when* tenants tend to bear the same property tax burdens as their fellow owner-occupying neighbors. We interpret this as evidence that the

home-voter effect originates from differences in tax salience rather than from differences in tax incidence between owners and renters. This interpretation is in line with recent findings by Cabral and Hoxby (2016) and Brunner et al. (2015) using U.S. data.

Our results have at least two important practical implications. First, they provide local governments with evidence enabling them to benchmark their actual tax rate choices against other structurally comparable local jurisdictions. Second, our finding of a home-voter effect in property taxation indicates that actual property tax levels may not be efficient in terms of overall social welfare. If owner-occupiers successfully manage to oppose high property tax rates, property taxation will tend to be systematically too low in homeowner communities, whereas other local fees and taxes will tend to be too high.

The latter second-round effect, while not investigated in this paper, may potentially affect the equity of local access to public and quasi-public goods. Examining the questions of whether local governments attempt to compensate lower property tax revenues resulting from higher local political power of homeowners by charging higher fees and non-property taxes could be a fruitful avenue of further research.

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Appendix

Box B1: Further Institutional Details on Assessed Values Used in German Property Taxation

Instead of current market values, the German property tax is based on historical so-called **assessed values** (“*Einheitswerte*“). Assessed values for all taxable property were determined for the last time on **January 1st, 1964** in **West Germany** and January 1st, 1935 in East Germany. The legislator’s original intention was to re-assess all taxable property every six years. This intention was coded in § 21 (1) of the German Valuation Law (“*Bewertungsgesetz*”), but the law already became suspended in 1965. Ever since, a legal foundation for updating the historical assessed values to current market values did not exist. For property constructed after 1964 (West Germany) or 1935 (East Germany), respectively, assessed values are computed based on comparison values that reflect the historical prices of properties of same type and similar size. Due to the very long time span since taxable properties were assessed, the assessed values are **completely disconnected from current market conditions**. Over the last years, the German Federal Constitutional Court has accepted multiple suits doubting the legitimacy of the current form of property taxation. A reform of the German property tax, aiming at a new assessment of all taxable property in 2022, is currently in preparation.

Table A1: Results of Further Alternative Spatial Specifications

| | SE model (10 N.N.) | SL model (30 N.N.) | SAC model (10N.N.) |
|-----------------------|-----------------------|-----------------------|------------------------|
| Constant | 305.047*** (7.980) | 130.555*** (7.772) | 436.859*** (15.854) |
| Pct. owner-occupied | -0.241*** (0.055) | -0.214*** (0.050) | -0.230*** (0.053) |
| Spending p.c. | 0.001*** (0.000) | 0.001*** (0.000) | 0.001*** (0.000) |
| Debt p.c. | 0.003*** (0.001) | 0.001 (0.001) | 0.004*** (0.001) |
| Business tax p.c. | -0.014*** (0.001) | -0.013*** (0.001) | -0.014*** (0.001) |
| Income/VAT p.c. | -0.060*** (0.009) | -0.054*** (0.008) | -0.053*** (0.009) |
| Tax base p.c. | 0.022 (0.046) | -0.025 (0.044) | 0.029 (0.044) |
| Population (1000s) | 0.463*** (0.045) | 0.468*** (0.046) | 0.445*** (0.043) |
| Population^2 | -0.000*** (0.000) | -0.000*** (0.000) | -0.000*** (0.000) |
| Population dens. | 0.163*** (0.024) | 0.076*** (0.020) | 0.179*** (0.023) |
| Income p.c. (1000s) | -0.329** (0.155) | -0.261* (0.154) | -0.277* (0.149) |
| Pct. unemployed | 0.690*** (0.252) | 0.513** (0.250) | 0.643*** (0.242) |
| Pct. <10 years | 0.158 (0.262) | 0.261 (0.266) | 0.190 (0.251) |
| Pct. >70 years | 0.412*** (0.157) | 0.421*** (0.151) | 0.388*** (0.151) |
| Pct. left-wing votes | 0.273*** (0.064) | 0.165*** (0.050) | 0.269*** (0.064) |
| D border (nat./state) | 4.658*** (1.425) | 2.593*** (1.126) | 4.990*** (1.430) |
| D pop>100,000 | 3.262 (8.140) | 4.444 (8.402) | 3.101 (7.787) |
| State dummies | Yes | Yes | Yes |
| λ | - | 0.615*** (0.013) | 0.839*** (0.013) |
| ρ | 0.684*** (0.012) | | -0.458*** (0.044) |
| Spatial lagged cov. | - | - | - |
| Wald test:lag cov=0 | - | - | - |
| # obs. | 8,036 | 8,036 | 8,036 |
| Squared corr. coeff. | 0.378 | 0.359 | 0.371 |
| Moran's I error term | 0.778 | 0.028 | 0.535 |

This table shows regression results for additional spatial specifications of Equation (3). The dependent variable is the 2011 municipal property tax multiplier in percent times 100. ***, ** and * denote statistical significance at the 1, 5, and 10% levels. HAC-robust standard errors are reported in parentheses. SE indicates the spatial error model, SL the spatial lag model, SAC the mixed-regressive spatial model. N.N. denotes the number of nearest neighbors used in the definition of the spatial weighting matrix.

Table A2: First-stage Regression Results for Spatial Lag IV Model

| | |
|---|----------------------|
| Constant | 48.76*** (2.273) |
| District pct. housing damaged in 1950 | -0.031*** (0.008) |
| District pct. housing owner- occupied 1950 | 0.028*** (0.006) |
| Spending p.c. | -0.000 (0.000) |
| Debt p.c. | 0.000 (0.000) |
| Business tax p.c. | -0.001*** (0.000) |
| Income/VAT p.c. | -0.001 (0.003) |
| Tax base p.c. | -0.207*** (0.032) |
| Population (1000s) | -0.173*** (0.025) |
| Population ² | 0.000*** (0.000) |
| Population dens. | -0.077*** (0.007) |
| Income p.c. (1000s) | 0.075 (0.060) |
| Pct. unemployed | -0.946*** (0.312) |
| Pct. <10 years | -0.117 (0.076) |
| Pct. >70 years | -0.076* (0.046) |
| Pct. left-wing votes | -0.023 (0.015) |
| D border (nat./state) | -0.608** (0.242) |
| D pop>100,000 | 18.426*** (2.273) |
| State dummies | Yes |
| λ | 0.468*** (0.016) |
| # obs. | 8,036 |
| Squared corr. coeff. | 0.378 |

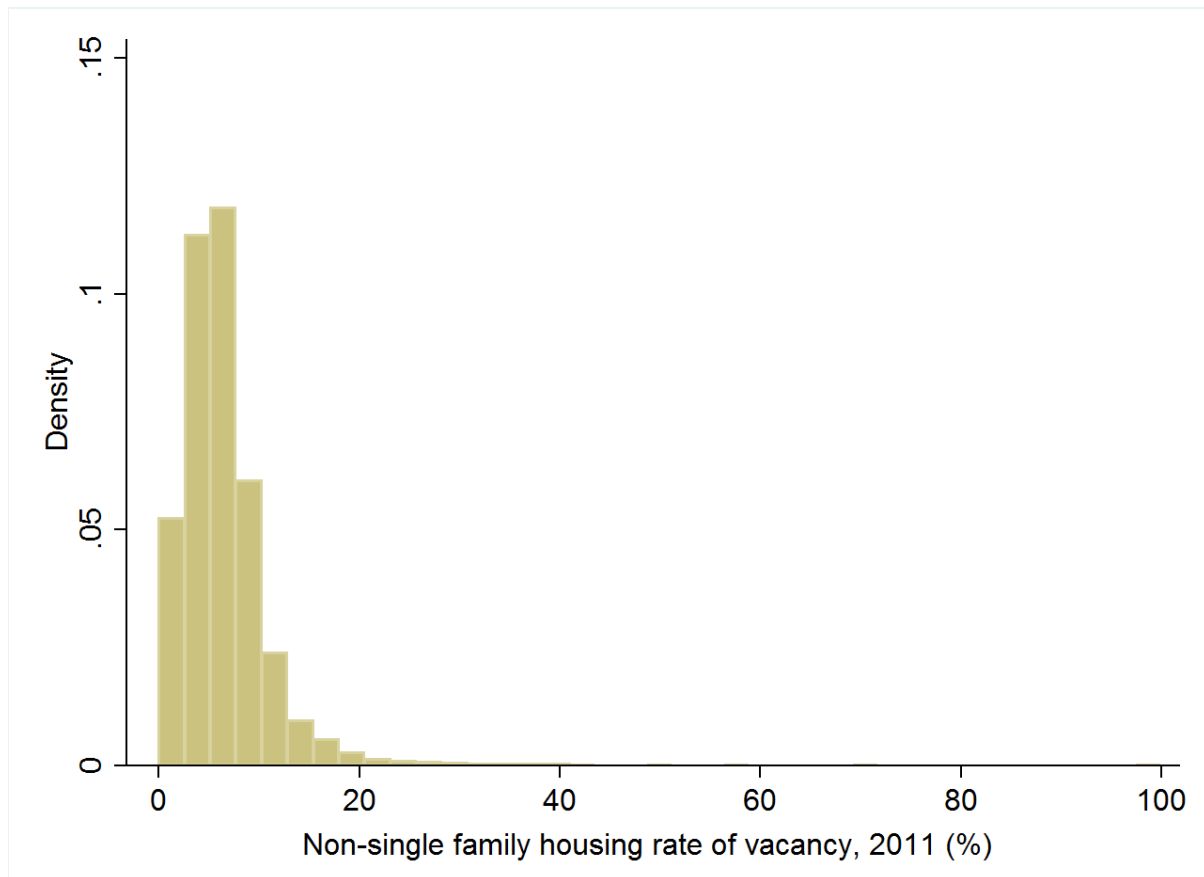
This table shows results for the first stage of the spatial lag instrumental variable regression. The dependent variable is the 2011 share of homeownership in municipality m in percent. Excluded instruments from the second-stage equation are the historical district percentage of housing damaged by warfare and historical district-level percentage of housing owner-occupied in 1950. ***, ** and * denote statistical significance at the 1, 5, and 10% levels. HAC-robust standard errors are reported in parentheses.

Table A3: Full Regression Results for Local Housing Vacancy Rate Split

| | OLS | SL Model (10 N.N.) | SL Model (20 N.N.) | SD Model (10 N.N.) | SL IV (10 N.N.) |
|---------------------------------------|-----------------------|-----------------------|-----------------------|------------------------|-----------------------|
| Constant | 317.886*** (8.960) | 131.150*** (9.547) | 106.715*** (9.985) | 116.466*** (15.744) | 82.284*** (18.927) |
| Pct. owner-occupied | -0.195*** (0.068) | -0.210*** (0.061) | -0.196*** (0.061) | -0.248*** (0.067) | -0.284** (0.144) |
| *D_high_vacancy | -0.208*** (0.070) | -0.224*** (0.063) | -0.213*** (0.063) | -0.259*** (0.069) | -0.286* (0.153) |
| Pct. owner-occupied *D_low_vacancy | 0.002*** (0.001) | 0.001*** (0.000) | 0.001** (0.000) | 0.001** (0.001) | 0.001*** (0.000) |
| Spending p.c. | 0.003*** (0.001) | 0.000 (0.001) | 0.001 (0.001) | 0.003** (0.001) | 0.002*** (0.001) |
| Debt p.c. | -0.012*** (0.002) | -0.019*** (0.002) | -0.013*** (0.002) | -0.014*** (0.002) | -0.013*** (0.002) |
| Business tax p.c. | -0.082*** (0.010) | -0.053*** (0.010) | -0.052*** (0.010) | -0.048*** (0.012) | -0.057*** (0.010) |
| Income/VAT p.c. | -0.129* (0.068) | -0.060 (0.056) | -0.028 (0.055) | 0.0210 (0.060) | -0.071 (0.064) |
| Tax base p.c. | 0.546*** (0.089) | 0.469*** (0.093) | 0.476*** (0.096) | 0.470*** (0.088) | 0.454*** (0.096) |
| Population (1000s) | -0.000*** (0.000) | -0.000*** (0.000) | -0.000*** (0.000) | -0.000*** (0.000) | -0.000 (0.000) |
| Population^2 | 0.090*** (0.027) | 0.077*** (0.026) | 0.073*** (0.026) | 0.198*** (0.030) | 0.067** (0.029) |
| Population dens. | -0.333 (0.238) | -0.259 (0.236) | -0.212 (0.234) | -0.227 (0.251) | -0.223 (0.236) |
| Income p.c. (1000s) | 0.239 (0.238) | 0.497** (0.235) | 0.515** (0.243) | 0.554** (0.265) | 0.374 (0.262) |
| Pct. unemployed | -0.005 (0.298) | 0.224 (0.255) | 0.240 (0.257) | 0.155 (0.258) | 0.173 (0.277) |
| Pct. <10 years | 0.534*** (0.177) | 0.407*** (0.151) | 0.401*** (0.153) | 0.362** (0.159) | 0.419** (0.175) |
| Pct. >70 years | 0.231*** (0.055) | 0.164*** (0.047) | 0.165*** (0.048) | 0.280*** (0.065) | 0.149*** (0.051) |
| Pct. left-wing votes | 1.692 (1.285) | 2.592 (1.165) | 2.352** (1.184) | 5.729*** (1.564) | 2.512** (1.234) |
| D border (nat./state) | 3.989 (13.471) | 4.204 (14.144) | 4.450 (14.337) | 3.751 (13.867) | 5.648 (14.435) |
| D pop>100,000 | State dummies | Yes | Yes | Yes | Yes |
| λ | - | 0.615*** (0.017) | 0.691*** (0.019) | 0.668*** (0.017) | 0.800** (0.034) |
| Spatial lagged cov. | - | - | - | Yes | - |
| Wald test:lag cov=0 | - | - | - | 420.51*** | - |
| # obs. | 8,036 | 8,036 | 8,036 | 8,036 | 8,036 |
| R^2 | 0.385 | | | | |
| Squared corr. coeff. | | 0.359 | 0.349 | 0.398 | |

This table shows regression results for five alternative specifications of Equation (3), where the homeownership share is replaced by interaction terms between homeownership share and a dummy variable indicating rental housing vacancy above and below the upper quartile of the sample vacancy rate distribution. The dependent variable is the 2011 municipal property tax multiplier in percent times 100. ***, ** and * denote statistical significance at the 1, 5, and 10% levels. HAC-robust standard errors are reported in parentheses.

Figure A1: Empirical Frequency Distribution of Non-Single Family Housing Vacancy



This figure is based on data from the 2011 Census and shows the empirical frequency distribution of the non-single family housing rate of vacancy in 8,036 Western German municipalities in 2011.