Natural Amenities and Neo-Hobbesian Local Public Finance

Luke Petach*

Abstract

A revenue maximizing local government must obey a migration constraint when levying taxes. Using this insight, I develop a simple theory of taxation that suggests natural amenities are a key factor influencing local tax rates. Natural amenities confer rents to residents which governments and interest groups compete to extract. Revenue maximizing local tax rates are increasing in the level of natural amenities, increasing in moving costs, and decreasing in households' reservation utility. Using data on natural amenities and taxation for US counties, I find that local tax rates are in-fact increasing the level of natural amenities. Finally, I suggest an alternative interpretation of the "tax revolts" of the late 1970's. Rather than an attempt to constrain Leviathan, local property tax reform (such as California's Proposition 13) and restrictions on housing supply are the outcome of competition over amenity rents in which property owners successfully capture a monopoly position at the expense of other social groups including renters and local government.

Keywords: Taxation, Public Choice, Natural Amenities, Land-Use Regulation, Constitutional Political Economy

JEL Codes: H21, H71, D72

1 Introduction

In *The Power to Tax*, Brennan and Buchanan (1980) remark that locational rents—e.g., as a result of natural amenities—provide a potential surplus which a revenue maximizing local gov-

*Jack C. Massey College of Business, Belmont University. Email: luke.petach@belmont.edu

ernment will seek to exploit via high tax rates: "[T]he governmental jurisdiction that is most 'favorably situated' in terms of the generation of locational rents...opens up the prospect for the relatively greater degree of fiscal exploitation" (p.202). Given this acknowledgment, it is curious that Buchanan otherwise gives little thought to the possibility of exploitation of locational surplus by other interest groups. In particular, Brennan and Buchanan (1980) interpret California's Proposition 13—a 1978 amendment to California's constitution which capped *ad valorem* property tax rates at 1% and limited increases in assessed value to 2% per-year, except in cases of change of ownership—as an example of idealized constitutional tax reform, intended to constrain the Leviathan-like proclivities of local government[1]. Elsewhere, Buchanan (1979) lauds Proposition 13 as an event which "sent political shock waves throughout the Western world" as California "turned back, by a two-to-one margin, the growth of government spending and taxing" (p.58).

Buchanan (1979)'s Panglossian interpretation of both the intent and result of Proposition 13 is not only at odds with the "politics without romance" approach to the political process of public choice theory, but is at odds with the purpose of Proposition 13 as interpreted by lawmakers. In Nordlinger v. Hahn (505 U.S. 1, 1992), the Supreme Court held that Proposition 13's "acquisition value" scheme of property assessment (which limits assessment increases for current homeowners) does not violate the US Constitution's equal protection clause because the state has a legitimate interest in "neighborhood preservation, continuity, and stability," further acknowledging that "[O]ver time, the acquisition-value system has created dramatic disparities in taxes paid by persons owning similar pieces of property" (p.1). In other words, the Court acknowledged that the purpose of the law was not to constraint government, but to provide a benefit to a particular special interest group (existing homeowners) that the state has an interest in promoting. In the Court's interpretation, Proposition 13 was not a restraint on the ability of government to extract a surplus generated by amenity rents, but a means by which a different interest group—in competition for those same amenity rents—legitimately captured

[1]E.g., Brennan and Buchanan (1980) write that "[C]alifornia's Proposition 13...has been populist and constitutional rather than elitist and legislative in its origins" (p.221).

a monopoly position at the expense of government and other social groups.

This paper builds on Buchanan's insights—that natural amenity rents afford an opportunity for surplus extraction by local government—and oversights—that tax limits on local government act as an idealized constitutional constraint—to explore an expanded Neo-Hobbesian approach to local public finance. First, I show that when a Leviathan government faces a migration constraint, local tax rates are constrained by the level of natural amenities, moving costs, and households' reservation utility. Second, I test the simple Leviathan framework using data on local taxation and natural amenities for US counties. In particular, I use data on local natural amenities from the United States Department of Agriculture (USDA) Economic Research Service (ERS) Natural Amenities Scale and data on county tax rates from the Internal Revenue Service (IRS) Statistics of Income (SOI) database. In a simple regression framework including local controls and state-fixed effects, higher levels of natural amenities are associated with higher levels of local property taxation and income taxation. Moving from the US county with the lowest level of natural amenities to the US county with the highest level of natural amenities results in an approximately one-standard deviation increase in local property taxes. I offer a further test of the Neo-Hobbesian framework by estimating a spatial regression model including the spatial lag of local tax rates and natural amenities, which should be negatively and positively related to households' reservation utility, respectively. As predicted by the theory, local tax rates are increasing in the tax rates in neighboring counties, and decreasing in the level of natural amenities in neighboring counties, suggesting the mobility constraint does act to restrain Leviathan.

Finally, I offer a re-assessment of the tax revolts of the late 1970's. Using data on property taxation and duration of ownership in California from the Census Integrated Public-Use Microdata Series (IPUMS), I show that Proposition 13 has resulted large disparities in tax liabilities by owners of different duration, even for properties of similar value: an outcome unlikely to satisfy the generality conditions for constitutional rules advanced by Brennan and Buchanan (1980), Boettke, Salter, and Smith (2021), and others in the robust political economy tradition.

Further, to the extent that Proposition 13 constitutes preferential treatment for a particular interest group, it would appear to contradict earlier arguments by Buchanan concerning the role of the state in Miller et al. v. Schoene (276 U.S. 272, 1928) (Buchanan, 1972; Buchanan and Samuels, 1975; Petach, 2023). These findings—interpreted in light of the Court's reasoning in Nordlinger v. Hahn (505 U.S. 1, 1992)—suggest that efforts at constitutional tax reform must be analyzed not only as an attempt to constrain excessive government, but also as a public choice problem wherein local tax reform is a vehicle through which different interest groups compete to extract locational rents.

The rest of the paper is organized as follows. Section 2 discusses the behavior of a Leviathan government in the face of a migration constraint. Section 3 introduces the data and the estimation strategy. Section 4 presents the empirical results. Section 5 introduces the data on Proposition 13 and provides an alternative interpretation of the tax revolts of the late 1970's. Section 6 concludes.

2 Revenue Maximization with a Migration Constraint

Consider a household choosing levels of a consumption good, c, and housing, h, in a given location l. For a location with a given level of natural amenities, A_l, a household with income, y, chooses c and h to maximize its utility function, $U = U(c, h; A_l)$, subject to a budget constraint, $c + (1+\tau)p_h h = y$, where τ is the local property tax rate, p_h is the price of housing, and the price of the consumption good is normalized to one. The solution to this problem is the indirect utility function:

$$V = V(\tau, p_h, y; A_l) \tag{1}$$

Where $V(\cdot)$ is increasing in y and A_l and decreasing in τ and p_h. In the canonical Ramsey optimal taxation setting, a government will find the optimal tax rate by maximizing (1) subject to a given revenue constraint (Atkinson and Stiglitz, 1980, Ch. 12), minimizing the total excess burden faced by citizens. In contrast, a central argument of the public choice approach to

taxation is that government officials do not behave like benevolent despots. The "Hobbesian" approach to taxation developed by Brennan and Buchanan (1980), assumes instead a Leviathan government seeking to maximize total tax revenues. In the context of *local* taxation, the primary constraint on a revenue maximizing Leviathan government is the ability of residents to "vote with their feet" against fiscal exploitation (Tiebout, 1956). Denoting population in l with N_l, the transition equation for population in location l is given by:

$$\dot{N}_l = \alpha[V(\tau, p_h, y; A_l) + M - \overline{V}] \tag{2}$$

Equation 2 says that population in l is growing as long as the sum of moving costs, M, and the indirect utility from residing in l, $V(\cdot)$, exceed the households' reservation utility of residing in other cities, $\overline{V}$, with α as a parameter indicating the speed of adjustment. Spatial equilibrium requires households to be indifferent between alternative locations, implying $\dot{N}_l = 0$. Setting $\dot{N}_l = 0$ gives the following equilibrium condition:

$$V(\tau, p_h, y; A_l) = \overline{V} - M \tag{3}$$

Intuitively, spatial equilibrium requires the indirect utility of residing in l exactly equal reservation utility net of moving costs. If a Leviathan government wishes to raise taxes without losing population, it must respect the spatial equilibrium condition. Equation 3 thus implicitly defines the *migration constrained maximum tax rate*, $\tau^m = \tau^m(p_h, y, A_l, M, \overline{V})$. A revenue maximizing government will be faced with a choice between τ^m and the traditional, unconstrained revenue maximizing rate, τ^*. In this context, the revenue maximizing choice of tax rate is given by:

$$\tau^{max} = \min[\tau^m, \tau^*] \tag{4}$$

If $\tau_m > \tau^*$ the local government can set $\tau^{max} = \tau^*$ without losing population. Because

the revenue raised at τ^* exceeds the revenue raised at τ_m by definition, τ^* is the revenue maximizing tax rate when $\tau^* < \tau^m$. Alternatively, when $\tau^* > \tau^m$ the migration constraint binds, and setting the tax rate equal to τ^* will result in a continuous loss of population according to Equation 2. In the limit, tax revenues fall to zero as the population declines unless the local government lowers the tax rate. In this case, the best the local government can do is set $\tau^{max} = \tau^m$ and receive revenues $R(\tau^m) < R(\tau^*)$. Figure 1 depicts this scenario. Thus, as long as one reasonably expects $\tau^m < \tau^*$, comparative static exercises concerning the revenue maximizing tax rate can be restricted to an evaluation of the migration constrained maximum rate. To the extent that much of the tax literature suggests that tax rates fall well short of the revenue maximizing rate in practice (perhaps due to constraints imposed by migration), there is *prima facie* evidence that $\tau^m < \tau^*$ (Diamond and Saez, 2011; Crowley and Sobel, 2011; Agersnap and Zidar, 2021).

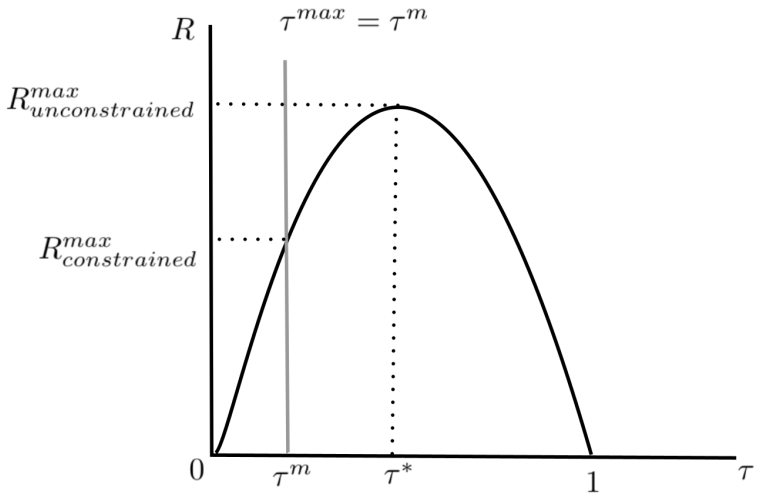


Figure 1: Revenue Maximizing Tax with a Binding Migration Constraint

Implicitly differentiating Equation 3 gives the following comparative statics for $\tau^m(\cdot)$, where V_i denotes the partial derivative of $V(\cdot)$ with respect to i:

$$\frac{\partial \tau^m}{\partial A_l} = -\frac{V_{A_L}}{V_\tau} > 0 \tag{5}$$

$$\frac{\partial \tau^m}{\partial p_h} = -\frac{V_{p_h}}{V_\tau} < 0 \tag{6}$$

$$\frac{\partial \tau^m}{\partial y} = -\frac{V_y}{V_\tau} > 0 \tag{7}$$

$$\frac{\partial \tau^m}{\partial M} = -\frac{1}{V_\tau} > 0 \tag{8}$$

$$\frac{\partial \tau^m}{\partial \overline{V}} = \frac{1}{V_\tau} < 0 \tag{9}$$

The migration constrained maximum tax rate is decreasing in house prices, increasing in income, increasing in moving costs, and decreasing in households' reservation utility. Most importantly, the model suggests that the migration constrained maximum property tax rate is increasing in the level of natural amenities, lending theoretical support to Brennan and Buchanan (1980)'s claim that "[t]hose governmental jurisdictions that are 'pedestrian' in the sense that they offer no locational rents at all...may remain immune from the fiscal inroads of Leviathan" (p.202).

Finally, it should be noted that the theoretical implications of the model described here are similar to those emerging from the literature on fiscal competition (Brueckner and Saavedra, 2001; Crowley and Sobel, 2011). In particular, both this paper and the tax competition literature emphasize the Tiebout (1956) insight that spatial competition enabled by mobile consumer-voters acts as a constraint on fiscal exploitation. However, the framework suggested here is more general than that found in much of the fiscal competition literature, in that the focus is not merely on the reaction function of a local government to taxation in other jurisdictions, but on the relationship between taxation and locational rents affected by all factors which influence either the household's indirect utility or reservation utility.

3 Data and Estimation Strategy

The data in this paper are obtained from two primary sources. First, data on natural amenities in US counties are obtained from the United States Department of Agriculture (USDA) Economic Research Service (ERS) Natural Amenities Scale. The Natural Amenities Scale is constructed for counties in the lower-48 contiguous states by combining six measures of climate (historical

mean January and July temperature, historical mean January sunlight, historical mean July relative humidity), topography (land surface form topography codes), and water area. The USDA reports Amenity Scale values in a standardized format as summed deviations from the mean[2]. For ease of interpretation, I convert the Amenity Scale into a normalized variable running from 0 (lowest amenity county) to 1 (highest amenity county). Figure 2 presents a map of the normalized Amenity Scale.

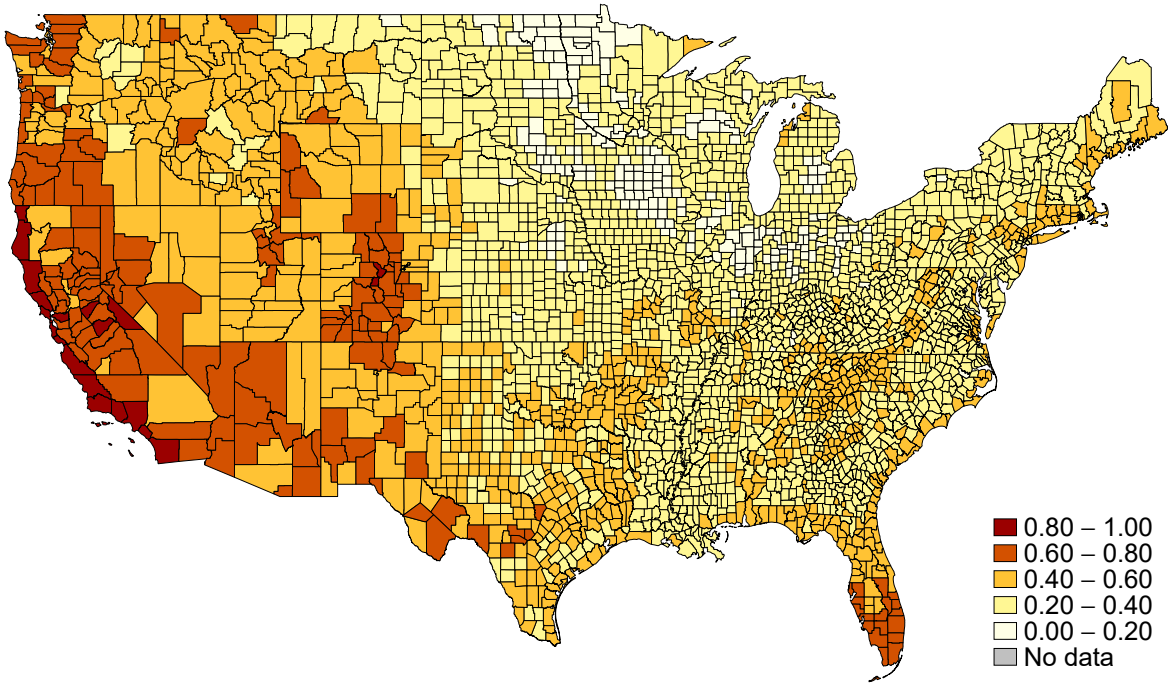


Figure 2: Normalized USDA ERS Amenity Scale

Second, data on county-level taxation is obtained from the Internal Revenue Service (IRS) Statistics of Income (SOI) database. In particular, I make use of the the 2019 county-level SOI file. I calculate local *effective* tax rates by taking total local taxes paid as a percentage of adjusted gross income for local property taxes, income taxes, and sales taxes, respectively. Although property tax rates as a percentage of property value are not calculable from the IRS data, property tax rates as a percentage of income (property taxes paid divided by adjusted gross income) are arguably a better indicator of the *burden* of property taxation—insofar as

[2]The USDA ERS Amenities Scale converts each component to a z-score and then sums across all components to arrive at the final measure.

property tax liabilities are paid out of current income, not by liquidating the property—and therefore of differential effort at amenity rent extraction across jurisdictions.

Finally, data on additional county-level covariates are obtained from the 2019 American Community Survey (ACS) five-year estimates. ACS variables include the county Gini co-efficient, real per-capita income, population, the county unemployment rate, the share of the population with at least a Bachelor's degree, the share of renter households that are rent burdened (those paying more than 50% of their income on rent), population shares by race, and the share of housing units that are owner-occupied. The final sample consists of observations for 3,106 counties in the lower-48 contiguous states. Table 1 presents sample means for all key variables.

	Mean	Std. Dev
Real Estate Taxes (% of AGI)	.3403205	.3215354
Local Income Taxes (% of AGI)	.6763939	.6835246
Local Sales Taxes (% of AGI)	.0406755	.0599367
Total Local Taxes (% of AGI)	1.05739	.939643
Amenity Scale	.3673271	.1297568
Ln(Population)	10.28194	1.4825
Ln(Per-Capita Income)	10.21353	.2267649
Unemployment Rate (%)	.052596	.0257664
Gini Co-efficient	.4457966	.0365068
Share Rent Burdened (Share of Renters)	.1747239	.0614918
Share Owner Occupied	.717053	.0817851
College Share	.2193093	.0954457
White Share	.76608	.1987789
Observations	3,106	

Table 1: Sample Means

Notes: Table presents sample means for key variables. Tax rates are calculated from the 2019 IRS SOI county-level file as a % of total county adjusted gross income. "Amenity Scale" is a normalized version of the USDA ERA Amenity Scale, ranging from 0 (US county with least natural amenities) to 1 (US county with most natural amenities). All other variables are obtained from the 2019 American Community Survey five-year estimates.

To examine the impact of natural amenities on local taxation, I begin by estimating the following model:

$$\text{Real Estate Taxes}_i = \beta_0 + \beta_1 \text{Natural Amenity Scale}_i + \mathbf{X}_i^T\beta + \gamma_s + \mu_i + \epsilon_i \qquad (10)$$

Where real estate taxes and the natural amenity scale are measured for county i as defined above, $\mathbf{X}$ is a vector of county-level controls, γ_s is a state-fixed effect, μ_i is a fixed-effect for the county's USDA Rural-Urban Continuum Code (RUCC), and ϵ_i is an idiosyncratic error term. If Brennan and Buchanan (1980) are correct in their assertion that with the existence of locational rents "a potential surplus for governmental exploitation becomes available" (p.202), then the sign of β_1 in equation 10 should be positive.

However, equation 10 paints an incomplete picture. Given the model presented in Section 2, the comparative statics in equations (5)-(8) suggest that—in addition to being a function of the level of natural amenities—local property tax rates in county i are a function of anything impacting the indirect utility of residing in other counties, including the level of natural amenities and taxation in those counties. Thus, I estimate a linear version of the migration constrained maximum tax rate $\tau^m = \tau^m(p_h, y, A_l, M, \overline{V})$ that includes controls for amenities and taxation in neighboring counties:

$$\begin{aligned}\text{Real Estate Taxes}_i = \beta_0 + \beta_1 \text{Natural Amenity Scale}_i + \rho_1 \sum_{j \neq i} \omega_{ij} \text{Natural Amenity Scale}_j \\ + \rho_2 \sum_{j \neq i} \omega_{ij} \text{Real Estate Taxes}_j + \mathbf{X}_i^T\beta + \gamma_s + \mu_i + \epsilon_i\end{aligned} \qquad (11)$$

Where ω_{ij} are a set of spatial weights determining the relative importance of neighboring county j, ρ_1 and ρ_2 are the estimated spatial lag coefficients, indicating the impact of taxation and natural amenities in county j on taxation in county i, and all other variables are defined as before. Equation 11 is thus a generalized version of the empirical reaction function estimated in the tax competition setting by Brueckner and Saavedra (2001) and Crowley and Sobel (2011). The spatial weights are constructed to be a decreasing function of distance. Specifically, a

power form for the spatial weights is assumed:

$$\omega_{ij} = \frac{d_{ij}^{-\delta}}{\sum_j d_{ij}^{-\delta}} \tag{12}$$

Where d_{ij} is the distance in miles between the geocentroids of counties i and j and δ is a distance-decay parameter. I set $\delta = 2$, although the results are robust to alternative parameterizations.

4 Empirical Results

	(1)	(2)	(3)	(4)
	Property Taxes (% of AGI)	Property Taxes (% of AGI)	Property Taxes (% of AGI)	Property Taxes (% of AGI)
Amenity Scale	0.690***	0.582***	0.279***	0.225***
	(0.0507)	(0.0640)	(0.0399)	(0.0354)
Ln(Population)			0.0761***	0.0608***
			(0.00287)	(0.00453)
Ln(Per-Capita Income)			0.649***	0.357***
			(0.0303)	(0.0298)
Unemployment Rate			0.846***	0.217*
			(0.153)	(0.124)
Gini Co-efficient			0.159	-0.0373
			(0.103)	(0.0916)
Share Rent Burdened				0.325***
				(0.0562)
Share Owner Occupied				0.422***
				(0.0649)
College Share				1.001***
				(0.0608)
White Share				-0.291***
				(0.0279)
N	3,106	3,106	3,106	3,106
R^2	0.08	0.49	0.79	0.84
State FE	N	Y	Y	Y
RUCC FE	N	N	N	Y

Table 2: Estimation Results: Baseline Model

Notes: Robust standard errors in parenthesis. * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$. . Tax rates are calculated from the 2019 IRS SOI county-level file as a % of total county adjusted gross income. "Amenity Scale" is a normalized version of the USDA ERA Amenity Scale, ranging from 0 (US county with least natural amenities) to 1 (US county with most natural amenities). All other variables are obtained from the 2019 American Community Survey five-year estimates.

Table 2 presents results from estimating the baseline model specified in equation 10. In each specification local property taxation is increasing in the level of natural amenities. Moving from the lowest amenity county (Red Lake County, MN) to the highest amenity county

(Ventura County, CA)[3], results in an increase in local property taxation (as a percentage of AGI) between 0.23 and 0.69 percentage points, or between 0.72 and 2.15 standard deviations: an economically large effect. With the exception of the share of renters that are rent burdened—which appears positively correlated with local property taxation, although the estimate suffers from obvious simultaneity bias—the control variables behave as expected. Local property taxes are increasing in the level of local per-capita income, as suggested by the simple model. The sign on the unemployment rate is ambiguous ex-ante. On the one hand, a higher local unemployment rate is likely to lower households' indirect utility, increasing the likelihood of out-migration, reducing the migration constrained maximum tax rate. On the other hand, if firms avoid job seekers with a history of unemployment (e.g., Eriksson and Rooth, 2014) or if there are differences in mobility between structurally and frictionally unemployed workers (e.g., see Bartel, 1979, who provides evidence that workers who leave a job voluntarily are more likely to migrate than those who are laid off) then unemployment may act to indirectly increase moving costs, increasing the migration constrained maximum rate. The results in Column 4 suggest that—although the impact is positive—the effect of unemployment is only weakly statistically significant when other control variables are included.

The results presented in Table 2 are of course incomplete, in that they do not account for the constraint on local taxation imposed by conditions in neighboring counties. Thus, Table 3 presents results from the full model specified in equation 11. The standard errors are estimated via bootstrapping to address the possibility that the errors would otherwise biased downward due to spatial correlation.

The results in Table 3 lend support to the comparative statics from the migration constrained model. In particular, while the amenity scale continues to be positively associated with local taxation, local property taxes appear to be *increasing* in the level of property taxation in neighboring jurisdictions and *decreasing* in the level of natural amenities in neighboring jurisdictions

[3]Other counties with near zero standardized amenity scores include Pembina County, ND, Tipton County, IN, and Grundy County, IA. Counties with standardized amenity scores near one include Humboldt County, CA, Santa Barbara County, CA, and Lake County, CO.

	(1)	(2)
	Property Taxes (% of AGI)	Property Taxes (% of AGI)
Amenity Scale	0.251***	0.576***
	(0.0436)	(0.116)
Spatial Lag: Property Taxes	0.797***	0.549***
	(0.0573)	(0.110)
Spatial Lag: Amenity Scale	-0.359***	-1.460***
	(0.116)	(0.381)
N	3,106	3,106
R^2	0.879	0.901
Full Controls	Y	Y
State FE	Y	Y
RUCC FE	Y	Y
Population Weights	N	Y

Table 3: Estimation Results: Full Spatial Model

Notes: Bootstrapped standard errors in parenthesis. * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$. . Tax rates are calculated from the 2019 IRS SOI county-level file as a % of total county adjusted gross income. "Amenity Scale" is a normalized version of the USDA ERA Amenity Scale, ranging from 0 (US county with least natural amenities) to 1 (US county with most natural amenities). All other variables are obtained from the 2019 American Community Survey five-year estimates.

(as expected, given that an increase in natural amenities in some county $j \neq i$ increases the reservation utility of residing in j). Further, both the tax competition effect and the neighboring county amenity affect are larger in magnitude than the own-county amenity effect. In other words: the migration constraint appears to be binding for a local fiscal authority seeking to extract the locational rents made possible by natural amenities. In Column (2), population weights are applied to each observation to test for the possibility that the results on own-county natural amenities are biased upward by over-representation of rural counties in the un-weighted sample. The results in Column (2) suggest that the un-weighted sample actually underestimates the effect of both local and neighboring-county natural amenities on local property taxation: the magnitude of the coefficients on both own-county amenities and the spatial lag of amenities are significantly increased in absolute value. In contrast, the magnitude of the property tax coefficient is decreased, although in a less dramatic fashion (and is approximately equal in value to the own-county amenity effect).

4.1 Extensions and Robustness Checks

Table 4 presents a series of robustness checks and extensions. In particular, Column (1) uses an alternative estimate of the local property tax rate—median property taxes as a % of median income—calculated from the ACS data, Column (2) looks at the effect of natural amenities on income taxes, Column (3) looks at the effect of natural amenities on sales taxes, and Column (4) looks at the effect of natural amenities on total local taxes.

	(1) Property Taxes (Census)	(2) Local Income Taxes (% of AGI)	(3) Local Sales Taxes (% of AGI)	(4) Total Local Taxes (% of AGI)
Amenity Scale	0.606***	0.276**	0.0337***	0.535***
	(0.182)	(0.126)	(0.00977)	(0.149)
Spatial Lag: Amenity Scale	-0.507	0.0730	-0.145***	-0.228
	(0.405)	(0.374)	(0.0242)	(0.423)
Spatial Lag: Property Taxes (Census)	0.726***			
	(0.0682)			
Spatial Lag: Income Taxes		0.718***		
		(0.0799)		
Spatial Lag: Sales Taxes			1.018***	
			(0.0750)	
Spatial Lag: Total Local Taxes				0.663***
				(0.0685)
N	3,105	3,106	3,106	3,106
R^2	0.883	0.822	0.823	0.865
Full Controls	Y	Y	Y	Y
State FE	Y	Y	Y	Y
RUCC FE	Y	Y	Y	Y

Table 4: Estimation Results: Extensions and Robustness Checks

Notes: Bootstrapped standard errors in parenthesis. * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$. In Column (1), tax rates are calculated as the ratio of median property tax payments to median income from the American Community Survey (ACS). In Column (2)-(4), tax rates are calculated from the 2019 IRS SOI county-level file as a % of total county adjusted gross income. "Amenity Scale" is a normalized version of the USDA ERA Amenity Scale, ranging from 0 (US county with least natural amenities) to 1 (US county with most natural amenities). All other variables are obtained from the 2019 ACS five-year estimates. Column (1) excludes Loving County, TX (FIPS code 48301) because of missing property tax information in the ACS data.

In every specification in Table 4, the own-county amenity effect and the neighboring-county tax competition effect remain statistically significant and economically meaningful. Using the ACS measure of local property taxation, moving from Red Lake County, MN to Ventura County, CA increases median property taxes (as a % of median income) by approximately 0.7 percentage points (about 0.5 standard deviations). Moving up the amenity ladder in a similar fashion increases local income taxation by 0.28 percentage points (0.41 standard deviations), local sales taxes by 0.03 percentage points (0.56 standard deviations), and total local taxes by 0.54 percentage points (0.57 standard deviations). Further, it should be noted that any effect

of natural amenities on local sales taxes is likely to be understated, to the extent that IRS data reflects only the sales tax liabilities that people report when filing tax returns, and thus underestimates the true burden of local sales taxation.

In contrast to the persistence of the own-county amenity effect and spatially lagged tax competition effect, the spatially lagged amenity effect is statistically significant only in the case of local sales taxes, appearing with the expected negative sign. The statistical insignificance of spatially lagged amenities on the alternative measure of local property taxation in Column (1) is likely driven by imprecision due to a (relative) lack of variation in the dependent variable—constructed as the ratio of county median property tax payments to county median income; the standard deviation of local property taxation is approximately 94% of the mean for the IRS measure, but only 53% of the mean for the ACS measure.

Up to this point, the estimation results appear to strongly support Brennan and Buchanan (1980)'s contention that communities with significant advantages in natural amenities are subject to fiscal exploitation by a revenue maximizing government. However, missing from both Brennan and Buchanan (1980)'s analysis and the model presented in Section 2 is the possibility that interest groups other than the fiscal authority may attempt to secure a monopoly position over the available amenity rents. If non-governmental interest groups attempt to direct policy in an effort to extract amenity rents, this would immediately call into question the welfare properties of constraints on taxation emerging from the political process. Thus, prior to discussing the political economy of one such constraint in Section 5—namely, California's Proposition 13—I explore whether the level of local natural amenities is systematically related to rent-extraction by non-governmental interest groups. In particular, I use data on local land-use regulations from the Wharton Residential Land-Use Regulatory Index (WRLURI) (Gyourko et al., 2008) to estimate the following model:

$$\text{WRLURI}_i = \beta_0 + \beta_1 \text{Natural Amenity Scale}_i + \mathbf{X}^T\beta + \epsilon_i \tag{13}$$

Where WRLURI is the land-use index and all other variables are defined as before. The WR-

LURI measures the intensity of land-use regulations in a given metropolitan statistical area. In particular, Gyourko et al. (2008) construct the WRLURI from eleven sub-indices that summarize information on the local regulatory environment. These sub-indices include: a measure of local pressure group activity, a measure of state-level political involvement, a measure of state-level court involvement, a measure of the extent of regulatory authority over zoning changes, a measure of the number of local authorities necessary to approve a project that does not require a zoning change, a measure indicating whether there is a community assembly or meeting before which any rezoning request must be presented, a measure indicating whether there are explicit supply restrictions in place, a measure indicating the extent of explicit restrictions on density, a measure indicating whether developers are required to pay for infrastructure costs associated with new development, and a measure indicating the average duration of time between application for rezoning and issuance of a building permit. Given each of the sub-indices, the WRLURI is constructed so that lower values indicate a more *laissez faire* regulatory approach. Further, Gyourko et al. (2008) normalize the WRLURI to have mean of zero and a standard deviation of one.

A large literature argues that a primary explanation for local land-use regulation—including single-family zoning, minimum lot size requirements, building height restrictions, urban growth boundaries, etc.—is the desire of local homeowners to maintain and improve the value of their property—the so-called "homevoter hypothesis" (Fischel, 2001; Dehring, et al., 2008; Hilber and Robert-Nicoud, 2013; Ortalo-Magne and Prat, 2014). It is thus unsurprising that—to the extent that local land-use regulation has been adopted or expanded in many cities, it appears to have been done to excess. Glaeser and Gyourko (2018) provide evidence that house prices have increased far beyond the cost of construction in many places, with land-use regulations driving a wedge between price and marginal cost; Hsieh and Moretti (2019) estimate that inefficient labor market sorting driven by local land-use regulation reduced *aggregate* growth in the United States by nearly 36% from 1964 to 2009; Ganong and Shoag (2017) indicate that land-use regulation in highly productive cities explains a significant portion of the slow-down

in regional convergence in the United States over the past half century. Given this body of evidence, restrictions on residential land-use appear an example of inefficient rent-seeking *par excellence*. Thus, should the presence of natural amenities afford potential rents to homeowners, one would expect homeowners as an interest group to devote more effort to rent extraction—including via increased land-use regulation, which effectively allows homeowners to capitalize the value of local amenity rents into their property. To the extent that a positive relationship between natural amenities and land-use regulation holds in the data, it suggests the existence of amenity rents does not entail fiscal exploitation by government alone, but rather a competition between different interest groups over the locational surplus. For an interest group excluded from this competition (such as renters, who have neither the power to tax nor an asset into which the value of amenities may be capitalized), the presence of natural amenities may entail fiscal exploitation by multiple parties.

Table 5 results from estimating equation 13. Because the WRLURI is available only for metropolitan statistical areas (MSAs), Table 5 aggregates the county-level data from previous specifications up to the MSA level[4]. Table 5 thus presents results from a sample of 264 MSAs.

	(1)	(2)
	WRLURI	WRLURI
Amenity Scale	2.054***	0.957***
	(0.197)	(0.246)
N	264	264
R^2	0.23	0.50
Full Controls	N	Y

Table 5: Estimation Results: Amenities and Land-Use Regulation in MSAs

Notes: Robust standard errors in parenthesis, * $p < 0.10$ ** $p < 0.05$ *** $p < 0.01$. Table 5 presents regression results from a sample of 264 MSAs. The dependent variable is the Wharton Residential Land-Use Regulatory Index (WRLURI). The independent variable is the MSA-level value of the USDA Amenity Scale, constructed as a population-weighted average of the Amenity Scale values for each county in an MSA. Control variables include populaiton, per-capita income, the unemployment rate, the Gini co-efficient, the share of renters who are rent burdened, the share of housing units that are owner-occupied, the share of individuals with a college degree, and the share of individuals that are white.

[4]MSA-level variables are constructed as a weighted-average of county-level variables for each county included in the MSA, where the weights are given by the county population.

The results in Table 5 suggest that the level of natural amenities is strongly related to the intensity of local land-use regulation. Without any additional controls, cross-sectional variation in the USDA Amenity Scale explains a significant portion of the variation in the WRLURI ($R^2 = 0.23$). When the full suite of controls is included in Column (2), the magnitude of the regression co-efficient on the Amenity Scale falls, but it remains both economically and statistically significant. Column (2) indicates that moving from the MSA with the fewest natural amenities to the MSA richest in natural amenities increases the intensity of local land-use regulation by approximately one standard deviation. For an MSA starting at the mean level of natural amenities, a one standard deviation increase is the equivalent of moving from either Atlanta, GA or Chicago, IL (WRLURI ≈ 0) to Philadelphia, PA or Seattle, WA (WRLURI ≈ 1), which are among the most intensely regulated large metropolitan areas (as measured by the WLRURI). Although these results are only suggestive (in that there is no natural experiment generating the sort of quasi-random variation in natural amenities that would be necessary for a *causal* interpretation), they nonetheless point to the possibility that homeowners compete with local government in an effort to establish a monopoly position on amenity rents. In the presence of competition over amenity rents, constraints on local government (e.g., in the form of constraints on taxation) may not reduce fiscal exploitation for all social groups, provided such regulations merely act to shift the monopoly over locational rents from the government to an alternative interest group equally invested in rent extraction[5].

[5]That land-use regulations primarily serve to transfer resources to a politically well-organized group should not be surprising to those in the public choice tradition. As Tullock (1986) emphasized, "[M]ost of the transfers in most societies, democratic or dictatorial, do not go to the poor. They go to people who for one reason or another are politically well organized." See Petach (2022) for an extended discussion of Tullock's approach to redistribution.

5 Proposition 13: Constitutional Dream or Public Choice Nightmare?

In 1978 the State of California voted to enact Proposition 13 (also named the People's Initiative to Limit Property Taxation) by a nearly two-thirds margin[6]. Proposition 13 amended the California state constitution, capping *ad valorem* property tax rates at 1% and limiting increases in assessed value to 2% per-year, except on change of ownership. Brennan and Buchanan (1980) point to Proposition 13 as an example of an attempt at genuine tax reform, aimed at formulating a fiscal constitution to constrain Leviathan. However, Brennan and Buchanan (1980) offer little consideration of the public choice dimension of the tax reform problem. In the context of a competition over amenity rents, restraints on local government may merely be a convenient means for other interest groups (e.g., existing homeowners) to establish a monopoly position at the expense of both local government and those outside the monopoly coalition (e.g., renters, new home buyers). In this section, I thus offer a reassessment of Proposition 13 and the "tax revolts" of the late 1970s in light of the political economy considerations that arise when local government is not the only entity with an interest in exploiting locational rents.

First, I argue that by generating large disparities in tax liabilities for owners of different duration, Proposition 13 fails to satisfy the generality requirements for constitutional reform laid out by Brennan and Buchanan (1980), Boettke, Salter, and Smith (2021), and others in the robust political economy tradition. Second, I show that Brennan and Buchanan (1980)'s interpretation of Proposition 13 is at odds with the purpose of the law *as interpreted by lawmakers* in Nordlinger v. Hahn (505 U.S. 1, 1992). Finally, I argue that—given the purpose of law as interpreted by the Court—Buchanan's support for Proposition 13 is inconsistent with his opposition to the sort of "state decision-making" (Buchanan, 1972, p.441) with which he is concerned in his debate with Warren Samuels over Miller et al. v. Schoene (276 U.S. 272,

[6]Around the time Proposition 13 was enacted, the homeownership rate in California was approximately 55% (Author's Calculation, Census Data). To the extent that that registered voters are older and more likely to own a home, it does not seem like a stretch to assume that the majority coalition in favor of Proposition 13 was constituted primarily of homeowners.

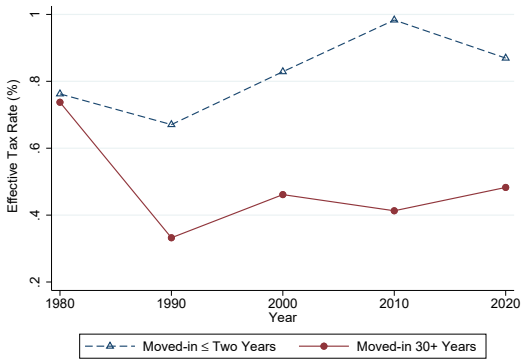
1928) (Buchanan and Samuels, 1975).

Consider first the requirements for a fiscal constitution suggested by the robust political economy tradition. Brennan and Buchanan (1980) argue that "[T]ax rules should be considered, analyzed, and discussed as a set of quasi-permanent arrangements within which persons can anticipate making appropriate behavioral adjustments" (p. 223). A major theme in Brennan and Buchanan (1980)'s analysis of such quasi-permanent rules is that a fiscal constitution should be characterized by generality[7]. Brennan and Buchanan (1980)'s call for generality echo's Buchanan (1950)'s earlier work, in which he states that fiscal justice requires " 'equal treatment for equals' or equal treatment for persons dissimilar in no respect," further arguing that "[W]hether or not this principle is consistent with maximizing social utility, it is essential as a guide to the operations of a liberal democratic state, stemming from the same base as the principle of the equality of individuals before the law" (p. 587).

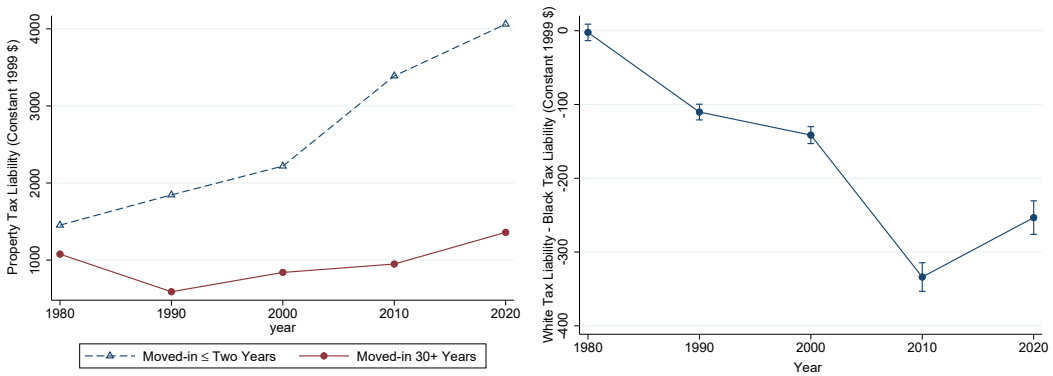
The generality criterion considered by Brennan and Buchanan (1980) is similar to the requirements of generality, predictability, and robustness advocated by Boettke, Salter, and Smith (2021) in the context of their discussion of monetary constitutions. A rule is general when it 'can be equally applied to all," a rule is predictable when it "enables those subject to the rules to form reliable expectations about the future," and a rule is robust if it "work[s] well even when those subject to the rule have limited knowledge and confront opportunistic incentives" (Boettke, Salter, and Smith, 2021, p.149-150). A crucial question in evaluating Proposition 13 and the subsequent tax revolts of the late 1970's is thus whether the tax rules generated satisfy the requirements of generality (uniformity), predictability, and robustness? While one might plausibly argue that the system of property taxation ushered in by Proposition 13 satisfies predictability, it is less clear whether Proposition 13 satisfies robustness, and it almost certainly

[7]Brennan and Buchanan (1980) note that the generality requirement may be satisfied in a number of ways. Uniformity in tax rates (i.e., proportional taxation), uniformity in rate structures (i.e., a progressive tax in which each individual faces the same rate structure), or uniformity in tax amounts (i.e., lump-sum taxation) may all plausibly satisfy the uniformity requirement. Brennan and Buchanan (1980) explicitly reject Hayek (1960)'s claim that only proportional taxation satisfies generality and uniformity requirements: "Hayek's argument to the effect that a proportional tax structure would meet the requirement for generality whereas a progressive rate structure would not do so seems to be dangerously arbitrary" (p.185).

fails to satisfy the generality requirement.



(a) Effective Tax Rates (% of Property Value)



(b) Property Tax Liability (Homes $<$ \$350,000, Constant 1999 \$)

(c) White-Black Tax Liability Difference (Homes $<$ \$350,000, Constant 1999 \$)

Figure 3: Property Taxation in California after Proposition 13

Notes: Data from Census Integrated Public-Use Microdata Series (IPUMS). All dollar values converted to constant 1999 dollars.

To illustrate the failure of Proposition 13 to produce "equal treatment for equals," Figure 3 uses data from the Census Integrated Public-Use Microdata Series (IPUMS) to present three different trend plots for tax liabilities (or rates) for California homeowners of different ownership duration and race from 1980 (shortly after the passage of Proposition 13) to 2020. First, Figure 4a illustrates the difference in effective property tax rates (tax liability as a % of property value) faced by new home buyers and long-time homeowners. As of 2020, the average effective property tax rate paid buy new home buyers is nearly double long-time residents (0.8% v. 0.4%). Figure 4b illustrates that this disparity exists *even for homes of similar value*. Restrict-

ing the sample to homeowners in homes valued at less than $350,000 (constant 1999 $), Figure 4b shows that new homeowners pay nearly twice as much in property taxes as long-time residents for similarly priced homes. Finally, Figure 4c shows that differential treatment of homeowners of different duration results in differential treatment of taxpayers by race. In particular, Figure 4c shows that—given differences in ownership duration across race—the average tax liability of white homeowners residing in homes valued at less than $350,000 is approximately $300 less than black homeowners residing in similar homes. Given an average tax liability of approximately $1,526 among all homeowners in houses valued at less than $350,000, the $300 difference in property taxation amounts to an almost 20% property tax discount for white homeowners. Whatever the accomplishments of Proposition 13, "equal treatment for equals" is not one of them.

It should not be surprising that Proposition 13 fails to satisfy the generality requirement for constitutional tax reform, as—contra Brennan and Buchanan (1980)—it was never the intent of the law to fulfill such a requirement. Indeed, the purpose of the law—as interpreted by lawmakers—is to provide a benefit to a favored group. Writing for the majority in Nordlinger v. Hahn (505 U.S. 1, 1992), Justice Blackmun openly acknowledges that Proposition 13 violates the principle of generality: "[T]he appropriate standard of review is whether the difference in treatment between newer owners and older owners rationally furthers a legitimate state interest" (p.11). The Court takes it for granted that Proposition 13 does result in differential treatment: the question of interest is whether such differential treatment furthers a legitimate purpose of the state. Blackmun ultimately concludes that Proposition 13 does further a legitimate state interest, namely "local neighborhood preservation, continuity, and stability," (p.12) and that in furthering this interest Proposition 13 confers a benefit to a "broad, powerful, and entrenched segment of society" (p. 18). In his dissent, Justice Stevens makes an impassioned case for the principle of generality:

> In my opinion, such disparate treatment of similarly situated taxpayers is arbitrary and unreasonable. Although the Court today recognizes these gross inequities, see

> *ante*, at 7, n.2, its analysis of the justification for those inequities consists largely of a restatement of the benefits that accrue to long-time property owners. That a law benefits those it benefits cannot be an adequate justification for severe inequalities as those created by Proposition 13. (505 U.S. 1, 1992, p.30)

Unfortunately, Stevens' plea appears to have fallen on deaf ears.

Given the failure of Proposition 13 to satisfy the generality requirement for fiscal constitutions in both intent (as indicated by the interpretation of the court in Nordlinger v. Hahn (505 U.S. 1, 1992)) and practice (as indicated by the disparities in tax treatment among otherwise equal individuals), Buchanan's support for Proposition 13 appears at odds with earlier opposition to state intervention in the case of Miller et al. v. Schoene (276 U.S. 272, 1928). In his debate with Warren Samuels in the *Journal of Law and Economics*, Buchanan (1972) excoriated the Court[8]—and Samuels (1971)' defense of it[9]—for "mak[ing] a judgment as to which owner would be visited with injury and which projected," further writing that "[T]he judicial role should have been limited strictly to a determination as to the constitutionality of legislative action, and this should not have included any attempt at making a judgment as to the economic efficiency or inefficiency or to the equity or inequity of the legislative choice" (p. 450). Yet such state decision making—regarding whether "one class of property...is of greater value to the public" (276 U.S. 272, 1928, p. 276) is exactly the sort of decision making embodied in Proposition 13's preferential treatment of existing homeowners (and the Court's subsequent defense of that treatment in Nordlinger v. Hahn (505 U.S. 1, 1992)). Thus, to the extent that Buchanan (1972)'s arguments against the Court in Miller et al. v. Schoene (276 U.S. 272, 1928) are correct, they should produce at least some skepticism toward Proposition 13. The absence of such skepticism on behalf of Brennan and Buchanan (1980) suggests the pair may have viewed what Proposition 13 represented—the possibility of truly constitutional tax reform—through rose colored glasses. While Brennan and Buchanan (1980) are undoubt-

[8]The case concerned a suit brought against the State of Virginia by the owners of red cedar trees whose property was condemned by the state in the interest of preserving an apple orchard.

[9]See Petach (2023) for further discussion and interpretation of the debate between Samuels and Buchanan.

edly correct regarding the possibility of fiscal exploitation at the hands of Leviathan—and, in particular, the role played by locational rents in facilitating fiscal exploitation—their evaluation of real-world attempts to impose tax limits suffers an apparent lapse from the usual "politics-without-romance" approach to public choice. When interest groups compete with the government to extract amenity rents, changes in local tax law or housing regulations may reflect an attempt by a particular coalition to establish a monopoly position over amenity rents, rather than a genuine desire for constitutional reform.

6 Conclusion

Building on Brennan and Buchanan (1980)'s insight that "[I]f locational rents accrue to persons in particular places...a potential surplus for governmental exploitation becomes available" (p.202), this paper examines the role of natural amenities as a factor influencing local tax rates. Adopting a "Neo-Hobbesian" approach to local public finance, I show in a simple model that a revenue maximizing local government must obey a migration constraint when levying taxes. The model delivers the *migration constrained maximum tax rate*, which depends on the level of natural amenities, moving costs, and households' reservation utility. I test the predictions of the model using county-level data on natural amenities from the United States Department of Agriculture (USDA) Natural Amenity Scale and data on local taxation from the Internal Revenue Service (IRS) Statistics of Income (SOI) database. The empirical results suggest that local tax rates are increasing in the level of own-county natural amenities, decreasing in the level of neighboring-county natural amenities, and increasing in level of neighboring-county taxation. The level of natural amenities is strongly positively associated with the level of local land-use regulation, suggesting that the existence of amenity rents does not entail fiscal exploitation by government alone, but rather a competition between different interest groups over the locational surplus. Finally, I offer a re-evaluation of the tax revolts of the late 1970's in light of the political economy considerations examined in the paper. An examination of

California's Proposition 13 suggests that the law fails to satisfy the generality requirement for constitutional rules advocated by the robust political economy tradition. Instead, Proposition 13 is better understood as an attempt by a particular interest group (existing homeowners) to capture a monopoly position over California's amenity rents.

References

276 U.S. 272. 1928. Miller et al. v. Schoene.

505 U.S. 1. 1992. Nordlinger v. Hahn, in his Capacity as Tax Assessor for Los Angeles County, et al.

Agersnap, O., and Zidar, O. 2021. "The Tax Elasticity of Capital Gains and Revenue-Maximizing Rates." *American Economic Review: Insights*, 3(4): 399-416.

Atkinson, A., and Stiglitz, J. 1980. *Lectures on Public Economics*, Princteon: Princeton University Press.

Bartel, A. 1979. "The Migration Decision: What Role Does Job Mobility Play?" *American Economic Review*, 69(5): 775-786.

Boettke, P., Salter, A., and Smith, D. 2021. *Money and the Rule of Law: Generality and Predictability in Monetary Institutions*. Cambridge, UK: Cambridge University Press.

Brennan, G., and Buchanan, J. 1980. *The Power to Tax: Analytical Foundations of a Fiscal Constitution*. Indianapolis: Liberty Fund.

Brueckner, J., and Saavedra, L. 2001. "Do Local Governments Engage in Strategic Property-Tax Competition?" *National Tax Journal*, 54(2): 203-229.

Buchanan, J. 1950. "Federalism and Fiscal Equity." *American Economic Review*, 40(4): 583-599.

Buchanan, J. 1972. "Politics, Property, and the Law: An Alternative Interpretation of Miller et al. v. Schoene." *Journal of Law and Economics*, 15(2): 439-452.

Buchanan, J. 1979. "Politics Without Romance: A Sketch of Positive Public Choice Theory and Its Normative Implications." in *The Logical Foundations of Constitutional Liberty*, p.45-59. Indianapolis: Liberty Fund.

Buchanan, J., and Samuels, W. 1975. "On Some Fundamental Issues in Political Economy: An Exchange of Correspondence." *Journal of Economic Issues*, 9(1): 15-38.

Crowley, G., and Sobel, R. 2011. "Does Fiscal Decentralization Constrain Leviathan? New Evidence from Local Property Tax Competition." *Public Choice*, 149: 5-30.

Dehring, C., Depken II, C., and Ward, M. 2008. "A Direct Test of the Homevoter Hypothesis." *Journal of Urban Economics*, 64: 155-170.

Diamond, P., and Saez, E. 2011. "The Case for a Progressive Tax: From Basic Research to Policy Recommendations." *Journal of Economic Perspectives*, 25(4): 165-190.

Eriksson, S., and Rooth, D. 2014. "Do Employers Use Unemployment as a Sorting Criterion When Hiring? Evidence from a Field Experiment." *American Economic Review*, 104(3): 1014-1039.

Fischel, W. 2001. *The Homevoter Hypothesis: How Home Values Influence Local Government Taxation, School Finance, and Land-Use Policies*, Cambridge, MA: Harvard University Press.

Ganong, P., and Shoag, D. 2017. "Why Has Regional Income Convergence in the U.S. Declined?" *Journal of Urban Economics*, 102: 76-90.

Glaeser, E., and Gyourko, J. 2018. "The Economic Implications of Housing Supply." *Journal of Economic Perspectives*, 32(1): 3-30.

Gyourko, J., Saiz, A., and Summers, A. 2008. "A New Measure of the Local Regulatory Environment for Housing Markets: The Wharton Residential Land Use Regulatory Index." *Urban Studies*, 45(3): 693-729.

Hayek, F. 1960. *The Constitution of Liberty*. Chicago: University of Chicago Press.

Hilber, C., and Robert-Nicoud, F. 2013. "On the Origins of Land-Use Regulations: Theory and Evidence from US Metro Areas." *Journal of Urban Economics*, 75: 29-43.

Hsieh, C., and Moretti, E. 2019. "Housing Constraints and Spatial Misallocation." *American Economic Journal: Macroeconomics*, 11(2): 1-39.

Ortalo-Magne, F., and Prat, F. 2014. "On the Political Economy of Urban Growth: Homeownership versus Affordability." *American Economic Journal: Microeconomics*, 6(1): 154-181.

Petach, L. 2022. "A Tullock Index for Assessing the Effectiveness of Redistribution." *Public Choice*, 191: 137-159.

Petach, L. 2023. "The Samuels-Buchanan Correspondence and the Lost Opportunity for a Positive Public Choice Scholarship." *Journal of Economic Issues*. Forthcoming.

Samuels, W. 1971. "Interrelations Between Legal and Economic Processes." *Journal of Law and Economics*, 14(2): 435-450.

Tullock, G. 1986. Reasons for Redistribution [1986]. In Rowley, C. (Ed). *The Economics and Politics of Wealth Redistribution*, pp. 42-70. Liberty Fund.

Tiebout, C. 1956. "A Pure Theory of Local Expenditures." *Journal of Political Economy*, 64(5): 416-424.