Spatial Productivity Differences and Government Rent-Seeking

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Abstract

Using a spatial equilibrium model, we show that high local productivity enables rent-seeking governments to extract rent from taxpayers by reducing residents' out-migration response to local tax hikes. This is supported by the empirical finding that tax burden and public-private wage gap tend to be higher in more productive cities and states. To distinguish government rent-seeking from other mechanisms, we analyze variations in public-sector collective bargaining legality across states and local governments' revenue dependence on state governments. We demonstrate that government rent-seeking creates spatial misallocation, discouraging workers from choosing high-productivity locations. Our quantitative model indicates that eliminating rent-seeking motives in state and local taxes can increase national output, although both the productivity and welfare gains are moderated by spatial differences in housing supply constraints.

Keywords: Rent-Seeking, Rent-Extraction, Leviathan, Public Sector, Government, Public-Private Wage Gap, Spatial Dispersion, Productivity, Migration, Tax, Union, Misallocation, Efficiency

JEL Codes: H71, H72, J24, J31, J45, R23, R51

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1 Introduction

While many public finance models consider governments as benevolent social planners, Brennan and Buchanan (1980) analyze the potential existence of rent-seeking governments, or "Leviathan" governments, who use their tax authority to maximize net tax revenue extracted from their taxpayers. However, the rent-seeking motive of a government can be curtailed by the threat that its taxpayers can "vote with their feet" by migrating to other jurisdictions if taxes become excessively high and public goods provisions are inadequate.

Several factors could potentially weaken the disciplining force of local residents' ability to out-migrate, such as migration frictions, desirable local amenities such as sunshine and beaches, as well as inelastic housing supply (Brueckner and Neumark, 2014; Diamond, 2017). In these situations, the reduced migration responses to tax hikes could enable a rent-seeking government to extract higher revenue by raising taxes without increasing the provision of public goods.

In this paper, we propose and test the hypothesis that high local productivity enables rent-seeking governments to extract more rents from taxpayers. Intuitively, disparities in spatial productivity across the U.S. enhance the desirability of certain locations and therefore reduces residents' incentive to relocate. The diminished tendency to move away from high-productivity locations weakens the local residents' migration elasticity with respect to local tax hikes, which could enable state and local governments in these locations to extract more rents by imposing heavier tax burden.

The hypothesis is motivated by an observation that tax burden appears to vary widely across states in the U.S. and is highly correlated with the state's productivity. Figure 1a presents a binned scatter plot of the per-capita-tax-to-income ratio against the state's private-sector log wage residual, using data on state and local governments' tax revenue. The figure suggests that the tax burden faced by each state's residents has a strong positive relationship with the state's labor productivity.[1] The strong positive relationship remains intact even after controlling for various measures of local natural amenities and political preferences (Figure 1b).

We argue that state and local governments' tax policies, driven by rent-seeking behavior and enabled by local productivity, may generate output loss in the national economy by reducing the aggregate labor

[1]The per-capita-tax-to-income ratio is calculated by dividing the state-area total taxes per capita levied by state and local governments to the state-level average total income among private workers. The state-level total taxes are from Annual Survey of State and Local Government Finances for 1987, 1998, 2007, and 2017. We compute the state-level average income and wage residuals using the Current Population Survey. We use the wage residual relative to the national mean to measure the labor productivity premium of each state. We compute the log wage residual separately for each period, controlling for dummies for age, race, Hispanic origin, sex, marital status, education, industry, and occupation. To generate the binned scatter plots, we control for year fixed effects. In Figure 1b, we further control for several measures of local natural amenities and political preferences. Figure A1 in the Appendix presents the relationship separately for each year.

productivity. Prior studies show that spatial disparities in tax rates can induce workers to relocate away from high-tax locations (Moretti and Wilson, 2017; Fajgelbaum et al., 2019). If the variation in tax burdens across locations is partly driven by government rent-seeking practices enabled by local productivity premium, workers may be less inclined to work and live in the high-productivity locations compared with the scenario in which governments lack rent-seeking motives. Therefore, governments' rent-seeking responses to local productivity may lead to spatial misallocation of labor, potentially lowering the aggregate productivity of the national economy.

To illustrate the mechanism underlying government rent-seeking, we present a spatial equilibrium model in which state and local governments maximize profit (i.e., net tax revenue) rather than residents' utility; workers are imperfectly mobile and make location choices based on after-tax wages, housing rents, amenities, public goods offered in each location, and their own idiosyncratic preferences. The model shows that the extent to which a government can increase taxes beyond the necessity of funding public goods depends on local residents' migration elasticity with respect to local tax rates. A government would be unable to generate any profit and resemble a benevolent government if local residents exhibit a high migration elasticity to tax rates. Furthermore, the model demonstrates that a location's desirability reduces the migration elasticity of its residents. This occurs because the number of marginal movers relative to inframarginal residents tend to be smaller in more desirable locations. As higher local productivity makes a location more attractive even after accounting for higher housing cost, the model predicts that locations with higher productivity will exhibit lower migration elasticity with respect to tax rates and thus enables governments to impose higher taxes while providing fewer public goods.

We proceed to empirically examine whether local productivity enables rent-seeking behavior by state and local governments. The model predicts that rent-seeking governments should impose higher tax rates in locations with higher productivity without increasing the provision of public goods. To test this hypothesis, we use the Current Population Survey (CPS) to estimate the average log wage residuals of private-sector workers across locations, controlling for various observable characteristics of workers. The variable serves as a proxy for location-specific labor productivity. By combining the productivity measure with government revenue data from the Annual Survey of State and Local Government Finances, we show that jurisdictions with higher private-sector labor productivity exhibit higher tax rates (defined as per-capita tax revenue over residents' average income) at both the state and county levels. As proxies of for government public goods, we use measures of road quality, school quality, and public safety, and find that these measures are not positively correlated with local labor productivity, after controlling for the local factors. These findings align with our model's prediction.

However, the positive relationship between tax rates and productivity could be driven by alternative explanations. For instance, residents in locations with higher productivity may have stronger preferences for public goods, which could lead to a positive relationship between tax rates and productivity without government having rent-seeking motives. Another explanation could be the "Baumol" effect—when private-sector productivity increases while public-sector productivity stagnates, under the assumption that the demand for public goods are income-elastic but highly price-inelastic, the price of public goods may rise if private-sector productivity is higher (Baumol, 1967). Through the Baumol effect, tax rates in more productive locations may be higher without governments' rent-seeking motives or preference heterogeneity.

To further test for governments' rent-seeking motives and distinguish them from the alternative explanations, we examine variations in the public-private wage gap across locations. The hypothesis is that rent-seeking governments in high-productivity locations may allocate additional tax revenue toward excess wage compensation for government employees compared with their counterparts in the private sector. To test the hypothesis, we use the CPS data. The results suggest that a 1% increase in the private-sector wage residual of a state is associated with a 0.4% increase in the hourly wage of state government workers relative to similar private sector workers; a 1% increase in the wage residual of a metropolitan statistical area (MSA) is associated with a 0.2% increase in the hourly wage of local government workers relative to similar private sector workers. The positive association between the public-private wage gap and local productivity presents evidence that the additional tax revenue collected by governments in high-productivity locations is likely to have been partially transferred to public sector workers and is unlikely driven solely by differential demand for public goods.

Nevertheless, the spatial relationship between the public-private wage gap and local productivity could still be spuriously generated by the Baumol effect if labor mobility between public and private sectors is imperfect. To further disentangle rent-seeking behavior from the Baumol effect, we examine how the relationship between the public-private wage gap and local productivity differs between states that permit public-sector collective bargaining and states that prohibit it. Following Brueckner and Neumark (2014) and Diamond (2015), we argue that in states where public-sector collective bargaining is permitted, government employees have a lower cost of exerting pressure on governments to extract tax rents for their compensation. Thus, if local productivity enables rent-seeking, the public-private wage gap should be more strongly affected by local productivity in states where collective bargaining is permitted for public-sector workers. Our findings based on the CPS are consistent with this prediction. The heterogeneous spatial relationship between the public-private wage gap and local productivity by collective bargaining legality could distinguish rent-seeking from the Baumol effect because the Baumol effect is caused by the income effect on the demand for public goods, and thus the Baumol effect should have a similar impact on the public-sector wage regardless of whether government workers can collectively bargain.

In addition to exploiting variations in collective bargaining legality across states, we delve into variations in local governments' financial autonomy and investigate the effect of state-level productivity on the wage premium of local government workers (Hoxby, 2001). The idea is that if the wage gap between local government workers and private sector workers is primarily driven by the Baumol effect, we expect that the wage gap should be influenced solely by the productivity of the areas where local government workers serve. However, if government rent-seeking plays a role, the wage premium of local government workers could also be affected by the productivity of the state, especially for local governments that have lower financial independence and rely more on transfers from the state government. This is because state governments may redistribute rents to workers at local governments, resulting in higher compensations for local government workers as well. Consistent with the rent-seeking hypothesis, we find that for local governments with a larger share of revenue derived from tax revenue, the wage gap between local government workers and private sector workers depends more on the local productivity. In contrast, for local governments relying more on state transfers as a share of revenue, the wage gap depends more on the state productivity.

As robustness checks, we show that our empirical evidence remains consistent with the prediction that local productivity premium enables government rent-seeking, after controlling for various measures of local demographics, natural amenities, land unavailability, and political preferences. The result aligns with the findings by Ferreira and Gyourko (2009) that city governments' policies do not differ significantly based on the political affiliation of the incumbents, although Kahn (2017) presents contrary evidence in the case of California cities.

After empirically validating the model, we use it to quantitatively analyze the impact of spatial variations in tax rates due to government rent-seeking on aggregate output and welfare. We begin by introducing a generalized model of government rent-seeking, in which the local governments have a mix of rent-seeking and benevolent motives. We calibrate the model both externally and internally by targeting key moments in the data. We then conduct counterfactual exercises in which we mute the government rent-seeking channel in the model and re-solve for the spatial equilibrium. We show that completely eliminating the rent-seeking channel could increase national output by up to 0.23 percentage points and yield welfare gains equivalent to a 12% higher income. This gain in aggregate output stems from the most productive locations recapturing labor supply.

Lastly, we highlight that the productivity and welfare gains resulting from the removal of government rent-seeking enabled by the productivity premium are mitigated by spatial variations in housing supply elasticity. Because the most productive areas in the U.S. tend to exhibit low housing supply elasticity, potential labor supply gains from any reduction in rent-seeking in these areas can be offset by an increase in housing rents, which weaken the recovery of labor supply. Therefore, the potential gains from eliminating tax rate variations driven by productivity difference would have been much larger if the housing supply were more elastic in these productive areas. Likewise, the locations that gain the most from the removal of rent-seeking are also the locations where rent increases are the strongest, offsetting the welfare gains produced by removing the government rent-seeking.

This paper contributes to several strands of literature. First, we contribute to the literature that investigates the rent-seeking behavior of governments. We built on the seminal work by Brennan and Buchanan (1980) who proposed the Leviathan Hypothesis and Niskanen (1968) who explores the economics of budget-maximizing bureaucrats. Our paper is most closely related to Brueckner and Neumark (2014) and Diamond (2017)—both studies test whether mitigation in migration elasticity with respect to local taxes can lead to an increase in government worker wages. Our paper also builds on the studies that evaluate local population's migration as a key margin of response to local tax differences (Haughwout et al., 2004; Duranton et al., 2011; Young and Varner, 2011; Moretti and Wilson, 2017; Akcigit et al., 2021). More broadly, we contribute to the understanding of how intergovernmental competition can affect the efficiency of local and national economic outcomes (Tiebout, 1956; Wilson, 1986; Zodrow and Mieszkowski, 1986; Hoxby, 1999; Wilson, 1999; Oates, 1999; Brueckner, 2000; Lyytikainen, 2012; Agrawal, 2015; Giroud and Rauh, 2019; Mast, 2020; Agrawal et al., 2022).

This paper highlights the role of government rent-seeking as a driver of spatial misallocation of labor. The mechanism mirrors the channel of land-use restrictions explored by Hsieh and Moretti (2019). Our findings suggest that the two mechanisms could crowd out each other: Policies that relax housing supply restrictions in high-productivity areas may exacerbate the degree of government rent-seeking, thereby weakening the positive effects of expanding housing supply. Our results are consistent with prior research on the aggregate implications of spatial differences in taxation (Zidar and Serrato, 2016; Fajgelbaum et al., 2019).[2] Our paper contributes to this literature by uncovering motivations driving variations in tax policies among state and local governments, in addition to examining the effects of these tax differences. We emphasize that spatial differences in tax policies can be an endogenous response to spatial productivity differences.

Lastly, we contribute to the literature that investigates the implications of spatial disparities of productivity. We emphasize that government rent-seeking could be an adverse consequence of such spatial disparities, in addition to the implications highlighted by the existing literature (Moretti, 2004; Gyourko et al., 2013; Moretti, 2013; Diamond, 2016; Ganong and Shoag, 2017; Giannone, 2019; Eckert et al., 2022).

The rest of the paper is organized as follows: Section 2 presents a spatial equilibrium model with rent-seeking governments. Section 3 describes the data and Section 4 presents the empirical evidence supporting the model's predictions. Section 5 conducts counterfactual analyses on the aggregate implications of government rent-seeking. Section 6 concludes.

2 Spatial Equilibrium Model with Rent-Seeking Governments

This section presents a model of rent-seeking local governments in a spatial equilibrium. We use this model to demonstrate how taxes and public good provisions set by such governments depend on migration elasticity and spatial productivity differences.

There are N locations: $j = 1, .., N$. Each local government levies income taxes from workers as a fraction of their wage income and provides local public goods using the taxes it levies. Rent-seeking governments retain the rent or "profits" that they generate and seek to maximize the rent by choosing tax rates and public good provisions accordingly. Workers can move across locations based on after-tax wages, housing rents, amenities, and public good provision of each location, but they are imperfectly mobile.

When we conduct the counterfactual analysis in Section 5, we further develop an enhanced version of the model with endogenous capital allocation. In both models, we use that governments collect taxes as a faction of workers' wage income. However, in reality, a large fraction of local governments' tax revenue comes from property tax. In Appendix A1, we show the model's implications remain the same if we allow for both income tax and property tax.

[2] Albouy (2009) takes a different approach by examining the heterogeneous tax burden resulting from a uniform federal tax schedule across states with different productivity levels and costs of living.

2.1 Government

The local government in location j collects tax revenue based on a tax rate τ_j and provides local public goods with the value of g_j per capita to all workers living in j. The government revenue is $\tau_j W_j L_j$ and the expenditure is the cost on public goods provision $g_j L_j$, where W_j is the wage level in location j and L_j is the number of workers living in location j. Let $B_j = W_j L_j$, representing the size of the tax base. The local government chooses the tax rate and public goods provision by maximizing its rent (i.e., profit):

$$\max_{\tau_j, g_j} \pi_j = \tau_j B_j - g_j L_j.$$

The first-order conditions (FOCs) are

$$B_j + \tau_j \frac{\partial B_j}{\partial \tau_j} - g_j \frac{\partial L_j}{\partial \tau_j} = 0; \tag{1}$$

$$\tau_j \frac{\partial B_j}{\partial g_j} - L_j - g_j \frac{\partial L_j}{\partial g_j} = 0. \tag{2}$$

Tax Markup Equation 1 can be rewritten as

$$1 + \frac{\partial L_j}{\partial \tau_j} \frac{\tau_j}{L_j} - \frac{g_j}{W_j \tau_j} \frac{\partial L_j}{\partial \tau_j} \frac{\tau_j}{L_j} = 0.$$

To facilitate the analysis, define $s_j = \frac{g_j}{W_j}$, representing per-resident local public good provision as a fraction of income. We can interpret s_j as the counterpart of τ_j: τ_j is the fraction of workers' income levied by the government while s_j is the fraction of income used to provide local public goods. Therefore, the rent that the government extracts can be rewritten as $(\tau_j - s_j)B_j$.

After defining s_j, we can further rewrite the above FOC condition as follows:

$$1 + \varepsilon_{L,\tau,j} - \frac{s_j}{\tau_j} \varepsilon_{L,\tau,j} = 0$$

where $\varepsilon_{L,\tau,j}$ is the population elasticity with respect to the tax rate, or the migration elasticity. Rearranging the expression, we have

$$\frac{\tau_j - s_j}{\tau_j} = -\frac{1}{\varepsilon_{L,\tau,j}}, \tag{3}$$

which shows that the rent as a fraction of tax, or tax markup, increases as the migration elasticity decreases.

This result mimics the Lerner index, where price markup is the inverse of the price elasticity of demand. The intuition behind the Lerner index is that producers can increase prices above marginal cost if consumers are not sensitive to the price increases. Similarly, in our case, the government can raise tax rates above the cost of providing public goods if local residents are not sensitive to these tax increases.

Local Public Good Provision Combining both FOCs, we derive the condition for public goods provision:

$$\frac{\partial L_j}{\partial s_j} = -\frac{\partial L_j}{\partial \tau_j}, \tag{4}$$

which means that s_j and τ_j must be set such that the loss in the tax base resulting from an increase in τ_j must be offset by the corresponding increase in s_j. If we assume that the population L_j is given by a logistic specification where residents derive normalized mean utility $\bar{U}_j$, then Equation 4 implies that

$$\frac{\partial \bar{U}_j}{\partial s_j} = -\frac{\partial \bar{U}_j}{\partial \tau_j}, \tag{5}$$

which implies that the government's equilibrium policy decisions must ensure that the marginal utility of public goods equals to the marginal utility loss of raising taxes to fund the public goods.

The government's problem demonstrates that a rent-seeking government's ability to raise taxes depend on the migration elasticity of the local population. We then incorporate additional actors in the model to show how factors such as local productivity premium can reduce migration elasticity, facilitating rent extraction by local governments.

2.2 Production

Each location j produces a tradeable output Y_j according to the following production function:

$$Y_j = \theta_j L_j.$$

To preserve tractability, we abstract away from modeling capital input. Therefore, θ_j captures both the total factor productivity (TFP) and the capital contribution to the final output. We use the linear production function for simplicity. Section 5.1.1 presents another version of the model with Cobb-Douglas production function and endogenous capital allocation. The simple production specification in this section implies that workers' wage in each location must equal their marginal productivity:

$$W_j = \theta_j.$$

2.3 Workers

Workers are imperfectly mobile and choose the location that provides the highest utility level. Each worker's utility from living in location j is

$$U_{ij} = \underbrace{w_j + \ln(1 - \tau_j) - \beta r_j + a_j + \gamma \ln(g_j)}_{\bar{U}_j} + \sigma \varepsilon_{ij},$$

where $w_j = \ln W_j$, r_j is log rent $\ln R_j$, and a_j is log amenity $\ln A_j$. Each worker has an individual-specific idiosyncratic taste for location j, denoted by ε_{ij}, drawn from a Type-I Extreme Value distribution. σ is the degree of preference dispersion. Thus, the probability that a worker chooses to living in location j is

$$P_j = \frac{\exp\left(\bar{U}_j/\sigma\right)}{\sum_{j'} \exp\left(\bar{U}_{j'}/\sigma\right)}. \tag{6}$$

The population of location j is $L_j = LP_j$, where L is the total population of the country.

2.4 Housing Market

The housing supply curve is

$$r_j = r_0 + \frac{1}{\eta_j} \ln L_j,$$

where η_j is the housing supply elasticity in location j. A greater η_j means that it is easier for the local housing market to expand in response to an increase in the housing demand L_j.

2.5 Migration Elasticity

Now, we derive the migration elasticity with respect to the tax rate and analyze how local factors affect the migration elasticity.

To derive the migration elasticity, we first derive how tax rates affect the local population in equilibrium:

$$\frac{\partial L_j}{\partial \tau_j} = -\frac{L_j\left(1 - P_j\right)}{\sigma\left(1 - \tau_j\right)} \Lambda_j,$$

where $\Lambda_j = \frac{1}{1+\frac{\beta}{\sigma\eta_j}(1-P_j)}$ is a mitigating factor created by the housing market response. Since $\Lambda_j > 0$, $\frac{\partial L_j}{\partial \tau_j}$ must be strictly less than zero, meaning that a higher tax rate will drive down local population. Thus, the migration elasticity with respect to tax is

$$\varepsilon_{L,\tau,j} = -\frac{(1-P_j)\,\tau_j}{\sigma\,(1-\tau_j)}\Lambda_j.$$

It is worth noting that $|\varepsilon_{L,\tau,j}|$ increases with respect to the probability of choosing to live elsewhere, $1-P_j$. This means if the desirability of location j increases, this will lower $1-P_j$, thereby decreasing $|\varepsilon_{L,\tau,j}|$.

The migration elasticity decreases with respect to the local housing supply elasticity η_j through the term $\Lambda_j = \frac{1}{1+\frac{\beta}{\sigma\eta_j}(1-P_j)}$: $0 < \Lambda_j < 1$ and is smaller as η_j decreases. This result is consistent with the prediction in the study by Diamond (2017), which analyzes local housing supply elasticity as a mitigating factor for the migration elasticity. The intuition is that if η_j is small, housing rent would drop sharply as τ_j goes up. This could mute the migration response induced by the rising tax rate. As a result, decreasing housing supply elasticity η_j could lower the migration elasticity.

Graphical Illustration Our model predicts that an increase in the relative desirability of location j lowers the migration elasticity in j. To provide intuition, we present a graphical illustration. For the graphical analysis, we group all other locations outside of j as "elsewhere" or $-j$ and assume that location j is small such that the wage and rent changes in j do not affect the aggregate wage and rent in "elsewhere" $-j$. Without the loss of generality, assume $\sigma = 1$. Therefore, a worker chooses location j if

$$\begin{aligned}\bar{U}_j + \varepsilon_{ij} > \bar{U}_{-j} + \varepsilon_{i,-j} \iff \\ \varepsilon_{ij} - \varepsilon_{i,-j} > \bar{U}_{-j} - \bar{U}_j.\end{aligned}$$

Since ε_{ij} and $\varepsilon_{i,-j}$ come from a Type-I Extreme Value distribution, $\varepsilon_{ij} - \varepsilon_{i,-j}$ follows a Logistic distribution, centered at 0. Thus, the mass of residents choosing j is represented by the areas under the probability density function function f on the right of the cutoff value $\bar{U}_{-j} - \bar{U}_j$, as shown in Figure 2. The number of marginal movers can be represented by $f(\bar{U}_{-j} - \bar{U}_j)$. A small increase in the tax rate will cause a slight shift to the right in the utility cutoff, leading the marginal movers to relocate away from j. The key intuition for the migration elasticity $\varepsilon_{L,\tau,j}$ is that it depends on the number of the marginal movers relative to the number of existing residents. The fraction could be represented by the hazard function: $H = \frac{f}{1-F}$, where F is the cumulative density function. The lower panel of Figure 2 plots H.

If location j becomes more desirable, either because of higher wages or more desirable amenities, the cutoff value will shift to the left (from $\bar{U}_{-j} - \bar{U}_j$ to $\bar{U}_{-j} - \bar{U}_j'$), leading to an increase in the population in j. Although the number of marginal movers increases in this case (upper panel), the size of marginal movers as a *fraction* of existing residents in j decreases (lower panel).[3] Therefore, increasing desirability of location j could lower the migration elasticity in j.

The Effect of Local Productivity Having demonstrated that higher relative desirability of a location lowers the migration elasticity, next, we show that higher local productivity can increase the desirability of a location in equilibrium and thus reduce the migration elasticity of local residents. Specifically, we derive $\frac{\partial \varepsilon_{L,\tau,j}}{\partial \theta_j}$.

We begin with totally differentiating P_j in Equation 6 with respect to θ, taking into the account the effect of θ on labor demand and rents. We also allow amenity a_j to endogenously respond to θ_j. It can be shown that

$$\frac{\partial P_j}{\partial \theta_j} = \frac{\frac{1}{\sigma} P_j \left(1 - P_j\right) \left(\frac{1}{\theta_j} + \frac{\partial a_j}{\partial \theta_j}\right)}{1 + \frac{\beta}{\sigma \eta_j} \left(1 - P_j\right)} > 0$$

Higher local productivity θ_j increases workers' probability of choosing location j, P_j, through two mechanisms: (i) higher productivity raises local wages, and thus increases the desirability of j; (ii) higher productivity may increase the level of amenity provided in j (Diamond, 2016). However, the increased population in j could have an equilibrium effect on rent due to due to the upward sloping housing supply curve. This equilibrium effect can be seen from the denominator—smaller housing supply elasticity η_j can mitigate the effect of θ_j on P_j.

Therefore, higher local productivity can lower the migration elasticity $|\varepsilon_{L,\tau,j}|$:

$$\frac{\partial \varepsilon_{L,\tau,j}}{\partial \theta_j} = \frac{\frac{1}{\sigma} P_j \left(1 - P_j\right) \left(\frac{1}{\theta_j} + \frac{\partial a_j}{\partial \theta_j}\right)}{1 + \frac{\beta}{\sigma \eta_j} \left(1 - P_j\right)} \frac{\tau_j}{\sigma \left(1 - \tau_j\right)} \Lambda_j > 0.$$

[3] It is worth noting that whether the size of marginal movers increases or decreases as a result of increasing desirability of j (or $\bar{U}_j$) is not determined, depending on the value of $\bar{U}_{-j} - \bar{U}_j$. However, it can be shown that H is an increasing function. Thus, increasing desirability of j will always lower the number of marginal movers as a fraction of current residents.

2.6 Local Public Goods and Taxation in Equilibrium

2.6.1 Rent-Seeking Government

Back to the problem of rent-seeking governments, the equilibrium tax rate and provision of local public goods can be solved by combining Equations 3 and 4:

$$\tau_j^* = \frac{\varepsilon_{L,\tau,j}\gamma}{1 + \varepsilon_{L,\tau,j} + \varepsilon_{L,\tau,j}\gamma};$$

$$s_j^* = \frac{\varepsilon_{L,\tau,j}\gamma + \gamma}{1 + \varepsilon_{L,\tau,j} + \varepsilon_{L,\tau,j}\gamma}.$$

τ_j^* and s_j^* are functions of the migration elasticity and preference for public goods γ. The restriction of $0 < \tau_j < 1$ and $0 < s_j < 1$ implies that $\varepsilon_{L,\tau,j} < -1$ must hold in equilibrium. If $\varepsilon_{L,\tau,j}$ approaches -1, τ_j would become 1 and the utility would go to $-\infty$, which would increase the migration elasticity $|\varepsilon_{L,\tau,j}|$.

We can see that as the migration elasticity $|\varepsilon_{L,\tau,j}|$ increases, τ_j decreases and s_j increases. Hence, the migration elasticity serves as a disciplining force, preventing tax rates from getting excessively high and ensuring an adequate provision of public goods.

At the one extreme, if $\varepsilon_{L,\tau,j}$ approaches $-\infty$, $\tau_j^* = s_j^* = \frac{\gamma}{1+\gamma}$. This indicates that governments are unable to extract any rent from the taxpayers and are compelled to efficiently provide public goods. At the other extreme, if $\varepsilon_{L,\tau,j}$ approaches the upper-bound of -1, $\tau_j^* \to 1$ and $s_j \to 0$, meaning that governments can impose nearly maximum tax rates without allocating any resources toward public goods provision..

Since the local productivity premium reduces the local migration elasticity $|\varepsilon_{L,\tau,j}|$, a rent-seeking government in location j tends to impose higher tax rates as the local productivity premium increases,

$$\frac{\partial \tau_j^*(\theta_j)}{\partial \theta_j} > 0,$$

and allocate a smaller fraction of the local tax towards public goods,

$$\frac{\partial s_j(\theta_j)}{\partial \theta_j} < 0.$$ [4]

[4] Although $\frac{\partial s_j(\theta_j)}{\partial \theta_j} < 0$, it is still possible that the absolute spending on public goods g_j is higher in more productive locations.

2.6.2 Benevolent Government

To compare with our findings based on the assumption of rent-seeking governments, we also analyze the behavior of benevolent governments. We assume that for benevolent local governments, $\tau_j = s_j$, implying that they do not extract any rents from the local tax base. Their objective is to maximize the mean utility of the local population, $\bar{U}_j$, by choosing τ_j. We show that the determination of tax rates and public goods provision in this case is solely influenced by the preference for local public goods, γ, and does not depend on local productivity:[5]

$$\tau_j^{benev} = s_j^{benev} = \frac{\gamma}{1+\gamma}, \text{ and}$$

$$\frac{\partial \tau_j^{benev}(\theta_j)}{\partial \theta_j} = 0$$

In the real world, governments may exhibit varying degrees of rent-seeking motives, captured by a weight δ. The weight can represent the intensity of rent-seeking motives among decision-makers in state and local governments. Thus, the government would determine tax rates according to the following equation:

$$\tau_j(\theta_j) = \delta \tau_j^*(\theta_j) + (1-\delta)\, \tau_j^{benev}(\gamma).$$

As a result, the impact of the local productivity on the equilibrium tax rate needs to be weighted by δ:

$$\frac{\partial \tau_j(\theta_j)}{\partial \theta_j} = \delta \frac{\partial \tau_j^*(\theta_j)}{\partial \theta_j}$$

2.7 Empirical Predictions

2.7.1 Spatial Correlation Between Tax Rates and Productivity

The direct prediction of the model is that if rent-seeking governments should impose higher tax rates in locations with higher productivity and the extra tax revenue should not be allocated towards increased provision of public goods. To empirically test the prediction, we examine whether state and local governments' tax revenue per capita as a fraction of the average income of local residents tends to be higher in jurisdictions with higher private-sector labor productivity.

[5] This result coincides with the equilibrium s_j^* and τ_j^* with rent-seeking governments if migration elasticity approaches $-\infty$. In other words, even with rent-seeking governments, if migration elasticity is very high, the governments could still behave as if they were benevolent.

However, residents in high-productivity areas could have stronger preferences for public goods. If so, we can observe the positive spatial correlation between τ_j and θ_j even if governments do not have rent-seeking motives. Ideally, we would like to test whether tax rate is positively correlated with the private-sector productivity, holding the level of public good provisions constant. Unfortunately, it is difficult to directly measure the level of public good provision using government expenditure data. The positive relationship between tax rates and productivity could also be driven by the "Baumol" effect: When private-sector productivity increases while public-sector productivity stagnates, under the assumption that the demand for public goods are income-elastic but highly price-inelastic, the price of public goods may rise if private-sector productivity is higher (Baumol, 1967). This could lead to higher tax rates in more productive locations. Appendix A4 presents a model of the Baumol effect and its implications.

2.7.2 Public-Private Wage Gap

To test for governments rent-seeking motives and distinguish them from the potential mechanism of heterogeneous preferences for public goods, we investigate the allocation of government rents. In particular, we examine whether these rents are distributed towards increased compensation to government workers.[6] Government workers can leverage their political and institutional power to exert pressure on their governments for higher compensation. To fulfill these demands, governments need to acquire the funds by extracting them from the local tax base. Thus, the relative wages of government workers compared with their private-sector counterparts depends on their governments' ability to extract rents from taxation. To test that higher productivity facilitates government rent-seeking, we examine whether the wage gap between government workers and private-sector workers is larger in locations with higher productivity, holding observable characteristics of workers and locations constant.

One concern of this approach is that the positive spatial relationship between the public-private wage gap and productivity could be still be driven by confounding factors, rather than government rent-seeking behavior. In particular, the spatial relationship could still be driven by the Baumol effect if labor mobility between the local public and private sectors are not perfect and therefore higher local private-sector productivity could lead to a higher wage premium for public-sector workers. Appendix A4.2 presents a model of the Baumol effect without labor mobility between public and private sectors.

[6]Governments could distribute the extra proceeds in various ways. For instance, they could make transfers to other governments or lobbying groups. Our model does not specify who "own" the rent-seeking governments and how the government "dividends" are distributed.

2.7.3 Collective Bargaining Laws

To overcome the remaining concern regarding the Baumol effect as a spurious driver of the relationship between the public-private wage gap and productivity, following Brueckner and Neumark (2014) and Diamond (2015), we examine whether the relationship between the public-private wage gap and productivity varies between states that allow collective bargaining and states that prohibit it.

The idea is that public-sector collective bargaining makes it easier for government workers to exert pressure on governments for compensation (Freeman, 1988; Acemoglu et al., 2001). Thus, if higher productivity enables rent-seeking, we expect that in states where collective bargaining is allowed, the public-private wage gap should react more to local productivity compared with in states where collective bargaining is not allowed.

This analysis can help distinguish government rent-seeking from the Baumol effect. If the spatial relationship between the public-private wage gap and productivity is solely driven by the Baumol effect, the relationship should not differ by the legality of collective bargaining. The reason is that Baumol effect is the equilibrium consequence of income effect and inelastic demand for public good, and thus should not be affected by whether government workers can collectively bargain.

2.7.4 Local Government Financial Independence

Lastly, we delve into variations in local governments' financial independence and investigate whether the wage gap between local government workers and private-sector workers could be affected by the productivity of the state, especially in areas where local governments reply more on transfers from the state government. The intuition is that if local government workers' wages are influenced by the Baumol effect, we expect that the wage gap between local government workers and private sector workers should be influenced solely by the productivity of the areas where the government workers serve. However, if the wage premium of local government worker is partially due to the distributed rents from the state government, the public-private wage gap should also depend on the rent-seeking ability of the state government. Therefore, we examine whether the wage gap between the local government workers and private sector workers depends on the productivity of the state in locations with a larger share of local government revenue derived from state transfers.

3 Data

We use data from several sources test the predictions of the model and to analyze the role of spatial productivity premium on government rent extraction.

3.1 Annual Survey of State and Local Government Finances

The Annual Survey of State and Local Government Finances provides detailed state and local government data on revenues and expenditures by governmental function. A census covering all state and local governments is conducted every five years (years ending in "2" and "7"). Local governments include county, township, municipality, school district, and special district governments.

We use the data for 1987, 1997, 2007, and 2017 to measure county-area and state-area government revenue and expenditure (Pierson et al., 2015). To measure county-area revenue and expenditure, we aggregate revenue and expenditure of all local governments located in a county. To measure state-area revenue and expenditure, we aggregate revenue and expenditure of the state government and all local governments located in the state.

Table 1 Panel A presents summary statistics. As an outcome of governments' rent extraction, we consider their tax revenues. The average state-area share of tax revenue relative to the total revenue is 39%. Corporation taxes only account for less than 5% of total tax revenue. The taxes collected by rent-seeking governments could be spent on increased public section compensation. The average state area share of expenditures on wages and salaries relative to total expenditures is around 25%. To measure the tax burden faced by states' residents, we use tax per capita as a fraction of the average income of a state; the average is 8% by using the total tax revenue and 7.7% by excluding corporation taxes. The table also presents corresponding county area summary statistics. The share of total revenue that comes from intergovernmental transfers is greater for local governments, with the county area average of 34%. The average county area tax per capita as a fraction of the average income is 3.5%; county area corporation taxes account for only 0.2% of total county area taxes.

3.2 Current Population Survey

We use data from the Current Population Survey (CPS) Annual Social and Economic Supplement (ASEC) to measure spatial differences in the wage residuals and to analyze the public-private sector wage gaps across states and metropolitan statistical areas (MSAs). The data provide various measures of annual income, including wage and total income. The data also provide detailed information on demographic, work, and geographic characteristics. Importantly, the data provide information on whether a worker belongs to the private sector or the public sector, where the public sector includes federal, state, or local government employees. Therefore, the data allow us to analyze how the wage gap between public and private sector workers differs across locations, holding other observable worker characteristics equal.

We study the period from 1977–2019 because the data distinguish between federal, state, and local government employees since 1976.[7] We restrict the sample to workers aged from 25–65, working at least 35 hours per week, and having positive wage income. We also exclude workers whose wages are imputed to avoid bias in the wage gap analysis due to the CPS's imputation algorithm. Wages are deflated by the CPI and measured in real 1999 dollars. To measure the wage premiums by state or MSA over time, we pool the data from 1977–1989, 1990–1999, 2000–2009, and 2010–2019 to increase power and mitigate measurement error.

Table 1 Panel B presents summary statistics for workers in private sectors, federal government, state governments, and local governments separately. The raw hourly wages are higher for all three types of government workers than private sector workers, consistent with the literature (e.g., Diamond, 2017).

3.3 Annual Survey of Public Pensions

The Annual Survey of Public Pensions provides information on contributions and benefits in state- and locally-administered defined benefit retirement plans. Specifically, the data include the dollar value of annual contributions made by both the government and employees to the retirement funds, the number of active members within each plan, the total annual benefits disbursed to beneficiaries, and the number of eligible beneficiaries each year.

We use the data to calculate the state- and county-level average government contribution to retirement plans by dividing the total government contribution for a state or county by the total number of active members. Similarly, we calculate the average benefits paid by dividing the total benefits disbursed by the total number of eligible beneficiaries.

3.4 Public Sector Collective Bargaining Laws

We use the dataset on public sector collective bargaining laws initially developed by Freeman and Valletta (1988). This dataset was subsequently expanded by Kim Rueben and provides annual data up until 1996.

[7] We exclude the 1976 data because 38 states cannot be separately identified.

For our analysis concerning the legality of collective bargaining, we merge the CPS data with the observed laws on an annual basis until 1996. For the CPS data after 1996, we merge them with the 1996 law since the collective bargaining laws remained relatively stable after 1996 (Diamond, 2017).

3.5 Amenities, Public goods, Land Unavailability, and Political Preferences

Amenities We acquire detailed information on county-specific measures of natural amenities, including proximity to lake and sea shore, January and July temperatures, and annual precipitation, from the publicly available replication package provided by Lee et al. (2019).

Public Goods We gather data on the provision of local public goods from several sources. First, we use data on road quality from the Bureau of Transportation Statistics. The data provide the percentage of roads in acceptable condition by state and year. We use data for the years 1997, 2007, and 2017. Second, we gather data on student and teacher counts at the school district level from the Common Core of Data (CCD) provided by the National Center for Education Statistics (NCES) within the U.S. Department of Education. Using the data, we calculate the teacher-student ratio for each school district level for 1987, 1997, 2007, and 2017. We then match the school districts with their corresponding counties to calculate the average teacher-student ratio at the county level. Third, we obtain county-level counts of arrests for all offenses from the Uniform Crime Reporting Program Data provided by the Federal Bureau of Investigation. We use the data to calculate the arrest rate at the county level for years 1987, 1997, 2007, and 2017. We use (lower) arrest rates as a proxy for public safety.

Land Unavailability We employ Saiz (2010)'s measure of land unavailability at the MSA level. We also use Saiz (2010)'s housing supply elasticity measure for our counterfactual analysis.

Political Preferences We gather voting records at both the state and county levels to account for political preferences. We obtain state-level voting data during the U.S. Presidential elections of 1980, 1992, 2000, and 2016 from the MIT Election Lab. For county-level voting data in the same years, we use Dave Leip's U.S. Election Atlas (Leip, 2023). We use the voting percentages from the election years 1980, 1992, 1000, and 2016 to proxy local political preferences in 1987, 1997, 2007, and 2017, respectively. Additionally, we source data regarding the party affiliations of state governors from Kaplan (2021).

4 Empirical Results

4.1 Estimating Spatial Wage Premium

We start with measuring the differences in residualized wages across states and MSAs. Following Hsieh and Moretti (2019), we use this measure to approximate the labor productivity θ in the model and capture how much workers can gain by living in one location compared with elsewhere in the U.S. To do so, for each time period, we regress private sector workers' log hourly wage on various demographic and work characteristics, including dummies for age, sex, race, Hispanic origin, marital status, education, industry, and occupation. The log hourly wage residuals capture the time-specific wage distribution, holding workers' observable characteristics constant. We then estimate the mean of the estimated log wage residuals at the state or MSA level separately for each period, subtracting the national means. We use $\ln \hat{\theta}_{jt}$ to donate the estimated log wage residual in location j and time t. We interpret $\ln \hat{\theta}_{jt}$ as the log point in wage premiums that a worker could gain by living in location j compared with similar workers living elsewhere in the country.

It is worth noting that $\ln \hat{\theta}_{jt}$ is a measure of labor productivity, capturing both the effect of the total factor productivity (TFP) and the contribution of capital.

4.2 Government Revenue and Expenditure Regressions

The model predicts that rent-seeking governments should impose higher tax rates in locations with higher productivity. The extra tax revenue should be spent on governments' interest, not on higher public goods provision. We test the model's prediction by examining how state and local governments' revenue and expenditure per local resident as a fraction of local residents' average income vary by the wage residual of local private sector workers. Specifically, we estimate the following regression at the state and county level:

$$\ln G_{jt} = \alpha_t + \beta \ln \hat{\theta}_{jt} + \epsilon_{jt}. \tag{7}$$

In the state-level regression, G_{jt} denotes the revenue or expenditure of the state government and local governments located in state j per state resident as a fraction of the state's average income in year t. $\ln \hat{\theta}_{jt}$ is the log wage premium of state j in year t estimated in Section 4.1. In the county-level regression, G_{jt} denotes the revenue or expenditure of local governments located in county j collected per county resident as a fraction of the average income of the MSA that contains county j in year t. $\ln \hat{\theta}_{jt}$ is the log wage premium of the MSA that contains county j in year t.[8] We control for year fixed effects α_t in all regressions and further control for state fixed effects in county-level regressions.

Table 2 Panel A presents the state-level regression results and Panl B presents the county-level regression results. Column 1 presents the results for governments' total tax revenue per capita as a fraction of the state's average income, which is used to approximate the level of tax rate faced by the state residents. Consistent with the model's prediction, the estimate in Panel A suggests that a 1% increase in the state wage premium is associated with a 1.2% increase in the state's tax rate. Panel B suggests a similar positive correlation at the county level. Column 2 presents the results using governments' tax revenue excluding corporation tax (i.e., tax on licenses pertaining to all corporations and tax on the income of corporations).[9] This does not affects the results.

In Appendix Table A1, we show that the positive correlation between the government's total or non-corporation tax revenue per capita (as a fraction of the average income) and wage premiums holds even after controlling for local demographics, natural amenities, land unavailability, and political preferences, although the standard errors in the state-level regression are relatively large.[10]

In column 3 of Table 2, we consider governments' non-tax revenue, such as transfers from other governments, fees collected for providing services, utility revenue, liquor store revenue, and contributions and investment earnings for all social insurance programs. We consider governments' non-tax revenues because they are less likely to be influenced by governments' rent-seeking motives. Consistently, the results in column 3 suggest that state and local governments' per capita non-tax revenue as a fraction of the local residents' average income is not positively correlated with the local wage premium. Panel B even suggests a negative correlation at the county level.

The model predicts that the greater tax revenue collected by rent-seeking governments in high-productivity areas will not be allocated towards increased provision of public goods. Unfortunately, we do not have a direct

[8] To match the government finance outcomes in 1987, 1997, 2007, and 2017 from the Annual Survey of State and Local Government Finances, we estimate $\ln \hat{\theta}_{jt}$ using the CPS data for 1977-1989, 1990–1999, 2000–2009, and 2010–2019, respectively. For the county-level regressions, we measure the average income and the log wage premium at the MSA level. This is because the number of counties identified in the CPS data is very limited. Therefore, we use the MSA-level measurement to reduce measurement error.

[9] Part of governments' property tax and sales tax revenue could come from corporations as well. Unfortunately, we cannot distinguish them from the Annual Survey of State and Local Government Finances data.

[10] To account for local demographic features, we control for average age, share of workers with college degrees, and share of workers with high school degrees. Natural amenities include proximity to lake, proximity to sea shore, mildness of weather measured by$(|\text{January minimum degree} - 20°C| + |\text{July maximum degree} - 20°C|)/2$, and annual precipitation. Land unavailability is measured by the share of land within 50km of a city's center unavailable for real-estate development due to geographic constraints (Saiz, 2010). To account for political preferences, we control for the share of votes for the Demographic Party and the Republican Party, respectively, and an indicator of the party affiliation of the state governor. In the state-level regressions, we control for the corresponding state-level statistics. In the county-level regressions, we control for the MSA-level statistics.

measure of government expenditure on public goods provision. As an approximate, we consider government expenditure excluding government payroll, using government payroll to approximate the expenditure for governments' interest (e.g., increasing government employment or raising public sector wages). This is a very rough approximate because the actual provision of public goods may require an increase in the number of government workers. Recognizing the limitation of the measurement, the estimates in column 4 of Table 2 show that there is not a statistically significant positive correlation between governments' non-payroll expenditure per capita as a fraction of local income and the local wage premium.

In Table 3, we examine alternative proxies for government public goods: road quality (percentage of roads in acceptable condition), school quality (teacher-student ratio), and public safety (lower arrest rate). We find no positive correlation between these public goods proxies and wage premiums, in particular after accounting for local demographics, natural amenities, land unavailability, and political preferences.[11] The results provide further evidence that the greater tax revenue collected in high-productivity areas may not have been allocated towards increased public goods provision.

In summary, the results in this section provide evidence that residents living in locations with high private-sector wage premiums tend to face higher tax rates. However, the positive correlation between tax rate and labor productivity could be driven by different preferences for public goods across locations, not governments' rent-seeking motives. The positive spatial correlation could be also driven by the Baumol effect. To further test for governments' rent-seeking motives and distinguish them from the alternative mechanisms, we examine whether the excess tax revenue collected by governments in high-productivity areas leads to higher compensation to public sector workers relative to private sector workers.

4.3 Public-Private Wage Gap Regressions

In this section, we analyze whether public sector workers in location with high private sector productivity get higher wages compared with private sector workers with similar observable characteristics .

Public-Private Wage Gap First, we exploit spatial variation in log wage residuals across states and examine the wage gap between *state* government workers and private sector workers with similar observable character-

[11]We find that state-level road quality is even negatively correlated with state wage premiums, both without and with control variables of state-level demographic features, natural amenities, land unavailability, and political preferences. Similarly, the county-level teacher-student ratio is also negatively correlated with MSA wage premiums, regardless of whether adding MSA-level controls. Lastly, although the county-level arrest rate is negatively correlated with MSA wage premiums (i.e., high-productivity counties tend to be safer), the coefficient becomes much smaller and statistically insignificant after adding MSA-level controls.

istics. To do so, we use individual-level data from the CPS, restricting the sample to state government workers and private sector workers, and estimate the following regression:

$$\ln W_{ijt} = \alpha_t + \delta_j + \beta_1 Gov_{ijt} + \beta_2 \ln \hat{\theta}_{jt} + \beta_3 Gov_{ijt} \cdot \ln \hat{\theta}_{jt} + \Lambda' X_{ijt} + \epsilon_{ijt}, \tag{8}$$

where W_{ijt} is the hourly wage of worker i in state j in year t; Gov_{ijt} is a dummy for whether worker i is a government worker; $\ln \hat{\theta}_{jt}$ is the average private sector log wage residual of state j in year t, as a measure of local labor productivity; X_{ijt} is a vector of individual characteristics, including dummies for age, gender, race, Hispanic origin, education, and interactions between the public dummy and occupation dummies. We control for the interaction terms to ensure that we compare public and private sector workers in the same occupation. We also control for year fixed effects α_t and state fixed effects δ_j. The parameter of interest is β_3, which measures how the public-private wage gap varies by the local labor productivity. The model predicts that $\beta_3 > 0$.

The results are presented in Table 4 Panel A. Column 1 suggests that wages are higher in states with higher labor productivity. Consistent with the model's prediction, we find that the wage gap between state government workers and private sector workers increases by 0.4% in states with a 1% increase in the wage residual. The estimate is statistically significant at the 1% level. As a falsification test, in column 2, instead of using state government workers, we restrict the sample to *federal* government workers and private sector workers. We conduct this analysis because the state governments' rent-seeking should not raise the wage of federal government workers. Column 2 shows that the wage gap between federal government workers and private sector workers is even lower in high-productivity states.

Second, we exploit spatial variation in log wage residuals across MSAs and examine the wage gap between *local* government workers and private sector workers. Specifically, we restrict the sample to local government workers and private sector workers, and estimate Equation 8 with j representing the MSA. Column 1 of Table 4 Panel B shows that the wage gap between local government workers and private sector workers increases by 0.2% in MSAs with a 1% increase in the wage residual.

Local Government Financial Independence In addition to analyzing how the wage gap between local government workers and private sector workers is impacted by the local labor productivity, we further investigate the impact of state-level productivity. This is because on average, a large fraction of local governments' revenue is from state government transfers. If the positive relationship between the public-private wage gap and local productivity is driven by government rent-seeking, then the wage premium of local government workers could also be affected by the productivity of the state, especially for local governments with lower financial independence. This analysis can be useful to disentangle the government rent-seeking mechanism from the Baumol effect because if the positive relationship between the public-private wage gap and local productivity is driven by the Baumol effect, we expect that the wage gap should be influenced solely by the productivity of the areas where the local government workers serve.

Specifically, in column 2 of Table 4 Panel B, as in column 1, we restrict the sample to local government workers and private sector workers and estimate Equation 8. In addition to including the MSA-level log wage residual and its interaction with the public dummy, we further controlling for the state-level log wage residual and its interaction with the public dummy. We find that the wage gap between local government workers and private sector workers increases with the state labor productivity, after controlling for the local productivity.

We further explore variations in financial independence across local governments, as the rent-seeking behavior of state governments may have a greater impact on the wage premium of local government workers of less financially independent local governments. To do so, we estimate the following equation:

$$\begin{aligned} \ln W_{ijst} = {} & \alpha_t + \delta_j + \beta_1 Gov_{ijst} + \beta_2 \ln \hat{\theta}_{jt} + \beta_3 Gov_{ijst} \cdot \ln \hat{\theta}_{jt} + \beta_4 Gov_{ijst} \cdot z_{jst}^{tax} \cdot \ln \hat{\theta}_{jt} \\ & + \beta_5 \ln \hat{\theta}_{st} + \beta_6 Gov_{ijst} \cdot \ln \hat{\theta}_{st} + \beta_7 Gov_{ijst} \cdot z_{jst}^{trans} \cdot \ln \hat{\theta}_{st} + \beta_8 z_{jst}^{tax} + \beta_9 z_{jst}^{trans} \\ & + \beta_{10} z_{jst}^{tax} \cdot \ln \hat{\theta}_{jt} + \beta_{11} z_{jst}^{trans} \cdot \ln \hat{\theta}_{st} + \beta_{12} Gov_{ijst} \cdot z_{jst}^{tax} + \beta_{13} Gov_{ijst} \cdot z_{jst}^{trans} \\ & + \Lambda' X_{ijt} + \epsilon_{ijt}, \end{aligned} \tag{9}$$

where W_{ijt} is the hourly wage of worker i in MSA j state s in year t; $\ln \hat{\theta}_{jt}$ is the log wage residual of MSA j; $\ln \hat{\theta}_{st}$ is the log wage residual of state s; z_{jst}^{tax} is the average share of local governments' total revenue derived from taxes for all local governments locating in MSA j within state s; z_{jst}^{trans} is the average share of local governments' total revenue derived from the state government transfers for all local governments locating in MSA j within state s; other variables are defined the same as in Equation 8. The parameters of interest are β_4 and β_7. We predict that for local governments with a greater share of revenue derived from local taxes, the wage gap (between the local government workers and private sector workers) depends more on the local productivity ($\beta_4 > 0$). For local governments with a greater share of revenue derived from state transfers, the wage gap depends more on the state productivity ($\beta_7 > 0$). The estimates in column 3 of Table 4 Panel B are consistent with the predictions.

Lastly, we conduct two falsification tests. Column 4 of Table 4 Panel B shows that the wage gap between state government workers and private sector workers does not increase with the local labor productivity, after controlling for the state's labor productivity. Column 5 shows that neither the state's labor productivity nor the MSA's labor productivity raise the wage gap between federal government workers and private sector workers.

In summary, the results in Table 4 indicate that higher labor productivity of a state is associated with higher wages of state government workers compared with their counterparts in the private sector. It also leads to a higher wage premium for local government workers in areas where a greater share of the local governments' revenue comes from state government transfers. In locations where tax revenue is a greater source of revenue for local governments, the wage gap between local government workers and private sector workers increases with the local labor productivity. These findings present supporting evidence for the existence of government rent-seeking driven by local productivity. Heterogeneity across locations with varying levels of financial independence for local governments further suggests that our results are unlikely to be solely attributed to the Baumol effect.

Collective Bargaining Laws We now consider whether the relationship between the public-private wage gap and the local labor productivity varies by the state-level collective bargaining laws by estimating the following equation:

$$\begin{aligned} \ln W_{ijt} = \alpha_t + \delta_j + \beta_1 Gov_{ijt} + \beta_2 \ln \hat{\theta}_{jt} + \beta_3 Gov_{ijt} \cdot \ln \hat{\theta}_{jt} + \beta_4 Gov_{ijst} \cdot Barg_{jt} \cdot \ln \hat{\theta}_{jt} \\ + \beta_5 Barg_{jt} + \beta_6 Barg_{jt} \cdot \ln \hat{\theta}_{jt} + \beta_7 Gov_{ijt} \cdot Barg_{jt} + \Lambda' X_{ijt} + \epsilon_{ijt}. \end{aligned} \tag{10}$$

We first conduct the analysis on state government workers by restricting the sample to state government workers and private sector workers. $Barg_{jt}$ is an indicator that collective bargaining is legal for state government workers in state j and year t. Other variables are defined as they are in Equation 8. The variation in states' collective bargaining laws is unlikely to be random. However, this does not impose severe threats to identification, because we are interested in the relationship between the public-private wage gap and labor productivity across states with the same type of collective bargaining laws. Similar to Diamond (2017), the key identifying assumption is that the different relationship between the wage gap and labor productivity in states where collective bargaining is legal and in states where collective bargaining is illegal is solely driven by the difference in their collective bargaining laws.

Table 5 presents the results. Column 1 in Panel A shows that in states where collective bargaining is illegal, higher state labor productivity has a negative relationship with the wage gap between state government workers and private sector workers. However, in states where collective bargaining is legal for state government workers, a 1% increase in the state wage residual is associated with a 0.47% increase in the wage gap between state government workers and private sector workers. In column 2 of Panel A, we conduct a falsification test by comparing the wage gap between federal government workers and private sector workers across locations. In contrast to state government workers, we do not find that in states where collective bargaining is legal, higher labor productivity of a state raises the wage premium of federal government workers.

Next, we compare the wage gap between local government workers and private sector workers across MSAs. $Barg_{jt}$ is an indicator that collective bargaining is legal for local government workers. Table 5 Panel B column 1 shows that in states where collective bargaining is legal for local government workers, higher local labor productivity is associated with a higher wage gap between local government workers and private sector workers.

Lastly, we conduct two falsification tests with state and federal government workers. Column 2 of Table 5 Panel B shows that in states where collective bargaining is legal for state government workers, local productivity does not raise the wage gap between state government workers and private sector workers, after controlling for the state's labor productivity. Column 3 shows that in states where collective bargaining legal for either state or local governments, neither the state's labor productivity nor the MSA's labor productivity raise the wage gap between federal government workers and private sector workers.

In Appendix Table A2, we show that in states allowing collective bargaining for state government workers, higher state wage premiums are associated with higher wage gap between state government workers and private sector workers, even after accounting for state-level demographics, natural amenities, land unavailability, and political preferences. In states permitting collective bargaining for local government workers, higher MSA wage premiums are still associated with higher wage gap between local government workers and private sector workers, but the coefficient is statistically insignificant after accounting for MSA-level characteristics.

In summary, the results suggest that higher labor productivity leads to higher wages for both state government workers and local government workers, compared with similar private sector workers, when the state collective bargaining laws allow these government workers to bargain. However, we do not find such a positive relationship when the government workers are not allowed to bargain. The heterogeneity across states with different collective bargaining laws also helps disentangle governments' rent-seeking behavior from the

Baumol effect. This is because the Baumol effect is caused by the income effect on the demand for public goods, and thus its effect on the public-private wage gap should not depend on whether government workers can collectively bargain.

4.4 Defined Benefit Public Pensions

In addition to higher wages, another way to enhance workers' compensation is by providing more favorable pension benefits. In this section, we conduct additional tests to examine the presence of government rent-seeking by investigating whether government workers receive higher benefits or enjoy greater government contributions relative to the local average income in locations with greater labor productivity. To do so, we estimate Equation 7 in Section 4.2. The outcome variables include log ratio of benefit per beneficiary to average income and log ratio of government contribution per member to average income.

Table 6 Panel A presents the state-level regression results. Column 1 suggests that higher private-sector wage premiums of a state is associated with higher average pensions benefit among all state and local government beneficiaries as a fraction of the average income of the state. Nevertheless, since defined benefit public pensions typically have formulas that were established prior to the retirement of the current retirees, the benefits received by current retirees are likely to be influenced by rents extracted by the governments in the past. Thus, column 2 further controls for the state log wage residual 10 years ago. The estimates suggest that the current average benefit is positively correlated with the state's productivity 10 years ago, and the correlation with the current productivity level is statistically insignificant. Column 3 suggests that higher private-sector wage premiums is also associated with higher average government pension contribution among all state and government pension plan members as a fraction of the average income.

Panel B of Table 6 presents the county-level regression results. The results suggest that the average pensions benefit among all local government beneficiaries of a county as a fraction of the average income is positively affected by the lagged state productivity; the association with the lagged MSA productivity is positive but the estimate is smaller and statistically insignificant. The average government contribution among all local government plan members of a county as a fraction of the average income is also positively affected by the state productivity.

5 Aggregate Effect of State and Local Government Rent-Seeking

Having empirically tested the model's predictions, we use it to assess the aggregate effects of state and local governments' rent-seeking motives on output and welfare. We show that variations in local tax rate (τ_j) and public goods as a fraction of income (s_j) driven by local governments' rent-seeking enabled by productivity variations could lead to substantial national output and welfare losses. Specifically, the loss in aggregate output arises when rent-seeking governments' policies on taxes and public goods distort spatial labor allocation, deterring workers from settling in more productive locations.

5.1 Generalized Problem of Local Governments

We start our aggregate analysis by outlining a generalized local government problem. The stylized model introduced in Section 2 present two extremes: fully rent-seeking governments and fully altruistic governments. For our quantitative model used to fit the data, we assume that each location j has a government driven by a combination of these motives.

For analytical simplicity, we assume that the government makes decisions regarding tax rate τ_j and public goods provision g_j in two stages. The government first chooses its tax rate τ_j. Once set, there is a δ probability of the government being rent-seeking, maximizing profit, and a $1-\delta$ probability of it being altruistic, maximizing local residents' welfare. Specifically, after τ_j is chosen:

- For a rent-seeking government, the public goods provision g_j (or equivalently, public goods as a fraction of income s_j) is chosen to maximize profit, given τ_j chosen in the previous step;
- For an altruistic government, the public goods provision is chosen such that $s_j = \tau_j$, with zero profit retention.

Formally, the government in location j solves the following problem:

$$\max_{\tau_j} \delta \Pi_j(\tau_j) + (1-\delta) V_j(\tau_j)$$

where $\Pi_j(\tau_j)$ is the profit value function of the rent-seeking government's profit maximization problem:

$$\Pi_j(\tau_j) = \max_{g_j} \tau_j B_j - g_j L_j,$$

and $V_j(\tau_j)$ is the re-scaled mean utility $\iota_j U_j$ of local residents in location j such that $s_j = \tau_j$ (i.e., taxes are used entirely to provide public goods, and no profit is retained by the government). We set ι_j to be the aggregate income of location j: $\iota_j = L_j W_j$.

We solve the government's generalized problem backward. First, we solve for $\Pi_j(\tau_j)$ by taking the first-order condition with respect to s_j (equivalent to with respect to g_j). Given the logistic specification of the residents' location choice, we derive that optimal public goods provision when the government seeks to maximize profit:

$$s_j(\tau_j) = \frac{\tau_j((1-P_j)/\sigma)\gamma}{1+((1-P_j)/\sigma)\gamma}.$$

The profit value function is:

$$\Pi_j(\tau_j) = \frac{\tau_j B_j}{1+((1-P_j)/\sigma)\gamma}.$$

Thus, at the first stage, the government would solve the following maximization problem:

$$\max_{\tau_j} \delta \frac{\tau_j B_j}{1+((1-P_j)/\sigma)\gamma} + (1-\delta)\iota_j \left(\ln(1-\tau_j) + \gamma \ln(\tau_j)\right) + C_j. \tag{11}$$[12]

After determining the optimal tax rate τ_j^*, the expected public goods provision set by the government can be given by

$$s^* = \frac{\tau_j^*(1-\delta+((1-P_j)/\sigma)\gamma)}{1+((1-P_j)/\sigma)\gamma}. \tag{12}$$

If $\delta = 0$, indicating a fully benevolent government, the first-order condition simplifies to that of a benevolent government. In this case, the optimal tax rate is $\tau_j^* = \frac{\gamma}{1+\gamma}$, with $s_j^* = \tau_j^*$ (Section 2.6.2). Conversely, if $\delta = 1$, meaning the government is solely rent seeking, the first-order condition aligns with that of a rent-seeking government (Section 2.6.1). We further explore the case in which $0 < \delta < 1$, representing a government with a combination of rent-seeking and benevolent motives.

Earlier, we demonstrate that local productivity dampens the migration elasticity with respect to taxes and public goods of the tax base. This, in turn, boosts the governments' incentive to increase local tax rates while decreasing the incentive to provide public goods. For analytical clarity, we represent tax rates and public goods provision as functions of local productivity θ_j, namely $\tau_j(\theta_j)$ and $s_j(\theta_j)$ in the following discussions.

[12] C_j denotes the sum of other terms in local residents' mean utility U_j.

5.1.1 Endogenous Capital Allocation

Another limitation of our stylized model in Section 2 is that we assume the production function of firms is linear with respect to labor input. In doing so, we overlook the spatial redistribution of capital in response to taxes. As a result, θ_j should be interpreted only as a gauge for labor productivity, not total factor productivity (TFP). In a more realistic setting, part of the tax burden could fall on capital owners. This could affect firms' location choice of capital (e.g., physical sites, offices, equipment, and factories).

One consequence of only modeling labor input in the production function is that it might undervalue the impact of government rent-seeking on aggregate output. This is because if firms' capital allocation is endogenous to labor supply choices, this may amplify the effects of spatial disparities in taxes and public goods. Specifically, if there is a decline in labor supply to location j, capital might be redirected to other locations due to a decreased return to capital, which could further reduce labor supply to location j because the labor productivity is lowered endogenously.[13]

To account for the potential effect of endogenous capital allocation, we assume that the numeraire tradable output is produced in each location j with the following Cobb-Douglas production function:

$$Y_j = \theta_j K_j^{1-\lambda} L_j^{\lambda}.$$

Given that the production function includes both labor and capital, θ_j now reflects the TFP, not simply the labor productivity. Here, λ represents the labor share in production, and $1 - \lambda$ is the capital share. Note that the linear production function in the stylized model is a specific case where $\lambda = 1$. Workers' wage in each location, W_j, is equal to their marginal product of labor and the capital price is equal the marginal product of capital in each location:

$$W_j = \lambda \theta_j K_j^{1-\lambda} L_j^{\lambda-1}$$

$$R_j^K = (1 - \lambda)\theta_j K_j^{-\lambda} L_j^{\lambda}$$

We assume that capital is perfectly mobile across locations and thus capital return is constant across space:

[13] Corporate tax rates in high-TFP cities may also be higher due to rent-seeking motives, which may further reduce capital allocation to high-productivity cities. As a result, the marginal labor productivity could endogenously become even lower.

$R_j^K = R^k$. Thus, the optimal capital level has the following relationship with labor supply:

$$K_j = \left(\frac{(1-\lambda)\theta_j}{R^K}\right)^{\frac{1}{\lambda}} L_j.$$

Since in each location j, there are two unknowns and two equations, we can solve for wage in j:

$$W_j = \theta_j^{\frac{1}{\lambda}} \lambda \left(\frac{1-\lambda}{R^K}\right)^{\frac{1-\lambda}{\lambda}}$$

This equation shows that with perfect capital mobility, the location-specific TFP is exactly captured by the location-specific wage, with some re-scaling.

5.1.2 Equilibrium Labor Supply, Output, and Welfare

After solving for the wage, we can derive the analytical expression for labor supply in each location j in equilibrium:

$$L_j = \left(\theta_j^{\frac{1+\gamma}{\lambda}} (1-\tau_j(\theta_j)) s_j(\theta_j)^\gamma A_j\right)^{\frac{1}{\sigma+\frac{\beta}{\eta_j}}} \Gamma,$$

where $\Gamma = \left(\left(\frac{L}{V}\right)^\sigma \left(\lambda \left(\frac{1-\lambda}{R^K}\right)^{\frac{1-\lambda}{\lambda}}\right)^{1+\gamma} R_0^{-\beta}\right)^{\frac{1}{\sigma+\frac{\beta}{\eta_j}}}$.[14]

Locations with higher productivity θ tend to attract a larger workforce due to higher wages. However, the allure of the productivity premium in location j is mitigated by several local factors. First, since the housing supply elasticity is not infinite, rents will adjust as more labor moves into location j. This reduces the pull of local productivity on the labor supply (especially when η_j is small). In addition to housing supply, if tax burden $\tau_j'(\theta_j) > 0$ and public good provision $s_j'(\theta_j) < 0$ due to government rent-seeking, these factors can further discourage workers from moving to locations with high θ_j.

The reduced flow of labor to locations with high θ_j would translate to subdued aggregate output:

$$Y = \sum_j \theta_j^{\frac{1+\frac{(1+\gamma)}{\sigma+\frac{\beta}{\eta_j}}}{\lambda}} \left((1-\tau_j(\theta_j))s_j(\theta_j)^\gamma A_j\right)^{\frac{1}{\sigma+\frac{\beta}{\eta_j}}} \left(\frac{1-\lambda}{R^K}\right)^{\frac{1-\lambda}{\lambda}} \Gamma$$

Without the consideration of taxes, the contribution of local productivity to aggregate output is tempered by migration frictions and housing supply constraints. However, if $\tau_j^{'}(\theta_j) > 0$ and $s_j^{'}(\theta_j) < 0$, the effect of local

[14] Appendix A5 shows the derivation procedure of the equilibrium labor supply equation.

productivity on total output would be further dampened, leading to a decrease in the aggregate output. The mitigating effect on the national output stems from the fact that labor is under-supplied to high-productivity locations compared with a scenario where $\tau_j^{'}(\theta_j) = 0$ and $s_j^{'}(\theta_j) = 0$. It is important to note that under our model's simplified assumption, the effect of government rent-seeking on national output is only through its correlation with local productivity. While a stronger government rent-seeking motive would lead to higher equilibrium levels of $\tau_j(\theta_j)$ and lower levels of $s_j(\theta_j)$, the average tax rates do not affect aggregate output. This is because our model does not account for individual labor supply choices given the location choice (e.g., whether to work or the working hours).

Lastly, we can derive the ex ante expected utility for national residents. This represents the expected utility for an average worker prior to the realization of the individual idiosyncratic preference ε_{ij}. This expected utility can serve as a measure of aggregate national welfare:

$$V = \sum_j \left(\theta_j^{\frac{1+\gamma}{\lambda}} (1 - \tau_j(\theta_j)) s_j(\theta_j)^{\gamma} A_j \right)^{\frac{1}{\sigma + \frac{\beta}{\eta_j}}} \Gamma^{-\frac{\beta}{\sigma \eta_j}} \left(\lambda \left(\frac{1-\lambda}{R^K} \right)^{\frac{1-\lambda}{\lambda}} \right)^{\frac{1+\gamma}{\sigma}} \left(R_0^{-\beta} \right)^{\frac{1}{\sigma}}$$

Without the consideration of taxes, the contribution of local productivity to utility is also dampened by migration frictions (larger σ) and housing supply constraints (smaller η_j). Unlike the effect on output, both the levels of taxes and public goods, and the ways $\tau_j(\theta_j)$ and $s_j(\theta_j)$ co-vary with θ_j affect utility. The intuition is that if rent-seeking leads to higher tax rates and lower public goods, utility levels will decline, even if these factors are not spatially correlated with local productivity.

5.1.3 Numerical Solutions for Government Decisions and Equilibrium Labor Supply

For the quantitative counterfactual analyses, we solve for the model equilibria numerically. The solution procedure is outlined as follows:

1. For each given set of θ_j, τ_j, and s_j values across locations, we solve for the spatial equilibrium in which each location j's labor supply (stemming from workers' location choices) equals to the labor demand (stemming from the marginal product of labor in location j), and housing market clears in each location j (with rents endogenized in the labor supply equation).

2. Given the equilibrium labor supply associated with each τ_j and s_j combination, we then solve for the governments' decision of τ_j by maximizing the value of government profit function described in

expression 11 and for s_j using equation 12.

5.2 Counterfactual Analyses

We conduct a series of counterfactual analyses to see how labor supply and aggregate outcomes would shift if local governments' rent-seeking motives were eliminated.

To do so, we first calibrate the model so that the model's predicted tax rates match the observed tax rates and the predicted tax rates vary with observed local productivity similarly to the observed pattern. Once the model is calibrated, in our counterfactual, we set $\delta = 0$, thus removing rent-seeking motives from governments' tax and public goods decisions. We then re-solve for the counterfactual equilibrium labor supply L_j^{cf}, aggregate productivity/output Y^{cf}, and welfare V^{cf}. By comparing Y^{cf} and V^{cf} with the baseline values Y and V, we quantitatively gauge the impact of government rent-seeking.

For these exercises, we consider each MSA as the geographic unit, denoted by index j. We define τ_j as the average tax rate faced by residents living in MSA j. The average tax rate is computed using the state and local governments' tax revenue (excluding corporate income tax) per capita relative to the average total income earned by workers living in the corresponding jurisdiction. This average tax rate for MSA residents is viewed as the state-level tax rate, weighted by county population if the MSA spans multiple states, plus the average county-level local tax rates for counties within the MSA, weighted by county population.

5.2.1 Calibrations

We calibrate the model so that its predictions for labor supply matches the observed labor supply in each location j and its predicted wages match the observed wages. Furthermore, the model's predicted τ_j matches the observed average tax rate and its relation with respect to local productivity θ_j matches the observed pattern. We calibrate some model parameters externally and others internally by matching key data moments.

Externally Calibrated Parameters We calibrate θ_j, η_j, β, and γ externally using data estimates, literature references, or plausible ranges. First, we calibrate labor productivity θ_j using the estimated log wage residual at the MSA level.[15] Second, the housing supply elasticity η_j is from Saiz (2010), which is also employed by Hsieh and Moretti (2019) for calibration. The housing expenditure share β is calibrated as 0.3 in the baseline exercise. Lastly, the fraction of expenditure on housing is shown to hover around 30%, though the number

[15] θ_j in the case of a Cobb-Douglas specification for the production function is calibrated using the equation $W_j = \theta_j^{\frac{1}{\lambda}} \lambda \left(\frac{1-\lambda}{R^K}\right)^{\frac{1-\lambda}{\lambda}}$.

has been rising in recent years (Bureau of Labor Statistics, 2020; Albouy et al., 2016). Notebaly, Diamond and Moretti (2023) show higher housing expenditure percentages among lower-income groups. Given these observations, we vary β to values between 0.1 and 0.6 in the Appendix (*results in progress*).

Calibrating preference for public goods γ is not straightforward. It is not measured by existing studies, nor is it directly identified from the data. Given potential government rent-seeking motives, observed tax rates could be a mix of genuine demand for public goods and government rent-seeking. For our analysis, we set γ to three values: 0, 0.31, and 0.416. Without rent-seeking, local tax would be $\tau_j = \frac{\gamma}{1+\gamma}$. Thus, these calibrations correspond to local tax rates of 0%, 3%, and 4%, respectively in the absence of rent-seeking motives. In the next subsection, we discuss why we cap the tax rate at 4%.

Internally Calibrated Parameters We calibrate A_j, σ, and δ internally to match key data moments. First, to calibrate the amenity A_j, we let the model's predicted labor supply for each location L_j match the observed location choice L_j^{data} in the data. The calibration relies on the idea of revealed preference: Given the calibrated preference for public goods, labor productivity, taxes and public goods, and housing supply elasticity, the only remaining determinant for location choice is A_j. Thus, observed location choices can be used to infer the spatial distribution of A_j.

Having identified A_j, we jointly calibrate workers' preference dispersion σ and the importance of rent-seeking motives δ to match the observed tax rates and the relationship between local tax rates τ_j and local productivity θ_j. The intuition behind the joint calibration is as follows: On the one hand, an increase in σ leads to reduced migration elasticities everywhere. As result, governments everywhere could raise tax rates and the wedge between taxes and public goods. This would increase the average tax rate but does not necessarily alter the relationship between tax rates and local productivity. On the other hand, an increase in δ amplifies government rent-seek. Governments then become more responsive to local utility shifters, including local productivity. As a result, a greater δ would both increase the average tax rate and enhance the correlation between local tax rates and local productivity.

Intuitively, to encapsulate both the average level of tax rates and the slope of local tax rates in relation to productivity, we can match the coefficients from the regression $\tau_j = \alpha_0 + \alpha_1 \hat{\theta}_j + \zeta_j$. However, we recognize that α_1 may capture the spurious relationship driven by omitted variables such as amenities and preferences for local public goods, which may be correlated with local productivity but are not included in our quantitative model.

To more accurately estimate the empirical analogues of the coefficients that our model reproduces, we control for additional local factors that could affect local tax rates and correlate with local productivity. Specifically, we control for measures of natural amenity: distance to sea shore $distshore_j$, mildness of weather $mild_j$ measured by(|January minimum degree $- 20°C| +$ |July maximum degree $- 20°C|)/2$, and annual precipitation $annpre$. To approximate heterogeneous preferences for public goods, we control for measures of local political preferences: the share of votes for Democratic and Republican Presidential candidates Dem_j and Rep_j, respectively. All the control variables are standardized so that they do not shift the magnitudes of α_0. We estimate the following equation using data for 2017:

$$\tau_j = \alpha_0 + \alpha_1 \hat{\theta}_j + \alpha_2 distshore_j + \alpha_3 mild_j + \alpha_4 annpre_j + \alpha_5 Dem_j + \alpha_6 Rep_j + \zeta_j.$$

In parallel to the empirical regression, we run the following regression using the model-predicted $\hat{\tau}_j^{model}$:

$$\hat{\tau}_j^{model} = \alpha_0^{model} + \alpha_1^{model} \hat{\theta}_j + \zeta_j^{model}.$$

The estimates of $\hat{\alpha}_0$ and $\hat{\alpha}_1$ are the key moments we match. We choose σ and δ so that $\hat{\alpha}_0^{model}$ and $\hat{\alpha}_1^{model}$ match $\hat{\alpha}_0$ and $\hat{\alpha}_1$, respectively.

Calibration Results Table 7 presents the calibrated parameters of our baseline model. We can see from the table that a higher calibrated γ results in a smaller σ. The intuition is that a larger γ indicates that residents have a more pronounced preference for local public goods. Consequently, the model interprets a larger fraction of observed local tax rates as reflecting a genuine demand for public goods (rather than government rent-seeking). However, a larger γ raises local tax rates everywhere and does not necessary cause a greater correlation between local tax rates and local productivity. Thus, to match the observed slope for local tax rates with respect to local productivity, δ also needs to be larger. However, a greater δ can overly elevate the average local tax rate. To reconcile this with the observed average tax rate, σ must be reduced.

At certain values of γ, σ will become unrealistically small. We cap γ at 0.0416 (implying a 4% local tax rate without government rent-seeking) because a larger γ would imply unrealistic values of σ to match the data. Note that even when $\gamma = 0$, the implied σ is still substantially smaller than 0.3, the calibration used by Hsieh and Moretti (2019). If we calibrate $\sigma = 0.3$, the model would either yield the average local tax rate considerably higher than observed or a substantially smaller slope for local tax rates with respect to local productivity. It is worth noting that the empirical coefficient α_1 might still suffer from upward bias, despite our controls. As a robustness check, we calibrate $\sigma = 0.3$ but only match α_0 while letting α_1 be untargeted to evaluate any changes in our counterfactual outcomes (*results in progress*).

5.3 Results

The counterfactual outcome in national output varies because we keep the national population constant in the baseline and the counterfactual. In each counterfactual exercise, we also adjust the distribution of housing supply elasticity η_j. This is to highly the interplay between government rent-seeking tax policies and local housing supply.

Table 8 Panel A shows the productivity and welfare results of our counterfactual exercises. Each row corresponds to a production function specification: The first row presents the results where firms have a linear production function in labor input: $Y_j = \theta_j L_j$ (namely the labor share $\lambda = 1$); the second row adopts the Cobb-Douglas production function $Y_j = \theta_j L_j^{\lambda} K_j^{1-\lambda}$, where the labor share is 0.7 ($\lambda = 0.7$). Each column corresponds to a particular calibration for public goods preference ($\gamma = 0, 0.031, 0.0416$).

Panel A presents the log difference in counterfactual national output and welfare setting $\delta = 0$ relative to the baseline case. Welfare is measured in terms of equivalent log income. Eliminating rent-seeking motives by setting $\delta = 0$ could boost the national output across different production function specifications and public goods preferences. The results suggest that rent-seeking behaviors by local government could curb national output by as much as 0.23 percentage point—a moderate but economically significant reduction. Depending on the production function specification and public goods preferences, the implied welfare cost due local government rent-seeking ranges from 5 to 12 percentage points.

We show that the increase in aggregate output is attributed to the correlation between the tax-public goods wedge and productivity. Panel B shows changes in log labor supply and log rents in high-, mid-, and low-productivity MSAs upon eliminating of rent-seeking. All MSAs are ranked by θ_j and the divided into three equal groups based on this ranking.[16] The results suggest that without rent-seeking motives, labor supply shifts towards the highest productivity MSAs, which drives the observed increase in national output.

Lastly, we highlight that the productivity and welfare gains resulting from the elimination of government rent-seeking enabled by productivity premiums are curtailed by spatial variations in housing supply elasticity. Since the most productive U.S. regions tend to exhibit low housing supply elasticity, any potential labor supply

[16] Panel B employs the Cobb-Douglas production function with labor share of 0.7 and $\gamma = 0.031$.

gains arising from reduced rent-seeking can be offset by rising housing rents, which weaken the recovery of labor supply. Therefore, potential gains from eliminating tax rate variations driven by productivity differences would be considerably larger if housing supply in these productive regions was more elastic. Similarly, the locations that benefit most from rent-seeking elimination also experience the steepest rent increases, which offset the welfare enhancements derived from eliminating government rent-seeking (*results examining the interplay between rent-seeking and local housing supply are in progress*).

6 Conclusion

This paper proposes and tests the hypothesis that the local productivity premium may enable state and local governments with rent-seeking motives to raise tax rates without increasing public goods provisions. By employing a spatial equilibrium model, we show that if a government maximizes net tax revenue, rather than the utility of local residents, its ability to extract rents from taxpayers depends on residents' migration elasticity with respect to the tax rate. The model reveals that the attractiveness of a location can mitigate residents' tendency to relocate, thereby weakening the disciplining force that prevents governments from extract excessive rents. The local productivity premium, which enhances the desirability of a location, can thus enable rent-seeking governments to raise taxes.

To validate the model's prediction, we begin with showing that cities and states with higher productivity experience higher average tax rates. However, we demonstrate that the positive relationship may also be driven by heterogeneous preferences for public goods or the presence of the Baumol effect, which arises when the demand for public goods is highly income elastic but price inelastic. In these scenarios, an increase in private-sector productivity can result in a greater allocation of tax revenue towards public goods, leading to a positive relationship between tax rates and productivity even in the absence of rent-seeking motives by governments.

To examine the presence of government rent-seeking and distinguish it from alternative explanations, we conduct additional tests. First, we show that there is a positive spatial correlation between the public-private wage gap and local private-sector productivity, controlling for various individual-level characteristics. The relationship is particularly strong in states where public-sector collective bargaining is legally permitted. Furthermore, we present evidence that the wage gap between local government workers and comparable private sector workers varies with state-level productivity, especially in areas where local governments rely more heavily on intergovernmental transfers from state governments.

Lastly, we calibrated the model and conduct various counterfactual analyses. The results suggest that the spatial variation in tax rates due to government rent-seeking enabled by local productivity premium leads to spatial misallocation of labor. The intuition is that the endogenous rent-seeking tax rates give rise to a positive correlation between local productivity and tax rates, resulting in a reduced number of workers willing to work in high-productivity locations. This spatial misallocation leads to a loss in aggregate output and welfare. Furthermore, we show that endogenous movement of capital can exacerbate the spatial misallocation.

It is worth noting that our paper has a few limitations. We employ a simple spatial equilibrium model to emphasize the role of migration elasticity as a crucial factor in restraining government rent-seeking behavior, and thus our model abstracts away from several key margins. First, we do not analyze how voters can potentially curb the rent-seeking power of local governments. Instead, we control for measures of local political preferences in the empirical analysis.

Second, we do not consider the traditional extensive and intensive margin responses of labor supply to local taxation, and assume that the primary adjustment mechanism for labor supply is through migration. In addition, we do not explicitly incorporate the presence of monopoly power in local labor markets, instead assuming that workers' wages are determined by the labor productivity. Furthermore, our framework does not account for other factors contributing to spatial variations in tax burdens, such as state and local tax deductions on federal income taxes. These omissions are important considerations for future research.

Lastly, our paper focuses on the period prior to the widespread adoption of remote work. The rise of remote work has the potential to alter the migration elasticity of workers in high-productivity locations. The taxation policies and public-sector wages in the decade or longer following the COVID-19 pandemic may begin to reflect the long-term changes in migration elasticity resulting from remote work. Our paper does not directly address this issue and we leave this important topic for future research.

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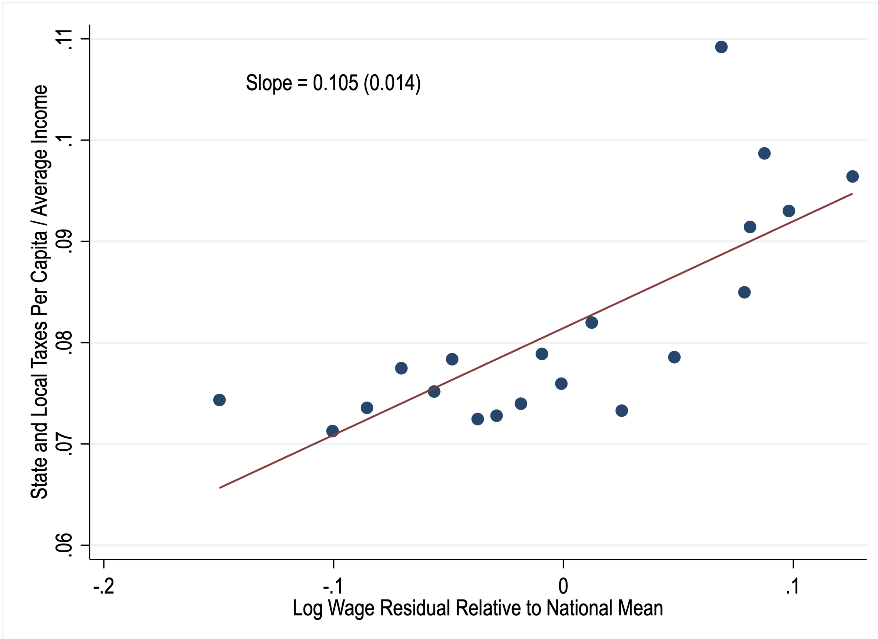
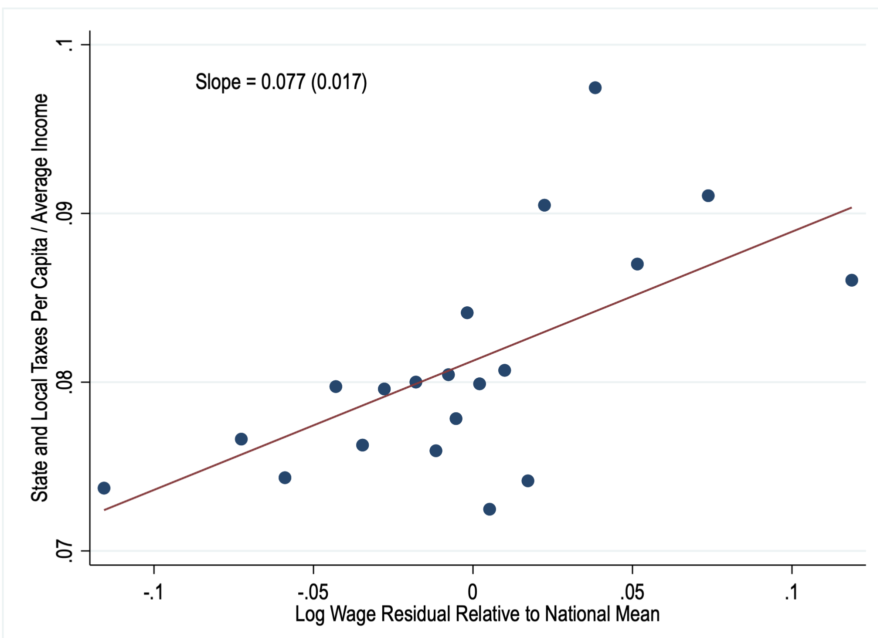
Figure 1: Per-Capita-Tax-to-Income Ratio Against State Wage Residual



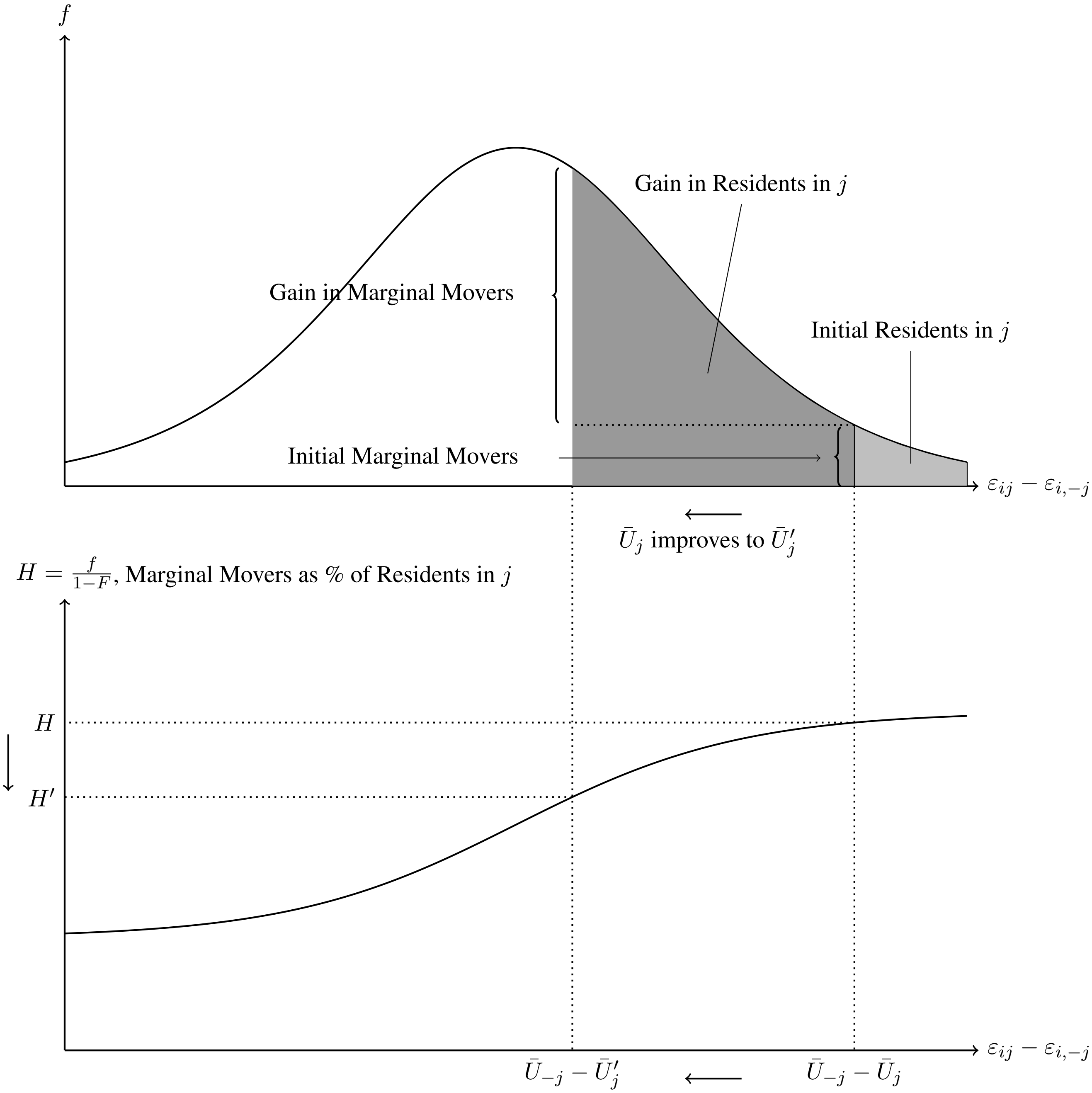
(a) Controls: Year FE



(b) Controls: Year FE, Amenity, and Political Preference

Note: This figure presents a binned scatter plot of the ratio of state-level total taxes per capita (levied by the state and local governments) to the state-level average income against the state's log wage residual relative to the national mean. State-level total taxes are from the Annual Survey of State and Local Government Finances for 1987, 1997, 2007, and 2017. We compute the state-level average income and log wage residuals using data from the CPS ASEC, pooling data from 1977–1989, 1990–1999, 2000–2009, and 2010–2019. Specifically, we restrict the sample to full-time workers aged from 25–65, excluding government employees. We compute the log wage residual separately for each period, controlling for indicators of workers' age, race, Hispanic origin, education, sex, marital status, occupation code, and industry code. We control for year fixed effects to generate the binned scatter plot. We further control for state amenity and political preference in Figure 1b.

Figure 2: Location Preferences and Marginal Movers



Note: The first plot is an analytical representation of a logistic distribution for $\varepsilon_{ij} - \varepsilon_{i,-j}$. We demonstrate how the population of residents in j and marginal movers between j and $-j$ would change if the mean utility for j increases from $\bar{U}_j$ to $\bar{U}'_j$. The area shaded in light grey, namely the area right of $\bar{U}_{-j} - \bar{U}_j$, represents the population of j initially. The area shaded in dark grey is the population that j would gain once the mean utility of j improves. The values of the pdf function at the cutoffs are the number of marginal movers in each scenario. The second plot is the corresponding value of the marginal movers as the fraction of residents in j – the pdf function divided by one minus the cdf function.

Table 1: Summary Statistics

Panel A: Annual Survey of State and Local Government Finances (1987, 1997, 2007, 2017)

	State Area: State and Local Gov			County Area: Local Gov		
	Obs.	Mean	SD	Obs.	Mean	SD
Total Taxes / Total Revenue	204	.392	.050	2942	.361	.116
Corporation Taxes / Total Taxes	204	.049	.027	2942	.002	.016
IG Transfers / Total Revenue	204	.289	.043	2942	.343	.099
Payroll Expenditure / Total Expenditure	204	.247	.044	2942	.360	.090
Tax Per Capita / Income	204	.081	.017	2942	.035	.033
Non-corporation Tax Per Capita / Income	204	.077	.016	2942	.035	.028
Non-payroll Expenditure Per Capita / Income	204	.150	.037	2942	.067	.061

Panel B: Current Population Survey (1977–2019)

	Private Sector Workers			Federal Gov Workers		
	Obs.	Mean	SD	Obs.	Mean	SD
Ln Hourly Wage	1575342	2.52	.805	92507	2.85	.648
Age	1575342	41.1	10.76	92507	42.8	10.52
Female	1575342	.423	.494	92507	.367	.482
Black	1575342	.103	.304	92507	.175	.380
Hispanic	1575342	.118	.323	92507	.074	.261
Share of Workers with High School Diploma	1575342	.232	.422	92507	.167	.373
Share of Workers with Some College	1575342	.256	.437	92507	.315	.465
Share of Workers with 4-year College or More	1575342	.279	.448	92507	.382	.486

	State Gov Workers			Local Gov Workers		
	Obs.	Mean	SD	Obs.	Mean	SD
Ln Hourly Wage	108670	2.64	.638	191149	2.62	.638
Age	108670	43.4	10.76	191149	43.32	10.53
Female	108670	.549	.498	191149	.566	.496
Black	108670	.137	.344	191149	.132	.338
Hispanic	108670	.066	.249	191149	.079	.270
Share of Workers with High School Diploma	108670	.143	.350	191149	.143	.351
Share of Workers with Some College	108670	.223	.417	191149	.212	.409
Share of Workers with 4-year College or More	108670	.526	.499	191149	.519	.500
Share of Workers under Collective Bargaining	102095	.638	.481	184535	.693	.461

Note: Panel A presents summary statistics on government revenue and expenditures from the Annual Survey of State and Local Government Finances for 1987, 1997, 2007, and 2017. The first three columns present state area summary statistics, aggregating the relevant revenue and expenditure of the state government and local governments within the state. The last three columns present county area summary statistics, aggregating the relevant revenue and expenditure of local governments within the county. Panel B presents summary statistics separately for private sector workers, federal government workers, state government workers, and local government workers in the CPS from 1977–2019. The sample is restricted to workers aged from 25–65 working at least 35 hours per week, having positive wage income, and whose wages are not imputed. The hourly wages are deflated by the CPI from use CPS and reported in real 1999 dollars. We match the CPS data with public sector collective bargaining laws by state and year to construct a dummy for whether collective bargaining is allowed for state or local government workers.

Table 2: State and Local Government Finances

Variables	Ln (Total Tax Rev Pc / Income) (1)	Ln (Non-Corp Tax Pc / Income) (2)	Log (Non-Tax Rev Pc / Income) (3)	Log (Non-Payroll Exp Pc / Income) (4)
Panel A: State Area Regressions (State and Local Governments)				
Log Wage Res	1.194***	1.109***	0.0546	0.527
	(0.346)	(0.328)	(0.631)	(0.522)
Observations	204	204	204	204
R-squared	0.358	0.358	0.310	0.386
Panel B: County Area Regressions (Local Governments)				
Log Wage Res	1.304***	1.276***	-0.901***	-0.0547
	(0.195)	(0.185)	(0.195)	(0.189)
Observations	2,942	2,942	2,942	2,938
R-squared	0.510	0.514	0.458	0.441

Note: Panel A presents the results of state-level regressions. Each observation is a state-year. The dependent variable is the log ratio of total tax per capita to average income, log ratio of non-corporation tax per capita to average income, log ratio of total non-tax revenue per capital to average income, and log ratio of total non-payroll expenditure per capita to average income. The government revenue and expenditure are those of both state and local governments, summed up at the state level, using the Annual Survey of State and Local Government Finances for 1987, 1997, 2007, and 2017. The average income is estimated using the personal total annual income from the CPS ASEC, pooling data from 1977–1989, 1990–1999, 2000-2009, and 2010–2019 to match the government surveys. To compute the state-level log wage residuals, we use the sample of full-time private sector workers aged from 25-65 from the CPS ASEC, controlling for indicators of workers' age, sex, race, Hispanic origin, marital status, education, occupation, and industry. State-level population is used as the analytical weight. Panel B presents the results of county-level regressions. Each observation is a county-year. The dependent variables are defined same as in Panel A, but government revenue and expenditure are those of local governments, summed up at the county level. The average income and log wage residuals are computed at the MSA level. County-level population is used as the analytical weight. Standard errors are clustered at the state level for panel A and MSA level for panel B. *** $p < 0.01$, ** $p < 0.05$, *$p < 0.1$.

Table 3: Relationship between Public Goods and Wage Premiums

Variables	Ln Percent of Acceptable Road Condition		Ln Teacher-Student Ratio		Ln Arrest Rate	
	(1)	(2)	(3)	(4)	(5)	(6)
Ln Wage Res	-1.407***	-1.009**	-0.147***	-0.170***	-0.418**	0.0964
	(0.349)	(0.451)	(0.0437)	(0.0416)	(0.185)	(0.196)
Observations	152	138	2,819	2,634	2,774	2,588
R-squared	0.304	0.559	0.798	0.794	0.380	0.415
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
State FE	No	No	Yes	Yes	Yes	Yes
Demographics, Amenities, Housing Supply, and Politics	No	Yes	No	Yes	No	Yes

Note: The dependent variable is log percent of acceptable road condition by state for 1997, 2007, and 2017 in columns 1–2, log teacher-student ratio by county for 1987, 1997, 2007, and 2017 in columns 3–4, and log arrest rate by county for 1987, 1997, 2007, and 2017 in columns 5–6. Each observation is a state-year in columns 1–2 and county-year in columns 3–6. The key independent variable is state-level log wage residuals in columns 1–2 and MSA-level log wage residuals in columns 3–6. To compute the log wage residuals, we use the sample of full-time private sector workers aged from 25–65 from the CPS ASEC, controlling for indicators of workers' age, sex, race, Hispanic origin, marital status, education, occupation, and industry. Column 1 controls for year fixed effects, and column 2 further controls for state-level characteristics, including average age, college share, high school share, proximity to the lake and sea shore, average of the January and July temperature (relative to 20 degree Celsius), annual precipitation, land unavailability, the share of votes for the Democratic Party and the Republican Party respectively, and the state governors' party affiliation dummy. Columns 3 and 5 control for state and year fixed effects. Columns 4 and 6 further control for MSA-level characteristics. Regressions are weighted by state-level population in columns 1–2, county-level student population in columns 3–4, and county-level population in columns 5–6. Standard errors are clustered at the state level in columns 1–2 and MSA level in columns 3–6. *** $p < 0.01$, ** $p < 0.05$, *$p < 0.1$.

Table 4: Public-Private Sector Wage Gaps

Panel A: Across-State Wage Premiums

Variable	Ln Wage	
	(1)	(2)
Ln Wage Res	1.153***	1.198***
	(0.0820)	(0.0791)
Public × Ln Wage Res	0.416***	-0.356**
	(0.113)	(0.140)
Definition of "Public"	State	Federal
Observations	1,683,994	1,667,836
R-squared	0.360	0.365

Panel B: Across-MSA Wage Premiums

Variable	Ln Wage				
	(1)	(2)	(3)	(4)	(5)
Ln Wage Res	0.952***	0.982***	0.958***	1.023***	1.016***
	(0.0334)	(0.0273)	(0.0779)	(0.0264)	(0.0280)
Public × Ln Wage Res	0.186*	-0.263***	-0.504***	-0.746***	-0.298*
	(0.110)	(0.0938)	(0.193)	(0.0674)	(0.163)
Public × Ln Wage Res			1.195*		
× Rev Share of Taxes			(0.711)		
State Ln Wage Res		0.00125	-0.0497	0.0394	0.0566
		(0.0570)	(0.124)	(0.0490)	(0.0507)
Public × State Ln Wage Res		0.884***	0.406*	1.249***	-0.104
		(0.129)	(0.245)	(0.106)	(0.0978)
Public × State Ln Wage Res			1.188*		
× Rev Share of State Transfer			(0.688)		
Definition of "Public"	Local	Local	Local	State	Federal
Observations	1,202,137	1,202,137	1,146,471	1,145,621	1,146,901
R-squared	0.372	0.372	0.373	0.373	0.377

Note: The sample consists of workers aged from 25–65 working at least 35 hours per week from the CPS ASEC from 1977–2019. The data are pooled into four periods: 1977–1989, 1990–1999, 2000-2009, and 2010–2019. In each column, the sample is restricted to private sector workers and public sector workers, where the definition of "public" sector workers is either federal, state, or local government workers, indicated in each column. *Public* is an indicator for public sector workers. In Panel A, *Ln Wage Res* denotes state-level log wage residuals. In Panel B, *Ln Wage Res* denotes MSA-level log wage residuals, with specifications in columns 2–4 further controlling for state-level log wage residuals. Log wage residuals are computed by controlling for dummies for workers' age, sex, race, Hispanic origin, marital status, education, occupation, and industry. *Rev Share of Taxes* is the fraction of the total revenue of local governments within each MSA that comes from taxation. *Rev Share of State Transfer* is the fraction of the total revenue of local governments within each MSA that comes from transfers from the corresponding state government. All regressions control for dummies for age, sex race, Hispanic origin, marital status, education, and the interaction between government worker dummy and occupation. All regressions are weighted using the CPS ASEC earnings weights. Standard errors are clustered at the state level in Panel A and MSA level in Panel B. *** $p < 0.01$, ** $p < 0.05$, *$p < 0.1$.

Table 5: Public-Private Sector Wage Gaps:
Collective Bargaining Legality

Panel A: Across-State Wage Premiums			
Variable	Ln Wage		
	(1)	(2)	
Public × Ln Wage Res	-0.167*	0.0212	
	(0.0935)	(0.193)	
Public × Collective Bargaining × Ln Wage Res	0.633***	-0.485**	
	(0.148)	(0.233)	
Definition of "Public"	State	Federal	
Observations	1,624,773	1,603,020	
R-squared	0.361	0.365	
Panel B: Across-MSA Wage Premiums			
Variable	Ln Wage		
	(1)	(2)	(3)
Public × Ln Wage Res	-0.157	-0.601***	-0.128
	(0.151)	(0.0958)	(0.153)
Public × Collective Bargaining × Ln Wage Res	0.305*	-0.213*	-0.352***
	(0.182)	(0.126)	(0.120)
Public × State Ln Wage Res		0.415***	0.0604
		(0.109)	(0.117)
Public × Collective Bargaining × State Ln Wage Res		0.989***	-0.102
		(0.159)	(0.167)
Definition of "Public"	Local	State	Federal
Observations	1,166,564	1,110,399	1,146,901
R-squared	0.372	0.373	0.377

Note: The sample consists of workers aged from 25–65 working at least 35 hours per week from the CPS ASEC from 1977–2019. The data are pooled into four periods: 1977–1989, 1990–1999, 2000-2009, and 2010–2019. In each column, the sample is restricted to private sector workers and public sector workers; the definition of "public" sector workers is either federal, state, or local government workers, indicated in each column. *Private* is an indicator for public sector workers included in each column. In Panel A, *Ln Wage Res* denotes state-level log wage residuals. *Collective Bargaining* is an indicator that the state permits collective bargaining of state government workers. In Panel B, *Ln Wage Res* denotes MSA-level log wage residuals, with specifications in columns 2–4 further controlling for state-level log wage residuals. *Collective Bargaining* is an indicator for legal collective bargaining of local government workers in column 1, legal collective bargaining of state government workers in column 2, and legal collective bargaining of either local or state government workers in column 3. Log wage residuals are computed by controlling for dummies for workers' age, sex, race, Hispanic origin, marital status, education, occupation, and industry. All regressions control for dummies for age, sex race, Hispanic origin, marital status, education, and the interaction between government worker dummy and occupation. All regressions are weighted using the CPS ASEC earnings weights. Standard errors are clustered at the state level in Panel A and MSA level in Panel B. *** $p <$ 0.01, ** $p <$ 0.05, *$p <$ 0.1.

Table 6: State and Local Government Defined Benefit Pensions

Variable	Ln (Benefit Per Beneficiary / Income)		Ln (Gov Contribution Per Member / Income)	
	(1)	(2)	(3)	(4)
Panel A: State Area Regressions (State and Local Governments)				
Ln Wage Res	0.969***	-0.546	2.724***	
	(0.318)	(0.993)	(0.637)	
Ln Wage Res $_{t-10}$		1.426*		
		(0.823)		
Observations	204	153	204	
R-squared	0.460	0.287	0.295	
Panel B: County Area Regressions (Local Governments)				
Ln Wage Res	-0.896	-1.231	1.580**	0.101
	(0.875)	(0.884)	(0.801)	(1.009)
State Ln Wage Res		-0.834		2.863***
		(2.099)		(1.036)
Ln Wage Res $_{t-10}$	1.382*	0.511		
	(0.808)	(0.570)		
State Ln Wage Res $_{t-10}$		3.155*		
		(1.606)		
Observations	817	817	1,201	1,201
R-squared	0.113	0.188	0.214	0.245

Note: Panel A presents the results of state-level regression. Each observation is a state-year. The dependent variable is the log ratio of benefit per beneficiary to average income and log ratio of government pension contribution per member to average income. The pension benefit and government contribution are those of both state and local governments, summed up at the state level, using data are from the Annual Survey of Public Pensions for 1987, 1998, 2007, and 2017. The average income is estimated using the personal total annual income from the CPS ASEC, pooling data from 1977–1989, 1990–1999, 2000–2009, and 2010–2019 to match the government surveys. To compute the state-level log wage residuals, we use the sample of full-time private sector workers aged from 25–65 from the CPS ASEC, controlling for dummies for workers' age, sex, race, Hispanic origin, marital status, education, occupation, and industry. State-level total number of beneficiaries is used as the analytical weight in columns 1–2 and state-level total number of pension members is used as the analytical weight in column 3. Panel B presents the results of county-level regressions. Each observation is a county-year. The dependent variables are defined same as in Panel A, but pension benefit and government contribution are those of local governments, summed at the county level. The average income and log wage residuals are computed at the MSA level. County-level total number of beneficiaries is used as the analytical weight in columns 1–2 and county-level total number of pension members is used as the analytical weight in columns 3–4. Standard errors are clustered at the state level in Panel A and MSA level in Panel B. *** $p < 0.01$, ** $p < 0.05$, *$p < 0.1$.

Table 7: Parameter Calibration

	Externally Calibrated Parameters		
β	0.3		
η_j	Estimates from Saiz (2010)		
θ_j	Estimates from CPS		
γ	0, 0.031, 0.0416		
	Internally Calibrated Parameters		
	$\lambda = 1$		
	$\gamma = 0$	$\gamma = 0.031$	$\gamma = 0.0416$
σ	0.12	0.06	0.04
δ	0.62	0.66	0.69
	$\lambda = 0.7$		
	$\gamma = 0$	$\gamma = 0.031$	$\gamma = 0.0416$
σ	0.10	0.05	0.04
δ	0.61	0.66	0.7

Table 8: Counterfactual Productivity and Welfare, Removing Rent-Seeking Motives

Panel A: Aggregate Output and Welfare Effects						
	$\Delta \ln Y$			$\Delta \ln V$ (Ln income equiv.)		
	$\gamma = 0$	$\gamma = 0.031$	$\gamma = 0.042$	$\gamma = 0$	$\gamma = 0.031$	$\gamma = 0.042$
$\lambda = 1$	0.0022	0.0013	0.00086	0.1184	0.1098	0.1005
$\lambda = 0.7$	0.0023	0.0020	0.0019	0.1166	0.0594	0.0473
Panel B: Labor Supply and Housing Rent Effects						
	$\Delta \ln L_j$			Δr_j		
	High θ_j	Mid θ_j	Low θ_j	High θ_j	Mid θ_j	Low θ_j
$\lambda = 0.7, \gamma = 0.042$	0.0121	-0.0147	-0.0390	0.0244	0.0083	-0.0090

Note: Panel A shows the productivity and welfare effects of the counterfactual exercises. Each row represents a production function specification. The first row assumes that production is linear in labor input ($\lambda = 1$), while the second row assumes a Cobb-Douglas production function where the labor share is 0.7 ($\lambda = 0.7$). Each column represents a specific calibration of γ– preference for public goods. The values represent the log change in counterfactual national output ($\delta = 0$) and welfare vis-a-vis the baseline. The welfare unit is calculated as the equivalent of log income. Panel B shows the changes in log labor supply and log rents in high-, mid-, and low-productivity cities. We rank all cities (MSAs) by θ_j and cut them into three equal groups based on the ranking. Panel B uses the Cobb-Douglas production function with labor share of 0.7 and $\gamma = 0.031$.

Appendix

A1 The Model Setup under Property Tax Regime

The baseline setup of the rent-seeking government problem assumes that the taxes are levy from income tax. In this section, we demonstrate that the income taxation in the context of studying rent-seeking local government is generalizable. To do so, we analyze an alternative setup for the government problem where taxes are levied from property tax.

The local government in location j collects property taxes from local residents by the tax rate τ_j and provide local public goods worth g_j back to all local residents in its jurisdiction.

The profit that the government can extract is as follows:

$$\pi_j = \tau_j \alpha R_j L_j - g_j L_j.$$

where α is the price rent ratio and τ_j the fraction of the value of the property collected as property taxes.

The government maximizes its rent by choosing the tax rate τ_j and the provision of local public good g_j. By the taking the first-order condition (FOC), we arrive at the following conditions:

$$\alpha R_j L_j + \tau_j \alpha \left(\frac{\partial R_j}{\partial \tau_j} L_j + R_j \frac{\partial L_j}{\partial \tau_j} \right) - g_j \frac{\partial L_j}{\partial \tau_j} = 0$$

$$\tau_j \alpha \left(\frac{\partial R_j}{\partial g_j} L_j + R_j \frac{\partial L_j}{\partial g_j} \right) - L_j - g_j \frac{\partial L_j}{\partial g_j} = 0$$

A1.1 Tax Markup

The first FOC condition can be rewritten as the following:

$$1 + \frac{\partial R_j}{\partial \tau_j} \frac{\tau_j}{R_j} + \frac{\partial L_j}{\partial \tau_j} \frac{\tau_j}{L_j} - \frac{g_j}{\alpha R_j \tau_j} \frac{\partial L_j}{\partial \tau_j} \frac{\tau_j}{L_j} = 0$$

We denote the per-resident local public expenditure as a fraction of the local property value, $s_j = \frac{g_j}{\alpha R_j}$.

Then the FOC condition becomes the following:

$$1 + \varepsilon_{R,\tau,j} + \varepsilon_{L,\tau,j} - \frac{s_j}{\tau_j} \varepsilon_{L,\tau,j} = 0$$

where $\varepsilon_{L,\tau,j}$ is local population elasticity with respect to local tax rate and $\varepsilon_{R,\tau,j}$ is the local rent elasticity with respect to local tax rate.

Rearranging the expression, we arrive at the following expression:

$$\frac{\tau_j - s_j}{\tau_j} = -\frac{1 - \varepsilon_{R,\tau,j}}{\varepsilon_{L,\tau,j}}.$$

The result is very similar to the baseline model where tax markup decreases if the absolute size of the tax base/population elasticity increases. In addition to the migration elasticity, the local rent response could act as a further disciplining force preventing the local government from extracting rent.

A1.2 Local Public Good Provision

To derive the condition for local public good provision, we similarly combine the first and the second FOCs. To demonstrate the equilibrium choice of s_j, we again assume that the population L_j is given by a logit specification where worker of type k derive normalized mean utility U_j. Denote P_j as the choice probability of workers choosing location j. Hence, $L_j = LP_j$, where L is the total number of workers nationwide. Based on these assumption, the following equation must hold:

$$(\tau_j - s_j)\left(\frac{\partial L_j}{\partial \tau_j} + \frac{\partial L_j}{\partial s_j}\right) + \frac{\tau_j L_j}{R_j}\left(\frac{\partial R_j}{\partial \tau_j} + \frac{\partial R_j}{\partial s_j}\right) = 0$$

or

$$(\tau_j - s_j)\frac{\partial L_j}{\partial \tau_j} + \frac{\tau_j L_j}{R_j}\frac{\partial R_j}{\partial \tau_j} = -(\tau_j - s_j)\frac{\partial L_j}{\partial s_j} - \frac{\tau_j L_j}{R_j}\frac{\partial R_j}{\partial s_j}$$

A2 Migration Elasticity and Its Relation to Local Productivity

In this section, we provide the derivation of the migration elasticity $\varepsilon_{L,\tau,j}$ and how it depends on local productivity θ_j.

We start with the location choice equation:

$$U_{ij} = w_j + \ln(1 - \tau_j) - \beta r_j + a_j + \gamma \ln(g_j) + \sigma \varepsilon_{ij}.$$

and

$$L_j = LP_j = L\frac{\exp\left(\bar{U}_j/\sigma\right)}{\sum_{j'}\exp\left(\bar{U}_{j'}/\sigma\right)}$$

To derive the migration elasticity, we need to first arrive at the expression for $\frac{\partial L_j}{\partial \tau_j}$. If we totally differentiate L_j with respect to τ_j, we must apply the chain rule on the L_j terms that also appear on the right-hand side:

$$\frac{\partial L_j}{\partial \tau_j} = \frac{1}{\sigma}LP_j\left(1-P_j\right)\left(-\frac{1}{1-\tau_j} - \left(1-\lambda+\frac{\beta}{\eta_j}\right)\frac{1}{L_j}\frac{\partial L_j}{\partial \tau_j}\right)$$

By combining $\frac{\partial L_j}{\partial \tau_j}$ to the left-hand side, we arrive at the following:

$$\frac{\partial L_j}{\partial \tau_j} = -\frac{L_j\left(1-P_j\right)}{\sigma\left(1-\tau_j\right)}\underbrace{\frac{1}{1+\frac{1}{\sigma}\left(1-P_j\right)\left(1-\lambda+\frac{\beta}{\eta_j}\right)}}_{\Lambda_j}$$

Once we have the equilibrium effect $\frac{\partial L_j}{\partial \tau_j}$, the migration is just the following:

$$\varepsilon_{L,\tau,j} = \frac{\partial L_j}{\partial \tau_j}\frac{\tau_j}{L_j} = -\frac{\left(1-P_j\right)\tau_j}{\sigma\left(1-\tau_j\right)}\Lambda_j$$

A3 Government Tax Rate and Local Public Good Provision

In this section, we provide derivation of tax rates and local public good provision set by a rent-seeking government and a benevolent government.

A3.1 Rent-Seeking Government

We start with the following two equations, which τ_j^* and s_j^* must satisfy:

$$\frac{\tau_j^* - s_j^*}{\tau_j^*} = -\frac{1}{\varepsilon_{L,\tau,j}}$$

$$\frac{\partial \bar{U}_j}{\partial s_j} = -\frac{\partial \bar{U}_j}{\partial \tau_j}.$$

The second equation implies that:

$$\tau_j^* = 1 - \frac{s_j^*}{\gamma}$$

Plugging this relationship into the tax markup equation, we get the following expressions:

$$\tau_j^* = \frac{\varepsilon_{L,\tau,j}\gamma}{1 + \varepsilon_{L,\tau,j} + \varepsilon_{L,\tau,j}\gamma}$$

$$s_j^* = \frac{\varepsilon_{L,\tau,j}\gamma + \gamma}{1 + \varepsilon_{L,\tau,j} + \varepsilon_{L,\tau,j}\gamma}$$

A3.2 Benevolent Government

For a benevolent government, $\tau_j = s_j$. But the marginal utility of s_j still needs to equal to marginal utility cost of τ_j. Therefore, the followin equation must hold:

$$\tau_j^{benev} = 1 - \frac{\tau_j^{benev}}{\gamma}$$

This implies that

$$\tau_j^{benev} = s_j^{benev} = \frac{\gamma}{1+\gamma}.$$

A4 Baumol Effect - Government Sector and Private Sector

A4.1 Free Labor Mobility Between Sectors

In this alternative setup, each location has two sectors: the government sector where local public goods are produced and the private sector where numeraire goods are produced.

Production function of the government sector:

$$G_j = aL_{g,j}^{\lambda}$$

Private sector production function:

$$Y_j = \theta_j L_{p,j}$$

Notice that productivity of local public goods is constant across locations.

The first-order condition of the private sector yields:

$$W_j = \theta_j$$

Since labor is freely mobile between the two sectors, wage is equalized across the sectors.

For the government sector, the equilibrium price of local public good is p_j. Therefore, the government sector's optimization problem would yield:

$$W_j = p_j a \lambda L_{g,j}^{\lambda-1}$$

This will, in turn, imply that:

$$L_{g,j} = \left(\frac{p_j a \lambda}{\theta_j}\right)^{\frac{1}{1-\lambda}}$$

and

$$G_j = a\left(\frac{p_j a \lambda}{\theta_j}\right)^{\frac{\lambda}{1-\lambda}}$$

G_j is thus the supply function of government-provisioned local public goods.

Consistent with the key features of the Baumol effect, we assume that local public good is income-elastic and price-inelastic:

$$G_j^d = L_j W_j^b p_j^{-\varepsilon}$$

where $b > 1$ and ε is very small.

Setting the demand for government-provisioned public goods with the supply, we can solve out the price for public goods:

$$p_j = \left(\frac{L_j \theta_j^b}{a}\right)^{\frac{1-\lambda}{\lambda+\varepsilon(1-\lambda)}} \left(\frac{\theta_j}{a\lambda}\right)^{\frac{\lambda}{\lambda+\varepsilon(1-\lambda)}}$$

and if we take ε to a very small number — $\varepsilon \to 0$, the market value of the local public goods would become:

$$p_j G_j = C L_j^{\frac{1}{\lambda}} \theta_j^{\frac{b}{\lambda}+1}$$

Thus, the total spending on public goods as a fraction of local aggregate income (tax rates set by benevolent government without government rent-seeking motives) should be increasing with local productivity θ_j:

$$\tau_j^{benev} = C L_j^{\frac{1-\lambda}{\lambda}} \theta_j^{\frac{b}{\lambda}}$$

This is classical prediction of the Baumol effect where under the assumption free mobility, high income-elasticity and low price-elasticity for public goods, higher private-sector productivity would lead to an increased size, cost, and expenditure share on public goods.

A4.2 Restricted Labor Mobility to and from Government Sector

Since we have found that public-private wage gap is rarely zero and often positive, we need to contend with the possibility that state and local government employment may not be mobile. Prior research has shown that government workers tend to have more job stability and hiring also tends to be a lot less flexible (Kopelman and Rosen, 2016).

If we restrict labor mobility between the public and private sectors, it is possible that higher productivity in private sector would not only lead to higher cost and expenditure share on public goods but also larger public-private wage gap. Below we demonstrate why.

We inherit the all the assumptions regarding the public and private sectors from the previous free-mobility section, except that public-sector labor supply is fixed at $\bar{L}_{g,j}$ and cannot adjust based on local θ_j.

With restricted labor mobility, wages are no longer equalized across sectors. We denote $W_{p,j}$ as the private-sector wage and $W_{g,j}$ as the public-sector wage.

Private-sector wage is still set such that $W_{p,j} = \theta_j$. But public-sector wage must be determined based on market clearing condition for public goods.

First, we write out the profit condition for public good production:

$$p_j a \bar{L}_{g,j} - W_{g,j} \bar{L}_{g,j}$$

Under the assumption of a benevolent government, profit should be zero. By setting the above equation to zero, we can solve for public-sector wage as a function of the price of public goods:

$$W_{g,j} = p_j a$$

And since labor supply to public sector is fixed, the provision of public good is also fixed:

$$G_j = a \bar{L}_{g,l}^{\lambda}$$

The market clearing condition for public good will yield:

$$p_j = \left(\frac{L_j W_{p,j}^b}{a \bar{L}_{g,j}} \right)^{\frac{1}{\varepsilon}}$$

and

$$W_{g,j} = a \left(\frac{L_j W_{p,j}^b}{a \bar{L}_{g,j}} \right)^{\frac{1}{\varepsilon}}$$

Thus, the public-private wage gap can written as the following:

$$\frac{W_{g,j}}{W_{p,j}} = a \left(\frac{L_j}{a \bar{L}_{g,j}} \right)^{\frac{1}{\varepsilon}} \theta_j^{\frac{b-\varepsilon}{\varepsilon}}$$

Thus, if ε is small enough such that $\varepsilon < b$, the public-private wage gap should increase with local productivity.

A5 Labor Supply, Aggregate Output and Welfare

In this section, we provide the derivations of the equilibrium labor supply as a function of local taxation. In turn, we use the labor supply solutions to construct the expressions for aggregate output and aggregate welfare.

A5.1 Generalized Problem for Local Governments

We write down the first-order condition for the rent-seeking government with respect to local public goods provision:

$$\tau_j \frac{\partial B_j}{\partial s_j} - B_j - W_j s_j \frac{\partial L_j}{\partial s_j} = 0$$

We can rewrite the equation by applying the logistic location choice specification:

$$\tau_j W_j L_j (1 - P_j) \frac{\gamma}{s_j \sigma} - B_j - s_j W_j L_j (1 - P_j) \frac{\gamma}{s_j \sigma} = 0$$

Further simplification leads to:

$$\tau_j (1 - P_j) \frac{\gamma}{s_j \sigma} - 1 - s_j (1 - P_j) \frac{\gamma}{s_j \sigma} = 0$$

$$(\tau_j - s_j)(1 - P_j)\frac{\gamma}{s_j\sigma} = 1$$

$$(\tau_j - s_j)\frac{1 - P_j}{\sigma}\gamma = s_j$$

$$\tau_j\frac{1 - P_j}{\sigma}\gamma = s_j(1 + \frac{1 - P_j}{\sigma}\gamma)$$

$$s_j = \frac{\tau_j((1 - P_j)/\sigma)\gamma}{1 + ((1 - P_j)/\sigma)\gamma}$$

Plugging in the solution for the profit-maximizing public good provision, we can derive the profit value function:

$$\Pi(\tau_j) = \frac{\tau_j B_j}{1 + ((1 - P_j)/\sigma)\gamma}.$$

Therefore, at the first stage, the government would solve the following maximization problem:

$$\max_{\tau_j} \delta\frac{\tau_j B_j}{1 + ((1 - P_j)/\sigma)\gamma} + (1 - \delta)\iota\left(\ln(1 - \tau_j) + \gamma\ln(\tau_j)\right)$$

In equilibrium, the expected public good provision is

$$s^* = \frac{\tau_j^*(1 - \delta + ((1 - P_j)/\sigma)\gamma)}{1 + ((1 - P_j)/\sigma)\gamma}$$

A5.2 Labor Supply

We start with workers' labor supply equation:

$$L_j = LP_j = L\frac{\exp\left((w_j + \ln(1 - \tau_j) - \beta r_j + a_j + \gamma\ln(g_j))/\sigma\right)}{\sum_{j'}\exp\left((w_{j'} + \ln\left(1 - \tau_{j'}\right) - \beta r_{j'} + a_{j'} + \gamma\ln(g_{j'}))/\sigma\right)}$$

We re-write the labor supply equation using levels:

$$L_j = L\frac{\left(W_j\left(1 - \tau_j(\theta_j)\right)R_j^{-\beta}A_j g_j^{\gamma}\right)^{\frac{1}{\sigma}}}{V}$$

where $V=\sum_j\left(W_j\left(1-\tau_j(\theta_j)\right)R_j^{-\beta}A_jg_j^{\gamma}\right)^{\frac{1}{\sigma}}$

We expand the expressions for the endogenous price variables $W_j = W_j = \theta_j^{\frac{1}{\lambda}}\lambda\left(\frac{1-\lambda}{R^K}\right)^{\frac{1-\lambda}{\lambda}}$ and $R_j = R_0L_j^{\frac{1}{\eta_j}}$. Plugging these in, we can write down the labor supply equation as follows:

$$L_j=\left(\theta_j^{\frac{1+\gamma}{\lambda}}\left(\lambda\left(\frac{1-\lambda}{R^K}\right)^{\frac{1-\lambda}{\lambda}}\right)^{1+\gamma}(1-\tau_j(\theta_j))s_j(\theta_j)^{\gamma}L_j^{-\frac{\beta}{\eta_j}}A_j\left(\frac{L}{V}\right)^{\sigma}R_0^{-\beta}\right)^{\frac{1}{\sigma}}$$

Next, we move the L_j term to the left-hand side:

$$L_j^{\frac{\sigma+\frac{\beta}{\eta_j}}{\sigma}}=\left(\theta_j^{\frac{1+\gamma}{\lambda}}\left(\lambda\left(\frac{1-\lambda}{R^K}\right)^{\frac{1-\lambda}{\lambda}}\right)^{1+\gamma}(1-\tau_j(\theta_j))s_j(\theta_j)^{\gamma}A_j\left(\frac{L}{V}\right)^{\sigma}R_0^{-\beta}\right)^{\frac{1}{\sigma}}$$

This would lead to the final equilibrium expression for labor supply:

$$L_j=\left(\theta_j^{\frac{1+\gamma}{\lambda}}(1-\tau_j(\theta_j))s_j(\theta_j)^{\gamma}A_j\right)^{\frac{1}{\sigma+\frac{\beta}{\eta_j}}}\underbrace{\left(\left(\frac{L}{V}\right)^{\sigma}\left(\lambda\left(\frac{1-\lambda}{R^K}\right)^{\frac{1-\lambda}{\lambda}}\right)^{1+\gamma}R_0^{-\beta}\right)^{\frac{1}{\sigma+\frac{\beta}{\eta_j}}}}_{\Gamma}.$$

A5.3 Aggregate Output

We start with the production function:

$$F_j=\theta_jL_j^{\lambda}K_j^{1-\lambda}$$

The national output is just the sum of the production across the country.

$$Y=\sum_j\theta_j^{\frac{1+\frac{(1+\gamma)}{\sigma+\frac{\beta}{\eta_j}}}{\lambda}}\left((1-\tau_j(\theta_j))s_j(\theta_j)^{\gamma}A_j\right)^{\frac{1}{\sigma+\frac{\beta}{\eta_j}}}\left(\frac{1-\lambda}{R^K}\right)^{\frac{1-\lambda}{\lambda}}\Gamma$$

A5.4 Aggregate Welfare

The expected ex ante utility of workers is measured as follows:

$$V=\sum_j\left(W_j\left(1-\tau_j(\theta_j)\right)R_j^{-\beta}A_jg_j^{\gamma}\right)^{\frac{1}{\sigma}}.$$

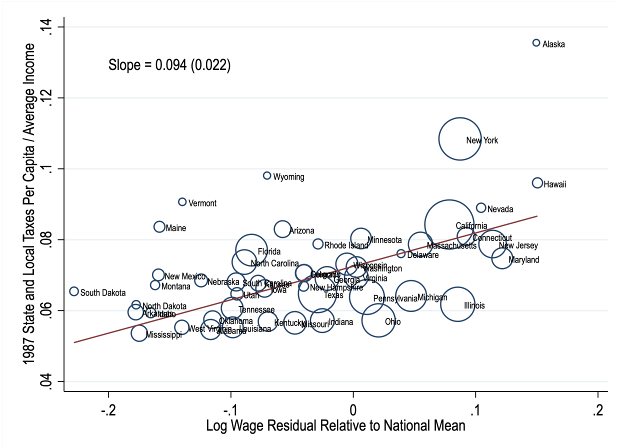
After we plug in the endogenous variables, we arrive at the following:

$$V = \sum_j \left(\theta_j^{\frac{1+\gamma}{\lambda}} \left(\lambda \left(\frac{1-\lambda}{R^K} \right)^{\frac{1-\lambda}{\lambda}} \right)^{1+\gamma} (1-\tau_j(\theta_j)) s_j(\theta_j)^\gamma L_j^{-\frac{\beta}{\eta_j}} A_j \right)^{\frac{1}{\sigma}} \left(R_0^{-\beta} \right)^{\frac{1}{\sigma}}$$

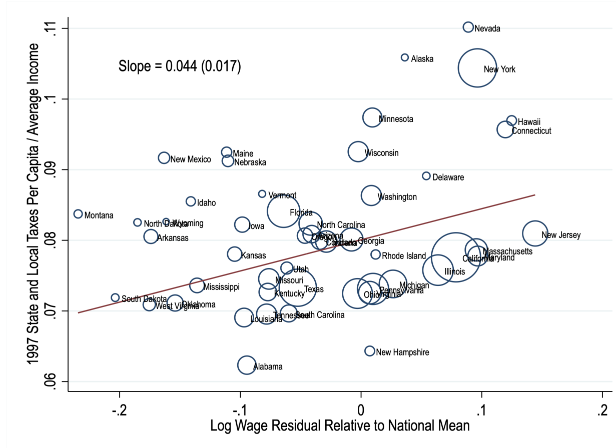
The expression then becomes:

$$V = \sum_j \left(\theta_j^{\frac{1+\gamma}{\lambda}} (1-\tau_j(\theta_j)) s_j(\theta_j)^\gamma A_j \right)^{\frac{1}{\sigma+\frac{\beta}{\eta_j}}} \Gamma^{-\frac{\beta}{\sigma\eta_j}} \left(\lambda \left(\frac{1-\lambda}{R^K} \right)^{\frac{1-\lambda}{\lambda}} \right)^{\frac{1+\gamma}{\sigma}} \left(R_0^{-\beta} \right)^{\frac{1}{\sigma}}$$

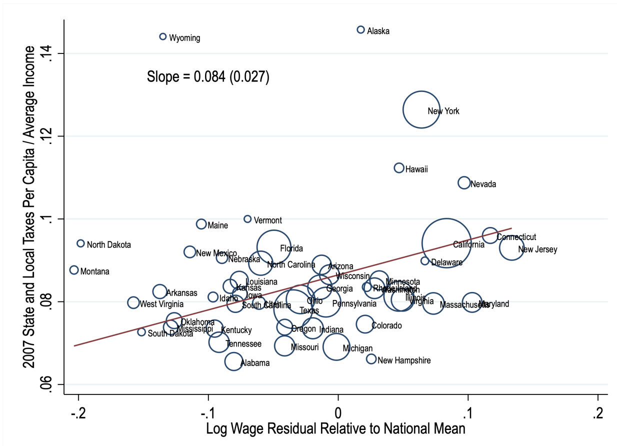
Figure A1: Per-Capita-Tax-to-Income Ratio Against State Wage Residual: By Year



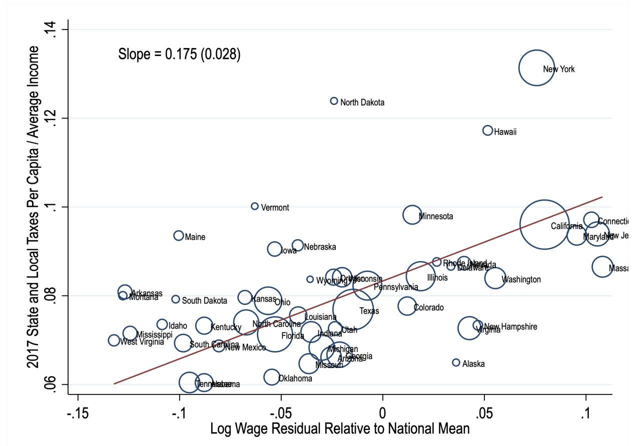
(a) 1987



(b) 1997



(c) 2007



(d) 2017

Note: The figures present scatter plot of the ratio of state-level total taxes per capita (levied by the state and local governments) to the state's average income against the state's log wage residual relative to the national mean, separately for 1987, 1997, 2007, and 2017. State-level total taxes are from the Annual Survey of State and Local Government Finances for 1987, 1997, 2007, and 2017. We compute the state-level average income and log wage residuals using the CPS ASEC, pooling data from 1977–1989, 1990–1999, 2000–2009, and 2010–2019. Specifically, we restrict the sample to full-time workers aged from 25–65, excluding government employees. For each period, we compute the log wage residual by controlling for indicators of workers' age, race, Hispanic origin, education, sex, marital status, occupation code, and industry code.

Table A1: State and Local Government Finances: Robustness Checks

Variables	Ln (Total Tax Rev Pc / Income)		Ln (Non-Corp Tax Pc / Income)	
	(1)	(2)	(3)	(4)
Panel A: State Area Regressions (State and Local Governments)				
Log Wage Res	1.194***	0.707	1.109***	0.610
	(0.346)	(0.486)	(0.328)	(0.475)
Observations	204	185	204	185
R-squared	0.358	0.483	0.358	0.479
Year FE	Yes	Yes	Yes	Yes
Demographics, Amenities, Politics, and Housing Supply	No	Yes	No	Yes
Panel B: County Area Regressions (Local Governments)				
Log Wage Res	1.304***	1.082***	1.276***	1.062***
	(0.195)	(0.161)	(0.185)	(0.155)
Observations	2,942	2,738	2,942	2,738
R-squared	0.510	0.514	0.514	0.520
Year FE, State FE	Yes	Yes	Yes	Yes
Demographics, Amenities, Housing Supply, and Politics	No	Yes	No	Yes

Note: Panel A presents the results of state-level regressions. Each observation is a state-year. The dependent variable is the log ratio of total tax per capita to average income, or log ratio of non-corporation tax per capita to average income. The government revenue is that of both state and local governments, summed up at the state level, using the Annual Survey of State and Local Government Finances for 1987, 1997, 2007, and 2017. The average income is estimated using the personal total annual income from the CPS ASEC, pooling data from 1977–1989, 1990–1999, 2000-2009, and 2010–2019 to match the government surveys. To compute the state-level log wage residuals, we use the sample of full-time private sector workers aged from 25–65 from the CPS ASEC, controlling for indicators of workers' age, sex, race, Hispanic origin, marital status, education, occupation, and industry. State-level population is used as the analytical weight. Columns 1 and 3 only control for year fixed effects (same as columns 1-2 of Table 2 Panel A). Columns 2 and 4 further control for state-level characteristics, including average age, college share, high school share, proximity to the lake and sea shore, average of the January and July temperature (relative to 20 degree Celsius), annual precipitation, land unavailability, the share of votes for the Democratic Party and the Republican Party respectively, and the state governors' party affiliation dummy. Panel B presents the results of county-level regressions. Each observation is a county-year. The dependent variables are defined same as in Panel A, but government revenue is that of local governments, summed up at the county level. The average income and log wage residuals are computed at the MSA level. County-level population is used as the analytical weight. Columns 1 and 3 only control for year and state fixed effects (same as columns 1-2 of Table 2 Panel B). Columns 2 and 4 further control for MSA-level characteristics defined in the same way as those in Panel A. Standard errors are clustered at the state level in Panel A and MSA level in Panel B. *** $p < 0.01$, ** $p < 0.05$, *$p < 0.1$.

Table A2: Public-Private Sector Wage Gaps: Robustness Checks

Panel A: Across-State Wage Premiums

Variable	Ln Wage	
	(1)	(2)
Public × Ln Wage Res	-0.167*	-0.233*
	(0.0935)	(0.128)
Public × Collective Bargaining × Ln Wage Res	0.633***	0.547***
	(0.148)	(0.161)
Definition of "Public"	State	State
Observations	1,624,773	1,555,073
R-squared	0.361	0.361
Year FE, State FE, Worker Characteristics	Yes	Yes
Interactions between Public and Demographics, Amenities, Housing Supply, and Politics	No	Yes

Panel B: Across-MSA Wage Premiums

Variable	Ln Wage			
	(1)	(2)	(3)	(4)
Public × Ln Wage Res	-0.157	-0.109	-0.601***	-0.603***
	(0.151)	(0.0917)	(0.0958)	(0.107)
Public × Collective Bargaining × Ln Wage Res	0.305*	0.116	-0.213*	-0.117
	(0.182)	(0.146)	(0.126)	(0.138)
Public × State Ln Wage Res			0.415***	0.331**
			(0.109)	(0.142)
Public × Collective Bargaining × State Ln Wage Res			0.989***	0.893***
			(0.159)	(0.166)
Definition of "Public"	Local	Local	State	State
Observations	1,166,564	1,032,663	1,110,399	982,417
R-squared	0.372	0.371	0.373	0.372
Year FE, State FE, Worker Characteristics	Yes	Yes	Yes	Yes
Interactions between Public and Demographics, Amenities, Housing Supply, and Politics	No	Yes	No	Yes

Note: The sample consists of workers aged from 25–65 working at least 35 hours per week from the CPS ASEC from 1977–2019. The data are pooled into four periods: 1977–1989, 1990–1999, 2000-2009, and 2010–2019. In each column, the sample is restricted to private sector workers and public sector workers, where the definition of "public" is either state or local government workers, indicated in each column. *Public* is an indicator for public sector workers. In Panel A, *Ln Wage Res* denotes state-level log wage residuals. *Collective Bargaining* is an indicator that the state permits collective bargaining of state government workers. Column 1 controls for year and state fixed effects, and workers' characteristics, including dummies for age, sex race, Hispanic origin, marital status, education, and the interaction between government worker dummy and occupation (same as column 1 of Table 5 Panel A). Column 2 further controls for the interactions between *Public* and various state-level characteristics, including average age, college share, high school share, proximity to the lake and sea shore, average of the January and July temperature (relative to 20 degree Celsius), annual precipitation, land unavailability, the share of votes for the Democratic Party and the Republican Party respectively, and the state governors' party affiliation dummy. In Panel B, *Ln Wage Res* denotes MSA-level log wage residuals and *State Ln Wage Res* denotes state-level log wage residuals. *Collective Bargaining* is an indicator that the state permits collective bargaining of local government workers in columns 1–2 and state government workers in columns 3–4. Columns 1 and 3 control for year and state fixed effects, and workers' characteristics (same as columns 1 and 2 of Table 5 Panel B). Columns 2 and 4 further control for the interactions between *Public* and various MSA-level characteristics defined in the same way as those in Panel A. Log wage residuals are computed by controlling for dummies for workers' age, sex, race, Hispanic origin, marital status, education, occupation, and industry. All regressions are weighted using the CPS ASEC earnings weights. Standard errors are clustered at the state level in Panel A and MSA level in Panel B. *** $p < 0.01$, ** $p < 0.05$, *$p < 0.1$.