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Standing Tiebout on his head: Tax capitalization and the monopoly power of local governments *

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Abstract. Much of the public finance literature argues that local governments behave competitively due to residents' ease of exit and entry. The model presented here challenges this widespread conclusion. Though it is costless to relocate to another locality, the presence of tax capitalization makes it impossible for land-owners to avoid monopolistic pricing of public services by moving; land-owners can only choose between paying the tax directly, or paying it indirectly in the form of a lower sale value for their housing if they exit. In consequence, the only real check on local governments comes through imperfectly functioning electoral channels.

1. Introduction

It is widely believed in public finance that local governments are subject to very stringent competitive pressure, possibly even approximating perfect competition (Mieskowski and Zodrow, 1989). In consequence, even if voting did not exist or had no practical consequences, local governments' policies would still have to conform to citizen preferences. Citizens' ability to easily relocate and exchange a bad government for a good one prevents bad governments from persisting.

The present paper suggests that local governments have a workable, unilateral, and widely practiced way to stifle these competitive pressures: the property tax. In spite of its relative decline as a revenue source over the century, in the United States the property tax in 1991 still provided 75% of local tax revenue [1] (Fisher, 1996: 4). The model developed assumes a Leontief production function for technology, which implies the empirically plausible result that property taxes are simply capitalized into real estate values (Yinger, Bloom, Börsch-Supan and Ladd, 1988). Mobility thus allows no escape from

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excessive taxation; whether they stay and pay the tax directly, or sell out and pay the tax via a lower sale price, land-owners bear the full burden of local taxation. Ease of mobility limits local governments' exactions only if movers aren't forced to bring their tax liabilities with them. Precisely because mobility *would* be a very tight constraint on local governments if they used other methods of finance, the property tax transforms competitive governments into local monopolists.

The innovation of this model is to combine this assumption about tax incidence with imperfections in the political process similar to those found in, for example, Grossman and Helpman (1996). Under the special assumption of a perfectly functioning electoral system, the model's results are very similar to Tiebout's. Yet the mechanism is quite different: What actually forces local governments to conform to citizen preferences in this model is voice, not exit. More importantly, insofar as the political process works imperfectly, local governments have latitude to deviate from voters' preferences.

This does not mean that different localities don't cater to different tastes. The subsequent model, like the Tiebout model, shows that it is natural and efficient for people with similar tastes for public goods to reside in the same localities. But the model differs from the Tiebout model in that it is political rather than economic pressure which drives politicians to conform to voter preferences; in fact, the economic pressure emphasized by the Tiebout model turns out to make no difference.

To keep the political-economic model tractable, the paper makes a number of simplifying assumptions: The number of localities is equal to the number of household types; each locality has an equal quantity of land; there are equal numbers of people of each type; all households begin with one unit of land. This leaves open the possibility of politician deviation from voter preferences, but rules out multiple and non-existent equilibria that can arise because of indivisibilities.

Section 2 reviews related literature. Section 3 sets up the baseline model, in which imperfectly restrained politicians just waste or "eat" extra taxes by extracting rents. Section 4 studies both the partial and general equilibria of the baseline model. Section 5 extends the baseline model to three germane topics: First, it investigates how the model works if rent-extraction is capped at zero; the result is that politicians provide a higher level of public goods than people desire. Second, it shows that if taxes attach to mobile wealth rather than immobile land the economic constraints emphasized by the Tiebout model reappear. Section 5.3 considers the model's implications for local constitutional design: property taxes probably have a minimal excess burden, but they allow officials a great deal of latitude to oversupply public goods; other taxes

have a higher excess burden but place more effective competitive restraints on policy-makers. Section 6 concludes.

2. Related literature

The present paper links several distinct strands of research, combining recent work in political economy and electoral imperfections with the long-standing literature on local public finance and tax capitalization. Tiebout (1956) inaugurated the modern study of the local supply of public goods. This seminal paper broadly argues that the market for local public goods potentially satisfies the assumptions of the perfectly competitive model – many suppliers, perfect information, costless mobility, and so on – and that in consequence local governments are tightly constrained to adhere to citizen preferences even in the absence of democratic voting.[2] Rose-Ackerman (1983) provides both a useful summary of earlier literature and raises a number of other important issues on the interaction of political and economic forces in local public finance.

The limitations of the Tiebout model are emphasized in an influential paper by Epple and Zelenitz (1981). In their model, local governments engage in Tiebout-style competition with each other, but face no internal political competition (such as elections). In this setting, Epple and Zelenitz conclude, inter-jurisdictional competition cannot fully eliminate the monopoly power of local governments. The implication is that democratic control over government may matter somewhat even on the local level. My model differs from that of Epple and Zelenitz in two ways. First, whereas Epple and Zelenitz show that Tiebout-type competition is not fully able to eliminate local government's monopoly power, my model actually concludes that Tiebout competition does not reduce the monopoly power of local governments *at all*. Second, while Epple and Zelenitz show that economic competition without political competition yields less-than-perfectly competitive results, my model shows that even if economic competition is supplemented by political competition, local governments will (except in certain polar cases) fall short of the perfectly competitive ideal.

Mieskowski and Zodrow (1989) label Tiebout's view of local public finance the "benefit tax" view, to which they contrast the so-called "new view" in which the property tax is essentially a distortionary tax on capital. "New view" models typically assume a fixed but mobile capital stock rather than a fixed and immobile land stock. Land also assumes a central role in the literature on the "Henry George Theorem," discussed in such works as Arnott and Stiglitz (1979) and Boadway and Flatters (1982). Yinger et al. (1988) thoroughly review the literature on tax capitalization without, how-

ever, considering the implications of tax capitalization for the effectiveness of Tiebout-style competition. One of the very few papers to explore the interaction between capitalization and local political economy is Yinger (1985); he concludes, for reasons rather different than those in the present paper, that capitalization normally leads to excessive local government expenditure.

Most of the formal literature on imperfections in the voting process is comparatively recent; Inman (1988) provides a good survey of earlier work. The specific imperfection used here resembles one introduced in Lindbeck and Weibull (1987), and more recently in Dixit and Londregan (1995), Dixit and Londregan (1996), and Grossman and Helpman (1996). (Although for a skeptical view of the "political failure" literature, see Wittman, 1995). In these models, parties may easily alter their positions on some issues (such as budgetary issues), but not their positions on other issues (such as abortion). This structure somewhat weakens the competition between the parties, allowing deviations from the preferences of the median voter to occur in equilibrium. The present model formalizes the imperfection in the voting process as a pure preference for party loyalty, though this could be interpreted as arising from the existence of "uninformed" and "informed" voters as in Grossman and Helpman (1996), or Baron (1994).

A recent paper by Nechyba (1997) also explores the interaction between economic and political constraints upon local governments, although his model and technique differ considerably from that of the present paper. Nechyba develops a general equilibrium simulation in which local governments require the aid of an outside enforcer (such as a common state government) to jointly deviate from property taxes to income taxes. But in this model is it necessary to appeal to citizens' exogenous perception of the unfairness of property taxation to explain the motive for joint deviation, because collusion significantly increases neither voters' nor politicians' utility. In contrast, in the present model property taxes are actually a perfectly efficient way to raise a given amount of revenue for local public spending, but voters may dislike property tax regimes because they can lead to excessive tax rates.

3. The baseline model[3]

3.1. *The political setting*

There are N localities, indexed by $\{1, 2, \ldots, k, \ldots, N\}$. Within each locality are two competing political parties i and j. The utility of party i is given by:

$$u_i = I_k * V(\mu_k + \theta G_k) \tag{1}$$

where I_k is an indicator variable which is 1 if party i wins the election and zero if j wins; G_k is the size of the government (funded by property taxes) in locality k; μ_k is taxation in excess of that necessary to supply public goods level G_k; $\theta < 1$, and $V'(\cdot) > 0$. Intuitively, the party in power gains utility from both power and rents, but is willing to trade off power for rents. Party j's utility is defined similarly. Thus the model follows Wittman (1977) in assuming that politicians care about policy as well as electoral victory. Elections in k are decided by simple majority vote; for simplicity, assume ties go to party i.

The local governments are in principle under the control of a single state government, but for current purposes we ignore the political and economic pressures on that state government. Each locality has a fixed supply of land, designated $\overline{L_k}$. $\sum_{k=1}^{N} \overline{L_k} \equiv \overline{L}$. Thus we are imagining a relatively developed situation, in which surplus land (or an "urban fringe") no longer exists; land is a fixed stock with a vertical supply curve. Moreover, the land *within* each locality is fixed because the borders are set exogenously; for simplicity, assume that each locality has the same amount of land, $\overline{L_k} = \frac{\overline{L}}{N}$. Finally, there is assumed to be perfect mobility of people between localities. Retaining this strong Tiebout entry/exit assumption helps illuminate how powerfully the method of tax finance can alter the competitiveness of local governments.

3.2. *Households and their utility functions*

Within the state, there are F households comprised of equal numbers of N different types, indexed by $\{1, \ldots, s, \ldots N\}$; hence, there are F/N households of each type s. The types mainly differ from one another in the intensity of their taste for public goods, as shall be explained below. Households enter the game with an equal endowment of immobile land L_f; somebody has to own all of the land, so $\sum_{f=1}^{F} L_f = \overline{L}$. For simplicity, I normalize the total stock of land to equal F; thus each household has 1 unit of land and each locality has a F/N units of land in it. Aside from their land endowment, households have liquid wealth, W_f, which can be consumed or used to buy capital goods to combine with land and produce housing.

Each voter has a taste for parties as well as government services. Designate their party preference, the amount of utility agents are willing to give up in order to live under their preferred party, as ρ_f.[4] $\rho_f > 0$ for all households. Intuitively, party i is the "advantaged" party: if the parties offer identical platforms, all voters prefer party i.[5] Designate household f's utility of government services in locality k as $u_{k,f}$. The value of public services is assumed to be

proportional to one's quantity of housing, so $u_{k,f} = U(G_k)H_f$, where H_f is household f's quantity of housing.

Each household has a quasi-linear utility function assumed to follow:

$$u_f = U(G_k)H_f + \ln H_f + \rho_f I_k + C_f \tag{2}$$

That is, households gain utility from: the level of government services their locality supplies to them, the housing they occupy, their taste for party i if it holds power in their locality, and from consumption out of the wealth remaining after paying for housing and local taxes. Note that it is assumed that it is only possible to live in and derive utility from housing and services in one locality, and that utility is an increasing function of government services, so $\frac{dU(G)}{dG} > 0$. Due to the quasi-linear form of the utility function (and assuming an interior solution) one can ignore the income effects of price changes on housing demand.[6]

Let T(G) designate the per-housing-unit level of taxes *necessary* to supply the per-housing-unit level of services $G_k, 0 \leq G \leq 1$; and recall that μ_k indicates taxation *in excess* of that necessary for service level G_k.[7] With all revenue drawn from property taxation, it is then by definition true that:

$$t_k p_k^H = T(G_k) + \mu_k \tag{3}$$

Each citizen has a most preferred level of services, G_f: Below that point providing services at marginal cost increases the citizen's utility, while above that point services delivered at marginal cost decrease the citizen's utility. It is convenient to formalize this using the following functional form:

$$U(G_k) - T(G_k) = Z - |G_k - G_f| \tag{4}$$

Z is the value (4) takes on when $G_k = G_f$; i.e., the actual tax-and-service package is at the agent's personal optimum level.

G_f distinguishes the N different types of households from one another. The taste of the type indexed $s = N$, with the greatest taste for public goods, is designated $\overline{G}$; the tastes of the N different types are distributed according to:

$$G_s = \frac{s}{N}\overline{G} \qquad s = 1, 2, 3, \ldots, N \tag{5}$$

Assume that citizens are initially "sorted" by tastes.[8] The F/N households with the lowest taste for public goods, indexed by $s = 1$, reside in and own their endowment of land in locality $k = 1$, the F/N households with the second lowest cluster of tastes for public goods, indexed by $s = 2$, reside in and own their endowment of land in locality $k = 2$, and so on. Thus, the price of land in a household's initial locality enters into its budget constraint.

Table 1. Summary of the model

Exogenous variables	
Name	Interpretation
N	Number of localities and types of citizens
k	Index for localities
θ	Taste parameter; $0 < \theta < 1$
ρ	Magnitude of a citizen's party preference; measures how much utility an agent is willing to give up in order to live under preferred party
$\overline{L_k}$	Fixed supply of land in locality k
$\overline{L}$	Total supply of land
F	Number of households
s	Index for citizen types
L_f	Initial land endowment of household f
W_f	Initial liquid wealth endowment of household f
G_f	Most preferred public service level of household f
Z	Value of $U(G) - T(G)$ when service provision is at an agent's personal optimum
$T(G_k)$	Per-housing unit level of taxes necessary to provide public service level G_k
$\overline{G}$	Most-preferred service level of citizen type with highest taste for public goods
β	Parameter in housing production function
p^K	Price of capital goods
$\hat{W}$	Wealth minus cost of capital goods used to build housing
$\overline{W}$	$\hat{W}$ of "rich" citizens
$\underline{W}$	$\hat{W}$ of "poor" citizens
G(T)	Highest level of G which may be supplied from a given amount of taxation
Endogenous variables	
u_i	Utility function of party i
I_k	Indicator variable = 1 if party i and = 0 if party j wins in locality k
$V(\mu + \theta G_k)$	Utility of party in locality k conditional on ruling
G_k	Public goods level in locality k
μ_k	Per-housing-unit taxation *in excess* of that necessary to provide public goods level G_k
$u_{k,f}$	Household f's utility of government services in locality k
u_f	Utility of household f
C_f	Level of household consumption of household f
H_f	Household f's level of housing
t_k	Tax rate in locality k
p_k^H	Housing price in locality k
p_k^L	Land price in locality k
H_k	Housing in locality k
K_k	Capital goods used to produce housing in locality k

Finally, the price of consumption is assumed to be fixed at 1 by the national market, so a household's budget constraint is given by:

$$(1 + t_k)p_k^H H_f + C_f \leq W_f + p_k^L \tag{6}$$

3.3. *The housing stock*

The housing stock is produced by combining land and capital goods. Empirically, estimates of tax capitalization often reach or even exceed 100% (Yinger et al. 1988).[9] The production function and supply elasticities used here are picked to be consistent with this fact. There is a Leontief fixed-proportions function, so for any locality k:

$$H_k = \min\left\{\frac{F}{N}, \beta K_k\right\} \tag{7}$$

Land, as explained earlier, is a fixed, immobile stock and is supplied perfectly inelastically. The supply of capital goods, however, is perfectly mobile, so p^K is fixed. Then assuming that no land is left idle, $\beta K = F$. Housing is produced competitively, so the before-tax price of one unit of housing is equal to the cost of production:

$$p_k^H = p_k^L + \frac{p^K}{\beta} \tag{8}$$

4. Equilibrium in the baseline model

We first put forward a candidate equilibrium for the housing market and political tournament considering a given locality in isolation. After examining this partial equilibrium of N autarchic communities, it will be shown that due to the presence of tax capitalization, the existence of alternative localities will not induce re-location in the face of tax differentials. In short, we will investigate partial equilibria in N localities, then prove that this is the same as the general equilibrium for N localities.

4.1. *Partial equilibrium in the economic and political game*

First consider the economic and political game without mobility. Equilibrium in each locality considered in isolation requires that

1. No citizen may desire to vote differently.

2. No party may desire to offer a different platform.

Consider a candidate partial equilibrium with the following properties: First, both parties offer to satisfy exactly the most preferred level of G_k of their constituents. Second, the "advantaged" party always wins ($I_k = 1\ \forall k$) and extracts rents $\mu_k = \rho_s$, where ρ_s is the *median* value of ρ_f for household type s. Under these assumptions, what will the housing market look like? Substituting the budget constraint (6) into the utility function (2), using (8), and suppressing the f subscripts where there is no ambiguity:

$$u_f = U(G_k)H + \ln H + \rho + W + p_k^H - \frac{p^K}{\beta} - (1 + t_k)p_k^H H \tag{9}$$

which we can re-write using (3) as:

$$u_f = U(G_k)H + \ln H + \rho + W + p_k^H - p_k^H H - [T(G_k) + \mu_k]H - \frac{p^K}{\beta} \tag{10}$$

Combining terms and using (4),

$$u_f = [Z - |G_k - G_f| - \mu_k]H + \ln H + \rho + W + (1 - H)p_k^H - \frac{p^K}{\beta} \tag{11}$$

Differentiating u_f with respect to H yields:

$$Z - |G_k - G_f| - \mu_k + \frac{1}{H} - p_k^H = 0 \tag{12}$$

which can be rewritten to get the housing demand function for citizens with all possible taste levels for government services:

$$H_f = \frac{1}{p_k^H - Z + |G_k - G_f| + \mu_k} \tag{13}$$

Remembering our assumption that each type of citizen comes "pre-sorted," it becomes possible to derive the overall demand schedule for housing within a locality.

$$H_k = \frac{F}{N}\frac{1}{p_k^H - Z + |G_k - G_s| + \mu_k} \tag{14}$$

Setting housing demand equal to the fixed housing supply F/N shows us that:

$$\frac{F}{N}\frac{1}{p_k^H - Z + |G_k - G_s| + \mu_k} = \frac{F}{N} \tag{15}$$

solving (15) for the price of housing in locality k, we learn that:

$$p_k^H = 1 + Z - \mu_k - |G_k - G_s| \tag{16}$$

Note that (16) shows the tax payments in excess of the cost of providing a given level of government services are fully capitalized into the price of housing. Moreover, since this candidate equilibrium stipulates that $|G_k - G_s| = 0$, and $\mu_k = \rho_s$:

$$p_k^H + \rho_s = 1 + Z \; \forall k \tag{17}$$

In other words, before-tax housing prices, adjusted for rent-extraction, will be identical for all localities if the winning political parties equate actual and desired levels of public goods for each locality.

Now consider the effects of the candidate equilibrium political platform on the housing market. Agents' utility in their initial locality is given by:

$$u_f = [Z - \rho_s - p_k^H]H + \ln H + \rho + W + p_k^H - \frac{p^K}{\beta} \tag{18}$$

Substituting in for housing prices given the level of government services yields:

$$u_f = Z - \rho_s + \rho + W - \frac{p^K}{\beta} \tag{19}$$

Now consider whether this candidate partial equilibrium is actually an equilibrium. The housing market's operation is clearly an optimal response given the political policies; but are these political policies optimal choices for voters and political parties?

Citizens without any party allegiance vote for whichever party gives them the highest utility level in terms of services and taxes. Thus, if $\rho_s = 0$, the only possible political equilibrium would be one in which both parties offer platforms with $\mu_k = 0$ and $|G_k - G_s| = 0$.

However, so long as $\rho_s \neq 0$, the story is more complicated. The advantaged party clearly wins the election if both parties offer platforms with $\mu_k = 0$ and $|G_k - G_s| = 0$; moreover, due to its supermajority, the advantaged party can still win the election if it somewhat increases either G_k or μ_k (and thereby strictly increase its own utility). In fact, it wins the election with probability 1 so long as the utility loss from the combined excess G_k and μ_k is less than ρ_s.

Which mix of excess G_k and μ will the advantaged party pick? The utility effects on citizens are identical (by Equation (16) and (18)). However, by Equation (1), $\frac{\partial u_i}{\partial \mu_k} = \frac{1}{\theta}\frac{\partial u_i}{\partial G_k} > \frac{\partial U_i}{\partial G_k}$, so the best way for a party to take its

advantage is always in the form of rents if this is allowed. Thus it sets $\mu_k = \rho_s$, just high enough to make the median voter indifferent.

The candidate equilibrium for this political game can thus be seen to be a full-fledged equilibrium. An advantaged party always wins if it plays $\mu = 0$ and $|G_k - G_s| = 0$, but it if did so it would not be taking full advantage of the situation. Given an unconstrained choice between the two margins of increased government size or increased rents, party i can get the most utility by simply taking 100% of its advantage in the latter form. The result of this process is that housing prices perfectly capitalize politicians' rent-extraction; the entire burden of imperfect political competition is borne by the housing sector.

4.2. *General equilibrium in the housing market*

To determine the general equilibrium in the overall economic and political game, it will be necessary to meet three conditions:

1. No citizen may desire to move to another locality.
2. No citizen may desire to vote differently.
3. No party may desire to offer a different platform.

The investigation of general equilibrium with costless movement begins with the preceding analysis of partial equilibrium in which relocation was impossible. The perhaps surprising result is that the general equilibrium in the game with relocation is the same as the partial equilibrium in the game without relocation. The argument proceeds by showing that the partial equilibrium satisfies all three conditions for general equilibrium.

4.2.1. *Equilibrium Condition #1*

An agent's utility from remaining in his initial locale is given by:

$$u_f = [Z - \mu_k - p_k^H]H + \ln H + \rho + W + p_k^H - \frac{p^K}{\beta} \tag{20}$$

Which we may compare to the utility which would be derived from residing in a different locale:

$$u_f' = [Z - |G_{k'} - G_f| - \mu_{k'} - p_{k'}^H]H' + \ln H' + \rho + W + p_k^H - \frac{p^K}{\beta} \tag{21}$$

Substituting in for the prices and quantities of housing using (11) and (16):

$$u_f = W + Z - \rho_s + \rho - \frac{p^K}{\beta} >$$

$$u'_f = -\ln(1 + |G_{k'} - G_f|) + W + Z - \rho_s + \rho - \frac{p^K}{\beta} \qquad (22)$$

Inequality (22) shows that the partial equilibrium described earlier satisfies the first condition for general equilibrium. Holding other aspects of the game constant, opening up alternative localities creates no incentive to move. How is this possible? Essentially, because an excessive charge for services is borne entirely by the original landowners, regardless of whether they opt to remain or migrate. Given the presence of political rent-extraction, there is no incentive *to* migrate. All that this would accomplish would be to change the level of government services without in the slightest mitigating the lost wealth due to the excessive charge for government services in one's original locality.

4.2.2. *Equilibrium Condition #2*

Would any voter wish to alter his or her voting decision once movement between localities is possible? After all, it is no longer necessarily true that voters will vote for the candidate that best satisfies their *own* tastes for services and taxes; rational voters, being home-owners as well, will want to consider the effect of different policies on their wealth via housing prices as well as their own comfort. Leaving aside party allegiances, citizens vote for whichever party gives them the most utility; do the changed conditions change voters' most preferred policies?[10]

The answer is no. Using (22), it can be seen that a citizen from locality k' could only be induced to relocate if the quantity of housing they would demand in the other locality would increase

$$p^H_{k'} - p^H_k > |G_k - G_f| \qquad (23)$$

That is, the price in the other locality must be sufficiently below the price in their locality of origin to compensate for the less-preferred tax-and-service package. This in turn would occur only if the price in k fell below the price in k':

$$p^H_k + \rho_s < 1 + Z \qquad (24)$$

But from (20), it can be seen that the inhabitants of k would only try to induce migration if it would result in:

$$p^H_k + \rho_s > 1 + Z \qquad (25)$$

Since (24) and (25) are never both satisfied, citizens in k must have no incentive to vote for different policies. Even in the polar case where a locality exactly adopted the most-preferred policies of, for example, an attitudinally adjacent locale (i.e., where preferences differed by $\frac{\overline{G}}{N}$) in order to induce migration, the result would merely be a lower housing price for *both* localities:

$$p_k^H + \rho_s = p_{k'}^H + \rho_{s'} = Z + \frac{1}{2} - \frac{\overline{G}}{2N} + \frac{\sqrt{\left(\frac{\overline{G}}{N}\right)^2 + 1}}{2} \tag{26}$$

Note that the limit of the above expression as $\frac{\overline{G}}{N} \to 0 = 1 + Z$; i.e., even if there were an infinite number of localities, it would still be impossible to raise $p_k^H + \rho_s$ above its candidate equilibrium value of $1 + Z$. Hence we have shown that the proffered candidate equilibrium satisfies the second equilibrium condition: No voter's preferred policies and hence voting decisions would change relative to their preferences and voting in partial equilibrium.

4.2.3. *Equilibrium Condition #3*

Finally, would any candidate wish to offer a different platform? Again, the answer is no (assuming, as we do, that migrants must wait a period before they can vote; or in other words, politicians must win the support of current citizens for their policies before they can implement them). The advantaged party and its margin of advantage remain unchanged. Similarly, its two ways of enjoying its advantaged position and their respective marginal benefits don't change either. The partial equilibrium argument goes through unaltered. By checking these three equilibrium conditions, it has been shown, perhaps surprisingly, that the Nash equilibrium for N isolated localities (pre-sorted by preferences) is exactly the same as the Nash equilibrium for those same N localities with perfect mobility.

Even though landowners bear excessive property tax burdens, interlocal competition in some sense persists. Suppose that the tastes of a small portion of the population in one locality change (as in the standard example in which a family's taste for public goods increases once it has school-age children). It would still make sense for this household to move to a locality that better matched their preferences. However, this is not migration in response to *excessive* charges for a set service level; it is migration in response to a change in the desired service level.

In this model, what precludes local governments from charging exorbitant fees for a given service package is *not* the option of moving. Moving does nothing to eliminate such burdens, which are merely capitalized into sale values. Rather, it is the electoral constraint which keeps local governments

in line. If $\rho_s = 0$, then the electoral system perfectly constrains politicians to supply exactly the desired service level at the minimum cost. But if the electoral system deviates from this condition (i.e., if voters have some party loyalties), then the restraints on politicians will not be strong enough to prevent them from exercising some degree of monopoly power. If there were no elections, i.e., if local governments were (malevolent) dictatorships, the presence of nearby alternative communities would not prevent full expropriation of land-owners via the property tax. The resulting equilibrium would look very much like a polar case considered in Epple and Zelenitz (1981), where local dictatorships extract rents from perfectly immobile tax bases.

4.3. *Does the ex ante sorting assumption matter?*

It was assumed that citizens are pre-sorted by taste levels. Is the equilibrium of the overall game driven by this seemingly strong assumption? Perhaps surprisingly, this assumption makes no difference whatever, serving merely to simplify the presentation. In this section, it is proven that the same equilibrium would arise for any arbitrary initial distribution of land holdings. That is, regardless of the ex ante endowments of land, in equilibrium citizens must be sorted according to their taste levels.

Suppose that citizens are not initially sorted according to tastes, but that equal numbers of citizens F/N initially reside in each locality. It is impossible for such a situation to satisfy our Equilibrium Condition #1, because there will necessarily be gains to trade. Assume that there exist at least two "misplaced" agents A and B such that A resides in locality k and B resides in locality k′, but $|G_k - G_A| > |G_{k'} - G_A|$ and $|G_{k'} - G_B| > |G_k - G_B|$.

Note first the agents' respective utilities in their initial locale:

$$u_k^A = [Z - |G_k - G_A| - \rho_s - p_k^H]H_A + \ln H_A + W_A + \rho_A + p_k^H - \frac{p^K}{\beta} \quad (27)$$

$$u_{k'}^B = [Z - |G_{k'} - G_B| - \rho_{s'} - p_{k'}^H]H_B + \ln H_B + W_B + \rho_B + p_{k'}^H - \frac{p^K}{\beta} \quad (28)$$

Consider the utility of the two agents if they simply swapped their locations:

$$u_{k'}^A = [Z - |G_{k'} - G_A| - \rho_{s'} - p_{k'}^H]H_B + \ln H_B + W_A + \rho_A + p_{k'}^H - \frac{p^K}{\beta} \quad (29)$$

$$u_k^B = [Z - |G_k - G_B| - \rho_s - p_k^H]H_A + \ln H_A + W_B + \rho_B + p_k^H - \frac{p^K}{\beta} \quad (30)$$

But note that:

$$\begin{aligned}&(u^{A}_{k'} + u^{B}_{k}) - (u^{A}_{k} + u^{B}_{k'}) = \\ &(|G_k - G_A| - |G_k - G_B|)H_A + (|G_{k'} - G_B| - |G_{k'} - G_A|)H_B > 0\end{aligned} \tag{31}$$

Given the quasi-linear utility specification, this implies that there must exist a mutually beneficial trade; wealth transferred between bargainers reduces the utility of the giver by the same amount that it increases the utility of the receiver. The assumption of *ex ante* sorting turns out to be innocuous, and can be used without loss of generality.

5. Applications

5.1. *The political and economic game with capped rent extraction*

Blatant rent-extraction might be politically unacceptable; and much like the monopoly profits of any other natural monopolist, the collection of monopoly rents by local governments might be forbidden or capped. In this section, we analyze the effects of capping μ_k at 0 in all N localities (i.e., $\mu_k \leq 0\ \forall k$). As is often the case with natural monopoly regulation, the result of this rent-extraction cap might very well be Pareto-inferior to the uncapped situation.

We begin as before by first considering the partial equilibrium in which movement between localities is impossible, then turn to the general equilibrium with costless movement, and see whether the equilibrium is the same. The main political difference is that now politicians must "spend" their advantage by expanding the size of the government rather than by extracting rents. The advantaged party's dominant strategy is to expand government as much as possible without risking electoral defeat. Thus, as in Equation (19), the representative citizen's utility is driven down to:

$$u_f = Z - \rho_s + W + \rho - \frac{p^K}{\beta} \tag{32}$$

only now citizen utility is below its optimum because $\mu = 0$ and $|G_k - G_s| = \rho_s$, rather than having $\mu = \rho_s$ and $|G_k - G_s| = 0$. The effect on housing prices is clear; using Equation (17),

$$p^H_k = 1 + Z - |G_k - G_s| \tag{33}$$

implying that:

$$p^H_k + |G_k - H_s| = 1 + Z \forall k \tag{34}$$

The partial equilibrium effect of the cap falls entirely upon politicians. Citizens' utility is not improved, but the welfare of the winning party is now $u_i = V(\theta G_f + \theta\rho_s)$ rather than $u_i = V(\theta G_f + \rho_s)$ as it was before the introduction of the cap.

A more complicated proof omitted here shows that this partial equilibrium will also be a general equilibrium so long as $\rho_s < \frac{\overline{G}}{2N} \forall s$. Intuitively, there are no gains to trade until the size of government in locality k is closer to the preferred size of non-residents than it is to the size of residents.

5.2. *The political and economic game with non-property taxes*

This section considers the effects of replacing the property tax with some method of finance which will not perfectly capitalize into housing values. In particular, it illustrates that Tiebout-like mobility checks on local government reappear under alternative tax regimes. If local political competition is completely ineffective, or if localities are controlled by local dictators, greater ease of mobility can greatly improve citizens' welfare in the resulting equilibrium (Epple and Zelenitz, 1981).

Suppose that *one* locality funds itself with a simple sales tax rather than a property tax, while the others continue to use property taxation,[11] and that as in Section 5.1 the extraction of pure rents is prohibited: $\mu_k \leq 0 \ \forall k$. Previously no assumptions about the functional form of the distribution of wealth were made; at this point for expositional convenience we assume that all communities *ex ante* contain equal proportions of "poor" residents with $W - \frac{p^K}{\beta} \equiv \hat{W} = \underline{W} = 0$, and "rich" residents with $W - \frac{p^K}{\beta} \equiv \hat{W} = \overline{W} > 0$. Remembering that the before-tax price of consumption is set at 1 by the national market, the household's budget constraint in the locality with sales taxation now becomes:

$$p_k^H H + (1 + t_k)C \leq W + p_k^L \tag{35}$$

First consider the partial equilibrium in which there is no mobility. Average per capita tax collections are:

$$\frac{1}{2}\frac{t_k}{1 + t_k}\overline{W} \tag{36}$$

The housing market clears when:

$$p_k^H = 1 + Z - |G_k - G_s| + \frac{1}{2}\frac{t_k}{1 + t_k}\overline{W} \tag{37}$$

Under the property tax regime, there was unanimity within each locality on the appropriate supply of public goods. But now that a sales tax funds public goods, the utility of poor households is given by:

$$u_f = Z - \left| G\left(\frac{1}{2}\frac{t_k}{1+t_k}(\overline{W}+\underline{W})\right) - G_s \right| + \frac{1}{2}\frac{t_k}{1+t_k}\overline{W} + \rho \qquad (38)$$

where G(T) indicates the inverse of T(G) i.e., G(T) gives the highest level of G which may be supplied from a given amount of taxation.

Similarly, the utility of rich households is given by:

$$u_f = Z - \left| G\left(\frac{1}{2}\frac{t_k}{1+t_k}(\overline{W}+\underline{W})\right) - G_s \right| + \frac{1+\frac{1}{2}t_k}{1+t_k}\overline{W} + \rho \qquad (39)$$

There will no longer be unanimous agreement that the government ought to set $G_k = G_s$; with taxation of unequal wealth funding equal benefits, the poorer citizens will most prefer $G_h > G_s$; similarly the richer type will most prefer $G_k < G_s$. In particular, due to the stark assumption what $\hat{W} = 0$ for half of the population (and because $\frac{dU(G)}{dG} > 0$), there is every reason for the low-wealth type to favor full expropriation of the wealthier type by setting $t_k = \infty$. With half of the population of the low-wealth type, the political partial equilibrium is extremely simple: the advantaged party wins with exactly 50% of the vote and sets $G_k = G\left(\frac{\overline{W}}{2}\right)$. In short, with sales taxes and no mobility, the wealthier citizens can be easily expropriated through the democratic process, but receive the same level of services as everyone else.

The situation changes in general equilibrium with mobility between communities. It then becomes possible for the wealthy type of citizen to sell their housing to low-wealth types from other localities and take their wealth with them. For example, if $G_k\left(\frac{\overline{W}}{2}\right) = \overline{G}\frac{k+1}{N}$ there is an incentive for the wealthy citizens of locality k to switch places with the poor inhabitants of locality $k+1$. By trading places, the wealthy migrants will be able to obtain public services without paying for twice the services they receive. Clearly this is not a stable equilibrium; to prevent the out-migration of the wealthy citizens, it would be necessary to ensure that they prefer their original abode to the next best alternative:

$$\begin{aligned} u_k &= Z - \left| G\left(\tfrac{1}{2}\tfrac{t_k}{1+t_k}(\overline{W}+\underline{W})\right) - G_s \right| + \tfrac{1+\frac{1}{2}t_k}{1+t_k}\overline{W} + \rho > \\ u_{k'} &= Z - s\tfrac{\overline{G}}{N} + \tfrac{1}{2}\tfrac{t_k}{1+t_k}\overline{W} + \overline{W} + \rho \end{aligned} \qquad (40)$$

which implies the following incentive compatibility condition:

$$\frac{1+t_k}{t_k}\left[- \left| G\left(\frac{1}{2}\frac{t_k}{1+t_k}(\overline{W}+\underline{W})\right) - G_s \right| + s\frac{\overline{G}}{N}\right] > \overline{W} \qquad (41)$$

which seriously limits the possibility of local redistribution. Much as in the Tiebout model, when local taxes attach to mobile resources rather than immobile property, the existence of convenient alternative communities makes a large political difference, supplementing or even supplanting electoral constraints.

5.3. *Local constitutional choice and time consistency*

A central goal of constitutional choice is to solve the time-consistency problem to eliminate or guard against *ex post* incentives to defect from *ex ante* optimal strategies (see Kydland and Prescott, 1977; Barro and Gordon, 1983; Fisher and Summers, 1989). The preceding analysis of the methods of local taxation suggests that the time consistency problem for local government could be particularly severe. Property taxation has a very low excess burden; in fact, in the model outlined in the paper, property taxation permits *costless* transfers from citizens to the government. Unfortunately, precisely because property taxation raises revenue so efficiently, it leaves citizens vulnerable to expropriation *ex post*.

Just as a lower dislike of inflation can cause lower utility in equilibrium in strategic situations between central bankers and the public (Rogoff, 1985), so too can a lower cost of expropriation reduce utility in strategic situations between local governments and homeowners. The deadweight burden of sales or income tax might be considerably greater than that of the property tax, but the attendant flight of businesses and high-income residents makes expropriation less attractive *ex post*.

It is possible to eliminate the incentive for expropriation by capping the rents that the government can charge. This is the approach that most modern democracies without serious corruption problems typically select. However, capping permissible rent-extraction can create a second problem: since they cannot take the rents directly, politicians may take them indirectly by expanding the size of the public sector over which they preside. This can be inefficient, since it could easily lead politicians to supply public goods that the citizenry does not value above their marginal cost.

Local constitutions therefore normally choose between two possible kinds of inefficiency: the inefficiency of distortionary tax systems, and the inefficiency of supply of public goods valued below their cost. The property tax system minimizes tax distortion, but makes it very easy to expand the size of local governments. Non-property taxes, in contrast, can be very distortionary, but this very fact checks the expansion of the public sector.

6. Conclusion

Many public finance economists believe that local governments face a stringently competitive environment. On its face, this view is plausible: relocation is always an option for a local government's dissatisfied customers. This paper reverses the standard conclusion. Mobility doesn't matter if an unwanted tax burden moves with you.

It was of course necessary to make a number of assumptions to get the model's results. The key substantive assumptions are the Leontief production function for housing (combined with the assumption of no idle land), and the assumption of imperfect political competition. The former implies 100% capitalization; the latter implies democratic constraints are too weak to prevent politicians from taking advantage of this golden opportunity to shirk. Neither of these substantive assumptions seem empirically unreasonable (Yinger et al., 1988; Peltzman, 1992). There are also a number of simplifying assumptions to make the model's solution tractable. In particular, the setup assumes that the household types and communities "match up." This is admittedly unrealistic, but helps focus attention on this paper's divergence from the familiar Tiebout results.

The model presented here does give some predictions similar to the traditional Tiebout model. In both models, localities specialize in satisfying different kinds of tastes; people with similar tastes naturally tend to reside in the same areas. Similarly, if a person's tastes change, both the current model and the Tiebout model would predict that they would relocate to a new location which served a public goods package closer to their desired level. Both the Tiebout model and the current model see that tastes for service differ among people, so local governments differentiate their product to appeal to these diverse tastes.

There are, however, two crucial differences. First, the Tiebout model sees economic competition as the primarily check upon local governments. The model presented here indicates that economic competition makes very little difference for local governments; instead, what matters is how well the electoral system works. If the electoral system works well, it is possible to enjoy the low deadweight loss of property tax funding without risking excess supply of public goods; but as the imperfections in the electoral system increase, the low deadweight loss of the property tax simply makes it easier to inefficiently expand the size of the public sector.

The second important difference is that while the Tiebout model can be first-best efficient under many assumptions (Mieskowski and Zodrow, 1989), the current model shows that there is considerable room for inefficiency in local governments. Property owners, rather than the government, bear the burden of excessive charges for public goods; the only check on abuse is to

elect a different party. Local politics is all politics; what determines the efficiency of the local public sector is not the ease of relocation, but the severity of the imperfections in the political process.

Notes

1. This varies considerably between types of localities. In 1991, property taxes made up 52.1% of cities' total tax revenue, compared with 69.5% for special districts, 74% for counties, 92.8% for townships, and 97.5% for school districts (Fisher, 1996: 4). There is also substantial regional heterogeneity: property taxes ranged from a high of 98.2% of local tax revenues in New England, to a low of 68.2% for the Mideast (Fisher, 1996: 204).
2. For more details and numerous extensions of the Tiebout model, see Mieszkowski and Zodrow (1989), Zodrow (1983), and Thisse and Zoller (1983).
3. Note that the interpretation of all symbols used is given in Table 1.
4. Slightly different analyses of imperfections in the electoral process include Baron (1994), Dixit and Londregan (1995, 1996), and Grossman and Helpman (1996), while Peltzman (1992) provides some empirical evidence for the importance of imperfections in the political process.
5. The assumption that ρ_f is non-negative for all voters is not necessary for the results, but it considerably simplifies the analysis of voters' locational choices.
6. Allowing different utility specifications merely *amplifies* the conclusion of the model; in a more standard utility function with an income effect, the result of a property tax is in fact *over*-capitalization: The property tax reduces wealth, which further reduces housing demand.
7. Note that given the subsequent assumption of a Leontief production function, this could also be interpreted as a tax on land value.
8. It will later be shown that this assumption of *ex ante* sorting is unnecessary; it simply makes it easier to understand how the model works.
9. As Yinger et al. (1988) notes, estimated capitalization rates below 100% may be largely due to the fact that tax differentials are rarely permanent. Rates above 100% are theoretically possible insofar as property taxes impose a dead-weight loss via the taxation of structural improvements. Another important difficulty in estimating the degree of tax capitalization is the selection of the appropriate risk-adjusted discount rate. See also Martinez-Vasquez and Ihlanfeldt (1987) which finds serious econometric deficiencies (although no consistent positive or negative bias) in most of the empirical work on tax capitalization.
10. Voting occurs *before* movement occurs, ensuring that a given citizenry cannot be pushed out by migration-inducing policies unless they themselves desire it.
11. This "sales tax" could also be interpreted as a wealth tax with a deduction of $\frac{p^K}{\beta}$.

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