EXPENDITURE COMPETITION

by

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What impact does decentralizing government decision-making have on economic efficiency, and on the level of public expenditures? On the one hand, the Tiebout Hypothesis states that the ability of individuals to "vote with their feet" produces a fully efficient equilibrium, with each individual moving to a jurisdiction that provides just the desired level of public goods, given the underlying resource costs. On the other hand, the huge literature sparked by Tiebout's original article has identified a variety of inefficiencies in local government behavior.

To begin with, the literature on "tax competition" suggests that when taxes on mobile capital are used rather than lump-sum taxes, then "tax competition" will generate too low levels of public goods. In particular, when one jurisdiction taxes capital at a higher rate, capital investment shifts to other jurisdictions, increasing the size of their tax bases. As a result, if each government simply acts in the best interests of its residents, then taxes and public good levels will be set inefficiently low in equilibrium.[1] A central government, in contrast, can take account of these externalities and potentially provide more efficient levels of public goods.

The public choice literature focuses on an additional source of inefficiency, arguing that governments do not act in the interests of residents but instead push to increase the size of the public sector beyond the level that residents would have preferred. Tax competition still reduces the size of government, but, as Brennan and Buchanan (1980) argue, the reduction can be welfare-improving because the size would otherwise be inefficiently large.

It is difficult to ascertain empirically whether the welfare-improving or welfare-worsening view of tax competition is more accurate, since both views seem to predict that an increase in the number of competing governments should reduce the total size of government. However, the empirical tests conducted by Oates (1985, 1989) did not even find a systematic relation between government size and decentralization, let alone identify the welfare implications of such a relation.[2]

Oates (1985) mentions an alternative to the Leviathan model. Referring to an argument by the historian, John Wallis, he writes that, "since individuals have more control over public decisions at the local than at the state or national level, they will wish to empower the public sector with a wider range of functions and responsibility where these activities are carried out at more localized levels of government" (p. 749). This type of reasoning calls into question the usefulness of models in which a single decision-maker controls the entire range of tax and public expenditure instruments. Rather, some policy instruments

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[1] See Wilson (1986) and Zodrow and Mieszkowski (1986) for an explicit analysis. For a recent review of the tax competition literature, see Wilson (1999).

[2] Oates's 1985 article led to additional work, some of which is discussed in Oates (1989). See Anderson and Van den Berg (1998) for a recent contribution.

might be more accurately modeled as under the control of residents, whereas others are largely delegated to self-interested government officials, leaving the electorate with only rudimentary methods of oversight. By our reading, Wallis assumes that residents have more limited oversight over expenditures in more centralized levels of government, and as a result impose tighter limits on tax rates.

The current paper examines more closely this intuitive story for why decentralization may be beneficial. In particular, we assume that residents directly control tax rates, e.g., through a required referendum, and choose these rates to maximize their utility. Expenditures, however, are controlled by government officials, who can easily spend tax revenue on "perks" instead of public goods whenever it is in their self-interest.[3]

Residents then face the problem of designing the incentives faced by public officials, to push them to spend tax revenue on public goods rather than perks. One approach, available with centralized as well as decentralized provision, is to threaten to fire officials (or vote them out of office) if they perform poorly. While residents may not easily be able to distinguish perks from essential expenditures, they can at least compare their officials' performance to that of officials elsewhere.[4] performance is hard to distinguish from bad luck, such still need to be used cautiously.

With decentralized provision, however, residents have the additional option to "vote with their feet," by emigrating to another jurisdiction, when officials waste too much of their budget on perks. This threat puts additional pressure on officials to improve performance. Intuitively, by attracting additional residents, officials can raise the jurisdiction's tax base — not only will the housing purchased by the additional residents add to the property tax base, but property values generally will rise. Given the tax rates previously set by the residents, a larger tax base raises the budget available to the officials, providing them room for more perks. To succeed in attracting additional residents, however, they have to offer a more attractive package of public goods, through providing the goods preferred by residents and through spending a larger fraction of their budget on public goods rather than perks. Officials thereby benefit from taking a smaller slice out of a larger pie.

Contrary to the tax competition literature, we then forecast that decentralizing the provision of public goods is welfare improving. However, we cannot say how decentralization affects the size of government. As suggested by Wallis, with less "waste" in government due to the threat of emigration, residents will choose to increase their demands for public goods. Since "waste" will fall, however, public expenditures rise on net only if the increase in public good levels is high enough to more than offset the fall in "waste." This helps explain the mixed results obtained in previous empirical studies comparing the size of government with the extent of fiscal decentralization. In any case, the incentive to cut "waste" implies that utilities are higher under fiscal decentralization.

This paper is not the first to examine the possible use of the tax structure to affect the incentives faced by public officials. Findlay and Wilson (1987) analyze the effect that a tax on private-sector output has on the behavior of a surplus-maximizing "Leviathan," whose

[3] They may also prefer to provide a different composition of public goods than those preferred by residents. For further discussion, see Gordon and Wilson (1999).

[4] This is the focus of the literature on yardstick competition, as in Besley and Case (1995).

motivations are similar to those of the government officials in the current paper. While they note that there will be an optimal tax rate for the citizens, they do not investigate its value. In contrast, Gordon and Wilson (1999) solve for the optimal tax structure for a closed jurisdiction, using a model of "waste" in government that is closely related to the one employed here. Glaeser (1996) compares the effectiveness of a property tax and a labor income tax in providing a link between the budget available to local officials and their choice of public good levels. Hoxby (1999) argues that this link can also improve officials' effort, making public production more efficient. The current paper examines not only the impact of labor mobility on the behavior of officials in a single jurisdiction, but also the implications of this mobility for the equilibrium properties of the entire system of jurisdictions.

The plan of this paper is as follows. In the next section, we analyze equilibrium property taxes and public good levels in a system of jurisdictions when migration is not feasible. To focus on the implications of agency problems, we omit mobile capital from the discussion, and thus effectively assume that housing is produced with land alone. We find that "waste" in government still leads to too low public good levels, relative to the "first best." Section 2 then explores how the equilibrium changes when instead migration is possible, though jurisdictions can impose zoning controls on housing if they wish. We quickly find that utility is higher with mobility. Section 3 then explores how results change when capital mobility and limitations on zoning are introduced. We provide a short summary in Section 4.

1. Economy without Residential Mobility

The economy consists of a large number of jurisdictions. For purposes of comparison, assume to begin with that migration is not feasible, perhaps due to language barriers or international borders. Each jurisdiction contains L identical residents and has an exogenous amount of housing, H. While these residents cannot leave if they are unhappy with government services, they can still fire (vote out of office) the government official if they are unhappy with the level of government services, g. In addition, residents have some control over the budget the official faces, through their control over the property tax rate, t. Residents also set the salary of the official, denoted by σ, thereby affecting the official's foregone income if she is fired.[5]

The equilibrium is determined as follows. First, residents set t and σ to maximize their utility. Taking these choices as given, the official then announces how much g she will provide. Given the official's announced policies, residents can either fire the official or allow the official to go ahead and provide g. If the official remains in office, she can use any residual government budget to finance perks, denoted by s. Finally, given their earlier choices for t and σ, and given g, residents allocate their income between housing, h, and nonhousing consumption, x, so as to maximize their utility. Observe that we are

[5] We do not take into account any possible link between the pay of officials and some measure of their performance. While such links are an important way for shareholders to induce corporate managers to act in their interests, public officials rarely face such links, perhaps because there is no equivalent to a Board of Directors that has the incentive to act in the interests of residents and can oversee such compensation schemes. We do, however, allow for yardstick competition.

allowing housing per resident to vary while fixing the jurisdiction's total stock of housing. In the current case, prices adjust so that each of the L residents demands $h = H/L$ units of housing. When we open the borders to labor mobility in the next section, we shall also allow jurisdictions to control h through residential zoning restrictions. This specification is intended to eliminate tax competition concerns, allowing us to focus on the implications of labor mobility for agency problems.

In analyzing this equilibrium, we start at the last stage and describe first the residents' choices for h and x. We next examine the choices made by the government official, given the threat she faces of being fired. Finally, we look at the residents' choices for t and σ.

Residents' consumption behavior

Taking t and g as given, each resident simply allocates his income I between h and x. The price of x is normalized to one, while the per period rental price of h is denoted by q. The budget constraint therefore is $I = x + qh$.

If housing is valued at c per unit in the jurisdiction, then the rental cost of a unit of housing, q, consists of foregone interest income, rc, plus the property taxes, tc, owed each period: $q = (r + t)c$.

Each resident's income, I, is determined as follows. Each resident supplies one unit of labor to the local economy, earning a wage w, which we treat as exogenously fixed.[6] Their initial assets consist of housing, h_n, with market value ch_n, and nonhousing assets of value A_n. These assets pay a return of r, that is exogenously set on international capital markets.[7] Therefore, $I = w + r(A_n + ch_n)$. We will focus on a closed-economy equilibrium in which $h_n = h$.[8]

Each individual chooses between h and x to maximize a strictly concave utility function, $U = u(x, h) + \mu(g)$, where $u_{xh} > 0$. Given the assumed separability in the utility function between public and private consumption, demand for x and h depends simply on I and q.[9] Denote the individual's resulting indirect utility by the function $\nu(q, I) + \mu(g)$.

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[6] By assuming an exogenous labor supply, we avoid uninteresting complications in the derivations due to changes in labor supply. The determinants of w could be modeled by assuming that residents work in constant-returns-to-scale firms that face prices for non-labor inputs and outputs that are determined on international factor and product markets.

[7] The return in the case of housing will take the form primarily of income in kind. However, in equilibrium the value of the marginal return on all alternative assets, whether received in cash or in kind, must be the same, and is denoted by r. We describe explicitly the initial portfolio structure in order to capture appropriately any capital gains/losses that occur in the housing market as a result of announced changes in government policy. Throughout the paper, r is assumed to be exogenously determined on the international capital market.

[8] Our model assumes infinite lifetimes, so that any capital gains in the value of housing assets is just offset over the lifetime by the extra opportunity cost of housing consumption. However, all decision-making occurs within a single period.

[9] We assume separability in order to eliminate an additional way in which the government's choice of g can affect property tax revenues, through its effects on the demands for h and x. Such effects exist equally in both closed and open economies, and so are not of importance for our analysis.

Government behavior

The public official[10] chooses g, taking t and σ as given, but recognizes the effects of her choice on market-clearing prices and consumer expenditure decisions and also on the probability of her being fired. She makes these choices subject to the following budget constraint:

$$tcH = g + \sigma + s, \tag{1}$$

where s represents the residual part of the budget that officials use to finance perks.

We assume that perks are not a perfect substitute for salary, σ. In particular, residents attempt to monitor officials to prevent such "waste." We assume that residents can largely prevent officials from pocketing extra cash, but cannot so easily detect reported expenses that go beyond what is needed to produce the observed public good. These additional perks can come from fancier offices, fact-finding trips, business lunches, hiring relatives and friends instead of more competent alternative employees, etc. Given the restriction that any perks take a form that is not easily detected by residents, we assume that the official's utility in office equals $V \equiv \sigma + f(s)$, where $f(s)$ is a strictly concave function. Perks are assumed to be almost as useful as salary in generating utility if they are consumed in small amounts, but this usefulness shrinks as perks grow. In particular, the function $f(s)$ satisfies the following properties: $f(0) = 0$, $f'(0) = 1$, $f'(s) > 0$ for all positive s and $f''(s) < 0$ for all nonnegative s.[11]

Officials do face the threat of being fired for poor performance. In particular, residents can compare the utility they receive with what residents in other jurisdictions receive. Utilities differ if officials in one jurisdiction spend more of their budget on perks than elsewhere. Utilities can also differ, however, due to random shocks that affect one jurisdiction more than another. We do not model these shocks directly, and simply assume that the probability the officials can remain employed is a function of the utility of local residents compared with the utility available elsewhere.

Implicitly, the model is intended to capture a dynamic process, in which job loss potentially occurs in the future, depending on current job performance. To maintain a one-period set-up, however, we assume that the official faces a probability $1 - \pi$ of losing her job immediately upon announcing her planned expenditure package. Here, $\pi \equiv \pi(U/U_o)$ is a concave function of the utility of residents in the jurisdiction, given the announced expenditure package, relative to the utility obtained in other jurisdictions, U_o, with $\pi' > 0$. Since the number of jurisdictions is large, each jurisdiction treats U_o as fixed.

If the official loses office, assume that her utility is some value V_n.[12] As a result, her expected utility, W, is

$$W = \pi V + (1 - \pi)V_n. \tag{2}$$

[10] For simplicity, we treat the government as a single individual, and so ignore internal monitoring and free-riding problems within the government.

[11] For simplicity, we ignore here any direct benefits officials receive from g, and we assume that officials are not affected directly by changes in the housing price.

[12] V_n can well be affected by government policies. However, we assume that the policies that are implemented if the official is replaced are unaffected by the policies that had previously been proposed by the official.

She then picks g to maximize this utility, subject to the budget constraint (1), and given the tax rates and salary that had been chosen by the residents.

Before examining the first-order condition for g, we need to examine the official's budget constraint more closely. In particular, we quickly find that $R = tcH$ is unaffected by the official's choice of g. Given the assumed separability in the utility function, g does not affect h and therefore does not affect c, while H is exogenous by assumption.

Since tax revenue is unaffected by g, the first-order condition for g, assuming an internal optimum, is

$$f' = \frac{\pi' \mu'}{\pi U_o}(V - V_n), \tag{3}$$

where the left-hand side measures the utility gain from extra perks, while the right-hand side measures the utility loss from the resulting higher probability of being fired. Since $f' > 0$, we immediately infer that $V > V_n$: in order to prevent officials from taking everything as perks, there has to be some cost to them of being fired. This is a standard result in the efficiency wage literature. The higher the utility V, the greater the threat of being fired and so the lower the chosen level of s.

Residents' choices for t and σ

Finally, residents must choose the tax rate and the salary level for the government official, taking into account how these choices affect g as well as the market-clearing price for housing. In particular, residents choose σ and t to solve:

$$\max_{\sigma,t}\Big[\nu\big((r+t)c, r(ch_n + A_n) + w\big) + \mu(g)\Big].$$

The resulting first-order condition for σ, the salary of the government official, is simply $\partial g/\partial \sigma = 0$: the salary is chosen to maximize g, for any given tax revenue. Therefore, extra salary simply crowds out perks dollar for dollar at the optimum: $\partial s/\partial \sigma = -1$.

Equation (3) helps provide some insight about the process by which the choice of σ affects g. When σ is initially very low, the official has a large budget available, causing s to be large, and therefore $f'(s)$ to be very low. Any increase in σ then raises V substantially, increasing the cost of being fired and therefore inducing the official to increase g in response. When σ is large, however, the budget constraint necessarily implies that s is low so that perks and salary are closer to perfect substitutes. Therefore V is little affected by any change in σ, so that the cost of σ will largely come out of reductions in g. The optimal value is in between, maximizing g for any given level of tax revenue. The optimal σ need not always be positive,[13] but we limit the analysis to this case for expositional simplicity.

Under this optimal σ, there is still "waste" in government: $s > 0$. To see this, assume to the contrary that $s = 0$ at the optimum. Then σ must be positive to induce the official to hold office. If we then reduce σ by a small amount, s must rise; otherwise, g would increase to balance the government budget, contradicting the optimality of the initial σ.

[13] When perks are valuable enough, residents can charge potential officials a fee for getting the position. More likely in practice, potential officials spend some of their own funds to try to obtain such jobs. In this case, however, the price paid is "wasted," rather than transferred to residents.

But s will rise above zero only if equation (3) holds with equality initially; otherwise, s would remain at the corner solution of $s = 0$ in response to small compensation changes. At an internal optimum, since $\partial U/\partial \sigma = 0$ and $\partial s/\partial \sigma = -1$, we infer by differentiating (3) with respect to σ that

$$-f'' = \frac{\pi' \mu'}{\pi U_o}(1 - f'). \tag{4}$$

But this equation cannot hold if $s = 0$, since then $1 - f' = 0$, whereas we have assumed that f'' is always negative. In equilibrium, there is necessarily "waste" in government.

Turning to the optimality condition for t, observe first that the Samuelson rule would require that the sum of marginal rates of substitution between g and x, LMRS, be equated to the marginal resource cost of g, which is one in the model.

In our setting, however, the chosen level of g will be below the first-best level because not all of the extra tax revenue will be spent on g — some will also be used to increase perks, raising the effective price of g. More formally, the first-order condition for t may be written in the following form:

$$L\text{MRS}\frac{\partial g}{\partial R} = 1, \tag{5}$$

where $\partial g/\partial R$ denotes the marginal change in g from another dollar of tax revenue financed by a higher property tax rate

Observe that $\partial g/\partial R < 1$ since the government official spends at least part of any extra budget on perks. To confirm this, examine equation (3), which characterizes the optimal g. If the officials spent the entire additional revenue on g, then μ' would drop, while all the other terms would remain unchanged.[14] Equation (3) would no longer hold, since the gain from additional s would now be higher than the gain from additional g. Some of the additional revenue must be spent as well on additional s in equilibrium, implying that $\partial g/\partial R < 1$. Therefore, $L\text{MRS} > 1$ so that expenditures on g are below the first-best level, due to the agency problems in monitoring government officials. Note, however, that there would be no efficiency gain from allowing different jurisdictions to coordinate their choices, since jurisdictions are not linked by factor mobility.

2. The Open Economy

Suppose now that residents can move between jurisdictions. As previously noted, we allow jurisdictions to control the size of their residential populations through residential zoning restrictions, specifying the value of h for each resident. We assume that there is an infinitely elastic supply of jurisdictions, each with the same amount of housing, H. Thus, the number of jurisdictions adjusts to maintain equilibrium as h varies within jurisdictions. In addition, we assume that if the population in a jurisdiction increases, congestion effects may raise the cost of providing public services. In particular, assume that the cost of providing a particular quality, g, of public services is denoted by $gC(L)$,

[14] π and π' remain unchanged since the residents' utilities are unaffected by any perturbation in t, starting at the optimal t.

where $C' \geq 0$ so that the marginal costs of g can increase if the population grows.[15] To maintain consistency with the closed economy model, assume that $C(L) = 1$ at the value of L in the closed economy.

With these modifications, we can now describe the utility of a potential new resident by $v(rA^* + w - (r + t)ch, h) + \mu(g)$, where the first argument of v, denoted y, is the new resident's income net of their nondiscretionary housing costs, while the second term h describes the required housing consumption set by local zoning ordinances. If each jurisdiction is small relative to the overall economy, then nonresidents move in until

$$v(rA^* + w - (r + t)ch, h) + \mu(g) = U_o \tag{6}$$

in equilibrium, where A^* is the sum of a nonresident's housing and nonhousing assets. In particular, if g rises in one jurisdiction for a given t, then property values rise by just enough to offset the more attractive government policies.

The rise in property values induced by a rise in g causes tax revenue to rise when government policy becomes more attractive.[16] The official can benefit directly from this extra tax revenue, through increased perks, resulting in stronger incentives at the margin to increase g.

More formally, we now allow individuals to choose their jurisdictions after each government commits to a quality of public services, g. Given the jurisdiction's prior choice of taxes and zoning restrictions, this choice of g determines property values and, therefore the government's budget. Otherwise, the timing of decisions is unchanged from the model without mobility.

What effect do individual migration decisions have on the incentives faced by the government official? If the official now increases g, property values must necessarily increase, so that potential residents in equilibrium still receive utility equal to only U_0 if they move in. In particular, given equation (6), we infer that

$$\frac{\partial c}{\partial g} = \frac{\mu'}{v_y h(r + t)} > 0. \tag{7}$$

Although H is fixed by assumption, the increase in c increases government revenue when g increases: extra g no longer needs to be financed entirely out of foregone perks.

Similarly, if any other local government policies change (e.g., the tax rate, zoning requirements, or the public official's salary), c will again adjust so that equation (6) remains satisfied, leaving potential immigrants to the jurisdiction unaffected by the policy change. What are the effects of a change in any such policy, z, on the utility of initial residents, $v(r(ch_n + A_n) + w - (r + t)ch, h) + \mu(g)$? Assuming that they own all of the housing that they consume (i.e., $h_n = h$), the resulting change in their utility (using (7)) is

$$rv_y h \frac{\partial c}{\partial z}. \tag{8}$$

[15] For the existence of an equilibrium, the public good must exhibit sufficient scale economies, measured by the speed with which $C(L)/L$ falls with L; otherwise, jurisdictions would have an incentive to become infinitesimally small.

[16] Given existing zoning ordinances controlling h, L and so costs of producing public goods cannot change.

We therefore conclude that residents act to maximize property values when choosing any particular policy.

As before, the official chooses g and s to maximize W, as described in equation (2), subject to the budget constraint, given by (1) with C now multiplying g. It is straightforward to show that the first-order condition for g now equals:

$$f' = B\frac{\pi'\mu'}{\pi U_o}(V - V_n), \tag{3a}$$

where

$$B = \left(\frac{r}{r+t}\right)\left(\frac{1}{C - tH\partial c/\partial g}\right) = \frac{r}{Cr - t[\text{LMRS} - C])}. \tag{9}$$

Here, the last equality relies on (7).

The extra term B in equation (3a) compared with equation (3) captures the effects of changes in property values caused by any increase in g. To begin with, the increase in property values dampens the gain to existing residents from extra g, since they now owe more property taxes per unit of h consumed: their marginal gain from extra g is now $\mu'[r/(r+t)]$ rather than μ'. The increase in property taxes, however, also implies that g can increase further for any drop in s, so that $\partial g/\partial s < -1$; previously tax revenue was unaffected by government behavior so that $\partial g/\partial s = -1$. Which of these two considerations dominates depends on whether LMRS is less than or greater than one.

Since in an open economy the objective of residents is simply to maximize property values, the optimal policies are characterized by $\partial c/\partial t = \partial c/\partial \sigma = \partial c/\partial h = 0$. Consider first the optimal zoning ordinances, h. If there were no zoning regulations, so that individuals could choose how much housing to buy given the rental price q, then individual demand would be characterized by $v_h = v_y q$. Instead, the first-order condition for the government's optimal choice for h is

$$v_h - v_y q + \mu' \frac{\partial g}{\partial h} = 0. \tag{10}$$

In general, the sign of $\partial g/\partial h$ is unclear. To begin with, since $Lh = H$, we know that $\partial L/\partial h = -L/h < 0$. This fall in L lowers the marginal (and average) costs of producing g, due to lower congestion. For both reasons, the equilibrium g will rise, everything else equal, in itself implying that $\partial g/\partial h > 0$. If this were the only effect of h on g, then equation (10) implies that $v_h < v_y q$: individuals would be forced to consume more housing than they would otherwise choose to buy, given the per-unit price q, due to local zoning ordinances. This population control provides a direct mechanism for taking into account the negative congestion externalities generated by new residents, a role for zoning emphasized in Hamilton (1975).

Congestion costs are not the only reason why h affects g, however. From equation (7) we find that $\partial c/\partial g$ becomes smaller when h increases: not only does h rise but v_y rises as well, since less money is left to finance other consumption, and since the rise in h raises the marginal utility of other consumption ($v_{yh} > 0$). This fall in $\partial c/\partial g$ lowers B by equation (9), and therefore, by equation (3a), lowers g. Together, these results suggest an ambiguous change in the effective level of public goods, g, due to a rise in h. Unless

$\partial g/\partial h = 0$, however, the jurisdiction will want to impose zoning regulations. For a pure public good (no congestion), we have $\partial g/\partial h < 0$, implying that zoning should actually force households to consumer less housing than they individually desire, which is the reverse of the fiscal zoning policy identified by Hamilton and others.

Note that even when migration is not feasible once residents have located in a jurisdiction, the presence of congestion costs should still affect the number of jurisdictions that arise, so the equilibrium population per jurisdiction. What changes when borders are open is the effect of h on agency costs, in itself leading to $\partial g/\partial h < 0$ and then $v_h > v_y q$ by (10). Our inference then is that h will drop and the population per jurisdiction will go up when borders are opened.

What about the jurisdiction's choice for t? Using equation (6), we infer that

$$\text{MRS}\frac{\partial g}{\partial t} = hc, \tag{11}$$

evaluated at the optimal policies. Solving for $\partial g/\partial t$ by differentiating equation (3a), we find that

$$\frac{\partial g}{\partial t} = \frac{Lhc}{C}\left(\frac{\mu'}{\mu' - \mu''(V - V_n)}\right)\left[1 + \left(\frac{t(V - V_n)}{BR}\right)\frac{\partial B}{\partial t}\right]. \tag{12}$$

Substituting for $\partial g/\partial t$ in equation (11), the first-order condition for t can be reexpressed as:

$$L\text{MRS}\left(\frac{\mu'}{\mu' - \mu''(V - V_n)}\right)\left[1 + \left(\frac{t(V - V_n)}{BR}\right)\frac{\partial B}{\partial t}\right] = C. \tag{13}$$

With this rule for public good provision, we may now prove:

Proposition 1: In the open economy, $L\text{MRS} > C$.

Proof: If $L\text{MRS} \le C$, then (13) can hold only if $\partial B/\partial t > 0$. But the expression for B in (3a) shows that $\partial B/\partial t < 0$ when $L\text{MRS} \le C$, provided $L\text{MRS}$ falls with t. Since L and h are fixed through zoning restrictions, $L\text{MRS}$ changes only because g rises and x falls along the resident's indifference curve. Consequently, MRS must fall, implying that $\partial B/\partial t < 0$. This contradiction establishes the result. ∎

Proposition 1 is similar to the underprovision result from the tax competition literature. However, the underprovision identified here should be viewed as the result of agency problems, not competition for mobile capital. In fact, Proposition 1 implies that $B > 1$, so that officials in an open economy are under more pressure to increase g. Due to these improved incentives on government officials, we find:

Proposition 2: Opening the borders to migration raises the utility of residents.

Proof: Start with the equilibrium values for g, h, L, and σ in the economy without mobility, where $C(L) = 1$. Then open the borders of all jurisdictions, keeping g, h, and σ fixed. By the symmetry of jurisdictions, we will continue to have $U = U_o$. In addition, with h held fixed, L remains unchanged, so that c and therefore tax revenue remain unchanged. The only change from equation (3) to equation (3a) is the introduction of the term $B > 1$. Therefore, for any values of t and σ, the official would choose a larger value of g. To maintain the same g as before, t must fall, benefiting existing residents. If we now allow the residents of each jurisdiction to choose the property-value maximizing levels of t, σ, and h, holding U_0 fixed in migration constraint (6), then the value of housing, c, rises. But c cannot rise in the final equilibrium, because it is fixed by the opportunity cost of new jurisdictions. Thus, the efficiency gains are translated instead into a rise in the equilibrium utility U_0, with no change in c. In other words, the property-value-maximizing behavior of jurisdictions leads to further utility gains. ∎

What then happens to the level of public services, and the size of government expenditures? That the utility of residents is higher in an open economy in itself will raise the demand for g as long as g is a normal good, which we assume. In addition, holding B fixed, given that $B > 1$ an increase in t will now result in more g and less waste than in a closed economy, lowering the effective price of g and further raising demand. If $\partial B/\partial t > 0$, then there is yet a further reason for demand to go up in an open economy, since a higher t improves incentives on the official. While an increase in t per se does raise B as seen from (9), this increase in t also lowers MRS. As a result, there is a strong presumption, but not a proof, that g is higher in an open economy.

Regardless, there is no clear presumption that government *expenditures* go up. When the price of a good falls, expenditures on a good go up only when the price elasticity of demand exceeds one.

Jurisdictions can do no better by coordinating their decisions. Since even as a group they continue to take c and r as fixed by the broader market, decisions in one jurisdiction have no effect on welfare in other jurisdictions. What is best for each jurisdiction in isolation is then best for the group.

One omission from the above discussion is what happens to the utility of the public officials when people can change jurisdictions. Intuitively, the officials gain only if a smaller fraction of a larger pie yields a larger slice. But we have just observed that the pie may not be larger. As a result, officials may oppose decentralization even if residents gain on net from it.

3. Extensions

We have found that factor mobility lowers agency costs and raises efficiency. In contrast, the tax competition literature emphasizes the tendency for governments to compete for scarce capital by setting tax and spending levels inefficiently low. These latter considerations are now introduced by allowing capital to be interjurisdictionally mobile.

Thus let housing be produced using a constant-returns-to-scale production function, $H(N, K)$, where N is land usage and K is the amount of capital invested in housing. Jurisdictions are now not only utility-takers in the market for residents, but also treat as fixed the rental price of a unit of mobile capital, r. We initially assume that capital is in infinitely elastic supply. In particular, assume a linear technology for converting the numeraire consumption good, x, into housing capital. If land sells for the price p per unit in a jurisdiction, then the unit value of housing, c, equals the minimum value of $pn+k$ such that $H(n, k) = 1$, where n and k represent the factor demands per unit of housing. This minimum value defines c as a function of p: $c(p)$. Given this relation, the cost-minimizing demands for land and capital per unit of housing may be expressed as functions of the unit cost: $n(c)$ and $k(c)$. The jurisdiction's aggregate demand for capital is then $K = Lhk$. Market clearing in the land market requires that $N = Lhn$.

For simplicity, we assume that housing does not depreciate. The per period rental cost of a unit of housing then continues to be $q = (r + t)c$. The remainder of the model is specified as before, except that we are now considering tax and spending decisions at a time prior to housing supply decisions.

Demand for housing consists of two choices: the number of units h and the relative use of capital vs. land, as reflected in $n(c)$ and $k(c)$. As in the previous section, we allow governments to impose direct controls on either or both choices, specifying h and/or n through zoning ordinances, such as minimum lot sizes and setback requirements.

What in fact will jurisdictions choose to do? More generally, how do the equilibrium policies change once capital is introduced into the model?

To begin with, how does mobile capital affect results in a closed economy, where capital can move but households cannot? If the jurisdiction imposes zoning controls on n, even without controls on h, the model in the previous section remains valid. What happens if it does not control n? If it still maintains controls on h, then any policy changes not only cannot affect h but cannot affect capital allocations — with hL fixed and N fixed, K is determined as well. Again, the previous analysis continues to apply.

What if a closed jurisdiction chooses not to control h or n? Now, mobile capital creates the standard pressures to reduce tax rates. In particular, with flexible demand for housing *and* mobile capital, (5) must be modified to reflect the distortion to housing demand:

$$L\text{MRS}\frac{\partial g}{\partial R}\left(1 - \alpha\frac{t\epsilon}{r + t}\right) = 1, \tag{14}$$

where ϵ is the elasticity of housing demand with respect to q (measured positively), and $\alpha = \left[c + (r + t)\partial c/\partial t\right] / \left[c + t\partial c/\partial t\right] < 1$ since $\partial c/\partial t < 0$. The term $t\epsilon/(r + t)$ captures the deadweight loss from tax distortions in the housing market. In addition, capital mobility does nothing to improve the incentives faced by government officials — the first-order condition for g remains equation (3). Welfare is then lower without zoning controls on h, so these controls make sense in a closed economy.

What about in an open economy, in which households are mobile? If a jurisdiction in an open economy maintains controls on *both* h and n, then the behavior of public officials would be the same as in the previous section, since they would once again face a fixed supply of housing when making their decisions. In addition, the welfare of residents would improve, as claimed in Proposition 2, if we continue to assume that the price of land, p, is fixed by the broader market. With p (and r) fixed for the group of jurisdictions, as well as for any individual jurisdiction, there are no interjurisdictional externalities, so no potential gain from coordination of policies across jurisdictions.

Consider what happens instead if the jurisdiction imposes no zoning controls at all. Now, when a government official considers increasing g, to begin with c still changes as described in equation (7). In addition, the increase in c causes a fall in individual demand for housing as well as in the use of land in producing housing: new capital is attracted to the jurisdiction to save on land in producing h. This extra contribution to the tax base contributes further to the higher-powered incentives faced by officials in an open economy. For the land market to continue to clear, so that we still have $Lhn = N$, L must rise. In particular, we find that

$$\frac{1}{L}\frac{\partial L}{\partial g} = -\left((r+t)\frac{h'}{h} + \frac{n'}{n}\right)\frac{\partial c}{\partial g} > 0. \tag{15}$$

These increases in L and c are large enough to offset the fall in h so that government revenue still increases on net when g increases.[17] If we rederive the first-order condition characterizing the official's choice for g, equation (3a) is still the resulting first-order condition, but now

$$B = \frac{r}{Cr - t[\text{LMRS}(1 - cn'/n) - C])}. \tag{16}$$

By removing restrictions on n, we find that B becomes larger, providing higher powered incentives to officials. Just as opening the economy, by improving incentives on officials, raises the welfare of residents, we find that eliminating zoning restrictions on n further raises B and again raises the utility of residents.

For the choice of the tax rate, note that the term reflecting housing market distortions drops out of (14). The reason is that no such distortions exist at the margin. The tax base is Lhc. Clearing of the land market requires that $Lhn = N$, so that the tax base is cN/n. By design, a marginal change in t leaves c unchanged, so leaves the tax base unchanged. Even if h is uncontrolled, so falls due to the rise in q, just enough new residents enter to leave the overall tax base unchanged. Total capital invested in housing, Lhk, is also unchanged.

Would it then be attractive to reimpose restrictions on h? Note that a marginal restriction on h has no impact on the relation between tax revenue, $tc(N/n)$, and g or t, since the quantity hL is fixed by the land market, and the division of the tax base, $c(N/n) = hL$, between h and L is irrelevant. This is why h does not affect B directly, unlike n. If we rederive the first-order conditions for h, as before we find that the government will still want to maintain controls on h, even when n is flexible, as long as $\partial g/\partial h \neq 0$. We were not able to sign $\partial g/\partial h$ previously, and this remains true. In general, this derivative will be nonzero, and controls would raise jurisdiction welfare.

Without capital mobility, we were able to show that $L\text{MRS} > C$, implying that public services were below the first-best level. With capital mobility added to the model, and h zoned, this is no longer necessarily the case. What we can show, using the same logic as before, is:

Proposition 1a: With capital mobility and zoning restrictions on h, $L\text{MRS}(1 - cn'/n) > C$.

Proof: Assume instead that $L\text{MRS}(1 - cn'/n) \leq C$. In this case, $L\text{MRS} < C$, and so (13) tells us that $\partial B/\partial t > 0$. But (15) shows that $\partial B/\partial t < 0$ if $L\text{MRS}(1 - cn'/n)$ declines with t. This condition is satisfied, since h, L and c do not change with t under our zoning restrictions. This contradiction establishes the result. ∎

[17] Given the equilibrium condition for the land market, tax revenue $R = tNc/n$. The increase in c when g increases, and the implied fall in n, together imply that $\partial R/\partial g > 0$.

That this proposition is weaker than Proposition 1 should not be entirely surprising. It is now possible that $L\text{MRS} < C$. While we have shown that there is always waste in government, we have also seen that a higher tax rate can create stronger incentives to limit such waste. Even though a higher tax rate generates more revenue, due to the higher powered incentives, waste might in fact fall at the margin, providing a marginal subsidy to public expenditures and raising the level of g above the first-best level.

Proposition 1a establishes that B exceeds $1/C$, which equals one in the closed economy. As a result, the proof of Proposition 2 continues to apply, with the implied reduction in public sector waste again establishing the superiority of the open economy, given that h is zoned.

Without zoning controls, we cannot prove that $B > 1/C$ in all cases, but this condition will continue to hold unless $\text{L}MRS << C$, i.e., substantial overprovision of the public good. For this reason, opening the economy seems likely to produce efficiency improvements, although we cannot be as definitive as before. However, there may now be gains from policy coordination among jurisdictions. We saw previously that individual jurisdictions may desire to control h via zoning restrictions, with the direction of the constraint depending on a tradeoff between congestion and agency costs. If such restrictions cannot be imposed directly, restricting the number of jurisdictions that are developed for residential use might serve a second-best role.

Until now, the model has ignored one of the main concerns of the tax competition literature, namely, competition for scarce capital. This scarcity could be inserted into the model, either by assuming that housing capital is fixed in supply for the entire system of jurisdictions, or by making the less extreme assumption of an upward-sloping supply curve for capital (i.e., a strictly concave transformation curve over numeraire consumption and housing capital).

Results here are very different than in standard tax competition models. There, tax rates are set inefficiently low, because each jurisdiction is under pressure to reduce t in order to attract capital from other jurisdictions. In our model, a jurisdiction sets t where a marginal change has no impact on c and therefore does not alter the allocation of capital.

A change in the zoned level of h also fails to alter the allocation of capital at the margin. However, it does change the residential population, suggesting a form of competition for residents, rather than capital. But our previous results have shown that this competition is welfare improving.

Amending the model to include an upward-sloping supply curve for land or capital complicates the analysis. Assume both curves slope up. By reducing h and attracting new residents, a jurisdiction reduces the demand for capital and land elsewhere, leading to a reduction in their prices. Unit house values then fall. Thus, t can be increased without changing the unit tax, ct. As seen in equation (9), this increase in t improves the incentives of public officials, reducing agency costs, and thereby raising welfare. As a result, jurisdictions may not compete vigorously enough for residents; they may zone h too high from the viewpoint of the entire residential population.

We previously argued that opening the economy would lead to a drop in the zoned level of h. By generating a fall in c, reducing agency costs, the gains from open borders are even larger than when c is set exogenously.

Consider finally the addition of a head tax to the model. Head taxes are viewed in the local public finance literature as a method for controlling congestion. Here this is accomplished through zoning restrictions. Given their impact on agency costs, however, head *subsidies* are now desirable. Consider first the setting without capital mobility. Given the desired zoning restrictions, the public official treats h and L as fixed but can capture a portion of the capital gains generated by a rise in g. By subsidizing L, financed by a rise in t, we can strengthen these incentives, thereby reducing waste in government. Thus, the model departs from the usual prescription that head taxes are good, finding instead a case for head subsidies. This finding carries over to the case with capital mobility. Holding g fixed, a revenue-neutral rise in t used to finance a head subsidy does not affect incentives to migrate if housing demand h is restricted by zoning. However, incentives to raise g are once again enhanced. Matters become much more complicated if for some reason zoning is ruled out, even when there are no congestion costs, because then the head subsidy distorts the supply of labor. Nevertheless, our working paper (Gordon-Wilson (2001)) provides conditions under which a positive head subsidy remains desirable.

4. Summary

This paper raises questions about past models of tax competition. Under these models, when a jurisdiction raises its tax rate, some of the tax base will leave for other jurisdictions, making it more difficult to finance public goods. The presumption is that public expenditures will fall when mobility is greater, leading to a reduction in welfare.

One omission from this story is that extra taxes are linked with extra public expenditures. Whether people and resources shift into or out of the jurisdiction in response to an increase in the tax rate depends on the net effect of the higher public expenditures as well as the higher tax rate, and on the availability and use of residential zoning controls.

Even in the absence of zoning, the model behaves very differently from the standard tax competition story. Since residents will choose to increase the tax rate only if doing so makes their jurisdiction more attractive, we infer that the utility gain from the extra expenditures must more than offset the utility loss from the extra taxes, implying that a tax increase at the margin attracts people into the jurisdiction. While each household will still demand less housing, due to the tax increase, the population in equilibrium increases by just enough to leave the tax base unaffected at the margin by a tax increase.

We explore the effects of mobility on waste in government. Government officials inevitably prefer to use at least some tax revenue for their own personal benefit rather than spending it entirely on public goods. The threat of being voted out of office, or fired, if they abuse this opportunity too much has only limited effects — monitoring is just too difficult. Instead, we argue that the tax structure can provide a form of incentive contract. If the official provides more public goods, the tax base will rise, generating additional tax revenue so additional resources that can benefit the official.

When mobility across jurisdictions is greater, the incentives faced by officials then become more high-powered, since the tax base will be more sensitive to the quality of public goods provided. As a result, waste in government will fall for any given tax rate, making public goods cheaper to residents and raising utility.

These results provide reasons why the devolution of government responsibilities from the central to more local levels of government can raise utility, lower waste in government, and therefore potentially increase the demand for public goods. Of course, the paper does not capture all relevant considerations. Most importantly, it ignores spillovers of benefits across borders, so that public goods that provide important benefits in many jurisdictions should still be provided by the national government. Another important omission is distributional considerations. Expenditures that aid some groups more than others will attract these groups to the jurisdiction, and the higher taxes used to finance the expenditures will cause other groups to emigrate. The resulting changes in the composition of residents in response to higher expenditures may no longer provide a net fiscal gain to the jurisdiction, so may not induce officials to reduce waste.

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