NBER WORKING PAPER SERIES

EXPENDITURE COMPETITION

Roger H. Gordon
John D. Wilson

Working Paper 8189
http://www.nber.org/papers/w8189

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
March 2001

Expenditure Competition
Roger H. Gordon and John D. Wilson
NBER Working Paper No. 8189
March 2001

ABSTRACT

Given the temptation on government officials to use some of their budget for "perks," residents face the problem of inducing officials to reduce such "waste." The threat to vote out of office officials who perform poorly is one possible response. In this paper, we explore the effect that competition for residents induced by fiscal decentralization has on "waste" in government.

We find not only that such competition reduces waste and raises the utility of residents, but also that it should increase the desired level of public expenditures, and to a point above the level that jurisdictions would choose if they could coordinate. These results are in sharp contrast to the presumed effects from such "tax competition," and suggest an additional advantage of fiscal decentralization.

Roger H. Gordon
Department of Economics
University of California, San Diego
9500 Gilman Drive
La Jolla, CA 92093-0508
rogordon@ucsd.edu
and NBER
Tel: 858-534-4828
Fax: 858-534-7040

John D. Wilson
Department of Economics
Michigan State University
East Lansing, MI 48824
Tel: 517-432-3116
wilsonjd@pilot.msu.edu

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 community 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 that suggests why a positive relation between government expenditures and fiscal decentralization might be observed. 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 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

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.

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]

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 public good levels should rise with increased fiscal decentralization. As suggested by Wallis, with less "waste" in government due to the threat of emigration, residents will likely 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 competition for residents, however, leads public expenditures to be too high in equilibrium, in contrast to the results from tax competition in an economy without mobility. With mobility, tax competition for mobile capital investments in housing is supplemented by competition for mobile residents. When a tax rise makes a jurisdiction more attractive to existing residents, it also makes it more attractive to potential immigrants. The resulting immigration generates a subsidy to public goods, since the new residents pay taxes yet do not add to the cost of producing pure public goods. For the same reason, their departure from other jurisdictions should impose a loss on these jurisdictions, due to the resulting drop in their tax base.

The paper also shows that in a decentralized setting a property tax dominates a head

[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).

tax on efficiency grounds: if both taxes are used, the optimal head tax is negative. By linking the tax revenue available to officials more closely to public good levels, through their impact on property values, the property tax leads to less waste in government than results with a head tax. With both taxes available, residents can provide higher powered incentives to officials even without expanding the size of the public sector.

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 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 (1995) 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. In this model, both "waste" and capital mobility lead to too low public good levels, relative to the "first best." Section 2 then explores how the equilibrium changes when instead migration is unrestricted. We quickly find that utility is higher with mobility. Under certain conditions, we are also able to show that public good levels are higher in an open economy, contrary to prior forecasts. However, equilibrium tax rates are inefficiently high, due to negative externalities imposed on other jurisdictions. We provide a short summary in Section 3.

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 land, N. While these residents cannot leave if they are unhappy with the level of public goods, g, they can still fire (vote out of office) the government official. 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]

[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.

The equilibrium is determined as follows. First, residents set t and σ to maximize their expected 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.

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 price of h is denoted by q. The budget constraint therefore equals $I = x + qh$.

The market-clearing price, q is determined as follows. Housing can be produced using the constant-returns-to-scale production function, $H(N, K_h)$, where N is the amount of land used and K_h the amount of capital invested in housing. The unit value of housing, c, in equilibrium must equal the marginal cost of producing new housing in that jurisdiction. If land sells for price p per unit in the jurisdiction and the price of K_h is one since it is simply one use for past output, then the equilibrium value of 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. Let $c(p)$ denote the resulting unit value for housing. Given this relation, the cost-minimizing demands for land and capital per unit of housing may be expressed as functions of the unit cost c: $n(c)$ and $k(c)$. The jurisdiction's aggregate demand for capital in the capital market is then $K_h \equiv Lhk$. Market clearing in the land market requires that $N = Lhn$.

The value of q equals the *per period* cost of a unit of housing. This cost consists of the foregone interest income, rc, plus the property taxes, tc, owed each period. Therefore, $q = (r + t)c$.

Each resident's income, I, is determined as follows. Each resident supplies one unit of labor to the local economy, earning a wage w.[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.[7] Therefore, $I = w + r(A_n + ch_n)$. We will focus on a closed-economy equilibrium in which $h_n = h$.

For completeness, assume that individuals work locally. Local firms are competitive, and face a constant-returns-to-scale production function, $F(K, L)$. Firms face a unit price for output on the goods market, and pay the rental rate of r for capital in the capital

[6] By assuming an exogenous labor supply, we avoid uninteresting complications in the derivations due to changes in labor supply.

[7] The return in the case of housing may take the form of income in kind. 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.

market. Competition between firms then bids up the wage rate w until firms just break even. We assume that the jurisdiction is small enough to be a price taker in the markets for output and capital. Since the wage rate depends simply on the output price and interest rate, it is therefore unaffected by t or g.[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 $v(q,I) + \mu(g)$.

Government behavior

The public official[10] chooses g, taking t and σ as given, but recognizing 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:

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

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] For some of the subsequent results, we also will assume that $f(s)$ satisfies $-d[f''/f']/ds < 0$, so that the function gradually flattens out. The common function, $f(s) = log(1+s)$, possesses all of these properties, for example.

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

[8] If land or public goods were also factors of production, then effects of t or g on p could also cause changes in the local equilibrium wage rate. For simplicity, we have ignored such effects.

[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.

[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.

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 expected utility of local residents compared with the expected 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 model, 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 expected 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, equals

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

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 $R = tcLh$ 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. In addition, in a closed economy L is exogenous.

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

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

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.

Residents choose σ and t to solve:

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

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: $\partial s/\partial\sigma = -1$.

[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.

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, 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. But s will rise above zero only if (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 equation (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 for two reasons. First, raising tax revenue with a property tax creates an excess burden due to the drop in demand for housing capital when the property tax increases. In addition, however, 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 further.

More formally, the first-order condition for t may be written in the following form:

$$L\text{MRS}\frac{\partial g}{\partial R}\left(1 - \alpha\frac{t}{r+t}\epsilon\right) = 1, \tag{5}$$

where $\partial g/\partial R$ denotes the marginal change in g from another dollar of tax revenue financed by a higher property tax rate, 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 $\partial c/\partial t < 0$.[13] The term $t\epsilon/(r+t)$ captures the excess burden from the property tax due to the resulting distortions to equilibrium housing demand.[14] These distortions make g more expensive, in themselves causing LMRS > 1.

[13] The increase in t raises q, thereby lowering demand for h. The land market continues to clear in spite of the drop in h only if c falls.

[14] The extra term α appears because of the effects of residents being owners as well as consumers of housing.

In addition, $\partial g/\partial R < 1$ 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.[15] 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, so that $\partial g/\partial R < 1$. Therefore, LMRS > 1 so that expenditures on g are below the first-best level, due in part to the agency problems in monitoring government officials.

Even taking these agency problems as given, expenditures on g are below the level that would be chosen if different jurisdictions could coordinate their choices. The optimal value of t (and therefore g) for any one jurisdiction is optimal from the perspective of the group of jurisdictions as a whole only if the other jurisdictions are also indifferent to any marginal change in t. However, a marginal increase in t leads to a fall in c, in order to maintain equilibrium in the land market in spite of the fall in h in response to the tax increase. This change in relative factor prices implies that n increases and k falls. Therefore aggregate investment Lhk falls by some amount dK. This amount dK must then be absorbed by other jurisdictions. As long as this extra capital is taxed in other jurisdictions as well, then these jurisdictions gain from the extra capital. Therefore jurisdictions, if they coordinate policies, will choose to raise t above the Nash equilibrium level.

These inefficiencies, both the deviation from the Samuelson rule and the loss from lack of interjurisdictional coordination, would both disappear if jurisdictions could use a lump-sum tax, perhaps in addition to a property tax, in order to finance g. The optimal policy would be to finance g solely with the lump-sum tax, and to do so until LMRS $= 1$. With a lump-sum tax, there are no welfare externalities due to capital mobility across jurisdictions, so no gain from policy coordination.

2. The Open Economy

Suppose now that residents can move between jurisdictions. If each jurisdiction is small relative to the overall economy, then nonresidents would move in until[16]

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

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 people move in until property values become expensive enough to offset the more attractive government policies.

This rise in property values, and the increase in the number of residents, both cause tax revenue to rise when government policy becomes more attractive. The official can

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

[16] For simplicity, we implicitly assume here that the utility from g does not depend on the number of residents in the community, and so ignore any congestion effects. With congestion, the effects of g on property values will be somewhat muted. But the qualitative properties of the model will remain unchanged, unless the losses from congestion become large enough.

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 jurisdiction as well as their housing and nonhousing consumption after each government commits to a level of government expenditures, g. These decisions on housing demand and location then determine the government's budget, and therefore the surplus available to the officials. 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

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

In addition, the number of residents must increase in response to an increase in g. To see this, examine the market equilibrium for housing in that jurisdiction: $Lhn = N$. As g rises, causing the price of land p and the value of housing c to rise, the land intensity of housing, n, and each resident's housing demand, h, both fall. The equilibrium number of residents must increase to restore aggregate demand for land to the fixed supply N:

$$\frac{1}{L}\frac{\partial L}{\partial g} = -\left((r+t)\frac{h'}{h} + \frac{n'}{n}\right)\frac{\partial c}{\partial g} > 0. \tag{8}$$

These increases in L and c are large enough to offset the fall in h so that government revenue increases on net when g increases:[17] extra g no longer needs to be financed entirely out of foregone perks.

What about the change in the utility of initial residents, $v((r+t)c, r(ch_n + A_n) + w) + \mu(g)$, in response to an increase in g? Assuming that they own all of the housing that they consume (i.e., $h_n = h$), the resulting change in their utility (using equation (7) and Roy's identity) equals

$$\mu' - tv_y h\frac{\partial c}{\partial g} = rv_y h\frac{\partial c}{\partial g} = \mu'\frac{r}{r+t} > 0. \tag{9}$$

While potential new residents will be indifferent in equilibrium to the increased g, initial residents gain from more g due to the resulting capital gains they receive on their initial holdings of housing.

As before, officials choose g and s to maximize W, as described in equation (2), subject to their budget constraint, which may now be expressed as $tcN/n = g + \sigma + s$. It is straight-forward to show that the first-order condition for g now equals:

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

[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 $\partial R/\partial g > 0$.

where

$$B = -\left(\frac{r}{r+t}\right)\frac{dg}{ds} = \left(\frac{r}{r+t}\right)\left(\frac{1}{1-\partial R/\partial g}\right) = \frac{r}{r - t[\text{LMRS}(1 - cn'/n) - 1]}.$$

The extra term B in equation (3a) compared with equation (3) captures the effects of changes in property values and the number of residents 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 $\partial g/\partial s = -1$. On net, $B > 1$ unless LMRS $<< 1$, a possibility we will ignore in the rest of the discussion.

Comparing equations (3) and (3a), we find that for any given values of t and σ, having $B > 1$ implies that officials will now choose a higher g than before. Intuitively, raising g is more attractive than before, since it now generates extra tax revenue, and is no longer financed entirely out of foregone perks.

Given this increased incentive on government officials to provide public goods, we can quickly show that

Proposition 1: The utility of residents is higher when they have the option of "exit" as well as "voice."

Proof: Start with the equilibrium values for g and σ in the economy without mobility. Then open the borders of all jurisdictions, keeping g and σ fixed. By the symmetry of jurisdictions, we will continue to have $U = U_o$. In addition, symmetry implies that L remains unchanged, so that c and therefore tax revenue remains 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 residents to optimize over t and σ, their utility rises further. ∎

We would also expect that the level of public goods chosen by residents will be higher than in an economy without mobility. To begin with, the threat of mobility induces officials to spend more of any budget on public goods rather than perks, reducing the effective price for g. In addition, a higher tax rate creates "higher-powered" incentives for officials, by transferring to officials a larger fraction of any increase in property values that result from extra public goods. As a result, not only is the fraction of any extra revenue spent on perks smaller than without mobility pressures, but perks might even fall in total when t rises. In addition, the efficiency loss from a higher tax rate, from discouraging housing consumption, is now offset by an efficiency gain from attracting new residents to the community who pay taxes but impose no offsetting costs on the government budget.

To examine this intuition more formally, we solve for the optimal level of g in an open economy, and then examine what happens to this optimal value if the economy is then closed. Since in an open economy the objective of residents is simply to maximize property values, the optimal policies are characterized by $\partial c/\partial t = \partial c/\partial \sigma = 0$. Using equation (6), we then infer that

$$\mathrm{MRS}\frac{\partial g}{\partial t} = hc, \tag{10}$$

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

$$\frac{\partial g}{\partial t} = Lhc\left(\frac{\mu'}{\mu' - \mu''(V - V_n)}\right)\left[1 + \left(\frac{t(V - V_n)}{BR}\right)\frac{\partial B}{\partial t}\right]. \tag{11}$$

Substituting for $\partial g/\partial t$ in equation (10), the first-order condition for t can be reexpressed as:

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

Denote the optimal value of t, and the implied optimal value of g, by t^* and g^*.

If mobility were now eliminated, what happens to optimal policies? To begin with, consider maintaining g at g^* by adjusting t as needed, while continuing to choose σ optimally: t will rise to some value $\hat{t}$.[18]

Will residents now find this level of g too high? If residents can reoptimize freely over t and σ, without the constraint that $g = g^*$, will they choose to reduce t? Equivalently, starting from $\hat{t}$ and g^*, is the derivative of utility with respect to t negative? Evaluating $\partial g/\partial R$ and substituting in equation (5), we infer that the derivative is negative if and only if

$$L\mathrm{MRS_c}\left(\frac{\mu'}{\mu' - \mu''(V_c - V_n)}\right)\left[1 - \alpha\frac{t}{r+t}\epsilon\right] < 1, \tag{5a}$$

where a subscript $_c$ indicates a closed economy value. To show that g falls, we therefore need to show that the inequality in equation (5a) necessarily holds.

Proceed term by term, comparing the left-hand sides of equations (12) and (5a). To begin with, given the symmetry of jurisdictions, L is the same in both cases.

How does $\mathrm{MRS} = \mu'/(\partial u/\partial x)$ compare to $\mathrm{MRS_c}$? Since g is the same in both settings, and the utility function is separable, the numerator in each expression is identical. How do the denominators, the marginal utilities of x, compare in the two settings? Without mobility, residents face a higher tax rate. This higher tax rate not only raises the price of housing but also causes a drop in c to maintain equilibrium in the housing market. Therefore, income from initial assets falls as well. The lower income suggests lower consumption of x and a higher marginal utility from x. The higher price for housing also causes x to fall, though, only if the price elasticity of h is less than one. If, in addition, utility is separable between h and x, then the fall in x is sufficient to show that $\mathrm{MRS_c} < \mathrm{MRS}$. (These conditions are clearly sufficient, but not necessary.)

The next term takes the same form in the two cases. Since g is the same, by construction, μ' and μ'' are also the same. However, $V_c > V$, since with a higher t but the same

[18] To see that t rises, note first, comparing equations (3) and (3a), that g must fall for any given values of t and σ. If we reoptimize over σ, g will increase, but not up to its value in an open economy. In order to maintain $g = g^*$, we need to increase t to some value $\hat{t} > t^*$.

g officials necessarily are left with more resources and more utility[19] when the economy is closed. Therefore the third term is smaller in a closed economy.

What about the fourth terms? The fourth term in equation (5a) is less than one. Therefore, the inequality in equation (5a) follows if $\partial B/\partial t > 0$, so that a higher tax rate creates higher-powered incentives. Using the definition of B following equation (3a), we see that[20]

$$\frac{\partial B}{\partial t} = \left(\frac{B^2}{r}\right)\left[(\beta - 1) + t\beta\frac{1}{\text{LMRS}}\frac{\partial \text{LMRS}}{\partial t}\right], \tag{13}$$

where $\beta = \text{LMRS}(1 - cn'/n) > 1$. The term $\beta - 1$ is then positive. In addition, $\partial L/\partial t > 0$, since the drop in h caused by the tax requires an increase in L to maintain equilibrium in the land market. However, $\partial\text{MRS}/\partial t$ would normally be negative, since g rises and x normally falls. As long as this term is not *too* negative, implying that preferences are not *too* elastic, we conclude that $\partial B/\partial t > 0$ so that the inequality in equation (5a) holds, implying lower consumption of public goods in an closed economy. In particular, we can show the following:

Proposition 2: If the utility function of residents satisfies $U = a_1\ln(h) + a_2\ln(x) + a_3\ln(g)$, with $a_3 > a_1$, then the optimal level of public goods is necessarily lower if residential mobility is eliminated.

Proof: To begin with, this utility function implies that $\text{MRS}_c < \text{MRS}$. To prove the theorem, it is therefore sufficient (but not necessary) to show that $\partial B/\partial t > 0$.

A sufficient (but not necessary) condition for $\partial B/\partial t > 0$ is that $\partial(\text{LMRS})/\partial t \geq 0$. Since by construction the tax change leaves c and therefore the land intensity of housing $n(c)$ unchanged, L must vary in inverse proportion to housing demand to keep the land market cleared. Thus the change in $LMRS$ is proportional to the change in MRS/h, which equals $x/(gh)$ under the Cobb-Douglas assumption. Another implication of this assumption is that the expenditure share on x simply equals $a_3/(a_1 + a_3)$. Since the income of residents does not change as t rises, we may conclude that x stays fixed. Given that $\partial U/\partial t = 0$ at the optimum, we then know that $h^{a_1}g^{a_3}$ is unaffected by a marginal change in t, implying that $x/(gh)$ is proportional to $g^{(a_3 - a_1)/a_1}$. Since $\partial g/\partial t > 0$, $LMRS$ therefore increases with t as long as $a_3 > a_1$.[21] ∎

While a Cobb-Douglas utility function is sufficient to ensure that g is higher in an open economy, it is certainly not necessary. It is still possible, though, that some communities have preferences that lead to a lower level of public goods in an open economy. For

19 The higher t and the same g imply that $\sigma + s$ is higher. $V = \sigma + f(s)$ is therefore higher as well unless σ is much lower, and s much higher, than in the open economy. But as shown below, if s is higher, given an optimal σ, then V is higher.

20 Note that cn'/n is unaffected by t, since at the optimum $\partial c/\partial t = 0$.

21 Under the Cobb-Douglas assumptions, this restriction on preferences implies that residents spend a larger fraction of their income on g than on h. According to the U.S. National Income and Product Accounts, during the period 1985-95 government expenditures on consumption and investment goods on average equaled 20.2% of GDP while housing consumption expenditures (including imputed rent) equaled only 10.2%.

example, if the marginal utility of x is constant, perhaps because utility is linear in x, but the marginal utility of g drops quickly as g increases, then residents may want to reduce g in order to raise B by making property values more sensitive to g, therefore creating stronger incentives on public officials to avoid waste. Even if $B > 1$, restrictions on tastes are needed to ensure that the *marginal* cost of extra g is also lower than in an economy without mobility.

If public expenditures are higher in an open economy, however, can we still be sure that the level of expenditures is below the first-best, so that LMRS > 1, due to efficiency and agency costs? In a closed economy, this result was immediate from the first-order condition for t. Now it is less clear. In particular, in equation (12) there are two expressions that multiply LMRS: the first is less than one but the second should be greater than one. Only if we can be sure that the product is less than one can we conclude necessarily that LMRS > 1.

In particular, equations (12) and (13) imply that LMRS $- 1$ is proportional to

$$-\left(\frac{R}{tL\text{MRS}}\right)\left(\frac{\mu''}{\mu'}\right)+\left(\frac{Bcn'}{rn}\right)L\text{MRS}-\left(\frac{tB}{r}\right)\left(1-\frac{cn'}{n}\right)\frac{\partial L\text{MRS}}{\partial t}. \qquad (14)$$

Therefore, LMRS > 1 in an open economy only if this expression is positive, and conversely. The first term is clearly positive, and captures the incentive of the public official to use some of any extra revenue for higher s as well as higher g, raising the implicit cost of g to residents. However, the second term is clearly negative, and the third is also negative under the conditions described in Proposition 2. These capture the increase in B as t increases, strengthening the incentives on the official to avoid waste. In general, it is therefore unclear whether g is above or below the first-best level.

The key complication is the effects of changes in L when t changes. If functional forms are chosen so that L does not change when t changes, then equation (14) implies that LMRS > 1, as in a closed economy. To see this, note first that to leave L unchanged, given the market clearing condition for the housing market, hn must remain unchanged. This requires both a Leontieff technology for producing housing, so that $n' = 0$, and a totally inelastic demand for housing, h. Under these conditions, the second term in equation (14) is zero and $\partial L/\partial t = 0$. In addition, an inelastic demand for housing implies that x must drop when t rises, given the household's budget constraint, assuring that $\partial\text{MRS}/\partial t < 0$. Therefore, the expression in equation (14) is positive and LMRS > 1. Under these assumptions, B falls when t increases, raising further the price of g to residents.

If L increases enough in response to an increase in g, though, then this result could easily reverse and we could find levels of g above the first-best level. The implied increase in B as t increases could be sufficient that s falls in spite of the extra revenue. This reduces the cost to residents of extra g below the underlying resource cost, yielding LMRS < 1. The underlying source of the subsidy to g is that the extra immigrants attracted by higher g pay taxes yet, given our assumptions, impose no extra budgetary costs since g has been assumed to be a pure local public good.

This implicit subsidy to public expenditures provided by immigrants comes at the expense of other governments, however, generating a negative externality. As a result,

Proposition 3: In an open economy, the equilibrium tax rates are above the rates that would be chosen by residents of the jurisdictions if they could coordinate, if

a) The equilibrium value of LMRS is close enough to 1, and

b) The production function for h is CES, with a substitution elasticity equal to or greater than one.

Proof: Without mobility, we showed that $\partial K/\partial t < 0$, implying that a drop in t causes a shift of capital into the jurisdiction, creating a negative externality in other jurisdictions since their tax base declines. In an open economy, however, $\partial K/\partial t = 0$. To see this, note that $\partial c/\partial t = 0$ at the optimum, given that residents choose t to maximize property values. If c is constant, and Lhn is constant to clear the land market, then $K \equiv Lhk$ is also constant. The drop in the number of residents as t declines just offsets the rise in demand for housing capital by each resident.

This drop in the number of residents creates its own externalities, however. Given that L falls in this jurisdiction when t declines, it must rise on net in other jurisdictions. This rise in L elsewhere to begin with implies an increase in property values there, to insure that the land market still clears. Holding g fixed, this rise in c lowers the utility of residents, since property tax payments rise by $th\partial c/\partial L$.[22] In addition, however, g rises. To judge whether the rise in L is a net welfare gain or loss to residents in these other jurisdictions, we need to look more closely at the resulting rise in g, to see if it is sufficient to more than offset the effects of increased property taxes on the welfare of each resident.

To do so, we compare the change in g with what would have occurred instead if t were increased by $dt \equiv (t/c)\partial c/\partial L$. Holding g fixed, this tax change lowers utility by $th\partial c/\partial L$, so has the same impact on utility as results from the change in c caused by a new resident. At the optimal value of t, we know that the resulting rise in g is just sufficient to offset the impact on utility of this higher tax rate. If g rises by more due to an extra resident than it does due to the equivalent rise in t, then we can conclude that the welfare of residents rises on net due to an extra resident, proving the Proposition.

To compare the impact on g of changes in t vs. L, compare first the effects on government revenue. Given $R = tNc/n$, we find

$$\frac{\partial R}{\partial L} = \frac{tN}{n}\frac{\partial c}{\partial L} - \frac{tNcn'}{n^2}\frac{\partial c}{\partial L}, \quad \text{while}$$
$$\frac{\partial R}{\partial t}dt = \frac{Nc}{n}dt = \frac{tN}{n}\frac{\partial c}{\partial L}.$$

We find that government revenue rises more due to an extra resident, since that resident also pays taxes. Therefore, everything else equal, g would rise more as well.

Inspecting equation (3a), however, we find that everything else is not quite equal. While U_o is unaffected, since the proposed marginal drop in t in the original jurisdiction leaves

[22] Implicitly, our model assumes infinite lifetimes, so that the capital gain in the value of housing assets is just offset over the lifetime by the extra opportunity cost of housing consumption, $rh\partial c/\partial L$. With finite lives, however, the effect of a rise in c on the cost of housing consumption becomes relatively less important, since there are fewer future years of housing consumption. With finite lifetimes, therefore, the Proposition will be valid under weaker conditions.

utility unaffected there, B will be affected by both a change in L and a change in t. A sufficient condition for the Proposition is that $\partial B/\partial L > (\partial B/\partial t)dt$, since then g would increase by more due to the extra resident even if tax revenue were the same. We will now show that this inequality is strictly satisfied if LMRS = 1. Given continuity, it will continue to be satisfied as long as LMRS does not deviate *too much* from 1.[23]

Consider then the impact on B of changes in L vs. t. Holding MRS and c fixed and making use of the assumption LMRS = 1, we find

$$\frac{\partial B}{\partial L} = \frac{B^2}{r}\left[\frac{t}{L}\left(1 - \frac{cn'}{n}\right)\right], \quad \text{while}$$
$$\frac{\partial B}{\partial t}dt = \frac{B^2}{r}\left[\frac{-cn'}{n} + \frac{t}{L}\left(1 - \frac{cn'}{n}\right)\frac{\partial L}{\partial t}\right]dt.$$

Given the equilibrium condition for the housing market, we know that $\partial L/\partial t = -Lh'c/h$. The same condition for the housing market implies that $\partial c/\partial L = -1/[L(n'/n+(r+t)h'/h)]$. Given that $dt = (t/c)\partial c/\partial L$, we then find that

$$\frac{\partial B}{\partial t}dt = \frac{B^2}{r}\left[\frac{t}{L}\left(\frac{hn' + t(1 - cn'/n)h'n}{hn' + (r+t)h'n}\right)\right]$$
$$< \frac{B^2}{r}\left[\frac{t}{L}\left(1 - \frac{cn'}{n}\right)\right] = \frac{\partial B}{\partial L},$$

consistent with our claim.

What about the change in MRS? Assume, contrary to the proposition, that g rises by less with a new resident. We will then show by contradiction that g must in fact be higher. If g rises by less with a new resident, then the numerator of MRS $= \mu'/(\partial u/\partial x)$ will be higher than results from the change dt. How do the denominators compare? With an increase in t, we have an uncompensated increase in the price of h. With an extra resident, we have the same uncompensated increase in the price of h along with a further compensated increase in the price of h (compensated by extra income so as to generate the same utility as with the original increase in t). The compensated increase lowers h and raises x, relative to what occurs as a result of dt. This lowers the marginal utility of x, resulting in a higher MRS with an extra resident, and so a higher B.

While the change dt, does not affect c, since c was maximized at the initial value of t, an extra resident causes c to rise. As a result, the term $(1 - cn'/n)$ changes. The price elasticity of land, $-cn'/n$, equals $\sigma(\theta_k/\theta_n)$, where σ is the elasticity of substitution between land and capital in production, and θ_i is factor i's income share. Assuming a CES production function, we may then conclude that $-cn'/n$ rises with c if the substitution elasticity is above one, and is constant in the Cobb-Douglas case,[24] providing a further reason why $\partial B/\partial L > (\partial B/\partial t)dt$.∎

---

[23] Deviations in one direction will normally strengthen the result, while sufficient deviations in the other direction may eventually overturn it. Which direction of deviation weakens the result depends on the elasticity of c with respect to L.

[24] While such a high substitution elasticity is implausible, recall that this is a sufficient, not a necessary, assumption.

One omission in the above discussion is what happens to the utility of the public official when people can change jurisdictions. To address this, we first show that V is higher if and only if s is higher. To see this, note that the equivalent to equation (4) in an open economy is

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

By combining this condition with the first-order condition for g, given by (3a), we find

$$-(1 - f')\left(\frac{f'}{f''}\right) = V - V_n. \tag{15}$$

The same equality in fact holds in the both closed and open economies. Under our assumptions, $-f'/f''$ is nondecreasing in s and $1-f'$ rises with s. As a result, equation (14) shows that V is simply a positive function of s under optimal policies, which we denote by $V(s)$.

To judge how the utility of the official is affected by mobility of residents, we therefore need to examine how s changes when mobility is allowed. To judge this, compare the first-order conditions for g in an open vs. closed economy:

$$f'(s_c) = \frac{\pi'\mu'(g_c)}{\pi U_o}(V(s_c) - V_n), \quad \text{and}$$
$$f'(s_o) = B\frac{\pi'\mu'(g_o)}{\pi U_o}(V(s_o) - V_n),$$

where the subscripts $_c$ and $_o$ refer to optimal values in a closed and open economy respectively. From these equations, we find that $s_o > s_c$, so that $V_o > V_c$, if and only if $B\mu'(g_o) < \mu'(g_c)$. While we have already shown conditions such that $g_o > g_c$, so that $\mu'(g_o) < \mu'(g_c)$, we also have shown that $B > 1$. In general, we cannot say whether or not the utility of the official is higher or lower in an open economy.

Intuitively, the official gains from decentralization only if a smaller fraction of a larger pie yields a larger slice. But the pie may not even be larger, since a higher g does not necessarily imply higher tax revenue. As a result, officials may oppose decentralization even if residents gain on net from it.

One final issue: Without mobility, we quickly showed that a lump-sum tax dominates a property tax as a means of financing local public expenditures. This is no longer true in an open economy. In fact,

Proposition 4 If residents can use a head tax as well as a property tax to finance public expenditures, then the optimal head tax is negative, if $LMRS$ is close enough to 1.

Proof: Assume to the contrary that the optimal head tax is zero, implying that $\partial c/\partial T = 0$. To show that the optimal head tax is negative, we then start from the optimal policies without a head tax, and show that the derivative of utility with respect to the head tax is negative.

Denote the head tax by T. Holding g constant, a marginal increase in T has the same effect on utility as a change in t of $dt \equiv 1/(ch)$, given our assumption that $\partial c/\partial T = 0$.

The change in t results in a change in g just sufficient to leave overall utility unaffected. A marginal increase in T therefore leaves utility unaffected if g increases by the same amount that occurs due to the tax change dt.

To compare the changes in g, note first that tax revenue increases by the same amount in both cases: $\partial R/\partial T = (\partial R/\partial t)dt = L$, given our assumption that $\partial c/\partial T = 0$.

Examining equation (3a), we again find that the key complication in forecasting the change in g is what happens to B. We now show that $(\partial B/\partial t)dt > \partial B/\partial T$ under the simplifying assumption that $L\text{MRS} = 1$. In doing so, ignore first any impacts on MRS. Given these assumptions,

$$\frac{\partial B}{\partial L} = \frac{B^2}{r}\left[\frac{t}{L}\left(1-\frac{cn'}{n}\right)\right]\frac{\partial L}{\partial T} = -\frac{B^2}{r}\left[\frac{t}{h}\frac{\partial h}{\partial T}\left(1-\frac{cn'}{n}\right)\right], \tag{16}$$

where we make use of the implication of the equilibrium condition in the housing market to find that $\partial L/\partial T = -(L/h)\partial h/\partial T$. In contrast,

$$\begin{aligned}\frac{\partial B}{\partial t}dt &= \frac{B^2}{r}\left[-\frac{cn'}{n}+\frac{t}{L}\left(1-\frac{cn'}{n}\right)\frac{\partial L}{\partial t}\right]dt \\ &= -\frac{B^2}{rh}\left[\frac{n'}{n}+t\frac{h'}{h}\left(1-\frac{cn'}{n}\right)\right].\end{aligned}$$

From the Slutsky condition, we know that $h' = h'_c + h\partial h/\partial T$, where h'_c is the compensated effect of a price increase on h. Given that $h'_c < 0$, we conclude that $h'/h < \partial h/\partial T$. It immediately follows that $(\partial B/\partial t)dt > \partial B/\partial T$, holding MRS fixed.

What happens to $\text{MRS} = \mu'/(\partial u/\partial x)$? We have assumed initially that g is the same in the two cases, implying that the numerators are the same. To compare the effects on x, we need to compare $\partial x/\partial T$ with $(\partial x/\partial t)dt$. From the Slutsky condition, we know that $\partial x_c/\partial q = \partial x/\partial q - h\partial x/\partial T$, where $\partial x_c/\partial q$ is the compensated cross-price effect so is necessarily positive. We therefore conclude that

$$\frac{1}{h}\frac{\partial x}{\partial q} = \frac{\partial x}{\partial t}dt > \frac{\partial x}{\partial T}.$$

As a result, MRS rises more in response to dt than it does in response to the head tax.

If $\partial c/\partial T = 0$, we then conclude that $(\partial B/\partial t)dt > \partial B/\partial T$, implying that g rises by less in response to the head tax than it does in response to dt, contrary to our initial assumption that g changes by the same in the two cases. Therefore, we infer that $\partial U/\partial T < 0$, implying that the optimal head tax is negative.∎

How can a property tax dominate a head tax? We normally expect that a property tax distorts housing decisions, imposing an efficiency loss, while a head tax creates no such distortions. To begin with, we have seen above that the efficiency cost from the distortion to housing decisions under the property tax is just offset in equilibrium by the gain from attracting new (tax-paying) residents. In addition, the property tax creates higher-powered incentives for officials than does a head tax, implying that waste in government is lower under the property tax. By combining a property tax with a negative head tax, incentives on officials can be made yet more high powered without residents being required simultaneously to increase the level of public goods. While such lump-sum transfers are rarely seen in practice, it may well be that many public goods are close to perfect substitutes for x, so would be equivalent to lump-sum transfers.

3. Summary

This paper is intended to raise 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. The shift of the tax base to other jurisdictions creates a positive externality there, implying that tax rates are too low on efficiency grounds.

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.

Since residents will choose to increase the tax rate only if doing so makes their community 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 and resources into the community, adding to the tax base. A tax increase should then impose a negative externality on other communities. The competition for residents therefore suggests that tax rates are too high on net.

In addition, 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. With less waste in government, residents should be willing to spend more on public goods, in fact too much given the negative externalities created by the competition for residents.

These results therefore 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 raise the level of 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 community, so may not induce officials to reduce waste. In addition, the paper ignores congestion externalities, which again reduce the gain to a jurisdiction from attracting extra residents through higher expenditures.

REFERENCES

Anderson, John E. and Hendrik Van den Berg. "Fiscal Decentralization and Government Size: An International Test for Leviathan Accounting for Unmeasured Economic Activity," *International Tax and Public Finance* 5, 1998, 171-86.

Besley, Timothy, and Case, Ann, "Incumbent Behavior: Vote-Seeking, Tax-Setting, and Yardstick Competition," *American Economic Review*, 1995, 95, 25-45.

Brennan, Gerald and James Buchanan, *The Power To Tax: Analytical Foundations of a Fiscal Constitution*, New York: Cambridge University Press, 1980.

Findlay, Ronald, and Wilson, John D., "The Political Economy of Leviathan," in *Economic Policy in Theory and Practice*, edited by A. Razin and E Sadka, Macmillan Press, London, 1987.

Glaeser, Edward, "The Incentive Effects of Property Taxes on Local Governments," *Public Choice* 89, 1996, pp. 93-111.

Gordon, Roger H., and Wilson, John D., "Tax Structure and Government Behavior: A Principal-Agent Model of Government," N.B.E.R. Working Paper No. 7244, 1999.

Hoxby, Caroline M., "The Productivity of Schools and Other Local Public Goods Producers," *Journal of Public Economics*, 1999, 1–30.

Oates, Wallace, "Searching for Leviathan: An Empirical Analysis," *American Economic Review*, 1985, 75, 748-757.

Oates, Wallace, "Searching for Leviathan: A Reply and Some Further Reflections," *American Economic Review*, 1989, 578-83.

Wilson, John D., "Theories of Tax Competition," *National Tax Journal*, 1999, 52, 269-304.

Wilson, John D., "A Theory of Interregional Tax Competition," *Journal of Urban Economics*, 1986, 19, 296-315.

Zodrow, George R., and Mieszkowski, Peter M., "Pigou, Property Taxation and the Underprovision of Local Public Goods," *Journal of Urban Economics*, 1986, 19, 356-370.