Intergovernmental grants and successful tax limitation referenda

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Abstract:

Analyses of fiscal limitation referenda have typically ignored the role of institutional structure in referenda outcomes. This article demonstrates the importance of such structure through the investigation of intergovernmental grants in a model of federal tax rate determination. Tax limitation referenda are shown to depend upon both the use of tax rates as a grant disbursement criterion as well as the size of the proposed tax cut.

Article:

1. Introduction

Fiscal limitation referenda have a long if sporadic history in the United States, dating at least back to the turn of the century and the progressive era. Typically, explanations for the success of these referenda have hinged upon political-process imperfections (Attiyeh and Engle, 1979; Ladd, 1978; Shapiro, Puryear, and Ross, 1979) or a change in preferences associated with voter demographics (Courant, Gramlich, and Rubinfeld, 1980; Citrin, 1979; Ladd and Wilson, 1982, 1983; Levy, 1975; Magaddino, Toma, and Toma, 1980; Mariotti, 1978). However, studies to date have generally failed to incorporate into their models the various institutional structures with which voters must interact. As a result, the literature has failed to appreciate the role of such structures in referenda outcomes.[1]

The purpose of this article is to demonstrate the importance of such structures in determining the success or failure of referenda by incorporating inter-governmental grants into a model of tax limitation referenda. The referendum structure resides within a more general median-voter model of tax rate determination in which voters in a federal system of government choose tax rates (and, by extension, levels of spending and grant levels) given an intergovernmental grant formula and the requirement that all governments balance their budgets.[2] After this choice process but before its enactment, an unanticipated referendum takes place. Voters participating in the higher-tiered government's decision-making process are given the choice of restricting the previously determined set of lower-tiered governmental tax rates through the passage of a tax limitation referendum. The success or failure of the referendum will depend upon the size of the restriction proposed and whether lower-tier tax rates are used as a criterion for disbursing intergovernmental grants.

That a referendum's success or failure should depend upon the criteria used to disburse intergovernmental grants suggests constraints on the ability of a higher-tiered government to effect policy through the use of intergovernmental grants. Particularly for policies aimed at redistribution, this result suggests that a coalition of lower-tiered governments which incurs a net loss in revenues may effectively impose limits on the types and/or size of redistribution programs which the higher-tiered government can impose on its citizenry. Thus, in the United States, coalitions of local governments or of states may be able to constrain national programs, while state programs may be constrained by coalitions of local governments.

Intuitively, the dependence of a referendum's success on intergovernmental grant structure can be seen by analogy to the prisoners' dilemma game.[3] In a world in which lower-tier tax rates are used as one of the criteria for disbursing grants, a lower-tiered government's decision to unilaterally cut its tax rate will reduce the grant received. Because the pool of grant funds is fixed, this loss becomes a gain for other lower-tiered governments which do not cut their rates. Interestingly, however, if all lower-tiered governments were to lower their rates simultaneously, these losses may cancel. Thus, it is possible for voters across all lower-tiered governments to prefer generally smaller lower-tier rates and yet be unable to achieve those smaller values because of the inhibitory nature of the grant structure.[4] The value of a tax limitation referendum lies in its ability to coordinate actions across localities and guarantee compliance in the general tax cut. In essence, the referendum allows prisoners to sit in the same room and beat the game.[5]

The outline of the paper is as follows. Section 2 presents the model of tax rate determination within a federal system of government and demonstrates the existence of an equilibrium. Section 3 then turns to the analysis of referenda. The referendum process is described, and two tax rate limitation referenda are examined. The first referendum, a simple prototype, calls for an equal cut in all lower-tier tax rates. The second referendum, closer to actual proposals, calls for a tax rate ceiling. In both cases, the success of the referendum is shown to depend on the use of lower-tier tax rates as a grant disbursement criterion as well as the size of the proposed cut. Given this grant structure, there will always exist a nontrivial tax limitation referendum which will receive the support of a majority of voters. Finally, Section 4 concludes the article with a summary and brief discussion of implications.

2. Tax rate determination

Tax limitation referenda take place within the context of an established process for choosing tax rates. I begin the analysis, therefore, with the construction of a simple model of tax rate determination within a federal system of government.[6]

2.1 The model

Assume a federal system of government comprised of one higher-tiered government, M lower-tiered governments, and N voters.[7] Assume that each voter consumes a privately produced good, C, a good provided by his lower-tiered government, G, and that these goods are evaluated by every voter i in the jth lower-tier jurisdiction with the strictly quasi-concave utility function:

$$U_i^j = U(C_i^j, G^j) \qquad (1)$$

Further, assume G^j is equal to the per-capita spending of the lower-tiered government and that G^J and C_i^j are both normal goods.[8] Finally, assume each voter is characterized by an exogenous level of income I and assessed housing H.[9] Since both income and housing are to be taxed, each voter will have the following budget constraint:

$$I_i^j = C_i^j + s\, I_i^j + t^j H_i^j \qquad (2)$$

where s is the income tax rate and t^j is the property tax rate.

Government structure is divided into lower-tier and higher-tier functions. Each lower-tiered government taxes the housing within its boundaries and provides the good G^j to its voters. Each lower-tiered government also must balance its budget. Hence, given that these governments also receive grants from the higher-tiered government, each of these jurisdictions will have the following budget constraint:

$$t^j \sum_{i=1}^{N^j} H_i^j + N^j A^j = N^j G^j \qquad (3)$$

where N^j is the population of the jth lower-tiered jurisdiction and A^j is the per-capita grant from the higher-tiered government.[10]

The higher-tiered government taxes income, provides grants to lower-tiered governments, and balances its budget. Hence, it will have the following budget constraint:

$$s \sum_{j=1}^{M} \sum_{i=1}^{N^j} I_i^j = \sum_{j=1}^{M} A^j N^j \qquad (4)$$

Assume that intergovernmental grants are given on a per-capita basis and based negatively upon the lower-tiered government's housing base and positively on the lower-tiered government's tax rate:

$$A^j = F - a_1 \bar{H}^j + a_2 t^j + a_3 t^j(B - \bar{H}^j) \qquad (5)$$

where F is a fixed grant (known in the educational literature as a foundation grant), $\bar{H}^j$ is the mean housing value in the jth lower-tier jurisdiction, the a_i are non-negative, and a_3 is no greater than one. The a_3 phrase represents a guaranteed tax base grant with B the exogenously determined guaranteed tax base. Assume B is weakly greater than every community's mean housing value. Finally, assume that all tax rates lie in the closed interval [0,1].

The political process whereby tax rates are chosen is assumed to be a set of majority-rule Condorcet voting processes. Each voter is assumed to be fully in-formed about the voting process and the structure of government, to participate, and to engage in truthful (non-strategic) voting. In order to guarantee a determinate equilibrium and to ensure that the model reflect the independence with which individual tax rates seem to be chosen, assume that voters are myopic in the polling booth. Thus, a voter in a lower-tier election assumes that all other lower-tier rates and the higher-tier rate are fixed. Likewise, a voter in a higher-tier election assumes that all lower-tier rates are fixed. All these assumptions assure that the voter will always choose that rate which if enacted would provide the higher utility.

2.2 Equilibrium

The equilibrium is defined to be an allocation of private consumption levels, lower-tiered governmental expenditure levels, and a set of tax rates which satisfy the assumptions of the model. More specifically, the equilibrium of the model is a collection of mutually consistent equilibria in each of the M + 1 higher- and lower-tier elections. The system-wide equilibrium can thus be represented by the simultaneous equation system:

$$t^{j*} = t^j_{med}(t^{-j*}, s^*) \qquad j = 1, \ldots, M \qquad (6)$$

$$s^* = s_{med}(t^*) \qquad (7)$$

Given the above definitions, the existence of a system-wide equilibrium can be shown. Each lower-tier and higher-tier equilibrium exists because of the assumption of an odd number of participants in each election and based on the convexity of each voter's budget constraint. The system-wide equilibrium then follows with the use of Brower's fixed point theorem and based upon the assumption that all tax rates lie in the closed interval [0,1].[11]

3. Tax rate limitation referenda

I now turn to the analysis of the referendum process itself. In the discussion below, a tax limitation referendum is assumed to occur after the equilibrium process described above has taken place but before its enactment. It is further assumed that the referendum is unanticipated by all voters so that the expectation of a referendum not affect the original equilibrium process. Given these assumptions, voters will support the referendum if it improves their utility over the original equilibrium (the status quo). Below, I begin with a description of the referendum process and the characterization of the voter's calculus. Following that, the outcome of two types of referenda are analyzed.[12]

3.1 The referendum process

A tax limitation referendum is defined to be a system-wide vote on whether to impose a set of exogenously determined lower-tier tax rate restrictions ex post on the status-quo set of lower-tier tax rates. If the referendum fails to receive a majority of votes, the set of status-quo tax rates will go into effect. If the referendum receives a majority of votes, each status-quo lower-tier tax rate will be decreased by some amount Δt^j. The income tax rate in either case will take its status-quo value.

Each voter is assumed to be fully informed as to the referendum process and to participate in a non-strategic manner. In addition, each voter is assumed to be unable to anticipate the referendum during the process of choosing the status-quo set of tax rates. Hence, the choice for the voter is between the status-quo set of tax rates:

$$(t^{1*}, \ldots, t^{M*}, s^*) \tag{8}$$

and the referendum set of tax rates:

$$(t^{1R}, \ldots, t^{MR}, s^*) \tag{9}$$

where:

$$t^{jR} = t^{j*} - \Delta t^j \qquad j = 1, \ldots, M \tag{10}$$

Hence, each voter has the choice function:

$$R_i^j(t^R, t^*) = \begin{cases} \text{Yes} & \text{if } W_i^j(t^R, s^*) - W_i^j(t^*, s^*) > 0 \\ \text{No} & \text{if } W_i^j(t^R, s^*) - W_i^j(t^*, s^*) \leq 0 \end{cases} \tag{11}$$

where $W_i^j(.)$ is the indirect utility function implied by equations (1) — (5). Note also that it is arbitrarily assumed that in the case of a tie, the voter will opt for the status-quo. This implies that the voter will support any referendum which places him within the indifference curve associated with the status-quo bundle of C and G supported by the set of status-quo tax rates (8). I now turn to the, analysis of specific referenda.

3.2 A fixed cut in tax rates

Suppose the following referendum is put up for a vote:

Referendum 1: Shall all lower-tier tax rates be cut by the amount Δt?

For simplicity, assume that At is less than the smallest property tax rate value.

Were the referendum to pass, the new system-wide equilibrium set of tax rates would generate an increase in private consumption and a decrease in governmental spending:

$$\Delta C_i^j = \Delta t\, H_i^j > 0 \tag{12}$$

$$\Delta G^j = -\Delta t\, [\, \bar{H}^j (1 - a_3) + \bar{H}\, a_3\,] < 0 \tag{13}$$

where $\bar{H}$ is the housing mean across all lower-tier jurisdictions and, recall, a_3 lies in the closed interval [0,1]. Since both changes are linear in the tax cut, the ratio of the two changes will be a constant:

$$\frac{\Delta C_i^j}{\Delta G^j} = -\frac{H_i^j}{\bar{H}^j (1 - a_3) + \bar{H}\, a_3} \tag{14}$$

Hence the referendum, if successful, will move the voter along a ray emanating from the status quo bundle of C and G and whose slope equals the ratio in equation (14).[13] Furthermore, the ratio (14) is greater in absolute terms than the slope of the voter's (G,C)-space opportunity set frontier:[14]

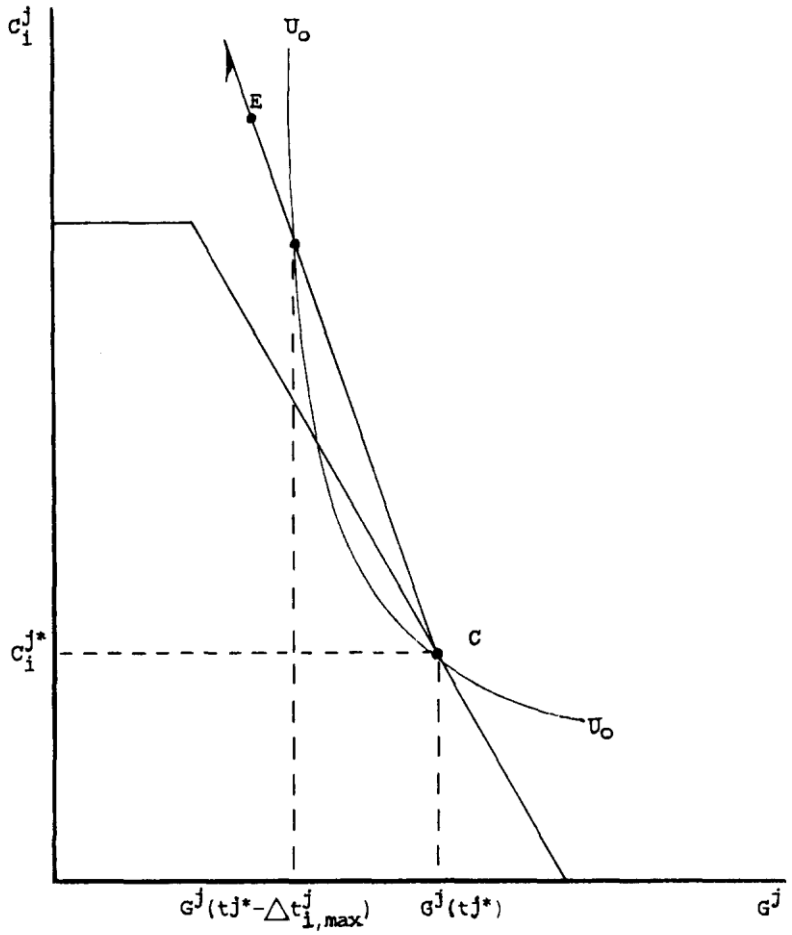

Figure 1.

$$\frac{\Delta C_i^j}{\Delta G^j} \geq \frac{H_i^j}{\hat{H}^j} \qquad (15)$$

Hence, the referendum will always move a voter's consumption bundle to a point (weakly) outside his original (G,C)-space opportunity set.

The above result, however, does not necessarily mean that a voter will support the referendum. To see that, group voters according to whether their ideal property tax rate is less than, equal to, or greater than the status-quo rate t^j*. For voters whose ideal property tax rate is less than or equal to the status-quo tax rate, the slope of the ray emanating from the status-quo bundle point will be greater than the voter's marginal rate of substitution. See Figure 1. Hence, for each voter with an ideal property tax rate less than or equal to his status-quo rate, there exists a set of tax rate cuts ranging up to some $\Delta t^j_{i,max}$ which would improve utility and thus are supportable.

For voters with ideal tax rates greater than the status-quo rate, it is not clear whether they will vote for or against the tax limitation referendum. At their status-quo bundle point, both the slope of the ray emanating from the status-quo bundle point and the marginal rate of substitution will be greater than the absolute value of the slope of the budget line. Hence, whether a tax cut will be supported depends upon the relation between this marginal rate of substitution and the slope of the ray (equation (14)). See Figure 2. If the marginal rate of substitution is greater than or equal to the slope of the ray (indifference curve U_A in Figure 2), the voter will not support any tax cut. If, on the other hand, the marginal rate of substitution is less than the slope of the ray (indifference curve U_B in Figure 2), there will exist tax cuts which the voter will support.

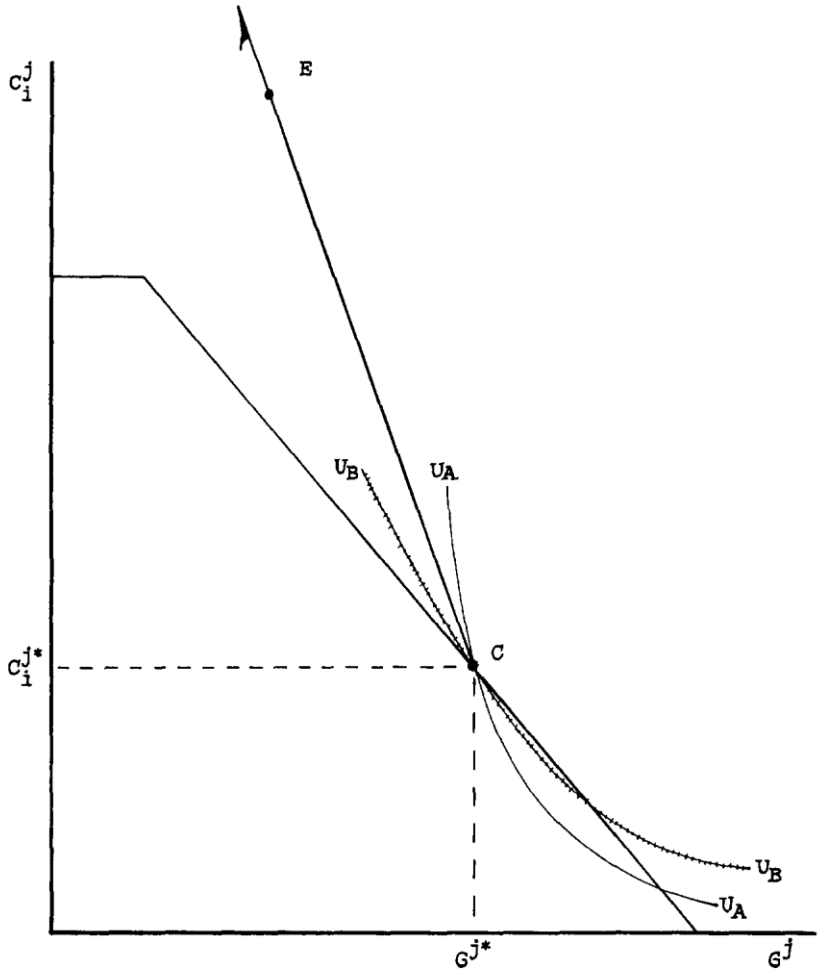

Figure 2.

Since for all voters the set of supportable tax cuts has an upper bound, the success of this referendum depends upon the size of the proposed cut. A referendum will pass only if the proposed tax cut lies within the set of supportable cuts for a majority of all voters. Note, however, that all voters with an ideal lower-tier tax rate less than or equal to the actual rate chosen will have non-empty supportable sets. Hence, since these people comprise a majority of voters in each lower-tier jurisdiction, there will always exist some flat tax cut which will pass. More generally, any proposed tax cut Δt such that:

$$\Delta t \leq \underset{i,j}{\text{med}} \ (\Delta t^j_{i,max}) \qquad (16)$$

will be supported by a majority of all voters.

Finally, consider the role of the grant structure. If grants are not disbursed at least in part on the basis of lower-tier tax rates (that is, if a_2 and a_3 are zero), then (15) is an equality. Hence, any tax cut will simply move the voter along his budget line. All voters with ideal tax rate values at least as great as the actual rate chosen would be made worse off. Since this group comprises a majority of voters in every jurisdiction, all referenda regardless of the size of the proposed tax cut will fail.

3.3 A tax rate ceiling

Now suppose that the following referendum (more in keeping with referenda actually proposed) is put up for a vote:

Referendum 2: Shall all lower-tier tax rates be no greater than t^c?

Were the referendum to pass, all lower-tier governments with local rates higher than t^c would set their rates at t^c. For those with $t^{j*} \leq t^c$, there would be no change. Hence, the new system of equilibrium tax rates would be:

$$t^{jR} = \begin{cases} t^{j*} & \text{if } t^{j*} \leq t^c \\ t^c & \text{if } t^{j*} > t^c \end{cases} \qquad (17)$$

$$s^R = s^* \qquad (18)$$

The effect of the referendum in a given jurisdiction would therefore depend upon whether t^c is greater or less than the jurisdiction's status-quo tax rate.

For voters in jurisdictions with rates less than or equal to t^c, there would be no effect on C, the level of private consumption. However, since the referendum would force other jurisdictions to lower their property tax rates, grants to jurisdictions with $t^{j*} \leq t^c$ would increase and hence so would G^j. This in turn creates a positive income effect for the voter which clearly improves utility regardless of the value of his ideal lower-tier tax rate. Hence, all voters in com-munities with $t^{j*} \leq t^c$ will vote in favor of the referendum.

For voters in communities where $t^{j*} > t^c$, support for the referendum is problematic. Though the consumption of C_i^j will rise due to the fall in the property tax rate, the effect on G^j is ambiguous due to the fact that a fall in the jurisdiction's tax rate, ceteris paribus, lowers government spending while a fall in the rates of other jurisdictions, ceteris paribus, increases G^j. We must therefore distinguish two cases. If ΔG^j is positive, the voter will clearly vote for the referendum regardless of his ideal local tax rate. However, if ΔG^j is negative, results will be similar to those found for Referendum 1. The referendum if passed would move the voter to a point outside his original budget constraint. Whether this induces the voter to support the tax rate ceiling will depend upon the value of the voter's ideal property tax rate in relation to the status-quo value t^{j*}. However, as the analysis of Referendum 1 demonstrates, there always exists a t^c sufficiently close to t^{j*} such that a majority of these voters will vote in favor of the referendum.

Thus, all those in jurisdictions with $t^{j*} \leq t^c$ as well as some proportion of voters in jurisdictions with $t^j > t^c$ will support the tax rate ceiling. Referendum 2 will pass if these voters comprise a majority of all voters, that is, if the following condition holds:

$$\sum_{\substack{k=1 \\ t^{k*} \leq t^c}}^{M} N^k + \sum_{\substack{k=1 \\ t^{k*} > t^c \\ \Delta G^k > 0}}^{M} N^k + \sum_{\substack{k=1 \\ t^{k*} > t^c \\ \Delta G^k < 0}}^{M} \tilde{N}^k > \frac{N}{2} \qquad (19)$$

where $\tilde{N}^k$ is the number of voters in locality k who will support the referendum. For the first two sums $\tilde{N}^k$ equals N^k. One such possible t^c, though not the lowest, would be the median lower-tier tax rate where each t^{j*} is weighted by N^j.

Finally, note that the role of intergovernmental grants in these results is the same as in Referendum 1. If lower-tier tax rates are not used as a criterion for disbursing grants (that is, a_2 and a_3 equal zero), then no voter with $t^{j*} \leq t^c$ will be affected by the cut. Hence none of these voters will have an incentive to support the cut. For voters with $t^{j*} > t^c$, the cut if enacted would simply move voters along their budget constraints. Hence, only those voters with ideal lower-tier tax rates less than the status-quo values would vote in favor of the referendum. Since these people do not comprise a majority in any lower-tier jurisdiction, the referendum will fall.

4. Conclusions

This article investigated two types of tax limitation referenda: flat tax cuts and rate ceilings. In both cases, success was shown to depend upon the existence of specific grant structures and the size of the restriction. In particular, the disbursal of grants based on lower-tier tax rates was shown to be a necessary condition for success. Given such structure, a successful referendum could always be constructed by making the tax cut

sufficiently small or the tax rate ceiling sufficiently high. In short, under the necessary structure, there was always a reallocation of intergovernmental grants which would improve the utility of at least half of all voters.

There are several implications of interest. First, for the case of tax rate ceiling referenda, the results imply that it is always possible for a coalition of lower-tier jurisdictions containing at least half of all voters to impose a tax rate ceiling equal to the highest pre-referendum lower-tier tax rate in their number. Thus, the motivation for tax limitation referenda may not be limited to desires for less government; it may also include redistributional desires.

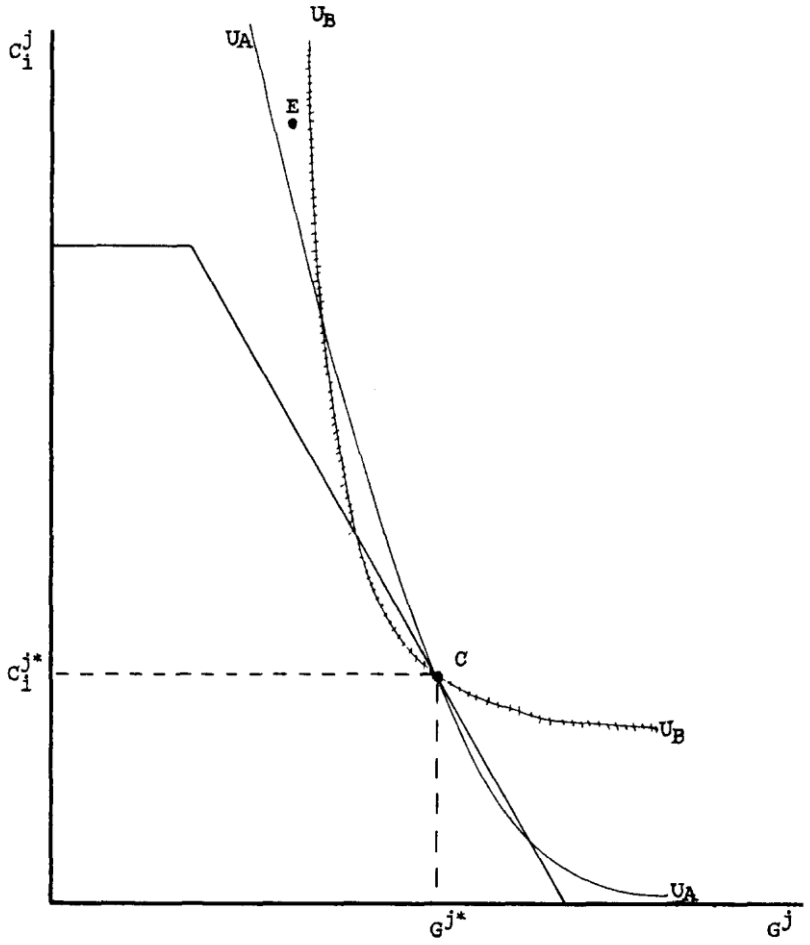

Figure 3.

Secondly, the results suggest that voters participating in tax limitation referenda may not align themselves in the same manner in which they align in the status-quo elections for lower-tier tax rates. For sufficiently large tax rate cuts, a voter who preferred in the general election a lower level of government than was actually chosen may vote against a tax limitation referendum. Like-wise, a voter who would have preferred a larger level of government than was actually chosen may vote for the referendum. Figure 3 illustrates this for two voters in the same jurisdiction and with the same budget constraint. Beginning with a status-quo consumption bundle at point C, it can be seen that a referendum which would move both voters to point E will be preferred by voter A but not by voter B. But voter A is the one who 'prefers more government' in the general election, while voter B is the one who 'prefers less government'. Such counterintuitive results illustrate the importance of modelling institutional structure and constraints which prevail when voting decisions are made.

Finally, these results can be extended to three-tiered federal systems such as in the United States. Because both states and the national government disburse grants to localities based upon local tax effort, the possibility exists for constraints at either the state or national level. It is conceivable that some localities, finding themselves without adequate support within their own state, could join a national coalition and thereby help impose

restrictions nationwide. Whether this mechanism lies behind the presence of local governmental lobbying in Washington is not clear.

Notes

1. This failure to fully develop complete models of the voting process has also led to problems with conclusive hypothesis testing. Romer and Rosenthal (1979, 1982) discuss the difficulties associated with formal hypothesis testing and provide a more rigorous example of such testing.
2. By a federal system of government I intend a two-tiered system in which there is one higher-tiered government and several lower-tiered governments. Voters are divided so that each voter participates in the decision-making of the higher-tiered government as well as one of the lower-tiered governments.
3. I am indebted to Howard Rosenthal for suggesting this interpretation.
4. This is, of course, a Cournot-Nash equilibrium process.
5. This can also be viewed as an externality problem in which cutting rates unilaterally creates positive externalities for other lower-tiered governments, while cutting rates in concert allows for the internalization of these benefits. This interpretation suggests the possibility that a federal system with referenda capabilities may be more efficient than those without such capabilities. However, the efficiency implications of referenda capabilities are not explored here.
6. A more general and detailed version of this section is developed in detail in Leyden (1986a). Copies of that paper are available upon request from the author.
7. In order to ensure a well defined equilibrium, assume that M and N are odd. See also note 10.
8. G^j is not a Samuelson public good. The assumption that G^j is equal to per-capita spending suggests instead a local public good with congestion (for example, public education). It is possible to model a local Samuelson public good by assuming G^j is equal to total local spending. However, this does not seem in keeping with the types of goods often provided by lower-tiered governments. Moreover, the per-capita specification has a long tradition both in economics and out. See Romer and Rosenthal (1978) for an example taken from the economics literature; see Barnett and Topham (1977) for a discussion of its use by the California Supreme Court.
9. It should be noted that this assumption is restrictive. As a general observation, the distributions of income and housing will be functions of governmental expenditures and tax rates. Hence, the model may be limited in its ability to examine long-run phenomena.
10. In order to ensure a well defined equilibrium, assume that the number of voters in each lower-level jurisdiction, N^j, is odd. See also note 7.
11. Leyden (1986a) proves this claim in detail. The system-wide equilibrium is not necessarily unique; the various higher- and lower-tier equilibria are unique individually.
12. For reasons of exposition, the treatment below is relatively verbal in nature. A more detailed mathematical treatment is available from the author upon request.
13. The distance along the ray is a function of Δt.
14. The right-hand side of this inequality is equal to the slope of the voter's (G,C)-space opportunity set frontier with:

$$\hat{H} = \bar{H}^j + \frac{N \wedge j - N}{N} [a_2 + a_3 (B - \bar{H}^j)]$$

Intuitively, the sign in equation (15) is due to the referendum lowering the price of government by reducing the outflow of grants associated with a decrease in the local tax rate. This, in turn, creates a steeper slope for the frontier of the voter's (G,C)-space opportunity set beginning at the status-quo point.

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