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**Provision of Public Goods, Voting and Agglomerative Bias**

by

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## 1 Introduction

This paper adds to the literature in local public finance originating from the work of Tiebout (1956) on the claim that decentralised decisionmaking would lead to a first best allocation both of households to jurisdictions and of local public goods within each community. A vast and powerful literature exists stating the precise conditions under which the hypothesis holds (Scotchmer 1994, Rubinfeld 1987). Central assumptions of the existence of the first best solution is the assumption of a free entry of new communities and of complete information of local governments on the preferences of potential members and their ability to simultaneously choose the membership and local public good allocation (Starrett 1993).

If these assumptions are relaxed the preferences of the members of a community are not revealed by the households' choice of their favourite jurisdiction. Local governments and households are then confronted with incomplete information on future compositions of the communities in terms of the preferences of the member households and future allocations of local public goods. Local governments then depend on a political decision making process to elicit the residents' preferences. We assume that local governments aggregate individual preferences by majority voting. That is, each moving phase of the consumers will be followed by a voting phase and a subsequent adjustment of the supply of public goods by the local governments. The potential migrants decide on their residential locations on the basis of expectations on future fiscal policies. The necessity and consequences in case of a limited number of community sites of a voting process on community choice has been analysed by several authors in a non-spatial context (cf. Wildasin 1986) This two stage process of moving and voting has also been studied only for a non-spatial setting (Starrett 1993). A bias in spatial club size has previously been assessed for the case of a Tiebout tax. We show that if we relax the strong informational conditions of this literature that a size bias results for the case of the taxation of land rents, too. In contrast to the cited literature we dispense with the assumption of a continuum of agents in each community.[1]

Tiebout (1956) suggested that the freerider problem of the provision of non-excludable, non-rival goods could be solved by viewing the provision of public goods in a system of numerous jurisdictions as being analogous to a competitive market for private goods: Competition between communities would ensure that a variety of bundles of public goods is

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[1] On the problems resulting from the assumption of a continuum of agents in Tiebout type models c.f. Berliant and Raa (1991).

produced, and individuals would reveal their preferences for public goods by moving ("voting with their feet"). In contrast to pure public goods with monotonically decreasing average costs the local public goods in the Tiebout model are produced with U shaped average cost curves with respect to community size. The competition between the communities would achieve efficiency in maximising the benefits of their members from the provision of public goods within the community and would force all communities to supply the public good at minimum cost.

Having perfect information on the different packages of public goods and taxes offered by a sufficiently large number of existing or potential communities households move to that jurisdiction where they realise their optimal plan to consume public and private goods. As there is no private production, and hence no labour market, and no mobility costs, individuals respond only to fiscal conditions. In the original Tiebout model there are no jurisdiction specific fixed resources.

If there is a heterogeneous population with respect to preferences and initial endowments it is, however, not clear how the competition *process* leads to an efficient outcome. Even if there were as large a number of jurisdictions as there are household types and the number of each household type could be divided by the optimal community size, the local governments would have to know the preferences of the population of all potential jurisdictions, coordinate plans among each other to decide which fiscal package to offer and immediately establish the equilibrium. Local governments would then have exactly the informational problems the Tiebout model claims to solve. Only then would all jurisdictions contain identical agents and a political decision process of the community in question be of no relevance: All members would have identical preferences.

If local governments have to seek support in elections they could do so with respect to the current population or, via an active immigration policy, try to influence the future composition of the community's population. If it is impossible to achieve an ultimate complete segregation of the total population according to household types (e.g. because of a finite number of community sites), or governments do not believe the process to lead to that absorbing state, we face an adverse selection problem for the latter political strategy. To avoid these complications we assume that the government resolves the disagreement over budgetary policy because of a heterogeneous population by a majority rule voting process (cf. e.g. Westhoff 1977).[1]

In section 2 the basic analytical framework will be presented. We explicitly take account of a land market. To argue for the taxation of land rents in the spatial context we analyse the optimal plan of the political decision maker if there were a complete segregation of the population according to types.

In section 3 we model migration decisions of the households, employing an overlapping generations model. and derive the temporary voting equilibrium.

## 2 Optimum taxation for spatial clubs and perfectly mobile households

### 2.1 Preferences of households

In the model we will use a local community is identified with a spatial club. A nonrivalrous collective good is to be shared by the members of a community living around it. To enjoy the collective good one must visit it. The cost of visiting it (in terms of a private consumption good) per unit

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[1] As has been shown by Bewley (1981) this could lead to an inefficient lock in of the competition process. (see also the modified example in Starrett 1988, sec. 5.3).

distance is assumed to be fixed. When households occupy space, one individual's use of space precludes another's use of the same space. This fact of spatial separation introduces an element of "club rivalry".

Besides the collective consumption good the agents consume a composite private good. The nonexcludable collective good enters the preferences of all members of a community symmetrically. Rivalry enters as a nonexcludable item. None of the households can be isolated from the effects of crowding.

People can choose the number of trips and the amount of land occupied. The total land of a jurisdiction is divided into a set of zones which are indexed by the variable s. Land within one zone is treated as homogeneous and perfectly divisible. L(s) denotes the amount of land in zone s. Each household must locate in a single zone. Assuming that the allocation within a zone satisfies standard convexity assumptions every agent in a particular zone will get the same allocation.

With these principles in mind we employ the following representation of preferences (assumed to be convex) for an agent of type h:

$$U^h\left[g, \eta^h(s), c^h(s), \frac{L(s)}{n(s)}\right] \tag{1}$$

g represents the nonexcludable element of the collective good under study, $\eta^h$ the individual use level of the public good, n(s) the number of residents in zone s. L(s)/n(s) = l(s) denotes the amount of land occupied by residents in zone s. $c^h$ indicates the consumption of the private good. It enters the utility function as the negative value of the initial endowments net of the period consumption.

The costs of the provision of the public good Γ(g) will only depend on the type of facility, indicating that there is no "service rivalry" apart from the rivalry caused by the spatial separation of the households.

**2.2 The social planners problem**

To find out which form of taxation the government should choose to finance the local public good we first study the governments decision problem for the case of a homogeneous population.

To maximise the welfare of the representative household of zone s the social planner maximises the utility function of a representative agent of zone s subject to the following constraints

$$U^h\left[g, \eta^h(s), c^h(s), \frac{L(s)}{n(s)}\right] \geq U^h \text{ for each s} \tag{2}$$

$$\sum_x n[x] = n \tag{3}$$

$$\sum_x n[x]c[x] + \sum_x n[x]\phi[x]\eta[x] + \Gamma(g) = 0 \tag{4}$$

Constraint (2) says that the utility of each household of a particular type should be independent of the zone it lives in.[1] The second constraint, with x being a counting variable for the zones, says that the sum of the number of residents in the individual zones must add up to the total number of members of that community n. Restriction (4) is the material balance equation. $\phi[s]$ is the transport cost (from s) per unit use of the public facility.

Assigning $\beta[s]$, $\nu$ and $\mu$ as Lagrangian multipliers to solve the constrained maximisation problem to the constraints (2), (3) and (4), respectively, and using first order conditions for the numeraire c to normalise we obtain as the necessary conditions for optimality:

$$\frac{\partial U^h[s] / \partial \eta}{\partial U^h[s] / \partial c} = \phi[s], \text{ each s} \tag{5}$$

$$\sum_x n[x] \frac{\partial U^h[s] / \partial g}{\partial U^h[s] / \partial c} = \frac{\partial \Gamma}{\partial g} \tag{6}$$

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1 On the problem that a first best solution would require an unequal treatment of equals in this spatial context and the reasons for the choice of a formulation that treats equals equally c.f. Starrett (1988). The unequal treatment would be particularly difficult to enforce in a democratic society as it is assumed here.

$$\frac{\partial U^h[s] / \partial l}{\partial U^h[s] / \partial c} \frac{L[s]}{n[s]} + c[s] + \phi[s]\eta[s] + \frac{\nu}{\mu} = 0, \text{ each s, and} \tag{7}$$

$$\nu = 0. \tag{8}$$

The first of these conditions says that $\eta$ should be allocated just as any other private good. Condition (6) indicates that g should be allocated like any nonexcludable item. The third condition refers to the allocation of land. Aggregating over the whole population, by multiplying each of these equations with the appropriate n(s), summing and substituting from the material balance equation (4) we obtain

$$\Gamma(g) - \sum_x \frac{\partial^h U[x] / \partial l(s)}{\partial^h U[x] / \partial c(s)} L(x) = n\frac{\nu}{\mu}, \text{ each s.} \tag{9}$$

n denotes the total number of residents in the jurisdiction. $\nu/\mu$ is the value of an extra resident in that community. If the jurisdiction has optimal size $\nu$ is equal to zero. The cost of the public good is financed by fully taxing the pseudo land rents. This leads to the following lemma we use in subsequent sections.

*Lemma: Governments will finance local public goods for a spatial club by taxing rents of a fixed local resource. If land is that fixed resource pseudo land rents are the tax base.*

## 2.3 Decentralization of spatial clubs

### *2.3.1 Household behaviour*

In this section we characterise the household decisions when the provision of local public goods is decentralised. If we cannot assume that for each type of household, defined in terms of its preferences and endowments with the composite consumption good, the utility maximising community exists at the outset jurisdictions will have heterogeneous populations. We start by studying the moving phase where households choose their community of residence. We analyse a situation where the process of moving, voting and reoptimisation of the supply of public goods has not reached an absorbing state.[1] We maintain the assumption that space generates the only element of rivalry. The households know that the local governments will finance the supply of the public goods by fully taxing the land rents. Given the quality or type of public facilities g offered by the jurisdictions the households then maximise utility with respect to the consumption of the composite good c, the use of the public good $\eta$ and the plot size l. All these variables depend on the zone s where the agent is

[1] On such a lock-in in a suboptimal allocation with heterogeneous populations for non-spatial clubs cf. Bewley (1981).

located. A household of type h residing in a zone of quality s then has the following decision problem

$$\max_{c,l,\eta} {}^{h}U[g, c(s), l(s), \eta(s)], \tag{10}$$

where r(g,s) is a bid rent function, subject to the budget constraint

$$c + r(g,s)l(s) + \eta(s)\phi(s) = 0. \tag{11}$$

The decision makers anticipate that the rent gradient will adjust so that each agent will be indifferent concerning location. Potential residents of a jurisdiction know that whatever rent structure will result total rents well be used to finance the local public goods. That is, the dependence of r on g must satisfy

$$\sum_{x} r(g.s)l(x)n(x) = \Gamma(g). \tag{12}$$

Given this knowledge they see the land rent as a price for the provision of the public good. Governments will, after each round of voting, offer a level or quality of the public good satisfying these conditions.

First order conditions for the potential member's optimal decision lead to

$$\frac{\partial^{h}U / \partial\eta(s)}{\partial^{h}U / \partial c(s)} = \phi(s), \text{ each s} \tag{13}$$

$$\frac{\partial^h U / \partial l(s)}{\partial^h U / \partial c(s)} = r(g, s), \text{ each s} \tag{14}$$

That is, the marginal rate of substitution between the consumption good and the use of the public good is equal to the transport cost per unit of the public good. The rate of substitution between the consumption good and the plot size is equalised to the land rent which in turn depends on the supply of the local public good and the zone of residence. The second condition (substituted back into the budget constraint) shows that the land allocation within the jurisdiction should be that of a competitive land market.

### *2.3.2 Government behaviour*

Due to the absence of a complete spectrum of fiscal packages which would allow for a complete segregation of household types and that there is no immediate arrival at the overall equilibrium due to the governments' incomplete information on the preferences the following violation of an overall optimum will hold for all but the median voter (in case of an odd number of members)

$$\frac{\partial^h U / \partial g}{\partial^h U / \partial c(s)} \neq \frac{\partial r(g, s)}{\partial g} l(s) \tag{15}$$

For the other households we have either

$$\frac{\partial^h U / \partial g}{\partial^h U / \partial c(s)} > \frac{\partial r(g,s)}{\partial g} l(s), \text{ or} \tag{16}$$

$$\frac{\partial^h U / \partial g}{\partial^h U / \partial c(s)} < \frac{\partial r(g,s)}{\partial g} l(s). \tag{17}$$

The former group would prefer a higher level of public goods supply and a higher level of taxation, and the latter group would prefer a lower level of the public good associated with lower (differential) land rents.

For $\{g^i, r^i(g^i,s)\}$ to be a voting equilibrium of community i the following conditions must hold:

$$\sum_x n^i(x) r^i(g,s) l(x) = \Gamma(g) \tag{18}$$

For at least half of the residents in community i must hold

$$\left.\frac{\partial^h U / \partial g^i}{\partial^h U / \partial c(s)}\right|_{g^i,r^i} \geq \frac{\partial r^i(g^i,s)}{\partial g^i} l(s), \text{ and for at least one half of them}$$

$$\left.\frac{\partial^h U / \partial g^i}{\partial^h U / \partial c(s)}\right|_{g^i,r^i} \leq \frac{\partial r^i(g^i,s)}{\partial g^i} l(s). \tag{19}$$

That is, at least one half of the households of the community in question have a higher willingness to pay for the public good than the median voter; the other half has a lower one. In what follows we use the agents' willingness to pay to order all households of the economy. h is then an index varable of the willingness to pay for the local public good.

The multistage process of moving of agents, voting and a subsequent reoptimisation by local governments would have reached an absorbing state if there is a voting equilibrium and no household wants to switch to a different community. As Westhoff (1977) has shown, in such an absorbing state, if it exists, the communities are either composed of identical sets of types of households or of single disjoint intervals of consumers. If such an equilibrium is unique it is necessarily unstable (Westhoff 1979). Any disturbance would lead to an adjustment process and a size bias as studied in the subsequent section.

After a voting equilibrium has been identified and the supply of the public services has been adjusted accordingly there are some consumers who have an incentive to switch to a different community. This requires that the density functions over types of households of different communities are not identical and that the supports of these functions overlap. Note that the density functions don't necessarily have full support, i. e. not all types of individuals with respect to preferences for the local public good must be represented in each community.

## 3 Bias in the size of spatial clubs

Households take decisions whether to switch to a different community after a voting phase which has taken place in all jurisdictions simultaneously and fiscal packages have been implemented in accordance with the median voter's optimality condition for the demand of the nonrivalrous good. Without complete segregation of types or identical distributions of households some of them may want to switch to a different jurisdiction. The agents have information on the current voting equilibria and the number of residents in all communities. In addition, they have subjective beliefs about the distribution of types of households and expectations on the migration streams into or out of the candidate community they potentially move to. On the basis of this information and these beliefs they form expectations about the new voting equilibrium that will result after the moving phase. The local governments implement the outcome of the voting phase without any regard to future changes of the size or the composition of the population.

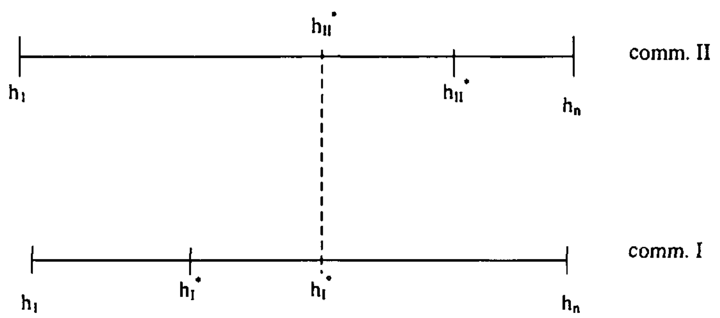
More precisely, we study the moving decisions in an overlapping generations framework. We assume that members of each generation live for two periods and that each generation that has died will be replaced by a new generation of identical agents. In each period there are "young households", born in that period, and "old households" that have been born one period before. After each voting phase households decide where to move, maximising total expected utility.

We start by looking at two jurisdictions $i \in \{I,II\}$. Let $n_{it}$ denote the individuals born in community i in period t. It follows that $n_{It}$ and $n_{IIt}$ as well as $n_{it}$ and $n_{it+1}$ are disjoint. In a situation of no migration the population in each community in period t is composed of the old agents born in the previous period and those born in period t, i.e. $n_{it-1} \cup n_{it}$. Household types are sorted and indexed by their willingness to pay for the local public good. The total spectrum of household types is then given by the vector $(h_1, h_2, ..., h_n)$. $h_1$ denotes the agent with the lowest willingness to pay and $h_n$ the highest willingness to pay for the public good. We can then characterise an individual by a triple $\{h, j, t\}$, with $h \in (h_1, h_2, ..., h_n)$, $j \in [I,II\}$ and $t = 1,2,...,T$.

To focus on the size bias resulting from the moving decisions, to avoid the analysis of a stochastic process that will at best under restrictive assumptions have an absorbing state and to take account of real world limitations of the relocation decisions of potential migrants, we assume that only young households have the opportunity to move to another jurisdiction.

Without loss of generality we assume that the voting equilibrium of community II implies a smaller level of the supply of the public good than the voting equilibrium of community one:

**Figure 1: Voting equilibria and marginal consumers in two communities**




$h_I^*$ and $h_{II}^*$ denote the current voting equilibria. For the households of types $h_I^*$ and $h_{II}^*$ the supply of the public goods after reoptimisation of the governments will be optimal (in case of odd numbers of members, near optimal otherwise) as the governments determine the optimal supply of public goods $g_I^*$ and $g_{II}^*$ from the equation

$$\frac{\partial^{h_i^*} U / \partial g_i^*}{\partial^{h_{ii}^*} U / \partial c} = \frac{\partial r^i(g_i^*, s)}{\partial g_i^*}, \text{ each s and } i = I,II \tag{20}$$

The further away the h of a certain household from the h of the voting equilibrium the greater is the loss from not living in a homogeneous community. If there were communities with both lower and higher values of the voting equilibrium, the larger distance between the willingness to pay of a household from that of the median voter the stronger would be the incentive to switch to a different community.[1]

Let ${}^{h_i}V(g_i^*)$ denote the indirect utility function of household h in community i enjoying the supply of the local public good according to the preferences of the median voter. From the condition ${}^{h_i}V(g_i^*) = {}^{h_j}V(g_j^*)$ we can determine the position of the marginal households indexed by $h_I^\circ$ and $h_{II}^\circ$ which is indifferent between the current equilibria of community I and community II. If the households were completely myopic the migration decisions would directly follow from the comparison of the indirect utilities that could be achieved in the two communities. The agents of community i would migrate whenever

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1 Note that only in the case of linear homogeneous utility functions we could measure the burden of an individual from not living in a homogeneous jurisdiction by the distance between the h of the voting equilibrium and the h of the household.

$$^{h_i}V\left(g_i^*\right) > {}^{h_j}V\left(g_j^*\right), \text{ for } i \neq j \text{ and } i,j = I,II \tag{21}$$

Given the current voting equilibria households that might want to switch to another community have an expectation function

$$\varphi_i\left(h_t^*\right) = M_{jt},\ i,j \in \{I,II\} \text{ and } i \neq j \tag{22}$$

with $h_t^*$ being the vector of current equilibria and $M_t = (m_{imin},\ldots,m_{imax})$ the vector of the number of migrants. Net outmigration streams have a negative sign and net immigration streams have a positive sign. If for example a potential migrant from community one assumed that all other agents act myopically he or she would expect all residents of community II with a lower h than $h_{II}^{\circ}$ to move to community I and all other agents of community I with an h higher than $h_I^{\circ}$ to move to community II.

Depending on the actual distribution of types and the sizes of both communities this might lead to an increase or a decrease of the voting equilibria in both communities. If there were "normal" reactions of the voting equilibria, i.e. $h_{II}^*$ moves up and $h_I^*$ moves down, those with the weakest incentive to move have the highest probability of making mistakes in the sense that they will have a lower indirect utility after moving than if they had stayed in the home jurisdiction. The probability of making mistakes is the highest for those with a willingness to pay for the public good close to the switching value.

Knowing the current equilibria and the numbers of residents in both communities the consumers have subjective beliefs about the distribution of types in the home community and the one they potentially want to migrate to. We assume that they perceive these distributions as multinomial distributions with parameters $n_i$ and $W_i = (w_{ihmin},\dots,w_{hmax})$, i = I,II. $n_i$ corresponds to the number of residents in community i and $W_i$ to the vector of the a priori relative frequencies of types in community i. The beliefs must be consistent with the current voting equilibria. The number of types must be finite with $k \geq 2$. Types are mutually exclusive and exhaustive. The sum of the parameters is equal to one. The subjective probability of a particular vector of households of different types can then be expressed as

$$f(\pi | n_i, W_i) = \frac{n_i\,!}{\pi_{i\min}\,!\dots\pi_{i\max}\,!} w_{i\min}^{\pi_{i\min}} \cdot\ldots\cdot w_{i\max}^{\pi_{i\max}} \tag{23}$$

The random vector $(\pi_{imin},\dots,\pi_{imax})$ indicates the beliefs on the absolute number of types in community i. The expected vector of absolute frequencies of types is given by

$$E(\pi) = n_i W_i \tag{24}$$

Beliefs are consistent with the current voting equilibria if

$$\sum_{h=hi_{min}}^{h_i^*} \pi_{ih} \geq \frac{1}{2} n_i . \tag{25}$$

We further assume that the subjective beliefs on the parameters of the multinomial distribution have the form of a Dirichlet distribution whose parametric vector is $\alpha_i = (\alpha_{imin},...,\alpha_{imax})'$ with the elements of $\alpha_i$ being positive integers. The random vectors $x_i$ of the Dirichlet distribution correspond to the weights of the multinomial distribution for community i (DeGroot 1970). The Dirichlet distribution has the form

$$\phi(x_i|\alpha_i) = \frac{G(\alpha_{i\,min},+\ldots+\alpha_{i\,max})}{G(\alpha_{i\,min})\cdot\ldots\cdot G(\alpha_{i\,max})} x_{i\,min}{}^{\alpha_{i\,min}-1} \cdot\ldots\cdot x_{i\,max}^{\alpha_{i\,max}-1}, \tag{26}$$

with G being the Gamma function. The expected value for a particular $X_h$ is given by

$$E(X_{ih}) = \frac{\alpha_{ih}}{\sum_{h=h_{i\,min}}^{h_{i\,max}} \alpha_{ih}} \tag{27}$$

The potential migrants form their expectations on the post moving multinomial distribution of types by updating the parameters using the expected migration streams by type given by the expectation function (22).

The new expected values for elements of the vector of parameters of the multinomial distribution is obtained by adding the number of migrants to the numerator of (27) (outmigrants with a negative sign) and adding the total net flow of migrants to the denominator. The expected value of the random parameter $X_{ih}^{'}$ then is

$$E\left(X_{ih}^{'}\right) = \frac{\alpha_{ih} + m_{ih}}{\sum_{h=h_{i\,min}}^{h_{i\,max}} \alpha_{ih} + \sum_{h=h_{i\,min}}^{h_{i\,max}} m_{ih}} \tag{28}$$

The new voting equilibrium is then computed from the condition

$$\sum_{h=h_{i\,min}}^{h_i^{**}} \frac{\alpha_{ih} + m_{ih}}{\sum_{h=h_{i\,min}}^{h_{i\,max}} \alpha_{ih} + \sum_{h=h_{i\,min}}^{h_{i\,max}} m_{ih}} = \frac{1}{2} \tag{29}$$

Comparing this with the consistency requirement for the beliefs about the initial distributions we obtain the expected difference between the initial voting equilibrium $h_i^{*}$ and the new voting equilibrium $h_i^{**}$. Interpreting the $\pi_{ih}/n_i$ as $\frac{\alpha_{ih}}{\sum_{h=h_{i\,min}}^{h_{i\,max}} \alpha_{ih}}$ and subtracting (25) from (29) we obtain, after rearranging

$$\sum_{h=h_i^*}^{h_i^{**}}(\alpha_{ih}+m_{ih})=\sum_{h=h_{i\min}}^{h_i^*}(\alpha_{ih}\frac{\sum_{h=h_{i\min}}^{h_{i\max}}m_{ih}}{\sum_{h=h_{i\min}}^{h_{i\max}}\alpha_{ih}}-m_{ih}) \qquad (30)$$

From expression (30) we derive the following proposition

*Proposition: The expected difference between the new and the old voting equilibrium will be the c.p. be smaller*

a) *the higher the number of household types between the old and the new equilibrium in the initial situation,*

b) *the higher the net migration for the types of households between the median voter in the initial situation and the median voter in the new equilibrium,*

c) *the smaller the change of the total population due to the moving phase,*

d) *the smaller the outmigration of households with a demand lower than the demand of the median voter in the initial situation.*

All these conditions hold for relatively large communities. That is, the expected distance between the own ideal fiscal package and the ideal of the median voter in the new voting equilibrium for household types between those of the old and the new voting equilibrium is smaller when they move to a relatively large jurisdiction. That is, would such a household of community I face a situation like the one depicted in Figure 1 and have the choice between moving to community II or to another community III which have equal initial voting equilibria but different sizes it would turn to the larger community. This establishes the claim of the size bias in spatial clubs even if the supply of the public good is financed by taxing land rents.

## 4 Conclusion

We have shown that even if public goods in spatial clubs are financed by taxing land rents that a size bias exists when some restrictive assumptions of the original Tiebout model are removed. If a full equilibrium of all household types segregating into different jurisdictions cannot be achieved at the outset governments depend on a mechanism to elicit the preferences of the households different from "voting with the feet". We assume majority voting as such a mechanism. Both the governments and the potential migrants face uncertainty with respect to future compositions of the communities and the fiscal packages that will be implemented to execute the outcome of the political process. We show that this uncertainty favours relatively large communities.

## References

Berliant, M. C., and T. t. Raa (1991). On the continuum approach of spatial and some local public goods or product differentiation models. some problems. *Journal of Economic Theory* 55 (1): 95-120.

Bewley, T. (1981). A critique of Tiebout's theory of local public expenditures. *Econometrica* 49: 713-740.

DeGroot, M. H. (1970). *Optimal statistical decisions*. New York.

Rubinfeld, D. L. (1987). The economics of the local public sector. In A. J. Auerbach, and M. Feldstein (ed.), *Handbook of Public Economics, Vol. II*. Amsterdam: Elsevier Publishers (North Holland).

Scotchmer, S. (1994). Public goods and the invisible hand. In J. Quigley, and E. Smolensky (ed.), *Modern Public Finance*. Cambridge, Mass.

Starrett, D. A. (1988). *Foundations of Public Economics*. Cambridge.

— (1993). On the equilibrium size and composition of communities. Technical report series No. 53. Stanford Institute for Theoretical Economics, Stanford University, Stanford, CA.

Tiebout, C. (1956). A pure theory of local public expenditures. *Journal of Political Economy* 64: 416-424.

Westhoff, F. (1977). Existence of equilibria in economies with a local public good. *Journal of Economic Theory*, 14: 84-112.

— (1979). Policy inferences form community choice models: A critique. *Journal of Urban Economics*, 6: 535-549.

Wildasin, D. E. (1986). *Urban Public Finance*. Chur.