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The Tiebout Model: Bring Back the Entrepreneurs

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Several recent papers in the literature have reformulated the nature of equilibrium in Tiebout models by assuming an exogenous number of communities, inflexible community boundaries, and in particular inactive landowners and developers. This paper argues that these assumptions are unwarranted and result in indeterminate solutions and incorrect analyses. Determinate long-run solutions require equilibrium in intercommunity land markets, which in turn require giving landowners and/or entrepreneurial developers an active role in the models. The role of politics in these models and its juxtaposition with entrepreneurial activities are also analyzed.

Recent papers such as those by Epple and Zelenitz (1981), Bucovetsky (1982), and Yinger (1982) on the Tiebout model differ fundamentally from earlier work by Ellickson (1970, 1971) and Hamilton (1975, 1976) in their formulation of long-run equilibrium in a Tiebout model. These recent papers move beyond the central focus of earlier work on population stratification to ask questions about the role of local politics, the role of entrenched interests, and the impact of external equalizing grants in the model. At the same time these papers have altered the formulation of what constitutes long-run equilibrium, particularly in intercommunity land markets. We will argue that the new formulation is incorrect and that a proper formulation of the problem will alter the answers to some of the questions asked.

In the earlier work, the process of population stratification gener-

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ally occurs in a setting where communities form on, say, a flat featureless plain, and each community perceives that land is available to it in infinitely elastic supply at a fixed price. First, this perception can mean either that total urban demand for land accounts for only a fraction of overall land use in competition with agricultural or recreational uses, or, if all local land is in urban use, that any one community accounts for only a tiny fraction of total urban demand. Second, it implies that community boundaries are flexible in the long run and respond so that land of uniform quality has the same price across communities. Third, there is a general presumption that the number of communities that form is endogenous. While we will suggest that maintaining endogeneity of community numbers and boundaries is the best way to formulate the problem, we will argue below that flexibility of boundaries and numbers is not necessarily critical, providing landowners and developers have an active role in the model.

In contrast to these notions of flexible community boundaries and numbers of communities, the recent papers presume a fixed number of communities with fixed land areas. Thus, there is no land use adjustment through variation in community boundaries and numbers to equalize land prices across communities. Moreover, there is no other adjustment mechanism for land uses across the fixed number of communities to equalize marginal products of land. This paper will argue that the solutions in the recent papers are certainly not long-run solutions, but might deal with what could be termed temporary equilibria in an unspecified dynamic context.

I will show why it is desirable to reincorporate equilibrium in intercommunity land markets in long-run versions of the Tiebout model. This will generally involve giving back landowners and developers an active entrepreneurial role in the model. Hence the title of this paper. This demonstration will be done in the context of examining a question raised by Epple and Zelenitz (1981): "Does Tiebout need politics?" I will show that Tiebout does not need politics in a properly formulated long-run model. As an aside, it should be noted that Epple and Zelenitz do not focus on the specific question they raise. They actually ask, if Tiebout *has* politics, whether population movements will eliminate the negative impact of "bad" politics. While Epple and Zelenitz answer this second question correctly with a no in their context, I will argue that in a long-run solution, population movements and land use adjustment will also eliminate the negative impact of bad politics.

The formal model in this paper as in the papers referenced above is a "single-period" or long-run equilibrium model where capital (housing structures) and lot sizes are perfectly malleable, so that comparative statics allows the world to be dissolved and costlessly restructured between solutions. In the concluding section I will argue that formally introducing dynamic considerations can alter the issues to be considered, in ways not generally recognized in the literature. The introduction of nonmalleability of lot sizes and structures and transactions costs of moving for existing residents means that the current decisions and behavior of residents will be affected by what they expect *future* public-good tax-development policies in the community will be, which introduces the issue of "time inconsistency" (e.g., Kydland and Prescott 1977; Fischer 1980).

Before turning to the conceptual issues analyzed in Sections I and II, it would be useful to ask whether it is more reasonable to assume a world where community numbers and boundaries are fixed or one where they are variable. The basic facts for the United States may surprise people because they indicate a degree of fluidity far beyond what seems to be generally assumed. In table 1 I look at how the number of urban places (local political units) over 2,500 has varied over time. Under A, I compare decade rates of growth in population of all urban places over 2,500 and growth rates in numbers of urban places over 2,500. Because data prior to 1950 are limited, I focus on urban places over 2,500. However, for 1950–60 and 1960–70, the growth rates for *all* urban places (including those under 2,500) are the same as the ones in the A columns, so that, overall, the growth rates in table 1 reflect new incorporations (not simply movements of tiny urban places into larger urban place categories). While the growth rates of numbers of places are generally less than for population, since 1930 the two growth rates are very close. Moreover, this near equality in growth rates holds by class of city. This is illustrated in the B columns for the decade with the highest overall growth rate, where I compare growth rates in population and numbers of places by city size category.

Perhaps even more surprising than the high growth rates of numbers of communities may be the extent of changes in political boundaries through annexation (and even detachments). These numbers are given in table 2. Two basic facts emerge. On average, the growth rates for land areas far exceed the growth rates for population in existing urban places. Second, even in relatively short periods of time (e.g., 1970–76), most cities experience growth through annexations. Even for any 1 year in the period 1970–76 about 30 percent of all cities had significant annexations. The only exception appears to be cities in the northeastern United States. While the focus is on annexations, detachments also occur, although at a much lower rate (detachments are about 1.4 percent of annexations).

Although I obviously have not shown that community numbers and sizes adjust to equalize prices for land of uniform quality, it is clear

TABLE 1

GROWTH IN THE NUMBERS OF COMMUNITIES

	A		B: 1950–60		
DECADE	Percentage Population Increase	Percentage Increase in No. of Urban Places	City Size Category (1,000s)	Percentage Population Increase	Percentage Increase in No. of Urban Places
1910–20	28	20	500	7	17
1920–30	27	16	100 –500	25	25
1930–40	8	9	50 –100	55	60
1940–50	20	16	10 –50	57	51
1950–60	29	27	2.5–10	18	17
1960–70	19	17			

SOURCE.— U.S. Bureau of the Census, *Historical Statistics for the U.S.A.*, Series A 43-72 (1976). Each row and hence decade growth rate is based on the same definitions and territories, although these definitions vary among rows.

TABLE 2

CHANGES IN COMMUNITY BOUNDARIES

	Percentage Increase in Land Area by Annexation	Percentage Increase in Total Population	Percentage of All Cities with at Least One Significant Annexation
1950–70:			
260 central cities with populations over 50,000 (in 1950)	106	18	n.a.
113 suburbs with populations over 50,000 (in 1950)	174	74	n.a.
1970–76:			
All cities 50,000+ in 1970	12	1*	61
All cities 25,000–50,000 in 1970	13	2*	64

SOURCE.—"Annexations and Corporate Changes," *Municipal and County Year Book* (1975, chap. 4, by Richard L. Forstall; 1978, chap. 3, by Richard L. Forstall and Joel C. Miller).

* These figures refer to the population increase through annexation alone, as opposed to the city's total population increase through all sources.

that, for whatever reasons, the numbers and land areas of local political units are highly flexible over time. Such an assumption seems not simply warranted but central to any analysis of the U.S. situation.

I. Long-Run Equilibrium: Tiebout Does Not Need Politics

I start by examining three possible models of *intra*community equilibrium and then go on to determine which of these formulations is consistent with long-run equilibrium across communities. A major point will be that whatever the politics involved, entrepreneurial developers are required to play an active role in the model to obtain solutions consistent with the usual notions of what constitutes long-run equilibrium.

In presenting the three models of intracommunity equilibrium, I make a number of standard simplifying assumptions, corresponding to those in, for example, Epple and Zelenitz (1981). These are not critical to my analyses and in many cases simply represent a need to limit the number of alternative solutions we consider. First, nonland income, nonhousing production, and the cost of capital are exogenous to the problem. Second, within a community people have identical incomes and tastes, reflecting the Tiebout forces encouraging stratification. Third, local public services are generally financed solely by a property tax on housing. It is assumed that this tax distorts housing consumption or that the type of "perfect zoning" in Hamilton (1975) is not feasible. This paper is not taking a stance on this issue but simply choosing the more common assumption. Finally, I assume in all cases that the number of communities is very large, so that communities do not see their actions affecting prices in other communities.

Before proceeding, it is useful to clarify the possible activities of agents in the economy, although their activities can vary according to the particular model of intracommunity equilibrium. First, there are land developers who do not live in the community and own the land, at least as an initial endowment. Developers may or may not be responsible for providing public services. Second, there are residents who either rent or buy housing in the community. Since in Section I of the paper we are using the traditional single-period model to characterize long-run equilibrium, renting versus owner occupancy are indistinguishable modes. In Section II, in a dynamic context, they will become critically different. Third, if there is politics with democratic (costless) voting, the only agents who vote are residents, whether they rent or own. With politics there is a costless government that provides public services. Finally, there can be faceless contractors who actually construct the housing with borrowed or purchased capital and land and then rent or sell it to residents. Alternatively, residents may directly build their own housing out of land and capital, borrowed or purchased from absentee land developers and capital owners. Or, as another alternative, land developers may construct and sell or rent out the housing. These three cases are equivalent in a long-run model.

A. *Intracommunity Equilibria*

In presenting the three models of intracommunity equilibrium we start by assuming that community land area is fixed. Then in Section I*B* we examine the impact of allowing community land area to vary on intercommunity equilibria and corresponding intracommunity equilibria. Under our various assumptions, intracommunity equilibrium deals only with equilibrium in local housing markets and in provision of local public services. For the housing market, total housing produced is $F(K, \bar{L})$, where $\bar{L}$ is the fixed land area and K is capital inputs. Total housing demand is per resident housing demand $h(\cdot)$

multiplied by the endogenous population N. The arguments of $h(\cdot)$ are prices, public service levels, and either income or utility as noted later. In housing market equilibrium in the community

$$F(K, \overline{L}) = N \cdot h(\cdot). \tag{1}$$

The specification of the fiscal side depends on the model in question. We now turn to the three models.

Local Public Goods: Tiebout without Politics

With no politics, the community is modeled as a club, where there is a club owner—in this case a group of land developers who act jointly through, say, a single land management company. The developers choose per person local public service levels, g, and property tax rates, t, to maximize profits. Profits are land rents plus taxes less public services expenditures, or

$$\pi = p_l\overline{L} + tpF(\cdot) - cNg, \tag{2}$$

where p_L is the price the developers charge for land, p is the price of housing, so tpF are total property taxes, and c is the constant cost of a unit of public services, which are modeled in the literature as a Samuelson private good. To be more general, in equation (2) the land company does not actually provide the housing, so that contractors or individuals can put up the structures. The results are identical if the company does provide the housing, so that profits are redefined as $p(1 + t)F(\cdot) - cNg$.

The land management company is constrained by equilibrium in the housing market as in equation (1). It is constrained by the builders' (or its own) choice of capital in housing where capital is chosen according to the usual marginal productivity condition, or

$$p_K = pF_K, \tag{3}$$

where p_K is the fixed cost of capital and $F_K \equiv \partial F(\cdot)/\partial K$. Land rents are a residual, or

$$p_lL = pF(\cdot) - p_KK. \tag{4}$$

Finally, the company is constrained by having to pay utility levels, $\overline{V}$, to its residents equal to those prevailing in the local economy. The indirect utility in this community is $V(y, \overset{*}{p}, g)$, where y is exogenous income and $\overset{*}{p}$ is the gross-of-tax price of housing; or

$$\overset{*}{p} = p(1 + t). \tag{5}$$

Thus the company faces the constraint that

$$\overline{V} - V(y, \overset{*}{p}, g) = 0. \tag{6}$$

To solve for the characteristics of intracommunity equilibrium, we can proceed in one of two ways. We can do a constrained maximization problem, where equation (2) is maximized subject to equations (1), (4), and (6).[1] However, since the model is simple enough, let us differentiate equations (1), (3), (4), (5), and (6) to solve for how the variables (p_L, p, F, and N) in equation (2) change, given market forces in the community as t and g change. Differentiating yields the key equations

$$\hat{p} = -(\widehat{1+t}) + \frac{mg}{\overset{*}{p}h}\hat{g}, \tag{7}$$

$$\hat{N} = -\frac{\theta_K}{\epsilon_K}(\widehat{1+t}) + \left[\left(\frac{\theta_K}{\epsilon_K} + \eta\right)\frac{mg}{\overset{*}{p}h} - \gamma\right]\hat{g}, \tag{8}$$

where a ˆ indicates rate of change. Further,

$$\hat{p}_L = \frac{\hat{p}}{\theta_V} \text{ and } \hat{F} = \frac{\theta_K}{\epsilon_K}\hat{p}, \tag{9}$$

where m is the marginal evaluation of public goods, $(\partial V/\partial g)/(\partial V/\partial y)$, and θ_K and θ_V are capital's and land's shares in housing revenue. The measures of supply inflexibility, ϵ_K; price elasticity of housing demand, η; and "complementarity" ($\gamma > 0$) or "substitutability" ($\gamma < 0$) between h and g are defined as

$$\begin{aligned} \epsilon_K &= -\frac{F_{KK}K}{F_K} > 0 \\ \eta &= -\left(\frac{\partial h}{\partial p}\ \frac{p}{h}\right) > 0 \\ \gamma &= \frac{\partial h}{\partial g}\ \frac{g}{h}. \end{aligned} \tag{10}$$

For a linear homogeneous $F(\cdot)$ function, $\epsilon_K = \theta_L/\sigma$, where σ is the elasticity of substitution in production and hence, in (9), $\hat{F} = (\theta_K/\theta_L)\sigma\hat{p}$.

Then, maximizing profits in equation (2) with respect to g and t (given the impact of g and t on all variables in the community) we get, after substitutions,

$$cgN = tpF, \tag{11}$$

$$m = c\frac{1-\gamma}{1-\eta[t/(1+t)]}. \tag{12}$$

[1] It is then also useful to specify $L = lN$ where l is the per person lot size set by the land company.

Given the housing consumption distortion caused by the property tax, equations (11) and (12) represent an "optimal" (i.e., second-best) solution. First, all property taxes are spent on public services, so that the land company does not exploit residents fiscally. Second, a second-best version of the condition for public goods consumption is satisfied. For $\gamma = 0$, the marginal evaluation of public goods, m, exceeds marginal costs, c (given $1 - \eta[t/(1 + t)] < 1$), so that public goods are "underconsumed" just like housing. This degree of underconsumption increases as η or $t/(1 + t)$ increases, since increases in both these are associated with greater underconsumption of housing associated with the property tax distortion. This notion of underconsumption of g is adjusted according to whether h and g are complements ($\gamma > 0$) or substitutes ($\gamma < 0$).

In summary, in terms of intracommunity equilibrium, Tiebout without politics produces efficient solutions. That is, we have maximized developer profits holding the utility of any residents constant.

Local Public Goods: Tiebout with "Good" Politics

Suppose public goods are provided by a government, which acts only to satisfy the demands of its homogeneous resident voters. The fixed amount of land in the community is supplied by passive landowner/developers, who accept the highest bid offered for their land but who for the moment play no other role. In terms of intracommunity equilibrium, with a balanced budget and identical voters since $g = tph/c$, the indirect utility function may be written as

$$V\left(y, \overset{*}{p}, \frac{tph}{c}\right). \tag{13}$$

Naive voters choose t to maximize (13) assuming p and h are unchanged. More sophisticated voters recognize that because t directly affects $\overset{*}{p} = p(1 + t)$, their h and necessarily, in their perception, everyone else's h will vary directly with t and indirectly with g (for complementarity or substitutability). Naive voters in maximizing (13) choose t such that $m = c$. More sophisticated voters will satisfy the optimality condition in equation (12). While there is some debate in the literature about whether to assume naïveté or not (e.g., Epple, Filimon, and Romer 1983), one could argue that any government that proposed a t and g that satisfied equation (12) would be elected, since realized utility, $V[y, p(1 + t), g]$, would be maximized for any p. That is, voters do not need to be sophisticated, providing they are offered (and believe) the sophisticated alternative.

In terms of the housing market, with migration, equilibrium must be such that the p (and the corresponding values of other endogenous variables, including N) that satisfies equation (1) is the p for which $\bar{V} - V[y, p(1 + \tilde{t}), \tilde{g}] = 0$, where $\tilde{t}$, $\tilde{g}$ are the values that satisfy a balanced budget, and either equation (12) holds or $m = c$. $\bar{V}$ is the equilibrium alternative utility level for these residents in the rest of the economy.

Before proceeding to the third model, we note that this good-politics formulation leaves the issue of potential migration and residents' interaction with the rest of the world vague. In the formulation residents obviously do not see themselves as explicitly constrained by migration in the utility they can achieve—they do go through the motions of maximizing utility in choosing g and t. Yet, as we will see, we do not particularly want them to perceive community population as being fixed. Basically, they simply ignore the potential impacts of g and t choices on population flows. If they explicitly perceive that population is fixed, in choosing g and t to maximize equation (13), besides a balanced budget they would see the constraints of equations (1) and (2). Then in maximizing equation (13), constrained by these interactions, they would choose g according to equation (15) below. This is part of the bad-politics equilibrium, where g is "overprovided" relative to equation (12) because it is recognized to be partially financed out of the rental income of absentee landowners (or a reduced land purchase price if residents buy rather than rent).

Local Public Goods: Tiebout with Bad Politics

Tiebout with bad politics or at least one version of it is the intracommunity solution in Epple and Zelenitz (1981). To enact it, both landowners and residents assume passive roles and there is a presumably dictatorial local government that seeks to maximize tax collections less public expenditures, inhibited by the market constraint that they must pay to their residents the utility levels prevailing in the economy. Given the fixed utility residents must receive, the government is trying to usurp land rents, which for some reason they do not have direct access to. In maximizing $tpF(\cdot) - cgN$ they face the same market conditions as in equations (1), (3), (4), and (6), and the same response of p, $F(\cdot)$, and N to changes in t and g, as in equations (7)–(9). The result, as in Epple and Zelenitz (1981), is

$$tpF(\cdot) - cgN = -\left(\frac{\epsilon_K}{\theta_K}\right)pF(\cdot) > 0 \tag{14}$$

$$m = c\,\frac{1 - \gamma}{1 - \eta[t/(1 + t)] + \{\eta\epsilon_K/[\theta_K(1 + t)]\}}. \tag{15}$$

Relative to the optimality condition in equation (12), (15) is adjusted to deal with the impact of trying to extract maximal profits; g is "overprovided" relative to (12) because it can in part be financed by land rents. However, equation (14) is the key result, representing fiscal exploitation.

This notion of fiscal exploitation should be treated gingerly, since usurping land rents does not always involve bad politics. For example, if the government was "really bad" and confiscated the land, we would obviously return to the profit-maximizing, no-politics solution and equation (12). Second, if the government could impose head taxes in addition to property taxes, head taxes would exactly cover public expenditures and equation (12) would be satisfied. The property tax rate would be set to usurp the maximum land rents possible, subject to residents' receiving $\overline{V}$. In this case the tax rate is given by

$$t = \frac{\epsilon_K}{\theta_K}. \tag{16}$$

This tax rate increases with supply inflexibility and land's share in output. Note that in intercommunity equilibrium (next in Sec. I*B*) this head tax solution and the no-politics solution would not be equivalent, since with head taxes residents will face two sets of taxes, altering the general equilibrium outcomes and lowering the utility levels of residents realized in the economy.

B. Intercommunity Equilibrium

Let us now turn to an examination of long-run equilibrium in the markets across communities. The examination is not an exercise in proving existence and uniqueness or dealing with the issue of (in)divisibility (Westhoff 1977; Ellickson 1979; Vohra 1982). It is a statement and evaluation in the present context of the usual conditions necessary to prove existence and uniqueness. Given these conditions, my characterization of long-run equilibrium will generally be consistent with general equilibrium models where prices are uniquely determined and solutions are Pareto efficient, or in my case with the property tax distortion, second best. In comparison with recent literature, the basic condition I will impose is that the price of land (of uniform quality) be equalized across communities in long-run solutions, just as prices of any commodity of uniform quality are equalized in general equilibrium solutions. This condition is absent from the hypothesized long-run solutions in Epple and Zelenitz (1981) and Yinger (1982) and perhaps in Bucovetsky (1982). If this condition is to be met, for reasons we will focus on, it will be necessary in general to give land developers an active role in the model.

In my analysis, I consider two cases—one where communities are fixed in number and size and one where they are not. We will see that fixing community numbers and sizes need not be critical. However, the assumption of flexibility is more consistent with the facts and allows for more flexible adjustment processes. Throughout I assume that the number of communities is sufficiently large to be consistent with the concepts inherent in models characterized by perfect competition and divisibility.

Fixed Community Sizes and Numbers

I will start by asking in what situations each of the three intracommunity solutions depicted in Section I*A* is consistent with long-run equilibrium. Before starting, note that in all solutions, in equilibrium, land and housing supplied across communities must be consumed and all people must be housed. That is, in addition to intracommunity equilibrium conditions, for n communities,

$$\begin{aligned} \sum_{i=1}^{n} N_i l_i(\cdot) &= \bar{L} \\ \sum_{i=1}^{n} N_i &= \bar{N}, \end{aligned} \tag{17}$$

where N_i is the population of community i, $\bar{N}$ total economy population, $l_i(\cdot)$ the derived demand for land, and $\bar{L}$ total economy land supply.

No politics.—The no-politics solution is generally consistent with a characterization where equilibrium is unique and prices of land of uniform quality are equalized across communities. If the land company in one community is earning either more or fewer rents by having land in one particular use versus another, then, respectively, either other land companies will convert their communities to this particular use or this community will switch uses until land prices are equalized across communities and competing uses such that equations (17) are satisfied. In equilibrium, the market for a homogeneous implicitly divisible commodity (land, in this situation) must clear at a uniform price.

As a particular example, suppose there are two income groups who stratify into different types of communities. We assume that either stratification is "naturally stable," so the poor do not chase the rich, or exclusionary zoning or other exclusionary activity of landowners ensures stability. The question is, What determines the allocation of the fixed number of communities between the rich and the poor? Land companies will adjust the land use of their communities until the allocation of rich and poor communities is such that within and across communities the derived demand for land in housing equals supply at equalized land prices. As another example, What happens if there are inefficient land companies? With free entry of entrepreneurs, at the limit inefficient land companies will be bought out and supplanted by efficient ones.

Good politics.—The good-politics intracommunity solution will be the same as the no-politics solutions, if all communities are identical. With identical communities, provided g and t choices are *always* governed by, say, equations (11) and (12), people will flow between communities to equalize housing and land prices such that demands and supplies of land within and across communities are equated.

However, in the good-politics case, if again we have two income groups between which we must allocate our communities, we have a problem. Without a mechanism involving land companies/developers that can reallocate community land uses, communities generally will not be allocated such that land prices are equalized throughout the model. Without such a mechanism any number of solutions are possible. In comparing the sets of rich and poor communities, there will be a wide range of allocations of the fixed number of communities between rich and poor and resulting divergent land prices between rich and poor communities consistent with intracommunity equilibrium.[2] Moreover, without a land reallocation mechanism, within the set of either rich or poor communities any one community can provide services *inefficiently* (i.e., not governed by eqq. [11] and [12]) and still keep some residents, since the inefficiencies will be capitalized into lower land prices.

Without a land market mechanism for allocating intercommunity land uses, the long-run equilibrium solution is in some sense arbitrary—perhaps, in informal terms, a function of the history of which communities were "occupied" by the rich versus the poor, or the efficient versus the inefficient, first. Histories are important, but I believe they go hand in hand with the dynamic models, not traditional static long-run models. In a long-run equilibrium with a fixed number of communities, active land companies are needed to alter community land uses to equalize marginal products of land. However, if we introduce active land companies, politics become superfluous, since a no-politics equilibrium is equivalent to a good-politics solution with active land companies.

[2] This holds even if we impose "natural" stability of stratification, which means that given g^R, p^R in a rich community, poor people will not want to enter. For any g^R, there will be a range of p^R where poor people will not want to enter (Ellickson 1970; Westhoff 1977; Epple et al. 1983). However, even if poor people want to enter (even in the solution where land prices are equalized across communities), stratification can be maintained by zoning (or by the developer's simply refusing to sell to poor people).

Bad politics.—The analysis of the bad-politics solutions may by now be apparent. With active land developers/companies/owners, bad politics are not possible because the landowners will collectively refuse to allocate their land in any community to those attempting to usurp their incomes. With "passive" landowners, usurpation is, of course, feasible. But the possibility for usurpation goes hand in hand with nonuniqueness of long-run solutions, and the then importance of history.

The notion of a world where landowners can act collectively within communities to turn over entire populations may seem extreme. One can posit an adjustment process where community compositions can change over time, but that is in the realm of a dynamic world. In a static world, the more realistic instantaneous adjustment process lies in allowing community boundaries and numbers to be flexible. In essence the market for land becomes explicitly (rather than implicitly through changeover in land uses between fixed communities) like any other market, with communities able to annex and detach land at the perceived fixed market prices and with developers able to buy up masses of land to form new communities. I turn to this situation next.

Endogenous Communities

With land capable of being added to and detached from existing communities or used in the formation of new communities at a constant (perceived) marginal cost, capitalization and bad politics are ruled out because the owner of each unit of land has the option to alter his land use. Then any temporarily low-priced uses will contract and high-priced uses expand. This is the Hamilton (1975) world (albeit without "perfect" zoning) where communities can be costlessly reshuffled and redesigned.

The good-politics and no-politics intracommunity solutions are both feasible subject to the constraints that the inter- and intracommunity derived demands for land exhaust supplies. The depiction of intracommunity solutions can easily be adjusted to deal with variable land supply. For example, with no politics, each landowner maximizes the profits from each potential resident $(p_L - \bar{p}_L)l + pht - cg$, where $\bar{p}_L$ is the fixed opportunity cost of land and p_L and p the prices charged for land and housing. Maximization is subject to the equal utility and the builder no-profit constraints in equations (4) and (6). The result is, again, equations (11) and (12).

The role of entrepreneurial developers in this context is less dramatic than when there are a fixed number of communities of fixed size. It is the usual role played by entrepreneurs in general equilibrium models. Entrepreneurs are there to set up new "clubs" or communities (corresponding to firms) to supplant inefficient ones. Communities may be governed by voting rules or run autocratically by the entrepreneur. Entrepreneurs need to participate actively only to the extent necessary to reshuffle land from inefficient to efficient uses.

The only problem with the endogenous community model is that, as always with constant returns to scale, firm or community size is indeterminate. To get determinate community sizes, we could, for example, as in the theory of the firm allow the unit cost of public services, c, to be a U-shaped function of N. Then each community would be the size that minimizes c. Providing there are a large enough number of communities of each type, any lumpiness problems (fractions) that arise from trying to divide a fixed population among an integer number of specific-size communities effectively disappear.

II. Directions for Future Work

The analysis of this paper is placed in a long-run model, and in this context the roles of land developers and governments in part seem duplicative. In a dynamic context where durable land and capital are not so malleable and agents have horizons extending beyond 1 period the issues are altered. In this context, stronger differences between the roles of land developers and governments are brought out. Conflicts among developers, governments, and residents are accentuated and achievement of efficient solutions is much more inhibited. To see the conflicts and issues involved, I will illustrate the type of problem and point out the direction for future work.

As an example, consider a 2-period world and look at one community. In period 1 initial residents move into the community where they plan to stay for the second period in the same house. Housing consumption chosen in period 1 by initial residents is also their consumption in period 2. In period 2, there may be new additional entrants and further development of the community. In period 2, the community will have a history—a stock of durable houses, perhaps a charter, and a set of laws and zoning regulations. Moreover, in period 1 the actions of economic agents will be affected by their expectations as to future public policies. As one example, the purchase decisions of initial residents in terms of their willingness to pay for housing in this community and their choice of housing consumption levels will be critically affected by their expectations about what will happen in period 2 in terms of future public service levels and future community tax bases and rates.

In period 2, when new people enter, there will be a conflict between the developer and initial residents over what public service levels to set and what sizes to zone lots for new entrants. Initial residents will want to zone lots to be very large so as to maximize the tax payments of new residents, and they will want to set public service levels to satisfy just their own preferences. Developers will want to set small lot sizes to maximize net-of-tax land sale profits and to set public service levels to satisfy just the preferences of new entrants so as to maximize their willingness to pay to live in the community. Pareto-efficient lot sizes and public service levels will differ from both these solutions, reflecting, respectively, both tax revenues and land sale profits and preferences of both new and old residents.

As analyzed in Henderson (1980), these conflicts are resolved and Pareto-efficient solutions achieved in a no-politics situation by the developer's choosing both current and future lot sizes and public service levels in period 1 so as to maximize the present value of profits. Maximizing the present value of profits means the developer takes into account the impact of his expected future policies on the actions (willingness to pay) of initial residents. However, actually achieving this optimal solution requires that the developer fix contractually, from the beginning, his own future policy actions and those of residents, with expectations being realized. As noted in the previous paragraph, the problem is that once into the future it is financially advantageous for the developer to break the contract and set lot sizes and public service levels at other than Pareto-efficient levels. Initial residents realize this and hence demand (in competitive development markets) in period 1 contractual guarantees. These are illustrated by the homeowner association contracts in "new towns" in the United States (Reichman 1976).

This problem is a classic illustration of a time inconsistency problem (Kydland and Prescott 1977) where consistent solutions in which profits are maximized period by period, taking past decisions of residents as given, are not optimal. Optimality may require the removal of discretionary policymaking in period 2. In a development context the policy instruments of concern are future public service levels, taxes, zoning laws, and development rights (the free issuance vs. denial of building permits).

Future work is needed to determine answers to the following questions that arise in this context. With good politics does this same type of problem come up? Or, under certain institutional arrangements, can consistent solutions be optimal ones? What would the possible institutional arrangements be? If under typical institutional arrangements optimal solutions are not possible, what types of consistent solutions will emerge and what will be their characteristics with or without politics? How do initial residents and/or developers manipulate decision variables to influence one another's actions to improve their own welfare? In a multiperiod model what role would "reputation" play in enforcing contractual arrangements (Barro and Gordon 1983)? Finally, how do land markets operate to allocate land across communities, given expectations about how efficiently communities will operate in the future?

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